



Sugarbush Resort

Vegetation Management Plan

November 2008

Prepared for:
Sugarbush Resort

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SE GROUP

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1.0 INTRODUCTION

1.1 Purpose of Report

Portions of Sugarbush Resort are located on National Forest System (NFS) lands and are operated under a Special Use Permit (SUP) issued by the Green Mountain National Forest (GMNF) and administered by the Eastern Region Winter Sports Team. The intent of this Vegetation Management Plan (VMP) is to guide the maintenance of existing winter and summer recreation trails (e.g., ski, mountain bike, hiking), the development of new trails, and management of all vegetation within all the SUP boundary. The management direction outlined in this VMP is intended to allow Sugarbush Resorts to maintain ski terrain and facilities while ensuring that maintenance activities are consistent with the objectives contained in *Green Mountain National Forest 2006 Land and Resource Management Plan*, hereafter referred to as the "Forest Plan". The VMP also includes direction for the management of vegetation during construction of new projects (e.g., new chairlifts, ski trails, and facilities) contained in the 1998 Final Environmental Impact Statement Proposed Improvement and Development at Sugarbush (USDA 1998), 2005 Amendments to the Master Development Plan (MDP) (SE GROUP 2005), any future NEPA decisions and Biological Assessment/Biological Evaluation updates. The VMP also includes guidance for managing vegetation around existing facilities and infrastructure, as well as on existing ski trails and tree skiing terrain.

1.2 Project Area

Sugarbush Resort encompasses approximately 5,113.5 acres. On the Lincoln Peak side, there are 1,825 acres of NFS lands. On the Mt. Ellen side, there are 58 acres of NFS lands. Additionally, there is a 32-acre parcel of NFS land in the Slide Brook drainage area. The remaining 3,320.5 acres is comprised of private lands. This VMP provides direction for the management of vegetation within the entire Sugarbush Resort area, as identified in Figure 1 – Vicinity Map, regardless of ownership. Within the project area, developed facilities, ski, hiking and mountain bike trails support the winter and summer operations.

2.0 GOALS AND OBJECTIVES

The Forest Plan (USDA 2006) establishes goals and objectives for each land allocation and management area (MA). This VMP acknowledges the goals and objectives of the Forest Plan and has adapted the following overall goal: to balance the recreational needs of Sugarbush Resort with habitat management. This VMP intends to achieve this overall goal by incorporating the following objectives:

- 1) Preservation of existing Bicknell's thrush habitat within the ski area boundary;
- 2) Restoration and maintenance of native plant communities; and
- 3) Overall habitat management for multiple species.

2.1 Preservation of Existing Thrush Habitat

Consistent with the GMNF Bicknell's Thrush Conservation Strategy, in instances where habitat removal or alteration (e.g., ski trail establishment or expansion) is proposed, a "no-net loss" mitigation process is

warranted. Few timber harvesting operations occur in the montane fir-dominated forests preferred by Bicknell's thrush, therefore the most promising opportunities on the GMNF for active management exist in areas of habitat that are currently developed for recreation, telecommunications, or wind power facilities (Rimmer et al. 2005). The U.S. Forest Service (USFS) recognizes that conducting vegetation management at ski areas or other managed sites on the GMNF provides an opportunity to preserve and enhance appropriate habitat for Bicknell's thrush.

2.2 Restoration and Maintenance of Native Plant Communities

An important component of this VMP is the improvement of lower quality thrush habitat and the maintenance of high quality habitat within the SUP area. As described in Section 4.3 – Bicknell's Thrush Habitat Assessment, potential thrush habitat has been surveyed to determine relative habitat quality. In practical terms, this means that areas currently classified as high quality should continue to be high quality with implementation of the projects contained within the Sugarbush MDP. The improvement component is not quite as easily defined. Improvement generally means 'made better'. As it relates to thrush, this means taking existing low quality habitat and making it medium or high quality habitat. It can also mean taking medium quality and making it high quality. The question then becomes, what should be the priority?

In general, low to medium quality habitats should be improved first in an effort to raise the baseline habitat conditions with the SUP area. The current distribution of thrush habitat quality shows a larger proportion of existing high quality habitat (29%) and low quality habitat (23%), essentially an inverse of the normal distribution. The improvement of lower quality habitats will increase the relative proportion of medium to high quality habitat throughout the SUP area. Existing low quality Bicknell's thrush habitat that has been identified for restoration is discussed further in Section 6.0 – Identification of Areas for Regeneration and for Preservation of Bicknell's Thrush Habitat of this VMP.

2.3 Wildlife Habitat Management

An objective of this VMP is to create continuous forest cover within the ski area. For purposes of this VMP, a continuous forest cover is envisioned as containing a variety of native species with multiple age classes across the landscape. The multiple age classes will provide habitat for a variety of wildlife species, ranging from black bear to migratory song birds to small mammals.

3.0 REGULATORY FRAMEWORK

3.1 Consistency with Green Mountain Forest Plan and USFS Policy and Guidelines

The management policies and direction for the Sugarbush SUP area are defined by the Management Area (MA) guidelines in the 2006 Forest Plan. That portion of the project area within NFS lands is categorized as MA 7.1 – Alpine Ski Area, which has a major emphasis "to provide alpine winter sports opportunities and year-round recreation opportunities" (USDA 2006, p.63). The Forest Plan also describes standards and guidelines for alpine ski areas and their associated resources in more specific detail. This includes guidelines

for timber management, fish and wildlife management, soil and water management, and visual impacts. The reader is referred to the 2006 Forest Plan (USDA 2006) for more detailed management prescriptions, and standards and guidelines. The overall mission of the USFS includes providing winter recreation opportunities for the public within appropriate MAs. This VMP is consistent with the management prescription and other goals and objectives for public use and recreation opportunities on the GMNF as set forth in the Forest Plan.

3.2 Consistency with Sugarbush MDP

The USFS administers Sugarbush Resort's SUP under the guidance of the GMNF Forest Plan (USDA 2006). The following documents serve as planning tools for Sugarbush Resort and the USFS: the *MDP for the Sugarbush Valley Sports Area (1983 MDP)*, the November 1996 *Resort Master Plan Update (1996 MDP)*, and the 2005 Amendments to the MDP (SE GROUP 2005). Approval for various project elements (but not all) contained within these master plans have been completed under the following analyses: June 1995 Record of Decision for the Mad River Water Withdrawal and Sugarbush South Snowmaking and Trail Improvement Project, the June 5, 1995 Decision Notice and Finding of No Significant Impact: Slide Brook Transportation Lift and Associated Facilities, and the June 19, 1998 Record of Decision for the Proposed Improvement and Development at Sugarbush Resort (USDA 1998). In addition, the State of Vermont, the towns of Warren and Fayston, and regional planning organizations (Mad River Valley Planning District, Central Vermont Regional Planning Commission) follow the 1983 MDP and the 1996 update for administration of ski area projects on private land.

3.3 Private Land Management

Vermont's Use Value Appraisal Program enables landowners who practice long-term forest management to have their enrolled land appraised for property taxes based on its value for forestry, rather than its fair market value. To be enrolled, forestland must have an approved, forest management plan updated at ten-year intervals. This management plan should clearly express the landowner's long-term forest management goals, describe forest stand conditions, silvicultural objectives, and include both a detailed map and schedule for silvicultural treatments. Upon expiration of a ten-year plan, the owner must file a new plan for the next succeeding ten years to remain in the program. Sugarbush Resort has enrolled private lands in Slide Brook, Spring Fling, and all of the Mt. Ellen areas in the Use Value Appraisal program. In the areas enrolled in this program, where no ski area facilities or trails are proposed or maintained, this VMP defers to the Forest Management Plans prepared by Fran Sladyk of Butternut Mountain Farm.

4.0 SITE CHARACTERIZATION

4.1 Site History

Sugarbush at Lincoln Peak was founded in 1958. The ski area grew significantly throughout the 1960s and 1970s and bought the nearby Glen Ellen ski area during the late 1970s. Although snowmaking was expanded throughout the next couple of decades, it could not match the snowmaking capabilities of other regional

mountains. In addition, the geographic separation between the two separate ski areas did not allow ease of movement between the two.

During 1994, Les Otten and LBO Enterprises leased Sugarbush Resort. In 1995, Sugarbush Resort was acquired by Sugarbush Resort Holding, Inc., a subsidiary of the American Skiing Company. In an effort to improve the ski experience at Lincoln Peak and to create a competitive position in the marketplace, Sugarbush undertook a massive capital improvement program during the 1995-96 construction season. Snowmaking was increased 300 percent and seven new lifts, including four high-speed quads, were installed. In 2001 American Skiing Company sold the resort to the current owners, Summit Ventures NE LLC.

Vegetation communities currently found in the Sugarbush SUP area have been influenced over time by natural processes, such as ice storms and changes in climate (see Figure 2 - Existing Landcover). The vegetation at Sugarbush Resort has also been influenced by human activities, such as timber harvest, cutting and use of unauthorized trails by skiers, and ski area development. Timber harvest occurred on NFS lands on the Lincoln Peak area from 1952 to 1958 (USDA-FS 1995a). However, no active logging has occurred on private lands in the Mount Ellen area since Granville Manufacturing stopped harvesting 40 to 50 years ago. During the past 40 years, spruce-fir and northern hardwood stands have become reestablished in the area. Since the development of Sugarbush Resort, the forest in this area has been primarily maintained in an even-aged condition. Limited cutting of small vegetation and tree limbs has occurred at upper elevations in areas where tree skiing is already taking place (e.g., Paradise area). Much of the area within the Sugarbush resort area was selectively cut, high grading the stands by removing the most valuable, quality timber species, leaving the residual stands with a high component of beech.

Ice storms have also influenced the health of forest stands within the project area. A large portion of the mixed northern forest in the project area was impacted by an ice storm which occurred in January 1998. In the area slated for Stein's Run and Lower Birdland tree skiing, approximately 60 to 70 percent of the trees were either bent over or broken from heavy ice loads (Petersen 1998).

4.2 Description of Existing Vegetation Communities

Seven major habitat types have been delineated within Sugarbush resort (see Figure 2 – Existing Landcover):

- Rock outcrops,
- Balsam-fir forest
- Mixed northern forest
- Northern hardwood forest
- Mature hemlock
- Riparian areas
- Ski run/developed lands

As elevation decreases, the forest changes from pure conifer to a mix of stands dominated by softwood with minor inclusions of hardwood, then to hardwood stands with minor inclusions of softwood, and finally to stands composed of hardwood at the lower elevations. These habitat types are described below, beginning at the type occurring at the highest elevation in the project area, and moving down slope. Unique forest resources are limited to three stands of mature hemlocks near the base of Lincoln Peak.

4.2.1 *Rock Outcrop*

Rock outcrops are noted separately because of the unique vegetative communities often associated with these terrain features. According to the Vermont Nongame and Natural Heritage Program (NNHP), these areas would be classified as cold acidic circum-neutral outcrop communities (Thompson 1989). Although small rock outcrops exist along the ridgeline, they are too small to support a unique community. The larger outcrop areas have been extensively surveyed for rare plants and no rare plants or any natural communities of outstanding ecological significance were found (Fichtel 1993). No impacts related to ski area operation and development are anticipated in the rock outcrop vegetation type; therefore it will not be discussed further within this VMP.

4.2.2 *Balsam Fir Forest*

Dense conifer forests occur on the high elevation ridgeline within the project area. This forest type covers elevations from approximately 3,000 feet (depending on aspect) to the summit of the ridges and peaks (approximately 4,000 feet). In the project area, this forest is dominated by balsam fir (*Abies balsamea*), which is found on well drained to dry shallow soils on steep, rocky upper mountain slopes (DeGraaf et al. 1992). Red spruce (*Picea rubra*) and paper birch (*Betula papyrifera*) are minor components of this type within the project area (Pioneer 1997d). At the higher elevations along the ridge (see Figure 2 – Existing Landcover), severe environmental conditions create first a stunted fir forest, and then at the highest and most exposed areas, a dwarfed, scrubby krummholz forest type (krummholz refers to trees with a stunted and deformed growth form resulting from high winds and ice). Based on NNHP classification, the balsam fir forest type would be classified as pure subalpine heath/krummholz community along the ridgelines to a spruce-fir forest at lower elevations (Thompson 1989). A similar forest structure type is also found on the ridge above the upper terminal of the North Lynx Triple chairlift. Krummholz areas are noted because they represent unique wildlife habitat, as discussed in the wildlife section of this document.

Surveys (Burbank 1994; Pioneer 1997d, e) of the dense balsam fir forest stands indicate the understory community contains mosses (*Pleurozium spp.* and *Dicranum spp.*), shining club moss (*Lycopodium lucidulum*), wood fern (*Dryopteris intermedia*), common wood sorrel (*Oxalis montana*), meadow rue (*Thalictrum polygamum*), and small-flowered woodrush (*Luzula parviflora*). However, the Paradise tree-skiing area is more open due to soil slumping, which has hindered tree development. Open areas resulting from blowdowns and trail development contain balsam fir seedlings and showy mountain-ash (*Sorbus decora*).

4.2.3 *Mixed Northern Forest*

The majority of the vegetation within the project area is classified as mixed northern forest, which occurs between the balsam fir and northern hardwood forest. This vegetation type occurs approximately between 2,200 feet to 3,800 feet. At higher elevations this type is more similar to the balsam fir forest, while at lower elevations it is more similar to the northern hardwood forest. According to NNHP classification, high-elevation hardwood types would most closely describe this forest type (Thompson 1989). Red spruce becomes co-dominant with the balsam fir as the elevation decreases and hardwood species, particularly yellow birch (*Betula alleghaniensis*), paper birch, and sugar maple (*Acer saccharum*) become more common. The understory at the higher elevations is similar to the balsam fir forest type and is dominated by balsam fir seedlings and mosses. In openings, dense shrub layers include pin cherry (*Prunus pensylvanica*), mountain maple (*Acer spicatum*), juneberries (*Amelanchier spp.*), and mountain-ash (*Sorbus americana*). As this type grades into the northern hardwood forest at lower elevations some of the shrubs and herbaceous species common in the northern hardwood forests become an increasingly more important component of the understory.

The mixed northern forest in the project area was impacted by an ice storm which occurred in January 1998. In the area slated for Stein's Run and Lower Birdland tree skiing, approximately 60 to 70 percent of the trees were either bent over or broken from the heavy ice loads (Petersen 1998).

