

Hemlock-Hardwood Swamp Communities

Hemlock-Hardwood Swamps within the Green Mountains usually occur as small wetland communities in saddles or benches in areas with variable topography and shallow bedrock. There are currently four of these sites mapped in the study area; three are considered to be locally significant (wetland #s 608, 609, 621) and one is considered to be state significant (wetland #627). The first three occur on or near the town-owned land near Irasville (the Waldron parcel). Only one of these sites was visited (wetland #621) due to lack of landowner permission for the others. Given the topography of the area, there may be more of these small swamps in this vicinity. These swamps are dominated by a mixture of hemlock (*Tsuga canadensis*) and red maple. Scattered shrubs of red spruce, hemlock and red maple are found over a dense cover of herbaceous plants dominated by sensitive fern and cinnamon fern. Standing water is common in the hollows of the varied microtopography. Though small, the swamp visited was in very good condition and showed no signs of human disturbance or invasive plant colonization.

The state significant Hemlock-Hardwood Swamp (wetland #627) is located southeast of the above mentioned swamps in Camel's Hump State Forest. This swamp is approximately 7 acres and sits in the saddle just north of Kew Hill. The vegetation is similar to that described above. Standing water is common in the hollows and the soils are composed of very deep organic peats. The swamp appears to be in very good condition. There is a hiking trail which runs near the swamp, but does not affect the condition of the community. This is a C-ranked example of this community type (See Appendix 1, Section F for discussion of ranking).

These examples of the Hemlock-Hardwood Swamp appear to be good examples of a community that is relatively uncommon in the heart of the Green Mountains. The most significant function that these swamps perform is that of wildlife habitat. These wetlands offer habitat and food for a wide variety of species including deer, moose, bear, spotted salamanders, wood frogs, green frogs, and possibly the uncommon four-toed salamander.

Hemlock Swamp Management Recommendations

The hemlock swamps identified in the study area are generally well buffered by surrounding upland forest in their current condition. Development in or near these sites does not appear to be a threat.

100' Buffer Zone: A minimum 100' buffer zone should be maintained around these swamps from any development.

Logging Restrictions: It is recommended that logging not occur within the swamp or within a 50' buffer of the swamp edge.

3.0 Vernal Pools

Vernal pools are seasonal wetlands that typically contain water during the wet spring months but become dry as the summer progresses. These isolated wetlands typically occur under a forest canopy, lack fish, and provide habitat to a wide variety of wildlife.

A total of 15 potential vernal pool locations were identified during the remote inventory. This includes two pools that were identified during the public meeting, two pools from the mapping of state land and one pool from the State of Vermont Department of Environmental Conservation's bio-assessment study of pools throughout Vermont. During the course of the field work, 7

potential pools were added to this list. The final map (provided in the appendix) shows the presence of 22 vernal pools in the study area. All but 2 of these pools (those identified during the town meeting) received a field visit to confirm their presence.

As can be seen from the vernal pool data summary table in Appendix 2 and attribute table information in Appendix 3, each pool that was visited received a state and local significance assessment. This ranking is based on the faunal number and diversity that a particular pool supports as well as the hydroperiod of the pool (See Appendix 1, Section B for discussion of methodology). The hydroperiod is an important measure of the reliability of a particular pool for animals that require long development stages for successful reproduction. The pools that were ranked as High for local significance were also considered to be state significant. While the “Low” and “Moderate” pools are likely not as reliable and diverse as the high ranking pools, they should still be considered locally significant. As such, each of the ranked vernal pools is included in the following section on management recommendations.

Vernal Pool Management Recommendations

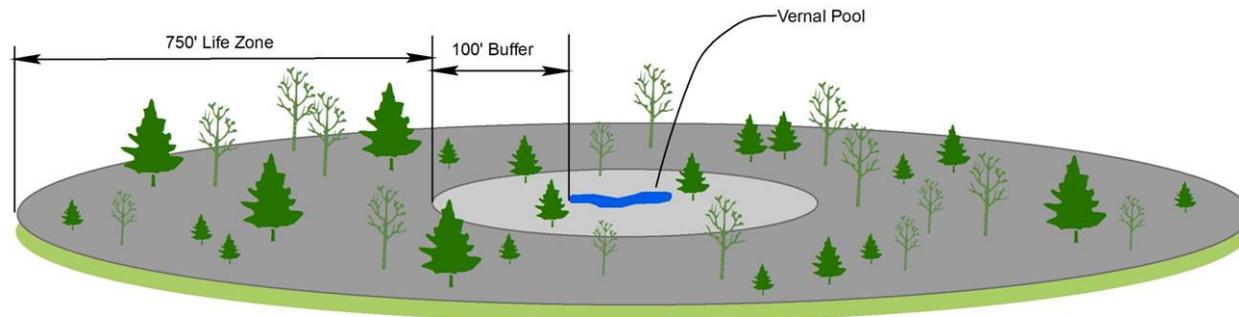
As can be seen on the attached map and Figure 5 below, there are two buffer areas around each vernal pool. These buffer distances are based on the work of Semlitsch (1998), Calhoun and Klemens (2002), Calhoun and deMayandier (2004). The first buffer distance is 100’ in diameter and is important because the density of amphibians within this area is very high both during the spring breeding period and the fall juvenile dispersal period. The nature of the forest immediately around the vernal pool has a tangible

