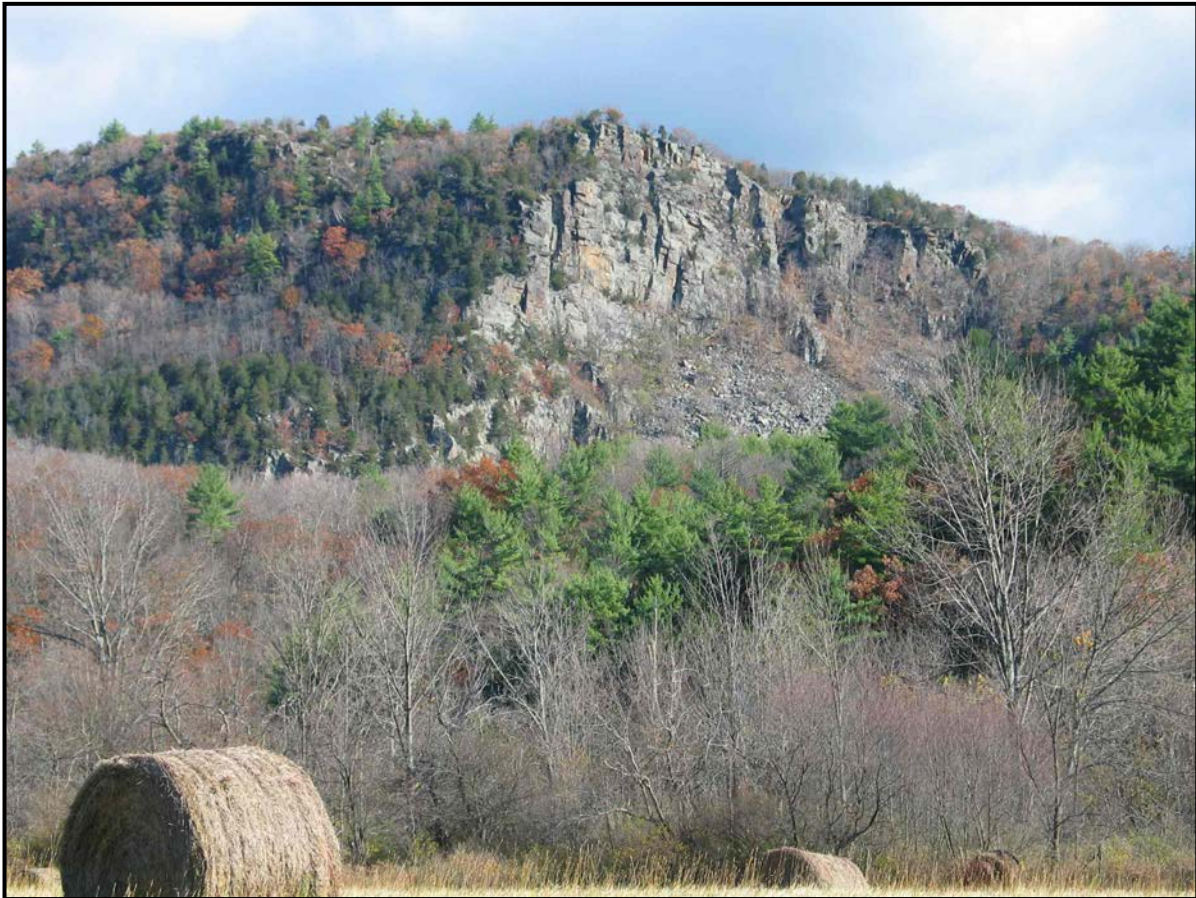


**Natural Communities of the
Helen W. Buckner Memorial Preserve
and Adjacent Lands
at Bald Mountain and Austin Hill**

West Haven, Vermont



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for
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In addition to The Nature Conservancy, there are several other landowners on the Bald Mountain peninsula. Thanks to these owners for permission to visit their land as part of this project and for their continued good stewardship of the area

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Background

At nearly 3,800 acres, the Helen W. Buckner Memorial Preserve at Bald Mountain in West Haven is The Nature Conservancy's largest Vermont preserve. It is of exceptional regional significance for the diversity of exemplary natural communities and the wide array of rare plant and animal species that have been documented here. The peninsula on which Bald Mountain occurs is bounded by the Poultney River and the southern end of Lake Champlain. The area has a rich cultural history that includes long use by Native Americans and farm settlement in the 1790s. With the combination of forested hills, dramatic cliffs, slow winding river, open lake and marshes, and agricultural fields, the Buckner Preserve is a beautiful and scenic place.

Numerous botanists, zoologists, ecologists, and naturalists have been attracted to the Bald Mountain peninsula over the years and have contributed to our current knowledge about this important natural area. The earliest record for peregrine falcon (*Falco peregrinus*) that is included in the Nongame and Natural Heritage Program (NNHP) database is from 1914. Early records for the rare Douglas knotweed (*Polygonum douglasii*) and hairy honeysuckle (*Lonicera hirsuta*) are from the 1930s and records for timber rattlesnake (*Crotalus horridus*) and five-lined skink (*Eumeces fasciatus*) are from 1959 and 1962, respectively. As of May 2006, there are 89 records in the Heritage Program database of rare, threatened, and endangered species and significant natural communities occurring on the Bald Mountain peninsula and in the adjacent Poultney River. This is a very high concentration! In fact, based on current Heritage Program records for the number of rare and uncommon plant and animal species documented per town, the town of West Haven (99 species) is third in the state, with only Colchester (139 species) and Burlington (109 species) having more species documented.

Project Purpose

The purposes of this project were to map, describe, and determine significance ranks for the natural communities on the Bald Mountain peninsula, and especially the Helen W. Buckner Memorial Preserve. This process includes applying standard Heritage Program/NatureServe methodology to identify element occurrences for natural communities, to link these natural community types to National Vegetation Classification associations (NatureServe 2006), and to enter natural community element occurrence records into the Heritage Program database (BIOTICS). These steps make it possible to relate natural community element occurrences in the Heritage Program database to portfolio targets established by The Nature Conservancy through the ecoregional planning process. An additional purpose was simply to add to the already abundant information on the ecological significance of the Bald Mountain peninsula and the Helen W. Buckner Memorial Preserve.

Physical Setting

Location

The Buckner Preserve is located on a peninsula in the southwestern corner of West Haven that is surrounded by New York State. The peninsula is bounded to the west and south by Lake Champlain and to the east by the Poultney River. In addition to the Buckner Preserve owned by The Nature Conservancy, there are also several parcels of land that are privately owned on the peninsula and Ward Marsh Wildlife Management Area that is owned by the Vermont Fish and Wildlife Department.

Climate

The climate at the Buckner Preserve is typical of the temperate conditions of the Champlain Valley. The growing season is over 130 days with warm summers and warmer winter temperatures than most other locations in Vermont. Not only is it warm, but it is also dry, with precipitation of only about 30 inches per year, as compared to over 70 inches that fall on the highest part of the Green Mountains. The warm, dry climate favors oaks, hickories, and other species that dominate the landscape to our south.

Topography

Bald Mountain dominates the northern half of the Preserve. The summit of the mountain rises to 1,060 feet. There are cliffs and steep slopes dropping 600 feet on the west side of Bald Mountain to elevations of 300 to 400 feet, with more gentle slopes on clay soils and rock outcrops down to Lake Champlain. East of Bald Mountain there are gradual slopes to the east extending down to elevations near 100 feet along the shoreline of the Poultney River. Sheer cliffs up to 400 feet high, the most dramatic on the Preserve, occur on the southwest side of Bald Mountain.

Austin Hill is the dominant topographic feature on the southern portions of the peninsula. Its rounded summit rises to an elevation of 641 feet. Vertical cliffs and talus slopes occur on the south side of Austin Hill, just north of Lake Champlain. There are generally steep slopes on the west side of Austin Hill and gentle slopes on the east side.

Bedrock Geology

The dominant bedrock that forms Bald Mountain and Austin Hill is Precambrian age gneiss and quartzite (Doll et al. 1961). This ancient rock is the same that forms the Adirondack Mountains to the west. This rock type is weather resistant and is generally acidic and low in carbonates, although, based on preliminary mapping by the Vermont Geological Survey, there are small imbedded bands of calc-silicate rock that provide more available calcium to vegetation (Marjorie Gale 2006, personal communication). The presence of this calc-silicate on Bald Mountain and possibly thin layers of schist and marble in the cliffs on the south side of Austin Hill (Fisher 1984) help to explain the presence of some calcium-loving plants on what would otherwise appear to be an acidic, nutrient poor setting.

There is a dramatic "normal" fault on the west side of Bald Mountain and Austin Hill – the land surface to the west of this fault line drop significantly in the past creating the very steep western slopes and cliffs. West of this fault line are carbonate rich rocks – limestone, dolomite, and

marble. It is interesting to note that these same carbonate rich rocks once covered the summit of Bald Mountain and Austin Hill, but these "soft" rocks were eroded away over the millennia, leaving the "hard" Precambrian gneiss and quartzite now exposed.