4.2.4 *Northern Hardwood Forest*

The second most abundant forest type within the project area is the northern hardwood forest, which occurs at elevations ranging from approximately 1,500 to 2,200 feet. This vegetation type is prevalent on moist loamy soils (DeGraaf et al. 1992). This northern hardwood forest type is characterized by a beech-birch-maple forest on Mount Ellen and Lincoln Peak and a rich northern hardwood forest in the Slide Brook area, as classified by the NNHP (Thompson 1989). The specific composition varies according to site conditions. The rich northern hardwood type is found on sites with high-fertility soils due to calcareous bedrock or steep colluvial slopes (Thompson 1989). Beech (*Fagus grandifolia*) is more common on drier sites, while birch (*Betula spp.*), eastern hemlock (*Tsuga canadensis*) or red spruce communities are more common on wet sites. Sugar maple and beech are the dominant late-successional tree species of this community, in association with red spruce and hemlock. Mid-successional species include yellow birch, white ash (*Fraxinus americana*), bigtooth aspen (*Populus grandidentata*), and red maple (*Acer rubrum*). Early seral species found on more recently disturbed sites include paper birch, black cherry (*Prunus serotina*), and white pine (*Pinus strobus*).

A diverse assemblage of shrubs, smaller trees, and forbs create a dense understory habitat in the northern hardwood forest type. Common shrubs include striped maple (*Acer pensylvanicum*), hobblebush (*Viburnum alnifolium*), alternate-leaf dogwood (*Cornus alternifolia*), raspberry (*Rubus spp.*), serviceberry (*Amelanchier arborea*), red elderberry (*Sambucus pubens*), wild sarsaparilla (*Aralia nudicaulis*), blueberry (*Vaccinium spp.*), and azalea (*Azalea spp.*). Forbs common to this community include Christmas fern (*Polystichum acrostichoides*), hay-scented fern (*Dennstaedtia punctilobula*), wood fern, asters (*Aster spp.*), wood sorrel, false lily-of-the-valley (*Maianthemum canadense*), red trillium (*Trillium erectum*), shining club moss, violets (*Viola spp.*), and jack-in-the-pulpit (*Arisaema*

triphyllum). Forbs associated with the rich northern hardwood type may include baneberry (*Actaea spp.*), blue cohosh (*Caulophyllum thalictroides*), and wood millet (*Millium effusum*).

4.2.5 Mature Hemlock Forest

A softwood forest dominated by mature eastern hemlock occurs in the project area at elevations ranging from 1,600 feet and 2,000 feet. Two intact stands were located by Fichtel (1993), and a small fragmented stand was delineated by Pioneer (1997g). This vegetation type occurs on a wide range of soil types, including nutrient-poor sites where hemlocks can out-compete hardwoods. In the Slide Brook area, it is found in cooler, moist habitats and on north-facing slopes. In mature, undisturbed stands, the understory is sparse, but in disturbed stands with more open canopies, understory plants include common wood sorrel, wood fern, wild sarsaparilla, and club mosses (Fichtel 1993).

4.2.6 Riparian Areas

Although there are over 10 acres of wetland communities in the project area, the individual wetland vegetation is either too small, is represented as understory, or is not sufficiently distinct from the neighboring forest types to be highlighted as part of this VMP. Two types of water-dependent communities, riverine complexes and wetlands, occur in the project area. Streams on Lincoln Peak are steep and rocky and soil resources that would support a more extensive riparian community are generally absent. In addition to the stream riparian zones, wetlands occur around seeps and springs, but this community has a higher concentration of graminoids (grass and grasslike species) than streamside zones. These habitat types make up a small but important part of the landscape within the project area, providing wildlife habitat and water quality functions.

4.2.7 Ski Runs/Developed Lands

Sugarbush Resort and facilities related to the resort operation occupy elevations from approximately 1,500 feet to 4,000 feet. Development of Sugarbush Resort has resulted in the creation of openings in the six naturally occurring vegetation types previously described. Ski runs include areas that have been converted from forests into openings now dominated by seeded introduced graminoids and forbs and native early seral species that recolonize disturbed areas. Additionally, fir waves occur adjacent to ski trail edges and within existing tree skiing terrain at higher elevations. These areas are frequently affected by snow, ice and wind, resulting in areas of blow down and dense regeneration. Other areas included in this classification are not revegetated due to their current uses, and include roads, buildings, parking lots, and other base area facilities.

4.3 Bicknell's Thrush Habitat Assessment

Since many wildlife species are closely tied to certain habitat features, the habitat types present in the project area may be used as an indication of the wildlife species likely to occur there. The general habitat types found within the project area include those described above, e.g., eastern hemlock forest, northern hardwood forest, mixed northern forest, and balsam fir forest (see Figure 2 – Existing Landcover).

A specific species of interest that was identified for this VMP is Bicknell's thrush (*Catharus bicknelli*), a neotropical migrant endemic to northern New England, New York, and parts of Quebec and Nova Scotia (VINS 1992). In response to declining populations and habitat, the GMNF developed the Bicknell's Thrush Conservation Strategy (VINS 2005). This document, among other things, requires the identification and determination of the relative quality of existing Bicknell's thrush habitat on the GMNF. Additionally, it recommends that prior to development on the GMNF, high-quality thrush habitat be avoided wherever possible and potential locations where thrush habitat can be restored be identified. An overarching goal of the Conservation Strategy is "no-net loss" of Bicknell's thrush habitat.

In order to comply with the Conservation Strategy, the SUP area has been surveyed to determine presence/absence of Bicknell's thrush (Pioneer 1997). Bicknell's thrush were found along all sections of ridgeline sampled between Mad River Glen and Lincoln Peak. Figure 4 – Bicknell's Thrush Habitat Assessment shows areas of potential Bicknell's thrush habitat. Bicknell's thrush were found in dense, high-elevation (greater than 3,400 feet), fir-dominated and spruce-fir/hardwood co-dominated vegetation community types. Bicknell's thrush were not found in lower-elevation spruce-fir/hardwood or hardwood dominated habitat types. Bicknell's thrush habitat within the SUP area has been divided into 5 categories: (1) High Quality, (2) Medium to High Quality, (3) Medium Quality, (4) Medium to Low Quality, and (5) Low Quality (Arrowwood 2005). Each category is described below. Please refer to Figure 4 – Bicknell's Thrush Habitat Assessment for the spatial distribution of habitat within the ski area.

4.3.1 High Quality Habitat

High Quality Bicknell's thrush habitat consists of stunted (approximately 5-15 feet), dense, spruce-fir forest communities. Fir waves and other disturbed (usually from wind) forest communities meet this standard. Areas of forest characterized by a thinly stocked, tall, standing, living (or dead) spruce-fir forest with a high level of light penetration to ground level and supporting a dense regenerating coniferous understory also meet this standard. These areas will require substantial site-specific habitat delineation and call and response field work if and when additional trails are proposed within them.

4.3.2 Medium to High Quality Habitat

Medium to High Quality Bicknell's thrush habitat was of two types. The first type of Bicknell's habitat that was sub-optimal was due to the advanced age or height of the tree (too old and too tall) or the lack of sufficient density of the woody vegetation. The second type of habitat mapped as Moderate-High Quality habitat consisted of areas that were dominated by High Quality habitat but interspersed with smaller areas that were only Moderate Quality habitat. These areas differed in their habitat quality over relatively short distances and the scale of this investigation and mapping did not allow any further refinement of habitat classes at this time. These areas will require considerable additional site-specific work regarding habitat quality if further trail development is proposed. If additional habitat assessment reveals large enough thrush habitat patches, call and response field work may be required.

4.3.3 Medium Quality Habitat

Bicknell's thrush habitat in these areas is generally only marginal. These sites consist of coniferous trees of more advanced age or size (15 feet high or higher) or of only moderate densities. These areas should require only minor amounts of additional environmental review in terms of Bicknell's thrush habitat.

4.3.4 Medium to Low Quality Habitat

These areas generally have only minor Bicknell's thrush habitat potential. Tall (greater than 25 feet) trees are usually present and understory coniferous growth is generally sparse. Also included in this category are areas with taller trees and very young regenerating conifers under 3-4 feet tall. These areas were often categorized as Potential Habitat. Generally these sites are currently a mix of Low and Medium Quality habitat.

4.3.5 Low Quality Habitat

These areas are characterized by tall trees (generally over 30 feet tall) with little to no understory growth of coniferous vegetation. Many of these sites are located in areas protected from the wind. Large areas of Low Quality habitat consisted of tall spruce or fir trees with a thick fern layer in the understory.

4.4 Species and Habitats of Interest

The SUP area contains suitable habitat for Threatened, Endangered and Sensitive species under the Endangered Species Act and the Regional Forester's Sensitive Species List. Sensitive species with potential to occur within the Sugarbush SUP area were determined through review of the Eastern Region (R9) Sensitive Species List (USDA-FS 2007). This VMP has been developed in accordance with habitat requirements for these species. Implementation of the prescriptions contained within this VMP will maintain or enhance habitat for these species. For purposes of this VMP, management strategies have been crafted to meet the needs of Bicknell's thrush (a Regional Forester's Sensitive Species). According to discussion with USFS specialists, Indiana bat are not present and lynx have been extirpated (LeClair 2008 pers. comm.). Table VMP-1, below, identifies species of interest and their associated habitat that have been taken into consideration during the development of this VMP. A complete list of threatened, endangered, and sensitive species can be in the Biological Evaluation/ Biological Assessment for Sugarbush Resort, on file at the Rochester Ranger District.

**Table VMP-1:
Species of Interest with Potential to Occur Within the Project Area**

Common Name	Scientific Name	Occurrence/Suitable Habitat	Status
Bicknell's thrush	<i>Catharus bicknelli</i>	Fir waves, dense undergrowth	Forest Service Sensitive
Indiana bat ^a	<i>Myotis sodalis</i>	Caves, mine shafts for roosting/hibernation; Hardwood forests for foraging	Endangered
Canada lynx*	<i>Lynx canadensis</i>	Extirpated	Threatened
Black bear	<i>Ursus americanus</i>	Habitat generalist	n/a
Neotropical migratory	n/a	Early successional, regenerating	Forest Service Sensitive

birds		forest stands, riparian areas	
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^a As of the writing of this VMP, Indiana bat are not known to be present within the project area and lynx are considered extirpated.

Deer wintering habitat is generally defined as areas of mature softwood cover with southern aspects that provide thermal cover and forage areas. In Vermont, deer wintering habitat is generally moderate to low elevations with stands of spruce, fir or white cedar. According to digital data from the Vermont Fish and Wildlife Department, there is no deer wintering habitat mapped within Sugarbush Bush.

5.0 ASSESSMENT OF PREVIOUS REVEGETATION EFFORTS

Prior to the development of this VMP, a review of previous management and revegetation efforts within Sugarbush Resort was conducted to determine the effectiveness of these treatments. The most recent recommendations are contained in *The Sugarbush 1997-1998 Tree Skiing Project: Proposed Forest Management Plan* (LeFerriere 1997). The intent of this plan was to provide general forest management recommendations and specific guidance for three new tree skiing areas within the resort (i.e., Paradise, Stein's Run and Lower Birdland, and Sleeper). The plan made limited reference to promoting opportunities for natural regeneration and for control of mortality due to skier induced tree damage, however the primary purpose of this management plan was guidance for trail development, not regeneration.

Several factors likely contributed to the plan not achieving the desired level of regeneration within the treatment areas (TAs):

- 1) Within the three new tree skiing areas the plan only called for significant tree removal or management in one area (Stein Run and Lower Birdland);
- 2) The description of the selection method was too vague to implement successfully;
- 3) The plan should have provided more specific guidance on implementation;
- 4) Not enough canopy trees were removed within the Sleeper area to encourage vigorous natural regeneration;
- 5) No monitoring component; and
- 6) Mortality of seedling/sapling regeneration due to impacts from skiers.

Forest health within the Paradise area is currently low, and was low when the 1997 plan was developed. This is mainly due to unauthorized tree cutting by area users and poor soil conditions. In order to address these conditions more effectively, the 1997 plan would have benefited from including a combination of skier exclusion and native tree planting in the affected area. Where forest management was suggested in the plan (i.e., Stein Run and Lower Birdland) thinning of up to one-half of the trees was recommended within the TA. More specific guidance regarding forest management (i.e., clear silvicultural prescriptions designed to meet the objectives of the plan) would have made this treatment more effective to implement.

To promote regeneration within the Sleeper area, the removal of hazard trees adjacent to the designated tree skiing areas was suggested. Natural regeneration in hardwood forests is generally achieved through increasing

the amount of light that reaches the forest floor. In retrospect this method may not have opened the canopy sufficiently to promote regeneration. Finally, following implementation there was no stipulation that the treated locations be monitored to ensure that the desired result was being achieved. This may have provided an opportunity to make management recommendations to increase the amount of regeneration in the treated area (e.g., replanting, skier exclusion).

One important component of the 1997 plan has been adapted for use in this VMP. The plan correctly recommended that tree skiing bands should be rotated using a “use-cycle” approach to promote forest health and regeneration. Specific guidance on how this will be achieved within this VMP is contained in Section 7.3 – Rotational Management of Tree Skiing Terrain.

6.0 IDENTIFICATION OF AREAS FOR REGENERATION AND FOR PRESERVATION OF BICKNELL’S THRUSH HABITAT

A review of the SUP area conducted by the USFS and Sugarbush staff in 2008 identified several areas of potential habitat improvement. Similarly, the thrush habitat quality assessment conducted by Arrowwood identified potential restoration areas. These areas will be the primary targets for habitat improvement (see Figure 4 –Bicknells’ Thrush Habitat Assessment)

- 1) Arrowwood Restoration Points – These points are generally early successional spruce pockets. They should be managed to improve habitat through opening the forest canopy and encouraging natural regeneration or leaving it alone to promote current regeneration.
- 2) Sunrise Trail (#48) skier’s left – This site was identified during a site review with the USFS in April 2008. The focus of this area should be to limit skier access and allow natural regeneration. Selective tree removal should target hardwoods with the exception of mountain ash which should be retained to provide a food source for thrush. This will allow coniferous trees to re-establish. Supplemental plantings of fir or spruce may be needed.
- 3) Forest stand between Upper Jester and Upper Organgrinder on Lincoln Peak – This site was identified in April 2008 during site review in conjunction with the USFS. This site would benefit from the removal of hardwoods to allow fir/spruce regeneration. Mountain ash should be retained to provide a food source for thrush.
- 4) Skier’s left of Upper Jester Trail – This site was identified in an April 2008 site review in conjunction with the USFS. This site would benefit from the removal of hardwoods to allow fir/spruce regeneration. Mountain ash should be retained to provide a food source for thrush. A viewpoint at the top of Upper Jester Trail could allow for interpretation of this and other Bicknell’s thrush habitat regeneration areas.
- 5) West of Allyn Lodge – This site was identified in an April 2008 site review in conjunction with the USFS. This site would benefit from the removal of hardwoods to allow fir/spruce regeneration. Mountain ash should be retained to provide a food source for thrush.