affect on the nature of the pool itself. Shading from surrounding trees can drastically prolong the hydroperiod of a pool. In addition, leaf litter that enters the pool from the surrounding

trees forms the basis for the food chain in the vernal pool ecosystem.

The condition of the forest in this 100’ buffer zone is therefore strongly linked to the condition of the vernal pool itself. For this reason, it is recommended that the vernal pool envelope be managed in a way that will not interfere with the functioning of the vernal pool. This includes maintaining a complete forested cover within this envelope. Light thinning of forest trees is, in most cases, acceptable but should come no closer than 25’ to the pool’s edge. Since many amphibians require a dense leaf litter on

Figure 5. Vernal Pool Buffer Zones



the forest floor with un-compacted soils, logging should occur when the soils are frozen and there is adequate snow cover. The creation of ruts in this area can often disrupt the hydrology of the nearby vernal pool. Development and other barriers to amphibian movement should be avoided within this buffer zone.

The next buffer shown on the attached map is calculated at 750' from the vernal pool habitat. This is termed the "amphibian life zone" or the "critical terrestrial habitat". As we have seen, amphibians that breed in vernal pools spend most of their adult lives in the forests surrounding their natal pools. These amphibians require a forest with dense leaf litter, decomposing woody debris, un-compacted soils, and adequate canopy cover. If logging is to occur in this area, it should occur in the winter when the ground is frozen and there is adequate snow cover. Ruts that occur in the life zone can fill with water and create population sinks as amphibians lay eggs in the ruts and never reach the more reliable vernal pool. Compaction of the soil can also result in direct loss of habitat for mole salamanders.

Calhoun and Klemens (2002) recommend maintaining 75% forested cover within this life zone to retain adequate habitat for forest dwelling amphibians.

4.0 Upland Natural Communities

A preliminary map of upland natural communities was created as part of the inventory process; see Appendix 1, Section C for methodology. Table 5 shows the summary statistics of the upland natural communities mapped in the study area. As can be seen from Table 5 above there are 271 occurrences of 13

different natural communities comprising a total of 33,862 acres. All of these types, with the exception of the Plantations, are considered to be natural communities according to Thompson and Sorenson (2000). Due to difficulties associated with mapping communities on a town-wide scale, the total number of acres presented above should be considered an approximate number. Small patches of forest were generally not mapped while some of the larger forests may contain open fields and residential development. The upland natural community map (included in the appendix) should be considered a preliminary map. The sites that were deemed to be significant were mapped more accurately based on field work and remote sensing. In all cases, however, boundary lines represent gradual transitions between natural communities and should not be considered discrete margins of the community. A detailed data summary table is provided in Appendix 2.

State and Locally Significant Upland Natural Communities

The methodology for determining state significance is based on the Vermont NonGame and Natural Heritage guidelines and is detailed in Section C of Appendix 1. Seventy-one (71) different occurrences of locally and state significant upland communities were discovered during the course of the field work. Each of these occurrences is briefly described below, and summarized in Table 6. For the most part, these determinations are based on field work conducted as part of this inventory. For the larger matrix forests (especially those on state land) information from the state ecologist was used in the assessments. For most of the larger communities, assessments were made only on a portion of the community for which landowner permission was obtained.

Table 5. Upland Natural Community Summary Data

Community Type	Number of Occurrences	Average Acreage	Total Acreage
Boreal Outcrop	3	3.93	11.78
Hemlock Forest	17	109.05	1853.85
Hemlock-Northern Hardwood Forest	66	107.30	7081.79
Hemlock-Red Spruce Forest	11	7.33	80.65
Lowland Spruce-Fir Forest	12	27.43	329.11
Montane Spruce-Fir Forest	24	80.07	1921.79
Montane Yellow Birch-Red Spruce Forest	28	114.03	3192.86
Montane Yellow Birch-Sugar Maple-Red Spruce Forest	1	39.24	39.24
Northern Hardwood Forest	43	291.10	12517.51
Plantation	9	27.48	247.30
Red Oak-Northern Hardwood Forest	1	9.39	9.39
Red Spruce-Northern Hardwood Forest	36	164.83	5934.01
Rich Northern Hardwood Forest	14	21.56	301.87
TOTAL	271	--	33862