In addition to the dramatic normal fault on the west side of Bald Mountain, there are two less dramatic bedrock faults that occur on the Buckner Preserve. Running northwest to southeast and generally east of the Bald Mountain summit is a steep-sided valley through which Big Hollow Brook flows. The other fault runs north to south and is located to the east of the summit of Austin Hill. This fault has also formed a narrow valley through which an unnamed stream drains to the south over the Austin Hill cliffs. This fault is clearly visible on the black-and-white orthophotos and on the color-infrared photos.

Surficial Geology and Soils

On the summits and east slopes of Bald Mountain and Austin Hill there is very little till deposited and the soils are shallow-to-bedrock and are well drained to excessively well drained. The three soil types mapped in complexes in these areas are Taconic, Hubbardton, and Macomber (Ferguson, NRCS 1998). The Taconic and Hubbardton soils are dominant on Bald Mountain and generally less than 10 inches deep to bedrock. There are more Macomber soils to the east of Austin Hill. Depth to bedrock in these soils can be as much as 40 inches and they generally support a more mesic natural community.

To the west of Austin Hill and Bald Mountain and the normal fault there is more till overlying the carbonate rich bedrock. The soils on hills and ridges in this area are generally steep and rocky and are mapped as the Farmington-Galway-Galoo complex (Ferguson, NRCS 1998). These soils are generally well drained and have much more available calcium than found in the Taconic-Hubbardton-Macomber complex soils.

Fine sediments, deposited in the former glacial Lake Vermont, cover the lower elevations of the Buckner Preserve near Lake Champlain and the Poultney River. The dominant soils are the very poorly drained Livingston silty clay loam, the somewhat poorly drained Kingsbury silty clay loam, and the moderately well drained Vergennes clay (Ferguson, NRCS 1998). These are all soils characteristic of mesic and wet clayplain forests.

Alluvial soils occur in the depositional floodplains adjacent to the Poultney River. These soils vary in their texture and drainage class, but generally all support floodplain forest communities. The soils include the well drained Tioga fine sandy loam, the moderately well drained Middlebury loam, and the poorly drained Rippowan fine sandy loam and Limerick silt loam (Ferguson, NRCS 1998).

Surface Waters

Lake Champlain and the Poultney River play a major role in determining the natural communities within their floodplains. Lake Champlain reaches its highest water levels during the months of April, May, and June, when the average maximum level is over 100 feet. At these high lake levels, the Drowned Lands and associated floodplain forests are flooded, as are the marshes and floodplain forests adjacent the Poultney River as far north as Reed Marshes. The lake and river may also flood in the fall and winter, and the Poultney River may flood over its

banks at any time of year in response to a large rainstorm or snow-melting event. Whereas the flowing waters of the Poultney River deposit fine sediments on the river floodplain, Lake Champlain's floodwaters have little flow and therefore deposit very little sediment onto the lake floodplain.

There are only two named streams on the Buckner Preserve. Big Hollow Brook is a perennial stream that flows to the southeast through the steep-sided valley formed by a bedrock fault. This beautiful cold, clear stream has a bed of gravel and angular rocks and is heavily shaded by the forests of the valley floor. A smaller, unnamed stream flows to the northwest out of Big Hollow. Bumps Brook is another perennial stream that flows to the southeast into the marshes along the Poultney River. An unnamed perennial stream flows to the south through the bedrock fault east of Austin Hill and forms a high waterfall over the Austin Hill cliffs. There are several other perennial streams mapped on the USGS topographic map originating on the preserve. Most of these streams flow to the east over the gentle eastern slopes of Bald Mountain.

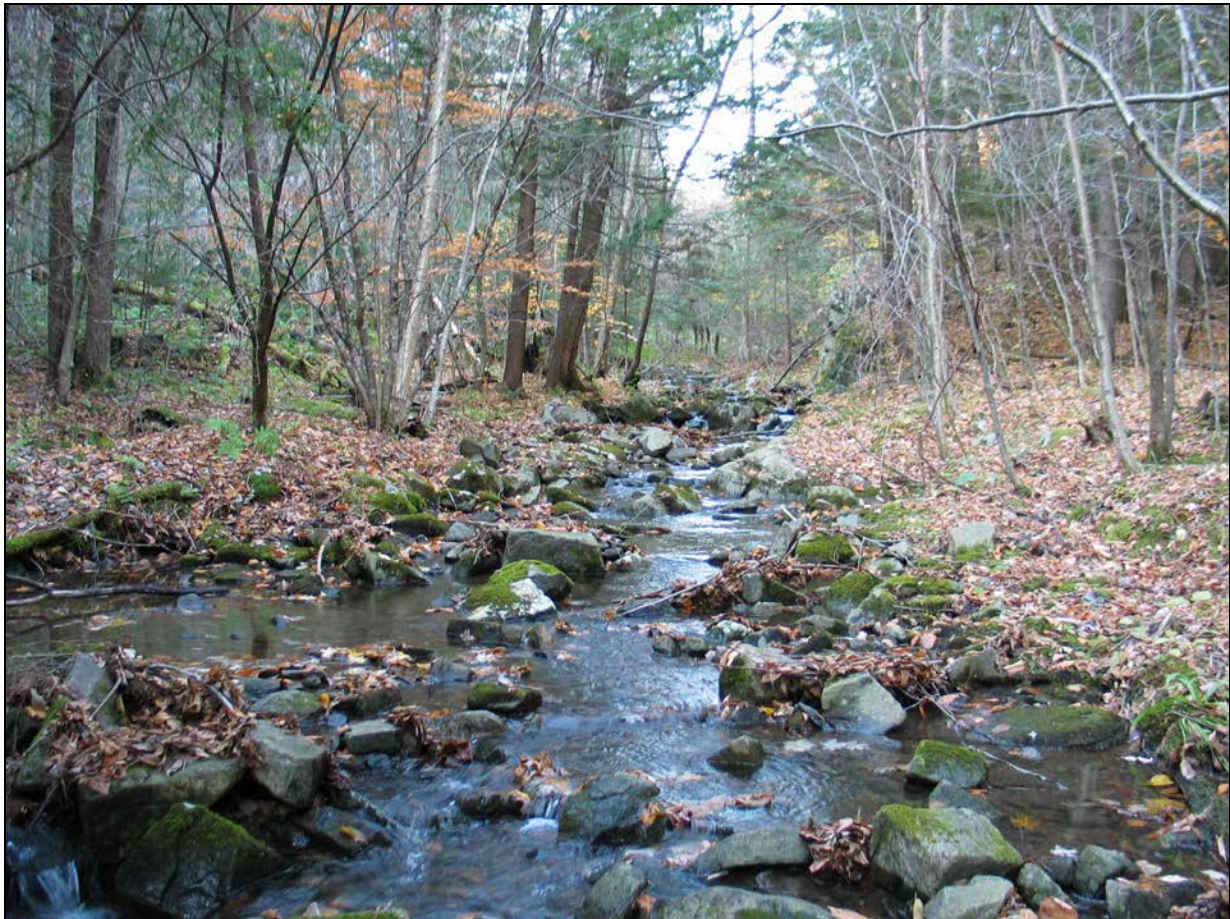


Photo 1. Big Hollow Brook, view upstream to the west.

Land Use History

Being adjacent to Lake Champlain and the Poultney River, the Bald Mountain peninsula was an important location for Native Americans and early European settlers to the area. Europeans settled this area in the 1790's. Two hundred years of land clearing, timber harvesting, and sheep and dairy farming followed. The Nature Conservancy purchased the 1,500-acre Galick family farm in 1989, and the preserve acreage is now 3,800 acres. Most of the land clearing for agriculture occurred in the highly productive, stone-free, clay and silty soils found at the lower elevations of the peninsula. Although most of the forests on the rocky uplands of the preserve were probably not cleared, they have been heavily logged over the years and some of the forest has been used as woodland pasture. Several fires have burned tens of acres in patches on the eastern slopes of Bald Mountain, primarily in the early 1980s, but fires also occurred in 1999 and 2002. The history of earlier fires is unknown.

Natural Communities

Methods

Work for this project occurred from June 2005 until June 2006. Field work took place from October 28 to December 1, 2005. Although this is a great time of year to walk and see through the woods for natural community mapping, it is not ideal for identifying many species of plants. Because of this, some of the species lists for natural communities are limited and I documented few rare species. The project area included the Bald Mountain peninsula, north to at least the northern extent of land owned by The Nature Conservancy.

The following steps were taken for this project.