These regeneration areas should be protected with strong and visible barriers, consistent with the management guidance in the Forest Plan for Alpine Ski Areas. These barriers may include a combination of, but are not limited to, signage, ropes, and fencing. Public outreach would be implemented to raise awareness regarding the importance of maintaining/improving Bicknell's thrush habitat.

7.0 VEGETATION MANAGEMENT GUIDELINES

The Forest Plan Standards and Guidelines for timber management in MA 7.IA (alpine ski areas) allow vegetation management to meet the ski area desired future condition and to manage habitat for Threatened, Endangered and Sensitive species. These guidelines emphasize the use-cycle approach in areas designated for tree skiing (see Section 7.3 – Rotational Management of Tree Skiing Terrain). The use-cycle approach is considered to be the amount of time a tree skiing band is actively maintained prior to abandonment and development of a new tree skiing band in a nearby forested area. The use-cycle approach has been adapted in this VMP to promote forest regeneration and uneven aged stand management. The intent of this VMP is to provide management direction for developed and proposed ski area facilities, the summer use of ski trails for mountain biking and hiking, and encourage a continuous forest cover with multiple canopy classes. The desired result is a mosaic of young and old forest stands providing diverse wildlife habitat while meeting the management and Forest Plan objectives for MA 7.1.

7.1 Prescription Selection

This section of the VMP is intended to be used as a stand-alone document that is organized as a how-to manual for implementing the vegetation management prescriptions. The 13 vegetation management prescriptions are organized in this section by Vegetation Management Zone (Zone) and use area. Forest cutting is to be coordinated with the affected ski area and avoided in wind-prone areas. Generally, seven forest types exist in the ski area boundaries. As elevation decreases, the forest changes from pure conifer (higher elevation) to a mix of stands dominated by softwood with minor inclusions of hardwood, then to hardwood stands with minor inclusions of softwood, and finally to stands composed of hardwood at the lower elevations. The conifer dominated forest types correspond with Bicknell's thrush habitat which occurs above 2,700 feet. For purposes of this VMP the Vegetation Management Zones have been divided by elevation into Zone A (Bicknell's thrush habitat) and Zone B (Non-Bicknell's thrush habitat) and are shown in Figure 5. Please refer to Section 7.2 – General Forest Zone Management for a complete description of Zones A and B.

The 13 vegetation management prescriptions are as follows:

Vegetation Management Zone A

- P1 - Formal Trail-Construction
- P2 - Formal Trail-Operational
- P3 - Developed Facilities-Construction
- P4 - Developed Facilities-Operational
- P5 - Tree Skiing Terrain-Construction

Vegetation Management Zone B

- P8 - Formal Trail- Construction
- P9 - Formal Trail-Operational
- P10 - Developed Facilities-Construction
- P11 – Developed Facilities-Operational
- P12 – Tree Skiing Terrain-Construction

P6 – Tree Skiing Terrain-Operational
P7 – Trail Edge-Operational

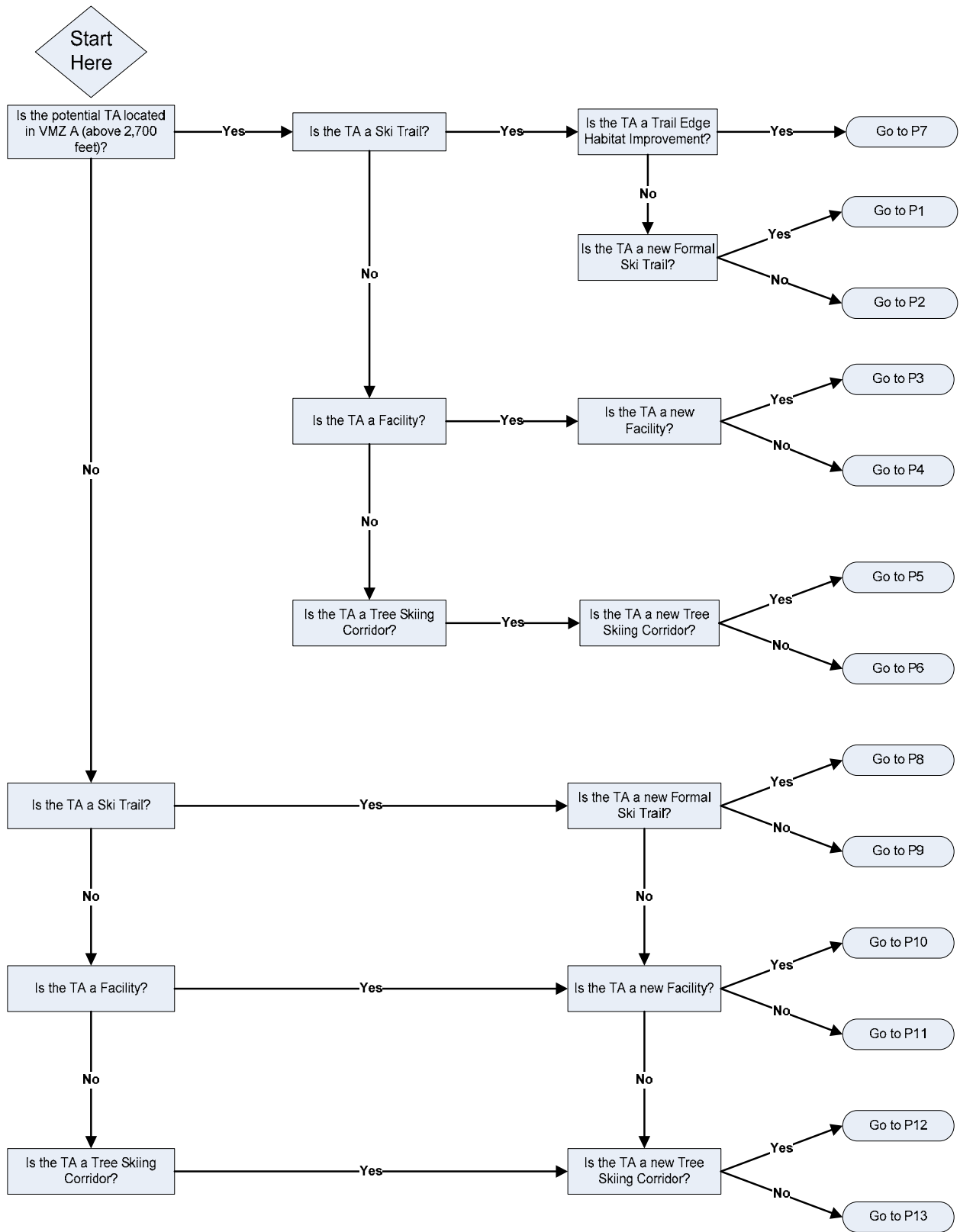
P13 – Tree Skiing Terrain-Operational

The prescriptions contain specific guidance for managing vegetation throughout the Project Area. Each vegetation management prescription contains the following sub-sections:

- Site Selection;
- Intent of Prescription; and
- Prescription Summary

The following steps are involved in selecting the appropriate prescription for a potential TA. For the purposes of this VMP, a TA is an area of land within the Project Area that is suitable for vegetation maintenance, such as a proposed ski trail, the area around an existing building, or tree skiing terrain. Only one prescription can be applied to each potential TA. If any questions or special circumstances arise, it may be necessary to request additional guidance from the USFS permit administrator or a qualified environmental specialist.

- STEP 1-** Use Figures 6 and 7 to determine what Zone the proposed TA is located in.
- STEP 2-** Use the flow chart below to select the appropriate vegetation management prescription (Illustration 1).
- STEP 3-** Implement the revegetation and fertilization guidelines contained in Section 7.6 of the VMP for prescriptions P1, P3, P8, and P10.



7.2 General Forest Zone Management

7.2.1 Zone A – Bicknell's Thrush Habitat

Zone A has been defined based on the habitat requirements for Bicknell's thrush (see Figure 5 – Vegetation Management Zones). This species is a habitat specialist, nesting only in fir-dominated forests generally above 2,700 feet in elevation. In New England, Bicknell's thrush breed in dense sub-alpine conifer thickets, often in the krummholz community (Sabo 1980; Sabo and Holmes 1983; Ouellet 1993; Atwood et al. 1996; Rimmer et al. 1996). Bicknell's thrush seem to select dense thickets of stunted or regenerating red spruce and balsam fir for nest placement, usually on exposed slopes above 3,000 feet in elevation. However, they have been found to nest in more mature or open conifer stands (McFarland and Rimmer 2001).

Zone A includes potential and confirmed thrush habitat within the SUP area as determined by field surveys. This zone extends from the SUP boundary along the ridgeline downslope to an elevation of 2,700 feet and includes all vegetation communities occurring within that range. Vegetation management prescriptions focus on balancing the winter and summer recreation needs of the ski area with the habitat requirements of Bicknell's thrush.

7.2.2 Zone B – Non-Bicknell Thrush Habitat

Zone B consists of all vegetation communities within the SUP area below 2,700 feet elevation (see Figure 5 – Vegetation Management Zones). Vegetation management prescriptions focus on balancing the winter and summer recreation needs of the ski area with overall habitat and continuous forest cover management.

7.2.3 Prescription Definitions (Zone A and Zone B)

- **Forest Edge Scalloping:** Flagging a separate, limit of clearing boundary outside of the flagged new trail or existing trail edge so the boundary is non-linear to reduce visual impacts associated with straight trail edges. The limit of clearing boundary should resemble an irregular sine wave that is outside of, but adjacent to the flagged trail edge. The flagged limit of clearing boundary should not exceed a maximum distance of 30 feet from the original flagged trail edge. All forest edge scalloping should be performed under the supervision of a qualified environmental specialist and approved by the USFS.
- **Forest Edge Feathering:** Selectively removing trees along the flagged limit of a new trail clearing boundary where appropriate, so that a hard line in the new trail-to-forest transition is not evident. The area to be thinned for forest edge feathering should be between approximately 15 feet and 30 feet wide. Large trees should be selectively removed starting at the flagged limit of clearing boundary, so that the tree density gets progressively lower as you move towards the center of the new trail within the 15 to 30-foot feathering area. All forest edge feathering should be performed under the supervision of a qualified environmental specialist and approved by the USFS.
- **Formal Ski Terrain:** For the purposes of this VMP, the term Formal Ski Terrain refers to all existing and proposed ski trails, lift corridors, cat tracks, and egress routes.

- **Full Clearing with Grading:** All trees would be removed within the construction limits, stumps would be removed, and the surface would be graded and revegetated, where appropriate. Grading would occur at all locations where structures are proposed (e.g., lift towers, buildings) and along key trails where a smooth surface is necessary. Grading may include the use of explosives for the removal of bedrock or large boulders, or the use of heavy equipment (e.g., excavators, bulldozers, etc.) for earthmoving. The removal of felled trees would be accomplished with skidders.
- **Full Clearing with No Grading:** All trees would be removed within the construction limits. Trees would be cut flush to the ground and stumps would not be removed. The surface would not be graded and the natural ground cover would be maintained.
- **Grading with No Clearing:** Grading would occur in non-forested locations to be developed (i.e., buildings, lift terminals, trails). Grading may include the use of explosives for the removal of bedrock or large boulders, or the use of heavy equipment (e.g., excavators, bulldozers, etc.) for earthmoving.
- **Hazard Tree:** Any living or dead tree that is located within or in close proximity to Formal Ski Terrain that has the potential to injure a person or damage a facility should the tree, or a portion of it fall. Hazard trees should be identified by the USFS or if the trees are identified by a qualified environmental specialist these trees should be approved by the USFS prior to removal.
- **Wetlands:** Areas that have been identified as wetlands in Figure 2 – Existing Landcover.
- **Streams:** Areas that have been identified as streams in Figure 2 – Existing Landcover.
- **Riparian Areas:** Riparian areas are three-dimensional ecotones (an ecological transition zone) where functional and process interactions take place between terrestrial and aquatic ecosystems. Riparian areas extend down into the groundwater, up above the canopy, outward across the floodplain, and up the near-slopes draining water from the terrestrial ecosystem, and along the water course or feature. Riparian areas are geographically delineable, highly variable in width, and include the water feature: stream, wetland, pond, or seasonal pool.
- **Qualified Environmental Specialist:** A person who has sufficient knowledge and experience in vegetation management or a closely related natural resources field, or a person approved by the USFS to implement the prescriptions within this VMP.
- **Hand Tools:** For the purposes of this VMP, the term Hand Tools refers to chainsaws, weed-whackers, shovels, and tree pruning saws.
- **Developed Facility:** For the purposes of this VMP, the term Developed Facility refers to all existing and proposed buildings, storage tanks, lift towers and terminals, parking lots, and ski patrol duty stations.
- **Selection Method:** Removal of the mature timber, usually the oldest or largest trees, either as single scattered individuals or in small groups at relatively short intervals, repeated indefinitely, by means of

which the continuous establishment of reproduction is encouraged and an uneven-aged stand is maintained.

- **Group Selection:** A selection system in which openings are created to regenerate a new age class in the space previously occupied by groups of 2 or more mature trees. The gaps created by a group selection cut will usually receive sufficient light levels to regenerate shade-intolerant species. All group selection should be performed under the supervision of the USFS and a qualified environmental specialist.
- **Individual Tree Selection:** Individual or single tree selection is a selection system in which openings are created to regenerate a new age class in the space previously occupied by individual mature trees. All individual tree selection should be performed under the supervision of the USFS and a qualified environmental specialist.
- **Diameter at Breast Height (DBH):** The diameter of a tree measured at 4.5 feet (i.e. chest height) above the ground on the uphill side of the tree.

7.2.4 *Prescriptions for Vegetation Management Zone A (Bicknell's Thrush Habitat)*

7.2.4.1 P1 – Formal Ski Terrain Construction

Intent of Prescription

The intent of this prescription is to ensure that the construction of new ski trails and egress routes will be carried out in such a way as to minimize impacts to water quality, wildlife, threatened, endangered, and special status plants and animals, and VQOs (see Figure 6 – Vegetation Management Prescriptions Zone A). The desired effect of this prescription is to maintain existing habitat for Bicknell's thrush consistent with the "no-net loss" strategy, as well as to develop new formal ski terrain. In some cases this may require simultaneous restoration of degraded habitat when new construction is proposed in areas of existing thrush habitat. This prescription contains guidelines for sediment and erosion control during trail construction, avoidance of special status plants and animals, revegetation of newly constructed trails, and non-native invasive species (NNIS) control. The guidelines contained in this prescription are supplemental to the trail construction prescriptions contained in the MDP. Further, these prescription guidelines should be included in the construction documents.