Table 6. Summary of Locally and State Significant Upland Natural Forest Communities

Natural Community	# of Sites	Total Acres	Locally Significant	State Significant
Montane Spruce-Fir	13	1769	Yes	Yes
Montane Yellow Birch Red Spruce	27	3050	Yes	Yes
Montane Yellow Birch Sugar Maple Red Spruce	1	39	Yes	Yes
Northern Hardwood	13	7838	Yes	Yes
Hemlock Northern Hardwood	8	292	No	Yes
Hemlock Forests	4	1140	Yes	Yes
Rich Northern Hardwood	1	99	Yes	Yes
Red Spruce-Northern Hardwood	3	14	Yes	Yes
Red Oak-Northern Hardwood	1	9	No	Yes

Montane Spruce-Fir Forests

The Montane Spruce-Fir forest is a high elevation, conifer dominated forest that is common on the peaks of the green mountains. These forests are dominated by Red Spruce (*Picea rubens*), balsam fir (*Abies balsamea*), and paper birch (*Betula papyrifera*). Mountain ash (*Sorbus spp.*) and mountain maple (*Acer spicatum*) are common in the shrub layer. The herbaceous layer is typically dominated by boreal herbs such as bunchberry (*Cornus canadensis*), Canada lily (*Maiathemum canadense*) and goldthread (*Coptis groenlandica*). These communities are characterized by steep slopes, shallow soils and frequent outcroppings of bedrock.

There are two occurrences of this forest that were considered state significant within the study area. This first occurrence includes polygon #s 2-3, 711-714, and 749 and encompasses a long ridge line from the Lincoln Gap in the south up to the Huntington Gap to the north. Because this is part of a state-wide mapping effort, much of this state significant occurrence sits outside of the study area.

The second significant occurrence of this type includes the montane forest north of the Huntington Gap up to Burnt Rock Mountain (#s 716, 719, 721, and 18). The portion of this occurrence within the study area is the southern end of a large forest that runs north to Camel's Hump.

Both of these large forests (together comprising over 1700 acres within the study area alone) are a significant feature in the landscape of the Green Mountains. Because of their size and relative remoteness, large-scale ecological processes are able to occur with only limited (or no) human interference.

These sites were not visited during the field work of this inventory. The condition of the community for these sites is based on field work done in Camel's Hump state forest and elsewhere.

Montane Yellow Birch-Red Spruce Forest

This type occurs as a transitional community between the Montane Spruce-Fir Forests at higher elevations and the Northern Hardwood Forests at lower elevations. The vegetation is typically intermediate between the two types with montane species intergrading with hardwood species.

There are three occurrences of this type within the study area that are considered state significant. The first one includes the sub-montane forests around Scragg Mountain in the southeastern part of the study area. The other occurrences flank the Montane Spruce-Fir Forests along the spine of the Green Mountains along the western part of the study area.

These sub-montane forest can be fairly remote sites with little human disturbance. Large scale ecological processes generally drive these communities. Like the montane forest, they also include areas outside of the study area.

These sites were considered to be state significant because of their size, the relatively undisturbed nature of the community and the quality of the landscape. None of these sites were visited during this inventory. The determination of significance is taken from field visits from state personnel in Camel's Hump State Forest and elsewhere.

Northern Hardwood Forests

The Northern Hardwood forest is a matrix natural community that occurs throughout the state. It can be found in large tracts and occur as a "background" natural community. Three occurrences of this community in the study area were found to be significant examples of this type.



Figure 6. Northern Hardwood Forest (#177)

The largest example of this community in the study area (and the region) is in Fayston and starts at the Appalachian Gap Road and runs north to the Camel's Hump area. This large forest consists of 5600 acres within the study area and approximately four times that outside of the study area. This community is considered to be a state significant example of this type.

The second largest northern hardwood forest in the study area is also a state significant occurrence. This forest is in the eastern

part of Waitsfield but continues into Northfield, Warren and Roxbury. It consists of 1600 acres within the study area and twice that amount outside of the study area.

The third example, a locally significant forest, is situated in the valley between Mt. Waitsfield and Bald Mountain and runs north into Moretown (# 158-9). This forest appears to be in very nice condition, contains localized areas of enrichment and is well buffered by surrounding natural communities. Within the study area, this forest is approximately 540 acres.

Hemlock-Northern Hardwood Forests

There are two examples of Hemlock-Northern Hardwood Forests in the study area that are considered to be locally significant. One occurs as a series of small patches on knolls and steep slopes around Deer Brook and French Brook in Fayston (#s 125, 135-7, 722-3, and 732). The other occurrence is a larger contiguous forest south of the Center Fayston Road (#176). Both of these occurrences appear to be in very nice condition and represent the best examples of this community type that was seen in the study area.