1. Existing information was compiled on the natural communities of the Bald Mountain peninsula. This included existing community maps by Dietrich Erdmann (1995), Marc DesMeules (undated), and one unknown author, as well as community element occurrences from the NNHP BIOTICS database and written records from the many people that have visited the area and contributed their notes to the NNHP files.
2. A preliminary map of all discernable natural communities and cover types was produced. This map was made by on-screen digitizing using the 1:5,000 black and white digital orthophoto quads as the primary base map. Spring, leaf-off color infrared aerial photographs (1992, 1:40,000, NAPP) were viewed through a stereoscope and generally provided the most useful information for natural community mapping. Other important digital information that was used regularly during the mapping process included the USGS topographic maps, the 2003 NAIP orthophoto images (summer, leaf-on photography), the NRCS Rutland County Soil Survey data, and the National Wetlands Inventory data.
3. All polygons mapped during step 2 that had natural cover were given preliminary assignment to a natural community type based on the Vermont community classification system (Thompson and Sorenson 2005). Fields and other cover types resulting from intensive human land use were assigned to a cover type and also to an "expected natural community type", generally based on the soil type present. This latter category was used primarily to identify agricultural land that would be expected to revert to clayplain forest or floodplain

forest if abandoned. All polygons were also assigned a "high", "medium", or "low" priority for site visit based on the expected significance of the community or the confidence in identification of the mapped community type.

4. Site visits were conducted on six days and were set up to visit as much of the peninsula as possible during the time allotted for the project. Emphasis was placed on visiting "high" and "medium" priority polygons. Observation points were established to document boundaries between community types and the composition and condition of individual mapped community polygons. Observation points were numbered sequentially and locations were recorded with a Garmin 76S GPS unit by averaging satellite data to improve accuracy. Species composition and environmental data were collected at each observation point using a project field form or a field notebook. The location of observation points can be seen on Figure 2 at the end of this report and in the ArcMap files included with this report. Copies of the observation point field forms and field notes are stored with this report at NNHP offices and The Nature Conservancy offices.
5. Based on information collected during site visits, the boundaries and classification of community polygons were revised to produce a final natural community map (see Figure 1 at the end of this report and the ArcMap files included with this report). A "comments" field was added to the natural community attribute table so brief descriptions could be included. Also, observation point numbers and dates of site visits were added to the natural community map attribute table so that site visit information could be easily linked to individual polygons.
6. Using the criteria in NNHP natural community ranking specifications, natural community polygons of a particular natural community type were assigned to separate element occurrences (all polygons of the same element occurrence were assigned the same EO_code number in the attribute table), and each occurrence was assigned size, current condition, landscape context, and overall element occurrence ranks. Those natural communities and cover types that do not qualify as element occurrences due to small size or poor condition were not ranked in the attribute table of the project ArcMap theme.
7. Natural community descriptions were written for all of the natural community types identified on the Bald Mountain peninsula. For very large natural communities, variations in expression were described. Some community descriptions are based on single polygons or a very small example.
8. All new natural community and rare species element occurrence data will be entered in the NNHP BIOTICS database as soon as staffing time allows.

Natural Community Mapping Results – Locations of Information

The results of the natural community mapping work for this project are in several formats and locations.

Natural community mapping: See Figure 1 at the end of this report and project ArcMap theme.

Natural community descriptions: See below section in the report and observation point field notes and field forms.

Natural community element occurrences: Element occurrence numbers are used in the Natural Community Description section below. See the project ArcMap theme attribute table to relate an element occurrence number to all of the mapped polygons that make up that element occurrence.

Natural community ranking: See the Natural Community Description section below and the project ArcMap theme attribute table.

Natural community/National Vegetation Classification crosswalk: See project ArcMap theme attribute table (NVC_type).

Observation point locations: Observation Point numbers are used to describe locations in the Natural Community Description section below. See Figure 2 at the end of this report and project ArcMap theme (Obs_Pt).

Observation point data: See observation point forms and field notes in project files in the NNHP office and The Nature Conservancy office.

Mapped polygon number: These numbers are used in the Natural Community Description section to identify specific mapped polygons of a natural community. See project ArcMap theme to identify mapped polygon locations (field name is "Id").

TNC Portfolio Sites: Element occurrences that qualify as portfolio sites for the St. Lawrence-Champlain Valley ecoregional plan (Thompson et al. 2002) are identified in Table 1 and in the project ArcMap theme attribute table (Port_2006).

Summary of Natural Community Mapping Results

Prior to this study, there were eight natural community types and 11 natural community element occurrences documented in the NNHP BIOTICS database for the Bald Mountain peninsula. As a result of this study, 27 natural community types are identified and 31 natural community element occurrences. Similarly, 10 natural community element occurrences were identified as portfolio sites in The Nature Conservancy's 2002 St. Lawrence-Champlain Valley ecoregional plan (Thompson et al. 2002). Based on this study, 26 natural community element occurrences qualify as portfolio sites and it is recommended that they be included as such in revisions to the St. Lawrence-Champlain Valley ecoregional plan. Table 1 provides a summary of the natural community mapping results for the project.

Table 1. Summary of natural community mapping results for the Bald Mountain peninsula. Information on the number, rank, and acreage of element occurrences (EOs) is provided. The number of element occurrences that were identified as portfolio sites in the St. Lawrence-Champlain Valley (STL) ecoregional plan (Thompson et al. 2002) and the number that qualify and are recommended for inclusion as portfolio sites based on this new work are also provided.

Natural Community Type	State Rank	Number of EOs	EO Rank	Total EO Acreage	Non EO Acreage	STL Portfolio EOs 2002	Qualifying STL Portfolio EOs 2006
dry oak forest	S3	1	B	14	0.5	0	1
dry oak-hickory-hophornbeam forest	S3	1	A	1844	7	1	1
mesic clayplain forest	S2	2	B, B	122+351=473	269	0	1
mesic maple-ash-hickory-oak forest	S3	1	A	663	14	0	1
open talus	S2	2	A, B	2.9+4.1=7.0	0	1	2
pitch pine-oak-heath rocky summit	S1	0		0	0.2	0	0
red cedar woodland	S2	2	A, A	2.4+2.1=4.5	0	0	2
rich northern hardwood forest	S4	1	B	17	0	0	1
temperate acidic cliff	S4	2	A, A	1.4	0	0	2
temperate acidic outcrop	S4	1	A	25	0	0	1
temperate calcareous cliff	S3	2	A, A	5.5	0	1	2
temperate hemlock forest	S4	2	A, A	343	0	0	2
transition hardwood limestone talus woodland	S3	3	A, A, A	38+29+13=80	0.6	2	3
buttonbush basin swamp	S2	0		0	0.2	0	0
buttonbush swamp	S2	0	not ranked	0	about 50	0	0
cattail marsh, deep bulrush marsh, deep broadleaf marsh, wild rice marsh*	S4	1*	B*	284*	255*	3	1 (EOs combined)
hemlock swamp	S2	0		0	1.7	0	0
lakeside floodplain forest	S3	1	A	74	0	1	1
red maple-black ash seepage swamp	S4	2	B, B	3.2	0.5	0	0
red maple-black gum swamp	S2	1	A	0.7	0	0	1
shallow emergent marsh	S4	0		0	11	0	0
silver maple-sensitive fern riverine floodplain forest	S3	1	B	142	0	1	1
vernal pool	S3	3	A, A, A	0.6+0.6+0.4=1.6	0	0	3
wet clayplain forest	S2	1	C	3.9	3.3	0	0

* These natural communities occur in marsh complexes and have not been mapped separately.

Natural Community Descriptions

Upland Natural Communities

Dry Oak Forest

***Significance:** B-ranked example (EO 5) is small, but in good condition and in an excellent landscape.*

A nice example of Dry Oak Forest occurs on a rocky ridgeline on the north side of the Big Hollow fault valley. Although the bedrock in this area is mapped as acidic gneiss and quartzite, the presence of some more carbonate-rich rock is indicated by several plant species that are associated with more available calcium. The soils on this rocky ridge are very shallow – the deepest soils sampled were 12 inches, but most locations have only several inches of soil over bedrock. A low stone wall runs through the community and it is likely that it has been grazed in the past. No evidence of fire was observed in the Dry Oak Forest, but portions of the Dry Oak-Hickory-Hophornbeam Forest to the north burned in the 1980s.

There are scattered white pines (*Pinus strobus*) that emerge above the stunted, open canopy of the forest. The main canopy is dominated by red oak (*Quercus rubra*), white pine, and chestnut oak (*Quercus prinus*). Other canopy species include white oak (*Quercus alba*), shagbark hickory (*Carya ovata*), and white ash (*Fraxinus americana*). Low sweet blueberry (*Vaccinium angustifolium*) and black huckleberry (*Gaylussacia baccata*) are the dominant low shrubs. A species of shadbush (*Amelanchier* sp.) and regeneration of oak and pine make up the rest of the shrub layer. Scattered common juniper (*Juniperus communis*) is a testament to past land clearing or grazing. Herbaceous cover varies from 25 to 50 percent and includes common oatgrass (*Danthonia spicata*), hairgrass (*Deschampsia flexuosa*), woodland sedge (*Carex pensylvanica*), rough-leaved ricegrass (*Oryzopsis asperifolia*), woodland sunflower (*Helianthus divaricatus*), marginal wood fern (*Dryopteris marginalis*), sharp-lobed hepatica (*Hepatica acutiloba*), and ebony spleenwort (*Asplenium platyneuron*). Lichens and the mosses *Polytrichum* sp. and *Leucobryum glauca* are common on the dry soil and rocks.