Prescription Summary

- Management activities (e.g., cutting, thinning, mowing, and construction) should occur between August 1 and May 15 to minimize impacts to neotropical migratory birds, unless a hazardous situation develops that requires attention during the interim months, approval is given by the USFS for individual projects outside this window, or where mowing is used as a program to control invasive species.
- In areas where the trail width of proposed formal skiing terrain exceeds 150 feet, tree islands should be retained to maintain a travel corridor between fragmented habitats.

- All new trails or trails to be modified should be flagged in the field by a qualified environmental specialist and approved by the USFS prior to construction.
- All merchantable timber within the clearing limits of proposed formal skiing terrain will be marked and tallied by the USFS, and paid for by the Permit holder.
- The qualified environmental specialist should use discretion when flagging new trails so as to avoid and minimize impacts to wetlands, streams, riparian reserves, survey and manage plant and animal species, and other sensitive areas.
- Appropriate construction equipment should be used for new trail construction to reduce soil and vegetation impacts. Helicopters and/or spider excavators may be required on steeper slopes.
- Hazard trees should be identified and felled under the guidance of the USFS and a qualified environmental specialist. Hazard trees should be felled in the forest and away from the ski area facility or ski trail, limbed, and scattered on the forest floor.
- Trees should be flush-cut and removed for all areas where grading is not prescribed.
- Vegetation and soil disturbance should be minimized within the flagged areas for new trails.
- New trails should be "feathered" and "scaloped" where appropriate.
- Appropriate erosion and sediment control Best Management Practices (BMPs) should be implemented during construction activities in accordance with the *Sugarbush Resort Temporary and Permanent Erosion and Sediments Control Measures – A Handbook* with the guidance of a qualified environmental specialist.
- No vegetation should be cleared outside of the flagged trail limits, unless required for public safety.
- No construction equipment should operate outside of the flagged trail limits.
- No earthwork should occur within the riparian area unless otherwise permitted by the appropriate federal and state agencies (e.g., USFS, U.S. Army Corps of Engineers).
- NNIS listed on the *GMNF NNIS List* and the *Invasive Species Watch List for Vermont* should be identified and controlled in the vicinity of new and modified ski terrain (see Section 7.5 – Non-native Invasive Species Management).
- Apply the revegetation and fertilization guidelines contained in Section 7.6 of this VMP following the completion of the new trail construction.

7.2.4.2 P2 – Formal Ski Terrain Operational Prescription

Intent of Prescription

The Operational Prescription for Formal Ski Terrain in Zone A is intended to provide guidance for vegetation maintenance that is consistent with the Forest Plan (see Figure 6 – Vegetation Management Prescriptions Zone A). The desired effect of this prescription is to maintain existing habitat for Bicknell's

thrush consistent with the “no-net loss” strategy, as well as to maintain existing formal ski terrain. This prescription contains guidelines for sediment and erosion control during trail maintenance, avoidance of riparian areas, and NNIS control. These prescription guidelines should be included in the construction documents.

Prescription Summary

- Management activities (e.g., cutting, thinning, mowing, and construction) should occur between August 1 and May 15 to minimize impacts to neotropical migratory birds, unless a hazardous situation develops that requires attention during the interim months, approval is given by the USFS for individual projects outside this window, or where mowing is used as a program to control invasive species.
- Where existing ski trails exceed 150 feet in width, no mowing of regenerating conifers should occur beyond 10 to 20 feet of existing trail edge to promote edge habitat regeneration, except where mowing is used as a program to control invasive species.
- The cutting apparatus should be set at an elevation of 4 inches above the ground to maintain minimum ground cover.
- Vegetation maintenance should be performed by hand using chain saws and weed-whackers in streams, wetlands, and where slopes are too steep for mechanized equipment.
- Maintenance equipment and vehicles should not be allowed in the riparian area.
- No earthwork should occur within streams or wetlands unless otherwise permitted by the appropriate federal and state agencies (e.g., USFS, US Army Corps of Engineers).
- Retain shrubs and low ground cover along stream banks in existing ski trails to the greatest extent possible, except NNIS.
- Shrubs and trees that pose a safety concern in mapped riparian areas (see Figure 3 – Proposed Facilities) should be cut by hand at an elevation of 4 feet above the ground/water surface, unless they pose a safety hazard.
- Hazard trees should be identified and felled under the guidance of the USFS and a qualified environmental specialist. Hazard trees should be felled in the forest and away from the ski area facility or ski trail, limbed, and scattered on the forest floor.
- Appropriate erosion and sediment control BMPs should be implemented during construction activities in accordance with the *Sugarbush Resort Temporary and Permanent Erosion and Sediments Control Measures – A Handbook* with the guidance of a qualified environmental specialist.
- NNIS listed on the *GMNF NNIS List* and the *Invasive Species Watch List for Vermont* should be identified and controlled within the SUP boundary (see Section 7.5 – Non-native Invasive Species Management).

7.2.4.3 P3 – Developed Facilities Construction Prescription

Intent of Prescription

The Construction Prescription for Developed Facilities is intended to ensure that the construction of new facilities will be carried out in such a way as to minimize impacts to water quality, wildlife, Threatened, Endangered, and Special status plants and animals (see Figure 6 – Vegetation Management Prescriptions Zone A). The desired effect of this prescription is to maintain existing habitat for Bicknell's thrush consistent with the "no-net loss" strategy, as well as to develop new facilities consistent with the land allocation of MA 7.1. In some cases this may require simultaneous restoration of degraded habitat when new construction is proposed in areas of existing thrush habitat. This prescription contains guidelines for sediment and erosion control during and after construction, avoidance of Special status plants and animals, revegetation around newly constructed facilities, and NNIS control. The guidelines contained in this prescription are supplemental to the construction and mitigation guidance contained in the USFS decision record or other Agency permits. Further, these prescription guidelines should be included in the construction documents.

Prescription Summary

- Management activities (e.g., cutting, thinning, mowing, and construction) should occur between August 1 and May 15 to minimize impacts to neotropical migratory birds, unless a hazardous situation develops that requires attention during the interim months, approval is given by the USFS for individual projects outside this window, or where mowing is used as a program to control invasive species.
- Prior to construction of a new facility, the limits of disturbance for facility construction will be flagged in the field, approved by the USFS and no removal of vegetation will occur outside these limits. Discretion should be used when flagging the limit of work boundary to avoid and minimize impacts to wetlands, streams, survey and manage plant and animal species, and other sensitive areas.
- No construction equipment should operate outside of the limit of work boundary.
- The area cleared for the new facility should be "feathered" into the surrounding forest under the guidance of the USFS and a qualified environmental specialist.
- The maintained area around the existing facility should be "feathered" into the surrounding forest under the guidance of the USFS and a qualified environmental specialist.
- NNIS listed on the *GMNF NNIS List* and the *Invasive Species Watch List for Vermont* should be identified and controlled in the vicinity of new and modified facilities (see Section 7.5 – Non-native Invasive Species Management).
- Apply the revegetation and fertilization guidelines, as necessary, contained in Section 7.6 of this VMP following the completion of new construction.

- Hazard trees should be identified and felled under the guidance of the USFS and a qualified environmental specialist. Hazard trees should be felled in the forest and away from the ski area facility or ski trail, limbed, and scattered on the forest floor.
- No earthwork should occur within wetlands or streams unless otherwise permitted by the appropriate federal and state agencies (e.g., USFS, U.S. Army Corps of Engineers).
- Appropriate erosion and sediment control BMPs should be implemented during construction activities in accordance with the *Sugarbush Resort Temporary and Permanent Erosion and Sediments Control Measures – A Handbook* with the guidance of a qualified environmental specialist.

7.2.4.4 P4 – Developed Facilities Operational Prescription

Intent of Prescription

The intent of this prescription is to ensure that when vegetation maintenance around existing Developed Facilities is necessary it will be carried out in such a way as to minimize impacts to water quality, wildlife, Threatened, Endangered, and Special status plants and animals, and VQOs (see Figure 6 – Vegetation Management Prescriptions Zone A). The desired effect of this prescription is to maintain existing habitat for Bicknell's thrush consistent with the "no-net loss" strategy, as well as to maintain existing developed facilities. This prescription contains guidelines for sediment and erosion control during vegetation maintenance and NNIS control. Further, these prescription guidelines should be included in the construction documents.

Prescription Summary

- Management activities (e.g., cutting, thinning, mowing, and construction) should occur between August 1 and May 15 to minimize impacts to neotropical migratory birds, unless a hazardous situation develops that requires attention during the interim months or where mowing is used as a program to control invasive species.
- Vegetation should be maintained at a height of 4-6 inches above the ground around the existing facility in a zone that extends from the perimeter of the facility to 10 feet away from the facility.
- Vegetation maintenance should be done with weed-whackers, a rotary mower, or other appropriate cutting machine.
- The maintained area around the existing facility should be "feathered" into the surrounding forest under the guidance of the USFS and a qualified environmental specialist.
- Hazard trees should be identified and felled under the guidance of the USFS and a qualified environmental specialist. Hazard trees should be felled in the forest and away from the ski area facility or ski trail, limbed, and scattered on the forest floor.
- Maintenance equipment and vehicles should not be allowed in the riparian area.

- Appropriate erosion and sediment control BMPs should be implemented during construction activities in accordance with the *Sugarbush Resort Temporary and Permanent Erosion and Sediments Control Measures – A Handbook* with the guidance of a qualified environmental specialist.
- NNIS listed on the *GMNF NNIS List* and the *Invasive Species Watch List for Vermont* should be identified and controlled in the vicinity of existing facilities (see Section 7.5 - Non-native Invasive Species Management).

7.2.4.5 P5 – Tree Skiing Terrain Construction Prescription

Intent of Prescription

The Construction Prescription for Tree Skiing Terrain is intended to ensure that the construction of new tree skiing terrain and maintenance of existing tree skiing terrain will be carried out in such a way as to minimize impacts to water quality, wildlife, Threatened, Endangered, and Special status plants and animals (see Figure 6 – Vegetation Management Prescriptions Zone A). The desired effect of this prescription is to provide continuous forest cover and increase forest structure by managing for an uneven age forest condition. This prescription contains a combination of group selection and individual tree removal to achieve this condition. The prescription also includes guidelines for sediment and erosion control during and after construction, avoidance of Special status plants and animals, revegetation around newly constructed facilities, and NNIS control. The guidelines contained in this prescription are supplemental to the construction and mitigation guidance contained in the MDP, and USFS decision documents. Further, these prescription guidelines should be included in the construction documents.

Prescription Summary

- Management activities (e.g., cutting, thinning, mowing, and construction) should occur between August 1 and May 15 to minimize impacts to neotropical migratory birds, unless a hazardous situation develops that requires attention during the interim months, approval is given by the USFS for individual projects outside this window, or where mowing is used as a program to control invasive species.
- When constructing a new tree skiing trail, the trail should contain a mix of group tree selection (all trees greater than 6 inches DBH cut in a patch two times the average tree height in the area) and individual tree selection (maintaining a minimum of 120 trees per acre or 50 percent residual stem density whichever is greater) to promote an uneven aged stand condition and facilitate growth of new vegetation. When applying this prescription, the group tree selection cuts should be spaced a minimum of 300 feet apart.
- In areas where conifers are the primary tree species, selection of trees for removal should target hardwood species (with the exception of mountain ash). The prescription should also remove dying, damaged or diseased trees of any species to the extent practical.

- The limits of proposed tree skiing corridors should be flagged in the field. Group selection areas within the proposed tree skiing corridor should be flagged separately (a different color) from corridor width by a qualified environmental specialist. All flagging should be reviewed and approved by the USFS prior to implementation.
- All merchantable timber within the clearing limits of proposed tree skiing terrain will be marked and tallied by the USFS, and paid for by the Permit holder.
- When constructing more than one new trail, or when locating a new trail in an area where there are existing tree skiing trails, the corridors should be spaced a minimum of 200 feet apart and no more than 50 feet in width.
- Hazard trees should be identified and felled under the guidance of the USFS and a qualified environmental specialist. Hazard trees should be felled in the forest and away from the ski area facility or ski trail, limbed, and scattered on the forest floor.
- The ground surface will not be graded and the natural ground cover will be maintained.
- All trees to be removed should be flush-cut, stumps will not be removed.
- All non-merchantable thinned trees should be flush-cut, limbed, and scattered throughout the TA.
- NNIS listed on the *GMNF NNIS List* and the *Invasive Species Watch List for Vermont* should be identified and controlled in the vicinity of proposed tree skiing corridors (see Section 7.5 – Non-native Invasive Species Management).
- Appropriate erosion and sediment control BMPs should be implemented during construction activities in accordance with the *Sugarbush Resort Temporary and Permanent Erosion and Sediments Control Measures – A Handbook* with the guidance of a qualified environmental specialist.

7.2.4.6 P6 – Tree Skiing Terrain Operational Prescription

Intent of Prescription

The Operational Prescription for tree skiing terrain in Zone A is intended to provide guidance for vegetation maintenance that is consistent with the Forest Plan and maintenance of existing Bicknell's thrush habitat (see Figure 6 – Vegetation Management Prescriptions Zone A). This prescription contains guidelines for sediment and erosion control during trail maintenance, avoidance of riparian areas, and NNIS control. These prescription guidelines should be included in the construction documents.

Prescription Summary

- Tree skiing corridors can be maintained once new vegetation reaches 5 feet in height or whenever the tops of the trees are above snow level, and should focus on shrubs rather than trees to the extent practicable (see Section 7.3 – Rotational Management of Tree Skiing Terrain).

- Tree skiing corridors should be maintained to 25 feet wide, where appropriate, with a 200-foot spacing between corridors.
- Islands of revegetation within the corridors should be roped off for regeneration.
- Vegetation management within tree skiing corridors in Zone A should be done by hand.
- Understory removal is permitted to maintain existing tree skiing corridors within Zone A, but should focus on trees greater than 15 feet in height, maintaining mountain ash to the extent practicable (see Section 7.3 – Rotational Management of Tree Skiing Terrain).
- The TA should not expand the boundaries of the existing tree skiing corridor.
- Management activities (e.g., cutting, thinning, mowing, and construction) should occur between August 1 and May 15 to minimize impacts to neotropical migratory birds, unless a hazardous situation develops that requires attention during the interim months, approval is given by the USFS for individual projects outside this window, or where mowing is used as a program to control invasive species.
- Hazard trees should be identified and felled under the guidance of the USFS and a qualified environmental specialist. Hazard trees should be felled in the forest and away from the ski area facility or ski trail, limbed, and scattered on the forest floor.
- Appropriate erosion and sediment control BMPs should be implemented during construction activities in accordance with the *Sugarbush Resort Temporary and Permanent Erosion and Sediments Control Measures – A Handbook* with the guidance of a qualified environmental specialist.
- NNIS listed on the *GMNF NNIS List* and the *Invasive Species Watch List for Vermont* should be identified and controlled in the vicinity of existing tree skiing corridors.