Hemlock Forests

Unlike the above mentioned communities, the Hemlock Forests are not matrix forests. Rather, they typically occur in patches on the landscape surrounded by matrix forest blocks. The largest and most significant Hemlock Forest visited during this inventory sits partially on the Waitsfield town property (Waldron parcel). Only the northern part (on town owned land) of this community was visited. This site appears to be in very good condition and displays a wide variety of topographic and ecologic conditions. Its condition and size make it a state significant example of a

Hemlock Forest. This ranking, coupled with the presence of wildlife habitat features, vernal pools and wetlands make this area an ecological gem in the study area.



Figure 7. Hemlock Forest (#52)

Two other very nice Hemlock forests can be found on either side of Number Nine Road in Fayston (#s 149 and 150). While surrounded by roads and rural development, these sites contain some very nice forest habitat in good condition. They occur in a typical Hemlock forest setting: on slopes and along the banks of high-order streams. These two sites are considered locally significant for their condition and size.

Rich Northern Hardwood Forest

In the Central Green Mountains, Rich Northern Hardwood Forests usually occur as small patches of forest surrounded by typical Northern Hardwood forests. As part of mapping of

Camel's Hump State Forest, the state mapped and assessed a large, nearly 100 acre stand of Rich Northern Hardwood Forest (#643). This site is unusual for this area in its large size and undisturbed nature. This site was not visited as part of this inventory.



Figure 8.
Rich Hardwood
Forest (#177)

Red Spruce-Northern Hardwood Forest

One occurrence of this type was identified in the study area as being state significant. This occurrence exists as a series of three small sites on the ridges and knolls on the slope south of Deer Brook in Fayston (#105-6, and 138). Like the Hemlock-Northern

Hardwood Forests nearby, these sites appear to be in very good condition and are well buffered by the surrounding natural communities.

Red Oak-Northern Hardwood Forest

Only one example of this type was discovered during the field inventory. This site sits on a relatively steep slope with shallow soils north of Bragg Hill Road (#158). Occasional bedrock outcrops create canopy openings which add to the plant diversity of the site and make it reminiscent of much larger oak forests or woodlands in southern Vermont. Though small, this site contains some nice large scattered red oak trees which are uncommon in the study area.



Figure 9. Red Oak-Northern Hardwood Forest (#177)

Management Recommendations for Significant Upland Communities

Many of the natural communities described above occur as “matrix” communities on the landscape. This means that they can occur as very large examples that often form the background natural communities on the landscape. Therefore, in order for a particular site to be considered state significant it must represent some of the best examples in the state. The site must be a very large un-fragmented example, be in overall good condition (lack of exotics/invasives or other major, human-caused disturbance) and be well buffered by other undisturbed natural communities.

Because of the large size of these communities, the management recommendations for maintaining their integrity are very different than those for smaller patch communities (see below). With matrix communities it is not an individual acre or parcel that is as important as the entire forest as a whole. Maintaining the integrity of these communities is more a matter of maintaining the un-fragmented nature of the community and limiting human encroachment into the interior of these sites. For this reason, infringement by residential development on the edges of these communities is not a cause for concern as much as the development of large fragmenting features into the heart of the community.

Unlike many wetland communities or smaller patch communities, matrix and larger patch communities tend to be more ecologically resilient. Active forest management including a wide variety of forestry practices generally does not threaten the ecological integrity of these sites. Many of these practices can mimic natural disturbance regimes and provide valuable wildlife habitat. Nearly all manners of recreation can be a part of the overall management plan for these sites.

The recommended management for patch communities (such as Hemlock Forests and Rich Northern Hardwood Forests) is similar to that presented above for the matrix communities. It differs primarily in the matter of scale. Large fragmenting developments that cut across or reach into the center of these sites should be discouraged. Some degree of encroachment around the margins of these sites is tolerable as long as it does not impact or degrade a significant section (>20%) of the community. If some impact to these communities is inevitable, development that is clustered near the edges are preferable to those that are scattered over a wider area.

Because they are generally smaller than patch communities, active forest management can have greater impact on the overall condition rank of patch communities. Whereas in matrix communities, an area of clear-cut may not affect the overall rank of the community, patch communities may be significantly affected by these cuts. If logging is to occur in these significant patch communities, selective logging is generally recommended over small clear-cuts.

5.0 Rare, Threatened and Endangered Species

Historical locations of rare plants and animals in the towns of Waitsfield and Fayston were obtained from the Vermont Non-Game and Natural Heritage Program (NNHP). Sites found within the study area were targeted for a field visit to determine the current status of the population in question. In addition, areas containing potential habitat for these species were targeted for a field visit to determine if other populations of these species exist.

There are currently no known rare species occurrences within the study area. Field visits to likely habitats were conducted as part