Chestnut oak (*Quercus prinus*) is widespread on the dry slopes of Bald Mountain and Austin Hill. Although this tree species is typically associated with the Dry Oak Forest and Dry Oak Woodland natural community types, it also occurs in other types. On the Buckner Preserve, chestnut oak occurs consistently, but in low abundance in two other community types: Hemlock Forest and Dry Oak-Hickory-Hophornbeam Forest. Other characteristics of these two forest types distinguish them from Dry Oak Forest. Hemlock Forests have greater than 75 percent cover of hemlock and a very sparse ground cover. Dry Oak-Hickory-Hophornbeam Forests have an understory of hophornbeam and typically a lawn of woodland sedge (*Carex pensylvanica*). On Austin Hill there is scattered chestnut oak throughout the Dry Oak-Hickory-Hophornbeam, but only one small patch of Dry Oak Forest, dominated by chestnut oak, was mapped on the north summit.

No specific management is needed for this natural community.



Photo 2. Dry Oak Forest on the ridge north of Big Hollow (Observation Point 8). Note chestnut oak in the center of the view and chestnut oak leaves in the upper right.

Dry Oak-Hickory-Hophornbeam Forest

Significance: A-ranked example (EO 6) is largest in the state.

This is the dominant natural community on the highlands of Bald Mountain and Austin Hill, occupying 1,844 acres. This is the largest known example of Dry Oak-Hickory-Hophornbeam Forest in Vermont and is a highly significant community – it is both extensive and very beautiful.

Dry Oak-Hickory-Hophornbeam Forest occurs primarily on the shallow-to-bedrock Taconic-Hubbardton soils that dominate the gentle east slopes of Bald Mountain. It also occurs on the steeper western slopes of Bald Mountain and across most of the Austin Hill summit. The convex topography on which this community occurs adds to its well drained to droughty nature.



Photo 3. Stunted, open canopy Dry Oak-Hickory-Hophornbeam Forest on gentle eastern slope of Bald Mountain (Observation Point 24)

The canopy closure and the height of the canopy vary considerably across this extensive Dry Oak-Hickory-Hophornbeam Forest. Open canopies with only 50 percent cover and stunted trees only 40 feet tall occur in the driest, most shallow soil areas. More closed canopies with up to 85 percent cover and trees to 65 feet tall occur in the locations with deeper soils that hold more moisture.

Red oak and shagbark hickory co-dominate the canopy in almost all locations observed. Other canopy species that occur in varying abundance include white oak, white ash, and white pine. Hemlock (*Tsuga canadensis*) can be abundant in some areas. Chestnut oak is relatively common on the dry, rocky soils of Bald Mountain and Austin Hill and this species occurs in low abundance in several areas of the Dry Oak-Hickory-Hophornbeam Forest. One of the most characteristic aspects of this community is the dominance of hophornbeam (*Ostrya virginiana*) as a sub-canopy tree. Hophornbeam typically occurs with regeneration of all of the canopy species. Eastern red cedar (*Juniperus virginiana*) is also an occasional sub-canopy species – it is unclear whether its presence is the result of past intensive land use of these forests or a natural occurrence. Typical shrubs include witch hazel (*Hamamelis virginiana*), maple-leaved viburnum (*Viburnum acerifolium*), low sweet blueberry, and low red shadbush (*Amelanchier sanguinea*). The other characteristic aspect of this community is the open, savannah-like nature of the forests

with lawns dominated by woodland sedge. There are many other herbs present, although none are typically abundant. Some of the more common species include marginal wood fern (*Dryopteris marginalis*), blue-stemmed goldenrod (*Solidago caesia*), common oatgrass, common hairgrass, ebony spleenwort, pale corydalis (*Corydalis sempervirens*), woodland sunflower, blunt-lobed hepatica (*Hepatica americana*), whorled loosestrife (*Lysimachia quadrifolia*), partridge berry (*Mitchella repens*), rough-leaved ricegrass, and bastard toadflax (*Comandra umbellata*). Rare and uncommon species found in the Dry Oak-Hickory-Hophornbeam Forest include golden corydalis (*Corydalis aurea*), squawroot (*Conopholis americana*), green adder's-mouth (*Malaxis unifolia*), and four-leaved milkweed (*Asclepias quadrifolia*). Moss cover is typically low, with *Pleurozium schreberi* and *Polytrichum* sp. common.



Photo 4. Western aspect Dry Oak-Hickory-Hophornbeam Forest on summit north of Big Hollow (Observation Point 33)

There are two areas where the Dry Oak-Hickory-Hophornbeam Forest varies considerably from this general description and these forest areas have been mapped separately. On the broad summit of Bald Mountain the forest is co-dominated by red oak and young white pine, with scattered pitch pine (*Pinus rigida*) and red pine (*Pinus resinosa*) (mapped polygon 112, based on visit by Bob Zaremba and John Roe in 1988). The origin of this conifer-dominated young forest is unclear but it seems likely that fire played a role. Another variation in the Dry Oak-Hickory-

Hophornbeam Forest occurs on the steep western slopes of Bald Mountain (mapped polygon 108). The bedrock is distinctly calcareous in this area and there are many small calcareous cliffs, ledges, and areas of Transition Hardwood Limestone Talus Woodland embedded in the Dry Oak-Hickory-Hophornbeam Forest. This steep western slope is nearly 240 acres and likely contains many interesting features – additional field survey is sure warranted here. There are similar areas of open calcareous outcrops within the Dry Oak-Hickory-Hophornbeam Forest above the Austin Hill cliffs. No attempt was made to map these very small open bedrock community inclusions within the Dry Oak-Hickory-Hophornbeam Forest, but their presence adds diversity and conservation significance to these forests.

Overall, the Dry Oak-Hickory-Hophornbeam Forest is in good condition, but is generally young, with most trees under 100 years old. There has been extensive logging in the forest and there are many old and new cut stumps. The forest is recovering very well from this harvesting and there are very few exotic species present. Although European bush honeysuckle (*Lonicera morrowii*) is a serious problem in some of the more limy forests and clayplain forests, it is noticeably scarce in the Dry Oak-Hickory-Hophornbeam Forest. Several fires have occurred in this forest over the past several decades, leaving charred trunks and openings that maintain the typical species of Dry Oak-Hickory-Hophornbeam Forest.



Photo 5. Burned white pine stump in small forest opening created by fire (Observation Point 31)

Mesic Clayplain Forest

Significance: *Two B-ranked examples (EO 3 and EO 4) are some of the largest in the state and have great restoration potential.*

Clay and silty-clay soils dominate the lower elevations of the Bald Mountain peninsula, totaling about 1,500 acres. Approximately 756 acres of this clay soil are maintained as agricultural fields or are closely associated with homesteads. The remaining 742 acres are in various successional stages of Mesic Clayplain Forest. Between Bald Mountain and Lake Champlain on the western side of the peninsula there are 391 acres of Mesic Clayplain Forest (roughly half of the 742 acres). Of these 391 acres, about 122 acres are young to medium age clayplain forest (EO 4, see map polygons 74, 78, and 87). The remaining 269 acres are reverting old field and very young forest, are D-ranked for current condition, and are not considered part of the Mesic Clayplain Forest element occurrence (EO 4). However, there is great potential for restoration on these 269 acres, which would greatly increase the significance of this relatively large area of clayplain forest. Between Bald Mountain and the Poultney River on the eastern side of the peninsula there are 351 acres of Mesic Clayplain Forest (EO 3), all of it is currently C-ranked for condition. All of the mapped Mesic Clayplain Forest on the western side of the Bald Mountain (EO 4) is on the Buckner Preserve, but only 157 acres of clayplain forest are on the Preserve on the eastern side of Bald Mountain – the remainder is on private land.

Two factors make the two Mesic Clayplain Forest element occurrences at The Buckner Preserve especially significant. First, these clayplain forests are among the four largest examples currently known in Vermont. Second, these clayplain forests occur in the most intact landscape of any clayplain forest in the state. Most of the clayplain forest at the Buckner Preserve borders agricultural fields on one side, but is also contiguous with the nearly 2,900 acres of unfragmented natural communities that form the interior or core of the preserve. Although no mature stands of Mesic Clayplain Forest have been documented on the Buckner Preserve or adjacent properties, there are many acres of forest that are young but in good condition with few invasive exotics that, with time, are expected to recover well on their own. There are also nearly 270 acres of abandoned field and very young clayplain forest on the western side of the Preserve (mapped polygons 66 and 178), portions of which have significant amounts European bush honeysuckle, and for which active restoration work will be extremely important in order to improve the ecological condition of the recovering forests.