7.2.4.7 P7 - Trail Edge Operational Prescription

Intent of Prescription

The Operational Prescription for trail edges in Zone A is intended to provide guidance for vegetation maintenance that is consistent with the Forest Plan and improvement of existing Bicknell's thrush habitat. Where opportunities exist to maintain or enhance Bicknell's thrush habitat along existing trail edges, mainly in areas where the adjacent forest is fir-spruce dominated and characterized by a high stem density in the understory, often forming a dense thicket. The desired effect is to provide suitable structure and a buffer by gradually decreasing tree height from the forest to the grassy trail edge.

Prescription Summary

- Management activities (e.g., cutting, thinning, mowing, and construction) should occur between August 1 and May 15 to minimize neotropical migratory birds, unless a hazardous situation develops that requires attention during the interim months, approval is given by the USFS for individual projects outside this window, or where mowing is used as a program to control invasive species.

- These areas should be identified by a qualified environmental specialist, or by the USFS, as areas where there is potential to maintain or enhance Bicknell's thrush habitat in Zone A.
- In these areas, which may include only one (usually the wind-exposed) side of a ski trail, low fir-spruce should be allowed to extend along the edge outward for 10-15 feet (or wider) at heights of 1-3 feet (or higher).
- The TA should not expand the boundaries of the existing trail.
- The qualified environmental specialist will determine if the edge of trails should be feathered or scalloped, gradually decreasing tree height from the forest to the grassy trail edge.
- NNIS listed on the *GMNF NNIS List* and the *Invasive Species Watch List for Vermont* should be identified and controlled in the vicinity of existing ski terrain (see Section 7.5 - Non-native Invasive Species Management).

7.2.5 Prescriptions for Vegetation Management Zone B (Non-Bicknell's Thrush Habitat)

7.2.5.1 P8 - Formal Ski Terrain Construction Prescription

Intent of Prescription

The intent of this prescription is to ensure that the construction of new ski trails and egress routes located in Zone B will be carried out in such a way as to minimize impacts to water quality, wildlife, Threatened, Endangered, and Special status plants and animals, and VQOs (see Figure 7 – Vegetation Management Prescriptions Zone B). This prescription contains guidelines for sediment and erosion control during trail construction, avoidance of Special status plants and animals, revegetation of newly constructed trails, and NNIS control. The guidelines contained in this prescription are supplemental to the trail construction prescriptions contained in the MDP. Further, these prescription guidelines should be included in the construction documents.

Prescription Summary

This prescription is generally the same as the Construction Prescription for Formal Ski Terrain in Zone A. However, the seasonal restrictions on vegetation maintenance and trail widths related to Bicknell's thrush habitat are not applicable in Zone B.

- All new trails or trails to be modified should be flagged in the field by a qualified environmental specialist and approved by the USFS prior to construction.
- Construction of formal ski terrain will include five clearing prescriptions: Full Clearing with Grading, Full Clearing with No Grading, Partial Clearing - Islands, Partial Clearing - Glades, and Grading with No Clearing. The new trail construction prescriptions should be applied following approval from the USFS.

- The qualified environmental specialist should use discretion when flagging new trails so as to avoid and minimize impacts to wetlands, streams, riparian reserves, survey and manage plant and animal species, and other sensitive areas.
- Appropriate construction equipment should be used for new trail construction to reduce soil and vegetation impacts. Helicopters and/or spider excavators may be required on steeper slopes.
- Hazard trees should be identified and felled under the guidance of the USFS and a qualified environmental specialist. Hazard trees should be felled in the forest and away from the ski area facility or ski trail, limbed, and scattered on the forest floor.
- Trees should be flush-cut in all areas where grading is not prescribed.
- Vegetation and soil disturbance should be minimized within the flagged areas for new trails.
- New trails should be "feathered" and "scalped" where appropriate.
- Appropriate erosion and sediment control BMPs should be implemented during construction activities in accordance with the *Sugarbush Resort Temporary and Permanent Erosion and Sediments Control Measures – A Handbook* with the guidance of a qualified environmental specialist.
- NNIS listed on the *GMNF NNIS List* and the *Invasive Species Watch List for Vermont* should be identified and controlled in the vicinity of proposed formal skiing terrain.
- No vegetation should be cleared outside of the flagged trail limits, unless required for public safety.
- No construction equipment should operate outside of the flagged trail limits.
- No earthwork should occur within wetlands or streams unless otherwise permitted by the appropriate federal and state agencies (e.g. USFS, U.S. Army Corps of Engineers, etc.).
- Apply the revegetation and fertilization guidelines contained in Section 7.6 of this VMP following the completion of the new trail construction (see Section 7.5 – Non-native Invasive Species Management).

7.2.5.2 P9 – Formal Ski Terrain Operational Prescription

This prescription applies to existing ski trails, egress routes, lift corridors, and cat-tracks (referred to collectively as trails). New or modified trails that are constructed under the USFS approval documents will be considered existing trails directly after construction of the trail is completed. The Operational Prescription for Formal Ski Terrain in Zone B is intended to provide guidance for vegetation maintenance that is consistent with the Forest Plan (see Figure 7 – Vegetation Management Prescriptions Zone B). This prescription contains guidelines for sediment and erosion control during trail maintenance, avoidance of Special status plants and animals, and NNIS control.

Prescription Summary

This prescription is generally the same as the Operational Prescription for Formal Ski Terrain in Zone A. Maintenance activities will be allowed within the existing ski trail edge. Trail edges can be defined by substantial differences in tree diameters or heights, or the presence of ski area infrastructure (e.g., snowmaking hydrants, lighting polls, etc.).

- Management activities (e.g., cutting, thinning, mowing, and construction) should occur between August 1 and May 15 to minimize impacts to neotropical migratory birds, unless a hazardous situation develops that requires attention during the interim months, approval is given by the USFS for individual projects outside this window, or where mowing is used as a program to control invasive species.
- The cutting apparatus should be set at an elevation of 4 inches above the ground to maintain minimum ground cover.
- Vegetation maintenance should be performed by hand using chain saws and weed-whackers in streams wetlands when not practical to use mechanized equipment.
- Maintenance equipment and vehicles should not be allowed in riparian areas.
- No earthwork should occur within streams or wetlands unless otherwise permitted by the appropriate federal and state agencies (e.g., USFS, U.S. Army Corps of Engineers).
- Retain shrubs and low ground cover along stream banks in existing ski trails to the greatest extent possible.
- Shrubs and trees that pose a safety concern in mapped riparian areas (see Figure 3 – Proposed Facilities) should be cut with hand tools at an elevation of 4 feet above the ground/water surface, unless it poses a public safety hazard.
- Hazard trees should be identified and felled under the guidance of the USFS and a qualified environmental specialist. Hazard trees should be felled in the forest and away from the ski area facility or ski trail, limbed, and scattered on the forest floor.
- Appropriate erosion and sediment control BMPs should be implemented during construction activities in accordance with the *Sugarbush Resort Temporary and Permanent Erosion and Sediments Control Measures – A Handbook* with the guidance of a qualified environmental specialist.
- NNIS listed on the *GMNF NNIS List* and the *Invasive Species Watch List for Vermont* should be identified and controlled in the vicinity of existing ski terrain (see Section 7.5 - Non-native Invasive Species Management).

7.2.5.3 P10 – Developed Facilities Construction Prescription

Intent of Prescription

The Construction Prescription for Developed Facilities is intended to ensure that the construction of new facilities located in Zone B will be carried out in such a way as to minimize impacts to water quality, wildlife, Threatened, Endangered, and Special status plants and animals (see Figure 7 – Vegetation Management Prescriptions Zone B). This prescription contains guidelines for sediment and erosion control during and after construction, avoidance of Special status plants and animals, revegetation and fertilization around newly constructed facilities, and NNIS control.

Prescription Summary

This prescription is generally the same as the Construction Prescription for Developed Facilities in Zone A. Maintenance activities will be allowed adjacent to existing structures. These can include view corridors from decks, lodges, and viewpoints.

- Prior to construction of a new facility, the limits of disturbance for facility construction will be flagged in the field and no removal of vegetation will occur outside these limits. Discretion should be used when flagging the limit of work boundary to avoid and minimize impacts to wetlands, riparian reserves, survey and manage plant and animal species, and other sensitive areas.
- No construction equipment should operate outside of the limit of work boundary.
- The area cleared for the new facility should be "feathered" into the surrounding forest under the guidance of the USFS and a qualified environmental specialist.
- The maintained area around the existing facility should be "feathered" into the surrounding forest under the guidance of the USFS and a qualified environmental specialist.
- NNIS listed on the *GMNF NNIS List* and the *Invasive Species Watch List for Vermont* should be identified and controlled in the vicinity of new and modified facilities (see Section 7.5 – Non-native Invasive Species Management).
- Apply the revegetation and fertilization guidelines contained in Section 7.6 of this VMP following the completion of new construction.
- Hazard trees should be identified and felled under the guidance of the USFS and a qualified environmental specialist. Hazard trees should be felled in the forest and away from the ski area facility or ski trail, limbed, and scattered on the forest floor.
- No earthwork should occur within wetlands or streams unless otherwise permitted by the appropriate federal and state agencies (e.g., USFS, U.S. Army Corps of Engineers).
- Appropriate erosion and sediment control BMPs should be implemented during construction activities in accordance with the *Sugarbush Resort Temporary and Permanent Erosion and Sediments Control Measures – A Handbook* with the guidance of a qualified environmental specialist.

7.2.5.4 P11 – Developed Facilities Operational Prescription

Intent of Prescription

The intent of this prescription is to ensure that the maintenance of vegetation surrounding existing developed facilities in Zone B will be carried out in such a way as to minimize impacts to water quality, wildlife, Threatened, Endangered, and Special status plants and animals, and VQOs (see Figure 7 – Vegetation Management Prescriptions Zone B). This prescription contains guidelines for sediment and erosion control during vegetation maintenance, avoidance of Special status plants and animals, revegetation of newly constructed trails, and NNIS control.

Prescription Summary

This prescription is generally the same as the Operational Prescription for Developed Facilities in Zone A. However, the seasonal restriction on vegetation maintenance related to Bicknell's thrush habitat is not applicable in Zone B.

- Management activities (e.g., cutting, thinning, mowing, and construction) should occur between August 1 and May 15 to minimize impacts to neotropical migratory birds, unless a hazardous situation develops that requires attention during the interim months, approval is given by the USFS for individual projects outside this window, or where mowing is used as a program to control invasive species.
- Vegetation should be maintained at a height of 4-6 inches above the ground around the existing facility in a zone that extends from the perimeter of the facility to 20 feet away from the facility.
- Appropriate construction equipment should be used near developed facilities to reduce soil and vegetation impacts. If the facility is inaccessible to tractors or tracked vehicles the vegetation maintenance should be performed by hand.
- The maintained area around the existing facility should be "feathered" into the surrounding forest under the guidance of the USFS and a qualified environmental specialist.
- Appropriate erosion and sediment control BMPs should be implemented during construction activities in accordance with the *Sugarbush Resort Temporary and Permanent Erosion and Sediments Control Measures – A Handbook* with the guidance of a qualified environmental specialist.
- NNIS listed on the *GMNF NNIS List* and the *Invasive Species Watch List for Vermont* should be identified and controlled in the vicinity of existing ski area facilities (see Section 7.5 – Non-native Invasive Species Management).
- Hazard trees should be identified and felled under the guidance of the USFS and a qualified environmental specialist. Hazard trees should be felled in the forest and away from the ski area facility or ski trail, limbed, and scattered on the forest floor.

- Apply the revegetation and fertilization guidelines contained in Section 7.6 of this VMP following the completion of new and modified facility construction.

7.2.5.5 P12 – Tree Skiing Terrain Construction Prescription

Intent of Prescription

The Construction Prescription for Tree Skiing Terrain in Zone B is intended to ensure that the construction of new tree skiing terrain will be carried out in such a way as to minimize impacts to water quality, wildlife, Threatened, Endangered, and Special status plants and animals (see Figure 7 – Vegetation Management Prescriptions Zone B). The desired effect of this prescription is to provide continuous forest cover and increase forest structure by managing for an uneven age forest condition. This prescription contains a combination of group selection and individual tree removal to achieve this condition. The prescription also includes guidelines for sediment and erosion control during and after construction, avoidance of Special status plants and animals, revegetation around newly constructed facilities, and NNIS control. The guidelines contained in this prescription are supplemental to the construction and mitigation guidance contained in the MDP. Further, these prescription guidelines should be included in the construction documents.

Prescription Summary

- New tree skiing corridors should contain a mix of group tree selection (all trees greater than 6 inches DBH cut in a patch two times the average tree height in the area) and individual tree selection to promote an uneven aged stand condition and facilitate growth of new vegetation.
- When applying this prescription healthy and bear scarred beech trees should be retained and selection of trees for removal should target dying, damaged or diseased trees of any species to the extent practical.
- The limits of proposed tree skiing corridors should be flagged in the field. Group selection areas within the proposed tree skiing corridor should be flagged separately (a different color) from corridor width by a qualified environmental specialist. All flagging should be reviewed and approved by the USFS prior to implementation.
- Tree skiing corridors should be fenced or roped off until new vegetation reaches 10 feet in height or whenever the tops of the trees are above snow level.
- Hazard trees should be identified and felled under the guidance of the USFS and a qualified environmental specialist. Hazard trees should be felled in the forest and away from the ski area facility or ski trail, limbed, and scattered on the forest floor.
- The ground surface would not be graded and the natural ground cover would be maintained.
- All trees to be removed should be flush-cut, stumps will not be removed.
- NNIS listed on the *GMNF NNIS List* and the *Invasive Species Watch List for Vermont* should be identified and controlled in the vicinity of proposed tree skiing corridors.

- Appropriate erosion and sediment control BMPs should be implemented during construction activities in accordance with the *Sugarbush Resort Temporary and Permanent Erosion and Sediments Control Measures – A Handbook* with the guidance of a qualified environmental specialist.