The western Mesic Clayplain Forest is generally younger and in poorer condition than the eastern example. The youngest portions of this "forest" are agricultural lands that have been abandoned in the past several decades (see map polygons 66 and 178). These old field areas have many sun-loving grasses and herbs that are not characteristic of clayplain forests. Eastern red cedar (*Juniperus virginiana*) is the dominant colonizing tree species in many of these areas, although white pine, green ash (*Fraxinus pennsylvanica*), bigtooth aspen (*Populus grandidentata*), basswood, red oak, white oak, shagbark hickory, and red maple (*Acer rubrum*) are also present in low abundance. Prickly ash (*Zanthoxylum americanum*) is a common shrub pioneer in the old field clayplain and can form dense, impenetrable stands. Other colonizing shrubs include gray dogwood (*Cornus foemina*), nannyberry (*Viburnum lentago*), and red raspberry (*Rubus idaeus*). Unfortunately, European bush honeysuckle is a significant component

of some of these old field/young forest clayplains. The forested portion of the western clayplain has areas of young white pine and some medium age forests (EO 4, mapped polygons 74, 78, 87). White pine forms a nearly closed canopy in those areas that have been abandoned from agricultural uses for many decades. These white pine forests are clearly visible on the orthophotos used for mapping. These white pine dominated forests typically have understory regeneration of characteristic clayplain forest trees, including sugar maple, red oak, white oak, white ash, and black birch, and varying amounts of European bush honeysuckle. The Mesic Clayplain Forests in the most mature condition typically occur on sloping areas of clay soil that may not have been cleared for agriculture in the past. The best expressions were observed on the more remote, northwestern side of the Preserve. In these forests, the dominant canopy species are sugar maple, shagbark hickory, white pine, hemlock, red and white oak, basswood, and hemlock. There is typically little invasive honeysuckle in these forests.



Photo 6. A young Mesic Clayplain Forest dominated by white pine, bigtooth aspen, and sugar maple on a clay soil ridge (Observation Point 41).

The eastern Mesic Clayplain Forest (EO 3) is generally more mature than the western example. Several nice examples of this community type were observed (see observation points 2, 12, 42 and 43). Again, these less disturbed examples occur on sloping terrain that may not have been cleared for agriculture in the past. The closed canopy of these forests is generally composed of

trees less than 100 years old, including sugar maple, white oak, red oak, shagbark hickory, white pine, red maple, basswood, and white ash. Hemlock is noticeably absent from most of these forests, with the exception of a small area of more mature forest (see observation point 42 in mapped polygon 47). Muscledwood (*Carpinus caroliniana*) and hophornbeam are typical understory species. Shrub level species include regeneration of all canopy species along with maple-leaved viburnum, nannyberry, gray dogwood, and occasional European bush honeysuckle and common buckthorn (*Rhamnus cathartica*). Herbaceous cover includes marginal wood fern (*Dryopteris marginalis*), blue-stemmed goldenrod, black snakeroot (*Sanicula marilandica*), barren strawberry (*Waldsteinia fragarioides*), hog peanut (*Amphicarpaea bracteata*), peduncled sedge (*Carex pedunculata*), gay wings (*Polygala paucifolia*), and sharp-lobed hepatica.

The primary management recommendation for the Mesic Clayplain Forest is to control exotic shrubs. Tree planting may be very useful in some of the old-field clayplain areas.

Mesic Maple-Ash-Hickory-Oak Forest

Significance: A-ranked example that is large, but highly variable in condition.

Mesic Maple-Ash-Hickory-Oak Forest occurs on gently sloping to moderately steep slopes where soils are relatively deep. The setting for this community type can be viewed as intermediate between the deep-soiled Mesic Clayplain Forests and shallow-soiled Dry Oak-Hickory-Hophornbeam Forests. Mesic Maple-Ash-Hickory-Oak Forest covers 677 acres on the Bald Mountain peninsula. This natural community type was mapped in 13 polygons, the largest of which is just less than 400 acres (mapped polygon 156). This largest, contiguous area of Mesic Maple-Ash-Hickory-Oak Forest is on the eastern side of Austin Hill and is primarily on land that is not owned by The Nature Conservancy.

The condition of Mesic Maple-Ash-Hickory-Oak Forest on the peninsula varies considerably. There are some areas of very young forest on the western side of the peninsula; most of the forest is of moderate age but has been logged heavily in the past; and there are scattered small areas of more mature forest. These three variations in condition, and the two small areas of mineral enriched Mesic Maple-Ash-Hickory-Oak Forest are described below.

The largest contiguous area of Mesic Maple-Ash-Hickory-Oak Forest is on the gentle western slopes of Austin Hill (mapped polygon 156). There has been heavy logging in much of this forest in the past, but based on only several observation points, it is recovering well. The canopy is 80 to 90 percent closed, with a variable composition of sugar maple, red maple, basswood, white ash, shagbark hickory, black birch, hemlock, and bitternut hickory (*Carya cordiformis*). In some areas white pine is more abundant. Tree species regeneration, maple-leaved viburnum, and witch hazel are the primary components of the shrub layer. Herbaceous species include marginal wood fern, blue-stemmed goldenrod, Christmas fern (*Polystichum acrostichoides*), broad-leaved ricegrass (*Oryzopsis racemosa*), peduncled sedge, hay-scented fern (*Dennstaedtia punctilobula*), and partridge berry (*Mitchella repens*). The large size (399 acres), relatively good condition (B-rank), and very good landscape context (A) of this Mesic Maple-Ash-Hickory-Oak Forest polygon drives the overall high rank (A) of this community occurrence on the Bald Mountain

peninsula. This area of forest, by itself, without including any of the other polygons of this forest type to the east, would be assigned an overall A-rank.



Photo 7. Young Mesic Maple-Ash-Hickory-Oak Forest and rock wall with view to Lake Champlain and the Drowned Lands (Observation Point 56).

On the western side of Bald Mountain and Austin Hill there are areas of medium age Mesic Maple-Ash-Hickory-Oak Forest that are interspersed with very young forest regenerating from old fields. In the medium-aged to more mature forests, the canopy is closed and composed of sugar maple, red oak, white oak, basswood, shagbark hickory, black birch, butternut (*Juglans cinerea*), and bitternut hickory. Hophornbeam is common in the understory and shrubs include maple-leaved viburnum and witch hazel. European bush honeysuckle is common in some areas and absent from others. The exotic shrub common barberry (*Berberis vulgaris*) is also occasional. Herbs include blue-stemmed goldenrod, white snakeroot (*Eupatorium rugosum*), woodland sedge, marginal wood fern, ebony spleenwort, broad-leaved ricegrass, and blunt-lobed hepatica. The most mature examples observed occur in less accessible locations, such as narrow rocky valleys (see Observation Point 83 and mapped polygon 113).

The youngest Mesic Maple-Ash-Hickory-Oak Forest occurs in areas of regenerating old field on the western side of the peninsula (portions of mapped polygons 96, and 107), usually adjacent to

areas of clay soil that were also cleared in the past. Although these areas include enough characteristic tree species to be classified as Mesic Maple-Ash-Hickory-Oak Forest, such as large open-grown red oak, they also may be dominated by impenetrable thickets of prickly ash and dense stands of European bush honeysuckle. Active restoration work is recommended to remove as much of the exotic shrub infestation as possible and allow these areas of forest to mature. It may make sense to brush-hog and mow these areas for a few years to set back the honeysuckle and then plant trees. As these youngest forests are patchy in their distribution, they were not mapped as separate polygons. If they were to be mapped separately, they should be assigned current condition rank of D.

Also on the western side of Bald Mountain at the bases of wooded talus slopes are two very nice examples of enriched Mesic Maple-Ash-Hickory-Oak Forest (mapped polygons 90 and 187). These forests appear to be enriched by downslope movement of soil and nutrients from the adjacent slopes. An especially nice and mature expression of this forest is found on a deep-soiled bench at an elevation of 420 feet on the lower western slopes of Bald Mountain (southern end of mapped polygon 187). The closed canopy reaches heights of about 75 feet. Sugar maples are dominant in the canopy and have the characteristic tight bark of fast growing trees. Other canopy trees include white ash, basswood, shagbark hickory, and black birch. The ground cover includes species indicative of the enriched conditions: broad-leaved ricegrass, maidenhair fern (*Adiantum pedatum*), blue-stemmed goldenrod, and ostrich fern (*Matteuccia struthiopteris*).

Control of the invasive shrub species is the primary management recommendation for Mesic Maple-Ash-Hickory-Oak Forests.

Open Talus

Significance: A and B-ranked examples of this rare community type.

The Open Talus communities on the Buckner Preserve are very fine examples that are in excellent condition. The five locations of Open Talus are separated into two element occurrences. The Bald Mountain Open Talus (EO 15) includes the large example on the south slope of Bald Mountain (mapped polygons 91 and 93) and the smaller example just west of Schoolhouse Marsh (mapped polygon 103). The Austin Hill Open Talus (EO 16) includes two mapped locations (mapped polygons 19 and 127). There are additional areas of Open Talus below the extensive cliffs on the south side of Austin Hill, but most of these areas are small and are mapped as inclusions within Transition Hardwood Talus Woodland or within the cliff communities.

The Bald Mountain Open Talus examples occur on gneiss and quartzite, although there are indications of the presence of calcium in the rock in the adjacent cliff and wooded talus. The large, angular blocks of rock range from one to ten feet in diameter and are likely very stable. However, portions of this and the Austin Hill talus are unstable, as indicated by scars on the stunted trees in the talus forest. There is virtually no vascular vegetation growing on the Open Talus slope due to the large size of the boulders and the lack of soil between the boulders. Lichens are sparse on the rock surface. The Open Talus is bordered above by either sheer cliff or

by an area of Transition Hardwood Limestone Talus Woodland, dominated by stunted trees. Below the Open Talus there is typically a narrow band of Transition Hardwood Limestone Talus Woodland with more developed canopy due to the increased amount of soil accumulation in this downslope location. A very significant feature of the Bald Mountain Open Talus is that it provides denning site for the very rare timber rattlesnake (*Crotalus horridus*) and the rare eastern ratsnake (*Elaphe alleghaniensis*). The very rare five-lined skink (*Eumeces fasciatus*) also uses these talus slopes.



Photo 8. Bald Mountain Open Talus with Transition Hardwood Limestone Talus Woodland and Temperate Calcareous Cliff in background.

The Austin Hill Open Talus also occurs on gneiss and quartzite, which also has indications of some calcium content. These talus slopes are mostly unvegetated due to the large size of the boulders and lack of accumulated soil. Transition Hardwood Limestone Talus Woodland and cliffs border the Open Talus. Five-lined skink also uses these areas of talus. The presence of the Galick Road, power line, and agricultural fields to the south of the Open Talus, decreases the condition of the surrounding landscape somewhat, but probably has little adverse effect on the talus community itself.

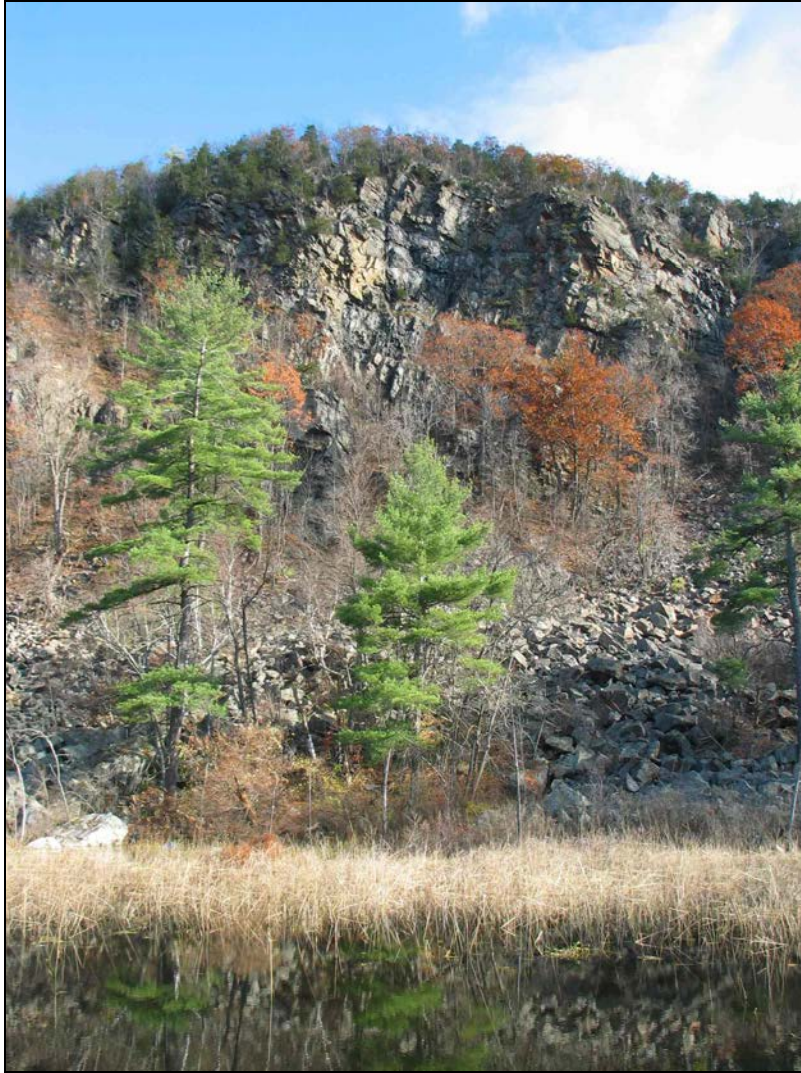


Photo 9. Austin Hill Open Talus, Transition Hardwood Limestone Talus Woodland (oak and hardwood area between talus and cliff), Temperate Calcareous Cliff, and cliff-top Red Cedar Woodland viewed from Galick Road. A roadside impoundment with wild rice is in the foreground.

Pitch Pine-Oak-Heath Rocky Summit

***Significance:** A very small example of this very rare (S1) natural community type.*

This one-quarter acre of Pitch Pine-Oak-Heath Rocky Summit is perched above the Austin Hill cliffs on the rocky, southwest aspect slope. The shallow soils and warm conditions in this setting are typical for this small patch community type. Although no evidence of past fires was observed, it is likely that fire has played a role in the development of this community at this location. Approximately 100 pitch pines dominate the open canopy (40-50 percent closure) and reach heights of only 15 feet. There are also stunted and scattered white oak, red oak, white pine, and black birch in the low, open canopy. The rocky ground is dominated by low sweet blueberry, hairgrass, little bluestem (*Schizachyrium scoparium*), and bracken fern (*Pteridium*

aquilinum). There is no sign of recent disturbance in the community. No tree cores were taken to age the pitch pine. "Tim's Trail" and "Tim's Bench" are located just north of the community. This Pitch Pine-Oak-Heath Rocky Summit was not considered an element occurrence due to its very small size. However, it is an important feature and its condition should be monitored in the future.

Red Cedar Woodland

Significance: Two A-ranked examples of this rare, small patch community type.

The two element occurrences are located on the cliff brows and associated steep slopes of Bald Mountain (EO 19) and Austin Hill (EO 17). These are narrow bands of conifer-dominated forest and woodland on shallow, droughty soils. Farther back from the cliff edges, the Red Cedar Woodland grades into Dry Oak-Hickory-Hophornbeam Forest. All of these small forest patches are in good condition with few or no exotic species present. It is likely that fire has played a role in their development, although no fire scars or charcoal in the soil were observed. Although many of eastern red cedars (*Juniperus virginiana*) appear to be old (one tree at Observation Point



Photo 10. Red Cedar Woodland on the western slopes of Austin Hill (mapped polygon 198).

116 had 153 annual growth rings outside a punky center), it is also possible that these areas were part of woodland pasture in the past. There is no sign of recent human disturbance in the examples visited.

The canopy varies from woodland (less than 60 percent cover) to forest and is strongly dominated by eastern red cedar. The canopy is typically only 15 to 20 feet high. Other canopy species include red oak, white ash, white pine, chestnut oak, and hophornbeam. Low sweet blueberry is an abundant low shrub and common juniper is occasional. Herbaceous cover includes little bluestem, common oatgrass, marginal woodfern, and woodland sedge. Mosses and lichens are scattered on the rocky ground.

Rich Mesic Maple-Ash-Hickory-Oak Forest

Significance: considered part of the A-ranked example of Mesic Maple-Ash-Hickory-Oak Forest.

Also on the western side of Bald Mountain at the bases of wooded talus slopes are two very nice examples of enriched Mesic Maple-Ash-Hickory-Oak Forest (mapped polygons 90 and 187). These forests appear to be enriched by downslope movement of soil and nutrients from the adjacent slopes. An especially nice and mature expression of this forest is found on a deep-soiled bench at an elevation of 420 feet on the lower western slopes of Bald Mountain (southern end of mapped polygon 187). The closed canopy reaches heights of about 75 feet. Sugar maples are the dominant tree and have the characteristic tight bark of fast growing trees. Other canopy trees include white ash, basswood, shagbark hickory, and black birch. The ground cover includes species indicative of the enriched conditions: broad-leaved ricegrass, maidenhair fern, blue-stemmed goldenrod, and ostrich fern.

Rich Northern Hardwood Forest

Significance: B-ranked example of this widespread, small patch community type.

The Buckner Preserve is characterized by dry, oak-dominated upland forests, cliffs and talus, and basin wetlands. The presence of a mature, seepy Rich Northern Hardwood Forest is a distinct contrast. This fine Rich Northern Hardwood forest (17.5 acres) occurs on the valley floor and lower sideslopes of the northwestern end of the Big Hollow bedrock thrust valley. There are several old stumps from past logging, but no recent human disturbance in this forest. There are several recent blowdowns of large trees that have created small canopy gaps and there is abundant downed wood. No exotic species were observed. There are many small seeps that originate in this valley bottom and their flow forms a small stream that drains out of the valley to the northwest and toward Lake Champlain.