7.2.5.6 P13 – Tree Skiing Terrain Operational Prescription

Intent of Prescription

The intent of this prescription is to maintain existing corridors in the forest that are currently used by skiers in a way that is consistent with the Forest Plan and maintenance of existing black bear habitat (see Figure 7 – Vegetation Management Prescriptions Zone B). Thinning trees in this area is necessary for maintaining open corridors that are becoming unsafe for skiers due to the high rate of tree establishment in recent years. This prescription is not intended to create new trails or corridors where none previously existed. This prescription contains guidelines for sediment and erosion control during trail maintenance, avoidance of the riparian area, and NNIS control. These prescription guidelines should be included in the construction documents.

Prescription Summary

- Understory removal is permitted to maintain existing tree skiing corridors within Zone B, but should focus on trees less than 15 feet in height, maintaining mountain ash and beech to the extent practicable.
- Management activities (e.g., cutting, thinning, mowing, and construction) should occur between August 1 and May 15 to minimize impacts to neotropical migratory birds, unless a hazardous situation develops that requires attention during the interim months, approval is given by the USFS for individual projects outside this window, or where mowing is used as a program to control invasive species.
- The TA should not expand the boundaries of the existing tree skiing corridor (see Section 7.3 – Rotational Management of Tree Skiing Terrain).
- Snags, hazard trees, and trees selected for removal due to increasing tree density within the existing tree skiing corridor should be flagged in the field by a qualified environmental specialist and approved by the USFS prior to implementation.
- Hazard trees should be felled in the forest and away from the ski area facility or ski trail, limbed, and scattered on the forest floor.
- All non-merchantable thinned trees should be flush-cut, limbed, and scattered throughout the TA.
- NNIS listed on the *GMNF NNIS List* and the *Invasive Species Watch List for Vermont* should be identified and controlled in the vicinity of existing ski terrain (see Section 7.5 - Non-native Invasive Species Management).

- Appropriate erosion and sediment control BMPs should be implemented during construction activities in accordance with the *Sugarbush Resort Temporary and Permanent Erosion and Sediments Control Measures – A Handbook* with the guidance of a qualified environmental specialist.

7.3 Rotational Management of Tree Skiing Terrain

The Forest Plan standards and guidelines for Alpine Ski Areas emphasize the use-cycle approach to promote forest regeneration in areas designated for tree skiing. The desired result of this VMP is to provide quality alpine winter sports opportunities (e.g., tree skiing) while enhancing or maintaining habitat for Threatened, Endangered, and Regional Forester's Sensitive species (e.g., Bicknell's thrush). This VMP incorporates a combination of individual and group tree selection (described in prescriptions P5 and P12) in areas designated for new tree skiing terrain (see Figures 6 and 7). In an effort to promote an uneven aged forest stand condition and improve the quality of wildlife habitat, tree skiing bands should be rotated on a 15-year use cycle.

New tree skiing bands have a use cycle of 15 years before they should be abandoned (e.g., no active maintenance) and allowed to regenerate. The use cycle begins the first winter season following implementation of a new band of tree skiing. Once they have been constructed these bands may be formally utilized by skiers for no more than 15 years. During this time of active use, vegetation may be maintained in accordance with Tree Skiing Terrain Operational Prescriptions (P6, P13).

At the end of the use cycle for tree skiing terrain, the tree skiing bands should be abandoned to allow for natural revegetation. Once the tree skiing bands have been abandoned, new tree skiing bands may be constructed (following the necessary approvals) using the construction prescriptions within this VMP. These new tree skiing bands should be constructed at least 200 feet from vacated tree skiing bands in Zone A.

7.4 Revegetation Guidelines

Any construction activity will require the development of a construction plan for review and approval by the USFS. The construction plan will include sediment and erosion control and revegetation and fertilization guidance for any project that results in ground disturbance. In areas where no ground disturbance occurs (e.g., proposed tree skiing corridors) natural revegetation should be encouraged. The appropriate plant species should be identified in the revegetation plans.

Plant species used to revegetate slopes will include native and desirable non-native species. Native species used in revegetation should include species known to occur within the vicinity of the project site. Seed for native species should be collected from local seed sources within the SUP area and either used for direct seedings or propagated at a local USFS approved nursery if available.

To avoid the spread of weeds during construction and restoration projects all vehicles and equipment doing work outside the limits of the road surface or in infested areas will follow appropriate BMPs listed in the construction plans (refer to Section 7.5 – Non-native Invasive Species Management).

Fertilizing of revegetated areas will occur no less than 100 feet from streams and should follow all state and federal guidelines. The fertilizer currently used is 15-15-15 N-P-K which is broadcast spread at the manufacturer's suggested rate per acre. A certified weed-free mulch or straw, when available, should be placed over the seed and fertilizer to promote stabilization.

7.5 Non-native Invasive Species Management

NNIS listed on the *GMNF NNIS List* and the *Invasive Species Watch List for Vermont* can spread and establish self-perpetuating populations and can displace natural plants. These plants are 'invasive' and can greatly diminish biological diversity and cause a cascade of negative ecological effects. The Sugarbush ski area is known to contain wild chervil (*Anthriscus sylvestris* [L.] Hoffm.) and purple loosestrife (*Lythrum salicaria*). Current NNIS management is performed by seasonal mowing in areas where these plants are present and is subject to the timing restrictions contained in the Summer Work plan.

Future NNIS management should include a combination of prevention and monitoring of invasive species within the ski area boundaries. This may include techniques such as equipment cleaning and post-construction stabilization using native seed mixes, among others.

7.6 Discussion of Preservation and Enhancement Methodologies and Expected Plant Community Succession

7.6.1 Regeneration Methodologies

As described in the general prescription definitions, this VMP utilizes uneven aged forest management strategies, which include a combination of individual and group tree selection as the primary reproduction method. In turn, these methods rely heavily on natural regeneration of the forest stands. No replanting is suggested at this time, but may be needed if monitoring requirements (see Section 8.0 - Monitoring and Evaluation) are not achieved. It is anticipated that the openings in the forest canopy will increase the amount of sunlight reaching the forest floor, facilitating natural regeneration of forest stands.

Developed ski trails and facilities are not expected to undergo natural community succession for the life of the ski area as they will be maintained in a non-natural state. Natural plant community succession is expected to occur within proposed and existing tree skiing areas as portions the stand are managed under the proposed use cycle rotation.

7.6.2 Plant and Seed Suppliers

The following companies are known to provide quality plant and seed stocks that would be acceptable to revegetation projects associated with this VMP.

Ernst Conservation Seeds
9006 Mercer Pike
Meadville, PA 16335
(814) 336-2404
www.ernstseeds.com

New England Wetland Plants, Inc.
820 West Street
Amherst, MA 01002
(413) 548-8000
www.newp.com

Kenyon's Variety Store
3337 Main St
Waitsfield, VT 05673
(802) 496-3922

Mad River Garden Center
PO Box 358
Waitsfield, VT 05673
(802) 496-5555

Lawes Agricultural
Route 73-champlain S
Brandon, VT 05733
(802) 247-6874

Vermont Wetland Plant Supply, LLC
P.O. Box 153
Orwell, VT 05760
(802) 948-2553
www.vermontwetlandplants.com

8.0 MONITORING AND EVALUATION

The monitoring of this VMP will focus primarily on the development of forest structure and the improvement of Bicknell's thrush habitat. Developed facilities (e.g., buildings and formal ski trails) will not need to be monitored as they will continue to be a modified forest community for the life of the ski area. Monitoring will instead focus on the following areas:

- Tree skiing corridors in Zone A and B
- Specific Restoration Areas (see Section 6.0)

The construction and operational tree skiing prescriptions within Zone A have been developed specifically to improve the quality of Bicknell's thrush habitat. The combination of group and individual selections will create a larger area for regeneration. Bicknell's thrush prefer dense, regenerating fir communities, which should result from the implementation of these management prescriptions. Therefore, these sites need to be monitored to ensure this is occurring. Similarly, tree skiing management prescriptions in Zone B have been developed to protect and improve bear habitat by retaining bear-scarred and healthy beech. Monitoring of these areas is necessary to ensure the objective is being attained. In areas identified for regeneration, monitoring should identify if regeneration or forest conditions are responding to ensure regeneration of conifers occur. The areas may need to be closed if forest conditions respond negatively. As individual projects are approved by the USFS, further monitoring of Bicknell's thrush population may be required as a condition of approval. Finally, specific restoration areas identified in Section 6.0 need to be monitored to ensure that restoration objectives are met.

8.1 Methods

This VMP will utilize a site sampling methodology to monitor the implementation of the vegetation management prescriptions discussed in Section 7.0 – Vegetation Management Guidelines. Prior to implementation of this VMP, a series of baseline sampling plots should be collected to document conditions. Several baseline sample sites should be located in areas of high to medium quality thrush habitat to establish performance standards for Zone A treatments. These sample sites will then be used to set targets for the sample sites located within TAs. Baseline and TA sample sites will be monitored to assess stem density and aerial coverage according to the following protocol.

8.1.1 Protocol

8.1.1.1 Stem Density

Sample sites will be 1/100th of an acre in size, centered on a fixed point. This equates to a radius of approximately 12 feet. Vegetation within the plot should be divided in three stratum; shrubs, seedling/sapling, and trees, for hardwood and softwood categories (refer to Appendix A for a sample datasheet). Herbaceous ground cover does not need to be recorded. The number of stems should be tallied for the shrub, seedling/sapling, and tree in each category. Stem density should be calculated by dividing the number of stems within a category by the total number of stems for the sample site.

8.1.1.2 Aerial Coverage

The sample site should be divided into three stratum; herbaceous, shrub/sapling, and trees. The tree stratum should be defined as heights greater than 15 feet. Trees less than 15 feet in height should be placed into the shrub/sapling stratum. For each stratum, the approximate aerial coverage of the sample site should be recorded. Estimates should be recorded from the center of the site. Use of a handheld densitometer could be incorporated to estimate coverage of the tree stratum. During this process the general health of each stratum and presence of any NNIS should be noted. If non-natives are present, an approximate area of coverage in the vicinity of the site should be noted. Follow-up treatment for the removal of non-native species may be required.

8.1.2 Performance Standards

Specific performance standards are deliberately omitted from the VMP at this time. Instead, this VMP proposes to use an adaptive set of performance standards based on the results of site-specific baseline sampling. As stated in Section 2.0 – Goals and Objectives, this VMP seeks to be compliant with the no-net loss of Bicknell's thrush habitat and to improve the quality of thrush habitat in appropriate areas within the ski area (e.g., Zone A). A standard set of performance criteria could be developed based on the life history requirements of Bicknell's thrush. However, this approach would speak toward thrush habitat across its natural range and may not be characteristic of the habitat types present at Sugarbush. Baseline sampling will establish general characteristics of known thrush habitat at Sugarbush that can be used to measure the results of future actions.

In general, there are several performance standards that are recommend as part of this VMP based on guidelines contained within the Conservation Strategy.

General Zone A Standards:

- 1) Less than 30 percent hardwood species
- 2) Higher proportion of softwood species stem density
- 3) Higher proportion of softwood shrub/sapling aerial coverage
- 4) Retain mountain ash
- 5) Softwood regeneration existing and tree height is less than 15 ft. where regeneration is managed

General Zone B Standards:

- 1) Retain all beech that is not diseased
- 2) Higher proportion of tree aerial coverage

Population monitoring of selected species (i.e., Bicknell's thrush) should be conducted on an annual basis, during spring mating, to track any changes in populations within TAs. As this VMP has been designed with an underlying intent to maintain or increase Bicknell's thrush populations in the area, it would be prudent to measure current and future populations. However, the USFS acknowledges that Sugarbush Resort is in the business of providing quality, year-round recreation experiences on NFS lands, not necessarily studying wildlife populations. Sugarbush Resort acknowledges that long-term population studies are needed to determine the overall success of this VMP and adapt treatment prescriptions as necessary. Therefore, no population monitoring is included as part of this VMP. However, it is assumed that Sugarbush Resort and the USFS will continue to explore partnerships with local non-profit groups and VINS to incorporate population monitoring within the ski area in the future.

8.2 Contingency Measures

The following contingency measures have been identified if sample plots are not meeting performance standards. It should be noted that these contingencies are conceptual and may be modified as necessary. Additional contingency measures may be incorporated as a result of site specific monitoring.

Scenario	Contingency Measure
Sample plot stem density is too low	Supplemental plantings of fir or spruce within the TA. Where possible, seedlings should be transplanted from adjacent areas.
Sample plot aerial coverage is too low	Supplemental plantings may be required. Use of fertilizers or mulch may aid in nutrient/water uptake to encourage growth.
Proportion of hardwood species is too high in Zone A	TAs should be revisited for hardwood species removal. May require hand removal of hardwood seedlings/saplings.
Regenerating communities show significant signs of skier damage.	Fencing should be erected to exclude skiers. Additional placement of signage per the Environmental Education plan should be placed in TAs to warn skiers of the environmental effects of skiing through these areas.

8.3 Monitoring Term

Monitoring terms should be separated for the type of action occurring. If the treatment is new construction, then monitoring should occur frequently post-construction and gradually taper off as the site stabilizes. This type of monitoring should, at a minimum, have a five-year monitoring period post construction where samples sites are checked twice every year. During this time it is important to gauge the need for supplemental plantings. Following this period, monitoring could be reduced to every other year if the sample sites indicated that desired standards are being achieved. At some point during this process, operational treatments may be applied to the TA. Then monitoring should shift to a focus on maintaining the new, operational condition of the site.

Monitoring of sample sites should occur at a minimum of twice yearly. Once at the beginning of the growing season during the leafing stage to assess new growth and recruitment. The second event should occur mid-way through the growing season to assess the maximum extent of vigor and aerial coverage. Monitoring should avoid the end of the growing season as most plants would begin to show signs of dormancy. Long-term monitoring should revolve around the 15-year use cycle outlined previously. As new cycles begin, a complete assessment of the general forest condition should be completed.