Tall, straight sugar maple and white ash rise to 75 feet and dominate the canopy that is 75 to 80 percent closed – openings from recent blowdowns are common. Beech and yellow birch (*Betula alleghaniensis*) are associate species in the lower canopy. The tall shrub layer is made up of

23regeneration of canopy trees, as well as red-berried elderberry (*Sambucus racemosa*), American elm, and striped maple (*Acer pensylvanicum*). There is a very sparse short shrub layer that includes elderberry and occasional red raspberry (*Rubus idaeus*) in the areas with larger canopy gaps. Herbaceous cover is 60 percent and includes maidenhair fern, white snakeroot, foam flower (*Tiarella cordifolia*), ostrich fern, evergreen woodfern (*Dryopteris intermedia*), Christmas fern, plantain-leaved sedge (*Carex plantaginea*), and violet (*Viola* sp.).

No specific management is needed for this natural community, although it should be checked every few years for the presence of exotic shrubs that may become established with the increased light from the new canopy gaps.

Temperate Acidic Cliff

Significance: Two A-ranked examples in excellent condition.

The two Temperate Acidic Cliffs on the Buckner Preserve occur on the northeastern side of the Big Hollow valley (EO 20) and just west of Schoolhouse Marsh on the eastern side of the preserve (EO 21). Both of these cliffs are mostly unvegetated and they are both in excellent condition. The Big Hollow cliffs vary in height from 10 to 50 feet and tend to be shaded from the canopy of the Transition Hardwood Limestone Talus Woodland below. In contrast, the Schoolhouse Marsh cliff is close to 100 feet tall and is exposed to the southeast. Five-lined skink and timber rattlesnake are known to use the cliff and talus at the Schoolhouse Marsh site.

These cliffs on the eastern side of the Bald Mountain peninsula are not easily classified as acidic or calcareous types. The bedrock in this area is mapped as Precambrian gneiss and quartzite and would therefore be expected to be acidic and low in carbonates. However, below the cliffs in Big Hollow there is distinctly calcareous talus woodland, as evidenced by several calcium-loving plants. Above these cliffs is a dry, acidic oak forest with very little plant indication of carbonates in the underlying bedrock.

Temperate Acidic Outcrop

Significance: A-ranked example on the broad summit of Bald Mountain

There are many small openings in the dry forests on the summits and slopes of Bald Mountain that are best classified as Temperate Acidic Outcrop. The shallow soils of these sites are dry, nutrient poor, and hot in summer. The resulting community varies from bare rock with scattered herbs to an open canopy (less than 25 percent cover) of stunted trees. The Temperate Acidic Outcrop grades into open-canopy Dry Oak-Hickory-Hophornbeam Forest and the boundaries between these two communities are not well defined. The example of this community type on Bald Mountain is in excellent condition. It is unclear what influence fire and grazing have played in creating these openings.

In areas with an open canopy, red oak, white ash, eastern red cedar, white pine, and pitch pine are scattered. Low sweet blueberry is the dominant low shrub, often forming a dense low cover. Common juniper is scattered on the outcrops. Herbs include little bluestem and common hairgrass. Schreber's moss (*Pleurozium schreberi*) and species of the genus *Anomodon* are common in cracks and hollows in the rock where small amounts of soil have accumulated.



Photo 11. Temperate Acidic Outcrop on the southern broad summit of Bald Mountain.

Temperate Calcareous Cliff

Significance: Two A-ranked examples of this uncommon community type.

The two Temperate Calcareous Cliff examples occur on the south side of Austin Hill and on the south side of Bald Mountain. These are both very impressive, high quality cliffs. The Bald Mountain cliff (EO 23) rises over 200 feet above the exposed Open Talus below. The nearly vertical cliff face is sparsely vegetated. Species that have been observed in fissures and shelves on the cliff face include wall rue (*Asplenium ruta-muraria*), maidenhair spleenwort (*Asplenium trichomanes*), purple-stemmed cliffbrake (*Pellaea atropurpurea*), harebell (*Campanula rotundifolia*), rusty woodsia (*Woodsia ilvensis*), herb Robert (*Geranium robertianum*), and

purple-flowering raspberry (*Rubus odoratus*). Animals closely associated with the cliff and adjacent talus include timber rattlesnake, eastern ratsnake, five-lined skink, nesting peregrine falcon and common raven (*Corvus corax*). The Austin Hill cliffs extend for nearly one mile and rise from 10 feet to over 200 feet. The cliffs are dolomite on the western end and gneiss and quartzite on the larger eastern side. The cliffs are dry and are sparsely vegetated. Some of the rare to uncommon species that have been observed on the cliffs include yellow pimpernel (*Taenidia integerrima*), lyre-leaved rock-cress (*Arabis lyrata*), blunt sphenopholis (*Sphenopholis obtusata*), blunt-leaved woodsia (*Woodsia obtusa*), tall cinquefoil (*Potentilla arguta*), and coffee tinker's-weed (*Triosetum aurantiacum*). Although the road and fields below the cliffs reduce the quality of the landscape context, there is likely little effect on the cliffs themselves. The views of the cliffs from the adjacent road and fields are spectacular, as are the views to the south from the cliff tops.

Temperate Hemlock Forest

Significance: Two A-ranked examples (EO 7 and EO 8) are of statewide significance.

Hemlock is a common tree on the Buckner Preserve and is a component of many natural communities. Hemlock Forests are defined as having a canopy made up of over 75 percent hemlock. There are many areas on the Preserve that have abundant hemlock in the canopy but are classified and mapped as other natural community types, especially Dry Oak-Hickory-Hophornbeam Forest and Mesic Maple-Ash-Hickory-Oak Forest. A total of 343 acres of Temperate Hemlock Forest were mapped.

There are two A-ranked examples of Temperate Hemlock Forest on the preserve. The larger example (EO 8, 247 acres) occurs to the north of Bald Mountain and in association with the slopes and ridges along Big Hollow. The second example (EO 7, 96 acres) occurs on the sideslopes of Austin Hill. There is typically more variation between individual patches of this Temperate Hemlock Forest on the preserve than there is between these two element occurrences, so a general description of the forest type on the preserve is provided, followed by some notes on characteristics of particular patches (mapped polygons).

The Temperate Hemlock Forest on the Buckner Preserve occurs on gentle to steeply sloping terrain with shallow, rocky soils. Some of these forests are on very steep slopes that include small imbedded cliffs. The underlying bedrock is primarily acidic gneiss and quartzite. Hemlock forms a nearly complete canopy cover in most areas mapped as this forest type. Other tree species that are common but make up less than 25 percent of the canopy cover include red oak, white oak, and black birch. Less common species include white pine, sugar maple, and shagbark hickory. Shrubs are scattered and include striped maple, maple-leaved viburnum, and low sweet blueberry. The herbaceous layer is very sparse with only one or two percent cover: Indian pipes (*Monotropa uniflora*), starflower (*Trientalis borealis*), rough-leaved ricegrass, woodland sedge, and bracken fern. The moss, *Leucobryum glauca*, forms small bluish-green mounds on the forest floor.

Portions of the large Temperate Hemlock Forest patch located north of Bald Mountain and Big Hollow (mapped polygon 106, Observation Point 29) are very mature and show no sign of recent disturbance. This forest occurs on steep north-facing slope. Hemlock accounts for nearly 85 percent of the canopy cover with about 10 percent red oak. The mature forest has a mixture of age classes, lots of pit-and-mound topography from wind blown trees, and abundant downed wood. The larger trees are mostly two feet in diameter. One 23-inch hemlock was cored and found to be 185 years old. Low sweet blueberry, woodland sedge, and *Leucobryum glauca* are the most abundant ground cover species. Although there was heavy logging on a few acres to the east in the more level Dry Oak-Hickory-Hophornbeam Forest, this mature Temperate Hemlock Forest shows no signs of human disturbance in the areas visited.



Photo 12. Mature Temperate Hemlock Forest on the north slope of Bald Mountain (Observation Point 29).

Another smaller area of mature Temperate Hemlock Forest occurs on the steep west slope of Austin Hill (mapped polygon 32, Observation Point 84). Black birch, white pine, and striped maple also occur on this rocky slope that includes some imbedded cliff.

Chestnut oak is especially common on the slopes of Austin Hill and this species is an important component of the two largest patches (mapped polygons 33 and 144) of Temperate Hemlock Forest in this area. The chestnut oak is especially abundant on the driest, most exposed ridges within the hemlock forest.

Transition Hardwood Limestone Talus Woodland

Significance: *Three A-ranked examples of this uncommon community, some of the best in Vermont*

Transition Hardwood Limestone Talus Woodland is really a signature community type for the Bald Mountain peninsula. It occurs on steep, rocky, often unstable slopes throughout the preserve. With over 80 acres mapped in 17 separate polygons, it is relatively common at this site, although it is uncommon statewide. The largest examples of Transition Hardwood Limestone Talus Woodland occur in association with Open Talus and Temperate Calcareous Cliff at the major cliff sites on the south sides of Bald Mountain and Austin Hill. In other locations, Transition Hardwood Limestone Talus Woodland occurs on steep slopes surrounded by Dry Oak-Hickory-Hophornbeam Forest, Mesic Maple-Ash-Hickory-Oak Forest, and other forest types. Although many of the mapped examples of this community type occur over bedrock mapped as Precambrian gneiss and quartzite, all the examples that were visited support some calcium-loving plant species. This is likely due to the small amounts of imbedded calc-silicate in the bedrock, but is also likely the result of the greater surface area of bedrock exposed in the talus, the subsequent weathering of the bedrock, and the accumulation of nutrients in the soils of the talus slope.