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Appendix A. Sample Monitoring Datasheet

Zone: _____ **General Observations (weather, temp.):**
Site #: _____
Date: _____
Person(s): _____

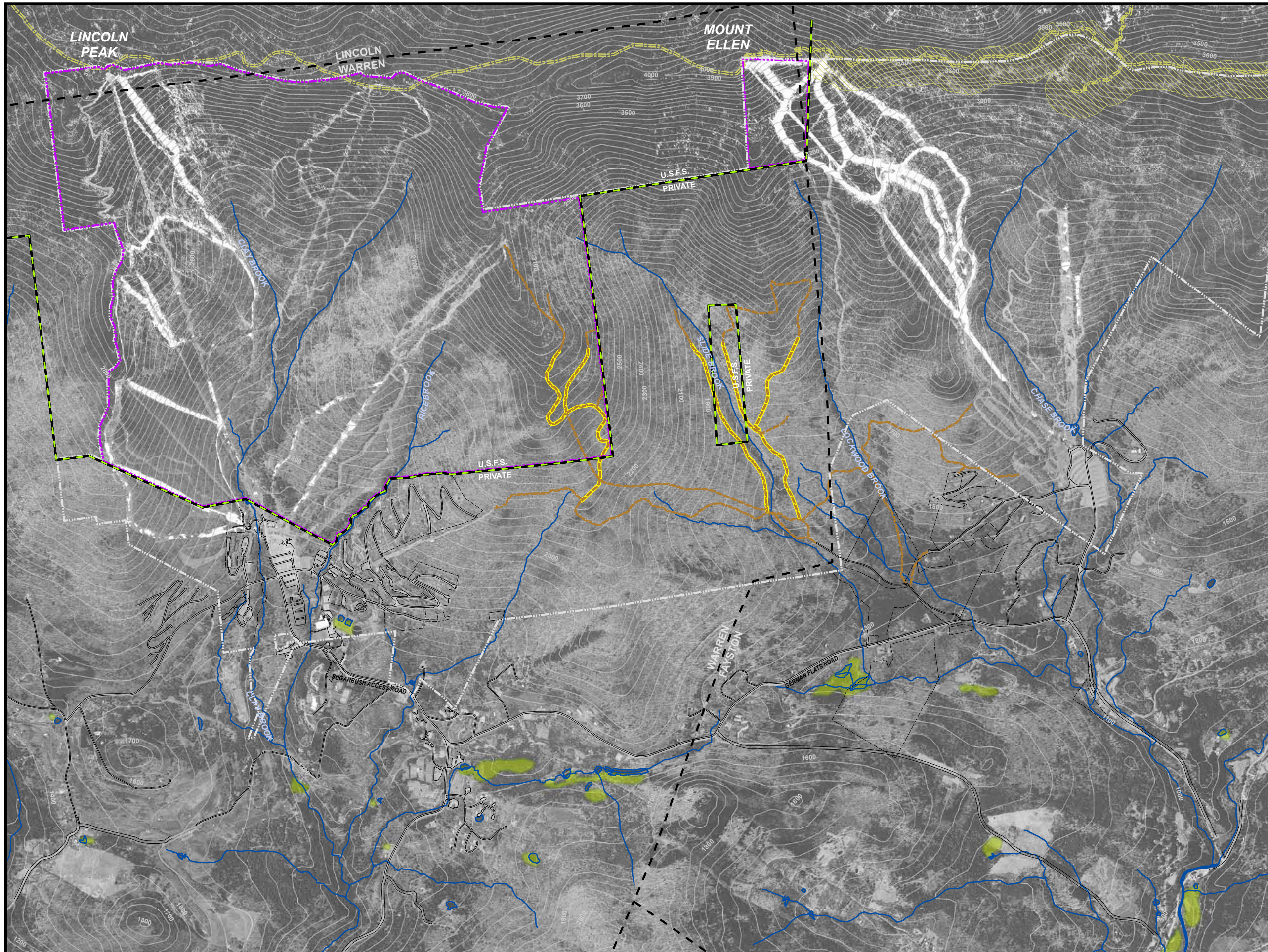
Stem Density

Hardwoods				Softwoods			
Species	Shrub	Seedling/ Sapling	Tree	Species	Shrub	Seedling/ Sapling	Tree
Total # Stems							
% Total Stems							

Aerial Coverage

Stratum	Hardwoods	Softwoods
Herbaceous		
Shrub/Sapling		
Trees		

General Notes of Site



SUGARBUSH

**Vegetation Management Plan
Figure 1
Vicinity Map**

Legend

- SUP BOUNDARY
- SKI AREA BOUNDARY
- SUGARBUSH BOUNDARY
- U.S.F.S.
- TOWN BOUNDARIES
- LONG TRAIL
- ROADS
- WORK ROADS
- EVACUATION ROUTES
- 50' CONTOURS
- STREAMS
- WETLANDS
- SUGARBUSH LONG TRAIL EASEMENT

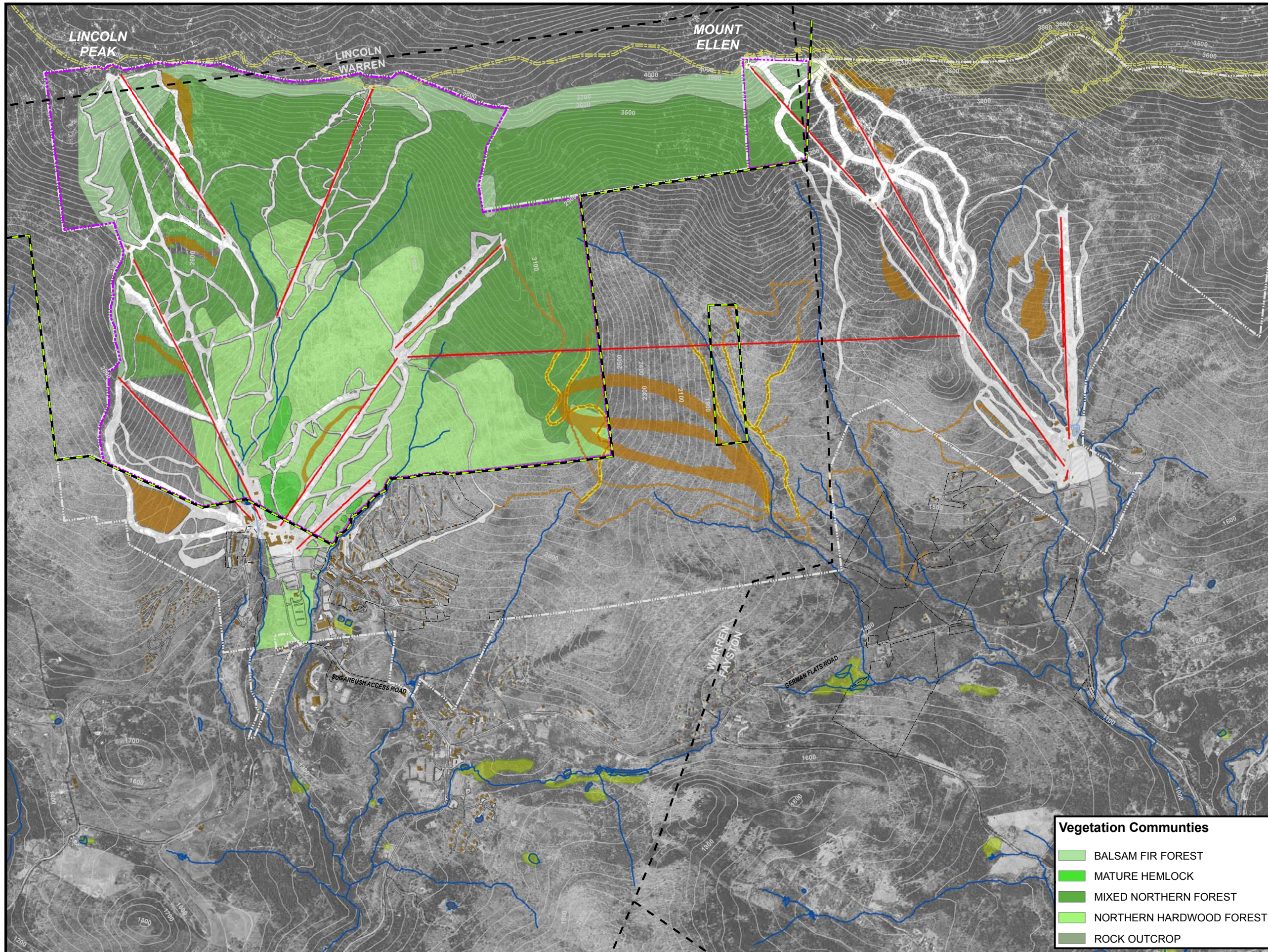
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Feet

Date Produced: June 2008

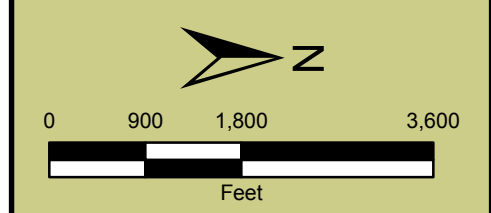
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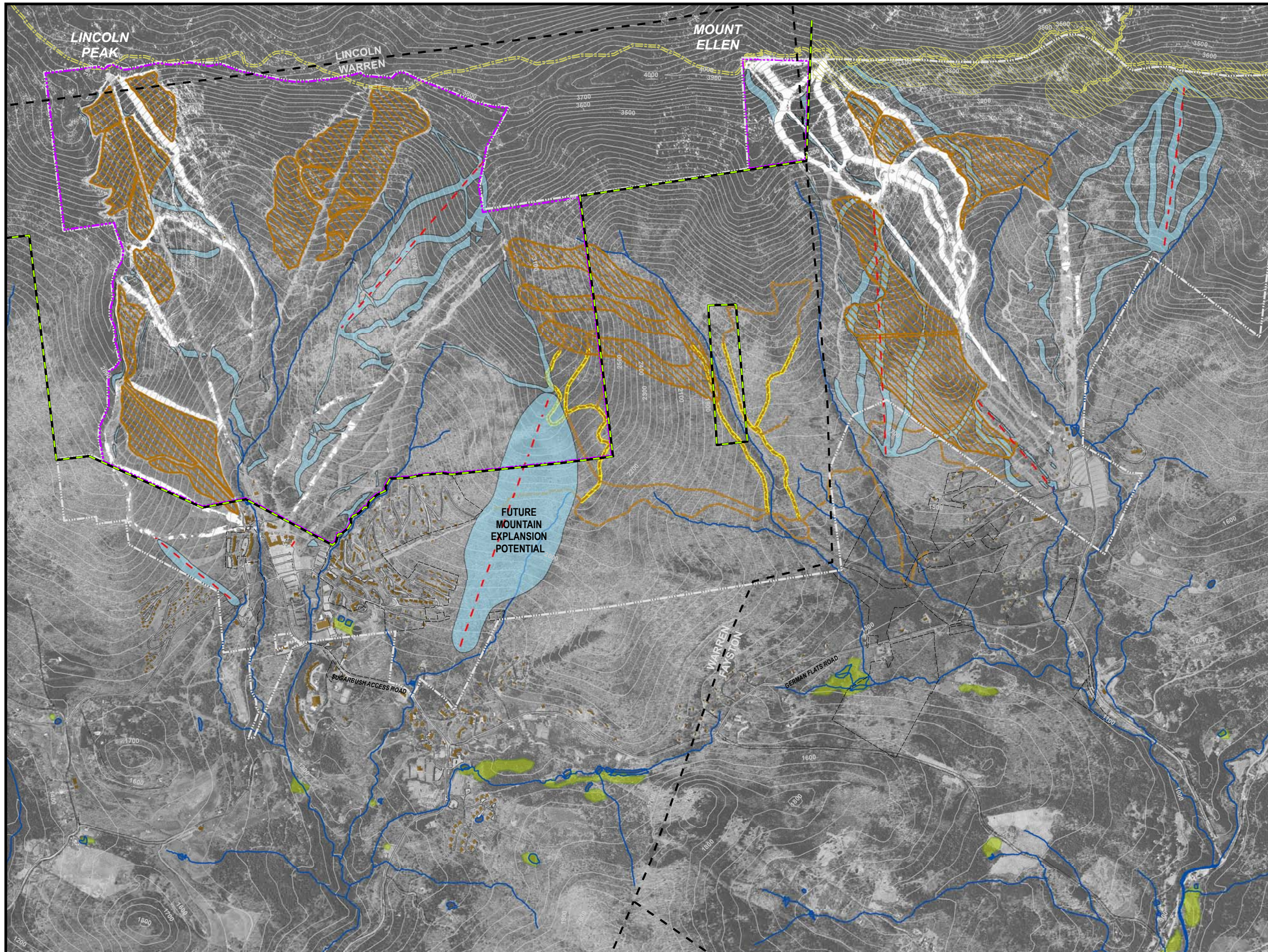
**Vegetation Management Plan
Figure 2
Existing Landcover**

- Legend**
- EXISTING TRAILS
 - EXISTING TREE SKIING
 - EXISTING BUILDINGS
 - EXISTING LIFTS
 - SUP BOUNDARY
 - SKI AREA BOUNDARY
 - SUGARBUSH BOUNDARIES
 - USFS
 - TOWN BOUNDARIES
 - LONG TRAIL
 - ROADS
 - WORK ROADS
 - EVACUATION ROUTES
 - 50' CONTOURS
 - STREAMS
 - WETLANDS
 - SUGARBUSH LONG TRAIL EASEMENT

- Vegetation Communities**
- BALSAM FIR FOREST
 - MATURE HEMLOCK
 - MIXED NORTHERN FOREST
 - NORTHERN HARDWOOD FOREST
 - ROCK OUTCROP



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SUGARBUSH

**Vegetation Management Plan
Figure 3
Proposed Facilities**

Legend

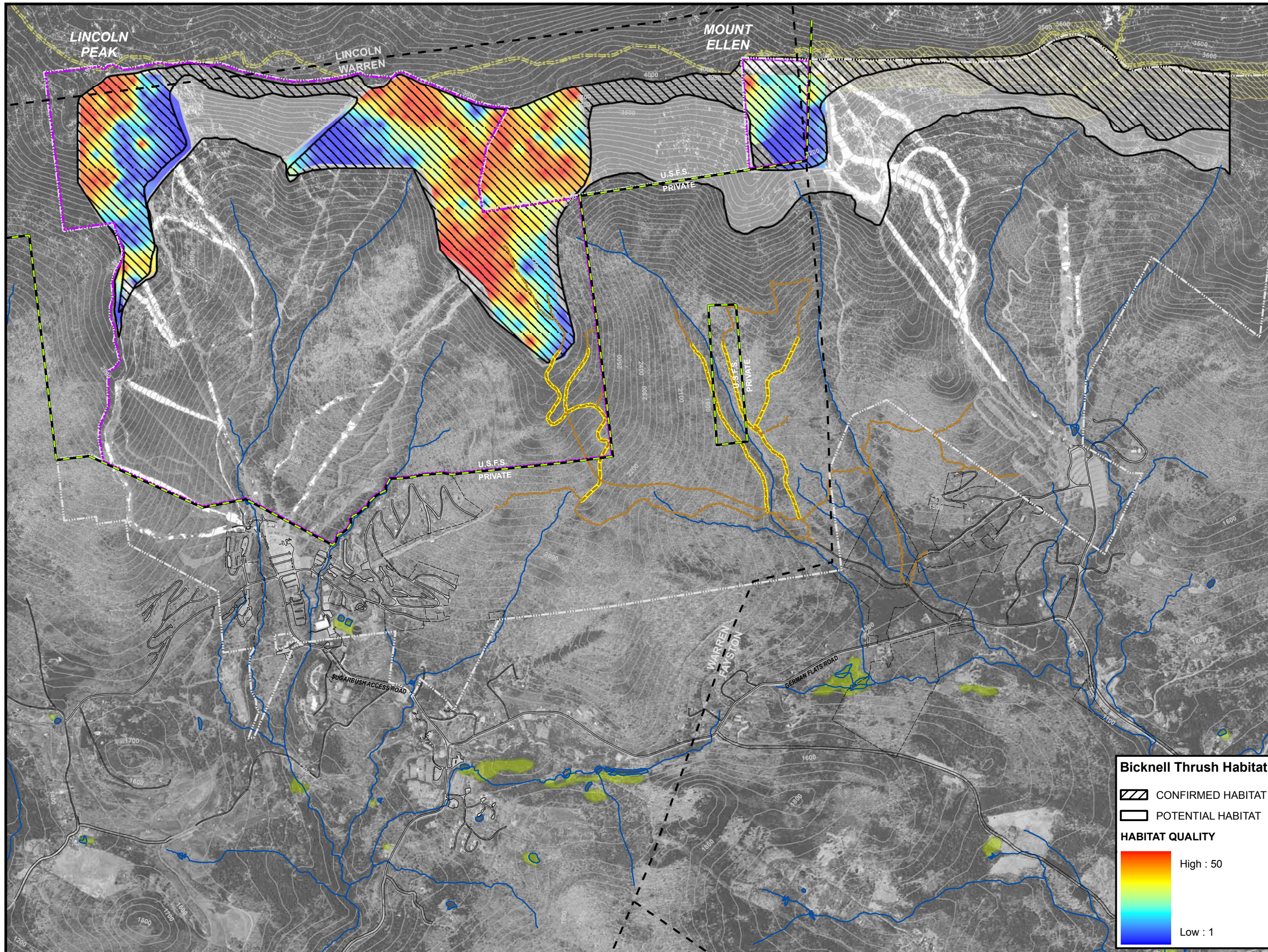
- EXISTING BUILDINGS
- PROPOSED TRAILS
- PROPOSED TREE SKIING
- PROPOSED LIFTS
- SUP BOUNDARY
- SKI AREA BOUNDARY
- SUGARBUSH BOUNDARY
- U.S.F.S.
- TOWN BOUNDARIES
- LONG TRAIL
- EXISTING ROADS
- EXISTING WORK ROADS
- EVACUATION ROUTES
- 50' CONTOURS
- STREAMS
- WETLANDS
- SUGARBUSH LONG TRAIL EASEMENT

0 900 1,800 3,600

 Feet

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SUGARBUSH
 Vegetation Management Plan
Figure 4
 Bicknell's Thrush
 Habitat Assessment

Legend

- SUP BOUNDARY
- SKI AREA BOUNDARY
- SUGARBUSH BOUNDARY
- U.S.F.S.
- TOWN BOUNDARIES
- LONG TRAIL
- ROADS
- WORK ROADS
- EVACUATION ROUTES
- 50' CONTOURS
- STREAMS
- WETLANDS
- SUGARBUSH LONG TRAIL EASEMENT

Bicknell Thrush Habitat

- ▨ CONFIRMED HABITAT
- ▭ POTENTIAL HABITAT

HABITAT QUALITY

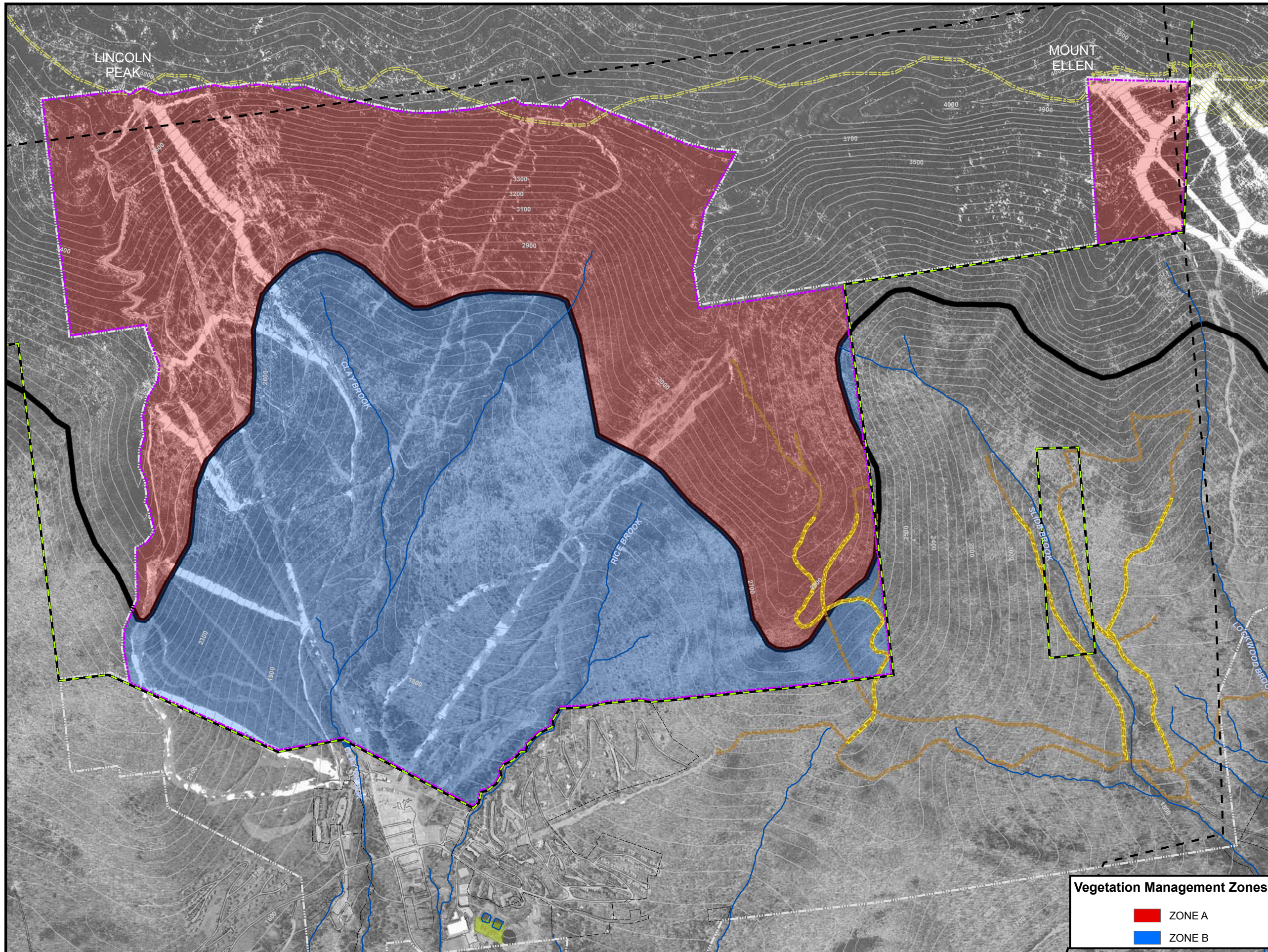
High : 50

Low : 1

0 900 1,800 3,600
 Feet

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 1955



Vegetation Management Zones

- ZONE A
- ZONE B

SUGARBUSH

**Vegetation Management Plan
Figure 5
Vegetation Management Zones**

Legend

- SUP BOUNDARY
- SKI AREA BOUNDARY
- SUGARBUSH BOUNDARY
- U.S.F.S.
- TOWN BOUNDARIES
- LONG TRAIL
- ROADS
- WORK ROADS
- EVACUATION ROUTES
- 2,700' CONTOUR
- 50' CONTOURS
- STREAMS
- WETLANDS
- SUGARBUSH LONGTRAIL EASEMENT

N

0 600 1,200 2,400
Feet

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1955



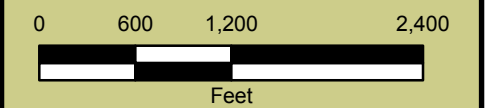
Vegetation Management Plan
Figure 6
Vegetation Management
Prescriptions
Zone A

Legend

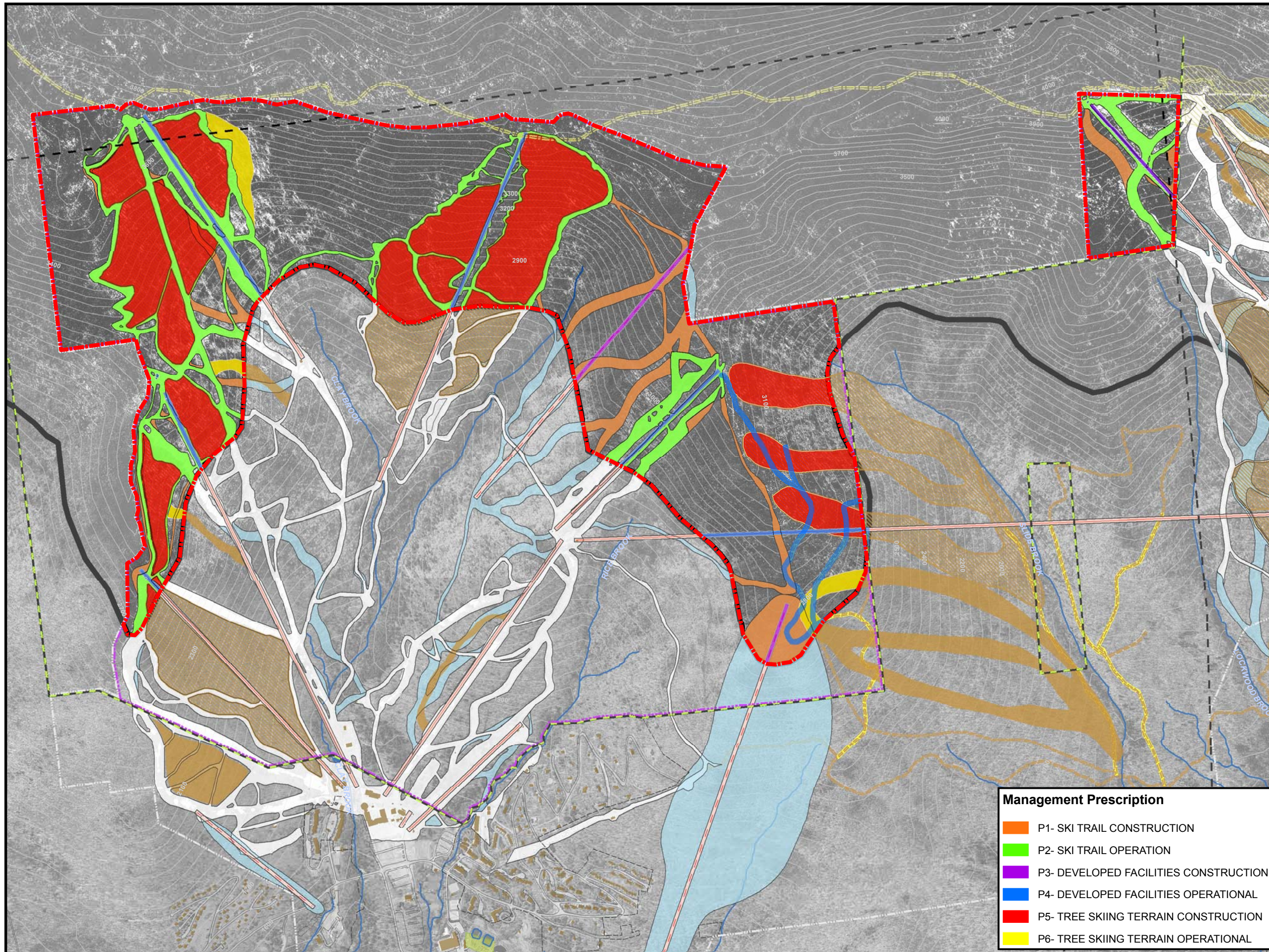
- ZONE A
- EXISTING TRAILS
- PROPOSED TRAILS
- EXISTING TREE SKIING
- PROPOSED TREE SKIING
- BUILDINGS
- EXISTING LIFTS
- PROPOSED LIFTS
- SUP BOUNDARY
- SKI AREA BOUNDARY
- SUGARBUSH BOUNDARY
- U.S.F.S.
- TOWN BOUNDARIES
- LONG TRAIL
- ROADS
- WORK ROADS
- EVACUATION ROUTES
- 2,700' CONTOUR
- 50' CONTOURS
- STREAMS
- WETLANDS
- SUGARBUSH LONGTRAIL EASEMENT

Management Prescription

- P1- SKI TRAIL CONSTRUCTION
- P2- SKI TRAIL OPERATION
- P3- DEVELOPED FACILITIES CONSTRUCTION
- P4- DEVELOPED FACILITIES OPERATIONAL
- P5- TREE SKIING TERRAIN CONSTRUCTION
- P6- TREE SKIING TERRAIN OPERATIONAL



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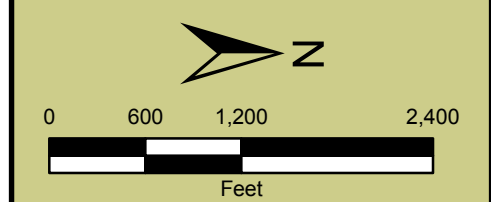




**Vegetation Management Plan
Figure 7
Vegetation Management
Prescriptions
Zone B**

- Legend**
- ZONE B
 - EXISTING TRAILS
 - PROPOSED TRAILS
 - EXISTING TREE SKIING
 - PROPOSED TREE SKIING
 - BUILDINGS
 - EXISTING LIFTS
 - PROPOSED LIFTS
 - SUP BOUNDARY
 - SKI AREA BOUNDARY
 - SUGARBUSH BOUNDARY
 - U.S.F.S.
 - TOWN BOUNDARIES
 - LONG TRAIL
 - ROADS
 - WORK ROADS
 - EVACUATION ROUTES
 - 50' CONTOURS
 - STREAMS
 - WETLANDS
 - SUGARBUSH LONGTRAIL EASEMENT

- Management Prescription**
- P8- SKI TRAIL CONSTRUCTION
 - P9- SKI TRAIL OPERATION
 - P10- DEVELOPED FACILITIES CONSTRUCTION
 - P11- DEVELOPED FACILITIES OPERATIONAL
 - P12- TREE SKIING TERRAIN CONSTRUCTION
 - P13- TREE SKIING TERRAIN OPERATIONAL



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