In general, all of the Transition Hardwood Limestone Talus Woodlands that were visited on the preserve are mature forests in good to excellent condition. There has been little logging in these forests, likely due to both the stunted condition of the trees and the very difficult access on these steep, unstable slopes. Surprisingly few exotic shrubs were encountered in these forests. The landscape context in which the Transition Hardwood Limestone Talus Woodlands occur is highly variable (assigned landscape context ranks range from A to C). Several examples are adjacent to abandoned fields and early successional forests, while others occur within the core of the preserve, surrounded by thousands of acres of intact forest.

The examples of Transition Hardwood Limestone Talus Woodland associated with the southern and western slopes of Bald Mountain (EO 25) are the most enriched, as they occur on limestone and dolomite bedrock. The open canopy in these forests is typically a mix of sugar maple, red and white oaks, basswood, butternut, and white ash. Other characteristic tree species present in low abundance only in this community type include hackberry (*Celtis occidentalis*) (mapped polygon 92), black maple (*Acer nigrum*) (mapped polygon 177), and bladdernut (*Staphylea trifolia*) (mapped polygon 186). Shrubs include common elderberry (*Sambucus canadensis*), red-berried elderberry, Virginia creeper (*Parthenocissus quinquefolia*), and mountain maple (*Acer spicatum*). The diverse herbaceous layer includes maidenhair fern, bulblet fern (*Cystopteris bulbifera*), walking fern (*Asplenium rhysophyllum*), herb Robert, wild ginger (*Asarum canadense*), white snakeroot, thimbleweed (*Anemone virginiana*), orange jewelweed (*Impatiens capensis*), bottlebrush grass (*Elymus hystrix*), and climbing fumitory (*Adlumia fungosa*). At the base of the Bald Mountain Open Talus there is a distinctly different talus woodland dominated by a white pine open canopy over large boulders covered with Virginia polypody (*Polypodium virginianum*).

The nearly 30 acres of Transition Hardwood Limestone Talus Woodland associated with the southern and western slopes of Austin Hill (EO 26) are very similar in some areas, as there is calcareous bedrock here as well. Oaks tend to be more abundant in these forests, including occasional chestnut oak. Additional shrub species include dogberry (*Ribes cynosbati*), summer grape (*Vitis aestivalis*), and downy arrowwood (*Viburnum rafinesquianum*). Peter Zika identified 48 herbaceous species in the talus forests south of Austin Hill during his 1983 visit. Some of the additional species he lists include blunt-leaved woodsia, rusty woodsia (*Woodsia ilvensis*), marginal woodfern, blunt-lobed hepatica, fragile fern (*Cystopteris fragilis*), pellitory (*Parietaria pensylvanica*), and sticky tick-trefoil (*Desmodium glutinosum*).

A smaller, but fine example of Transition Hardwood Limestone Talus Woodland occurs in Big Hollow (mapped polygon 111, part of EO 27). This remote and undisturbed talus forest is dominated by black birch, yellow birch, sugar maple, white ash, and basswood. A 22-inch diameter at breast height red pine at the top of the talus slope was aged at 219 years by coring. Red-berried elderberry, mountain maple, striped maple, witch hazel, and Canada honeysuckle (*Lonicera canadensis*) make up the sparse shrub layer. Herbs include marginal woodfern, white snakeroot, Virginia polypody, foam flower, herb Robert, sweet cicely (*Osmorhiza claytonii*), and maidenhair fern. The uncommon climbing fumitory and the rare golden corydalis also occur in this talus forest. Mosses are common on the shady rocks and include *Anomodon* sp., *Dicranum* sp., and *Rhyzomnium* sp.



Photo 13. Transition Hardwood Limestone Talus Woodland on the north side of the Big Hollow Valley (observation point 7).

Wetland Natural Communities

Buttonbush Basin Swamp

***Significance:** Two very small examples occur as part of vernal pools, both are considered locally significant.*

The two Buttonbush Basin Swamps that were visited on the Preserve are each less than one tenth of an acre and occur as part of vernal pools (mapped polygons 22 and 151). These Buttonbush Basin Swamps both occur in small basins on local bedrock summits and both have very small watersheds. It is likely that the portion of these wetland basins dominated by buttonbush (*Cephalanthus occidentalis*) have more permanent standing water than do the closely associated vernal pools. Lesser amounts of winterberry holly (*Ilex verticillata*) are also present in the basin swamps, and there is a scattering of royal fern (*Osmunda regalis*), cinnamon fern (*Osmunda cinnamomea*), and common water-horehound (*Lycopus uniflorus*). Organic soils of 12 to 20 inches deep over gleyed mineral substrate indicate that these wetlands are permanently inundated or saturated. The Buttonbush Basin Swamps and associated vernal pools are small and therefore well shaded by the surrounding upland forests. It is likely that both of these small basin wetlands are important for amphibian breeding habitat.

Buttonbush Swamp

***Significance:** likely of statewide significance.*

Buttonbush Swamp occurs as part of the mosaic of Cattail Marsh, Deep Bulrush Marsh, and Deep Broadleaf Marsh in the extensive deep marshes of the Drowned Lands. The approximately 250 acres of high quality marsh and wet shrub swamp that occur at the Drowned Lands is flooded by Lake Champlain seasonally and most of the area is inundated throughout the year. Additional field work is needed to determine the extent and composition of the Buttonbush Swamp and other component natural communities in this highly significant wetland complex.

Cattail Marsh/Deep Bulrush Marsh/Deep Broadleaf Marsh/Wild Rice Marsh

***Significance:** B-ranked examples (EO 2) of these communities occur in the large complex of marshes along the Poultney River. High quality examples also occur in the Drowned Lands but are unranked, as they were not visited for this project.*

There are approximately 280 acres of marsh complex occurring on the Vermont side of the Poultney River from The Elbow north to Reed Marshes. This complex includes Cattail Marsh, Deep Bulrush Marsh, and Wild Rice Marsh. It is difficult to map the boundaries of the individual natural communities that occur as a mosaic in deep marsh complexes like this. In this case, the three component natural communities are all considered B-ranked examples and are of statewide significance. They are large examples, in relatively good condition, but in a landscape that is fragmented by agricultural land and a road (Bay Road) that runs between the marshes and

the river. The Element Occurrences for these natural communities should be combined with those on the New York side of the Poultney River.

Some of the species occurring in this marsh complex include broad-leaved cattail (*Typha latifolia*), narrow-leaved cattail (*Typha angustifolia*), sweet flag (*Acorus calamus*), giant bur-reed (*Sparganium eurycarpum*), broad-leaved arrowhead (*Sagittaria latifolia*), river bulrush (*Scirpus fluviatilis*), wild rice (*Zizania aquatica*), and buttonbush. The invasive exotic purple loosestrife (*Lythrum salicaria*) is present in most of the marshes.

A similar marsh complex that also includes Buttonbush Swamp occurs in the Drowned Lands. This wetland complex is approximately 250 acres, is likely in better condition, and occurs in a better landscape context than the marshes along the Poultney River. However, as there has been very little inventory done in the Drowned Lands, the component natural communities are not identified with certainty and are not yet ranked. All of the marshes provide important waterfowl and wildlife habitat.



Photo 14. The Drowned Lands marshes, aquatic bed, and narrow band of floodplain forest as viewed from the south summit of Bald Mountain.

Hemlock Swamp

Significance: unknown

Two small conifer-dominated swamps on the eastern side of the preserve, west of Schoolhouse Marsh, have been provisionally mapped as Hemlock Swamp. Site visits are needed to confirm the type and to assess significance. Given the small size of these swamps, it is not likely that they will be of state significance as community occurrences, but no other conifer swamps are known from the preserve and they may contain rare plants or species not found elsewhere on the peninsula.

Lakeside Floodplain Forest

Significance: A-ranked example of this uncommon community type

The Lakeside Floodplain Forests of the Drowned Lands occur in two distinct settings. The largest area of Lakeside Floodplain Forest occurs on long, narrow levees or beach ridges between the open water of Lake Champlain and the extensive marshes and shrub swamp of the Drowned Lands. On these slightly elevated alluvial ridges, tall silver maple (*Acer saccharinum*) dominate the canopy, with lesser amounts of green ash. The silver maples reach diameters at breast height of 28 inches, although the average is closer to 14 inches. Spring flooding regularly inundates these ridge forests under 30 inches of water, as indicated by the sediment stains on the lower tree trunks. There is abundant silver maple regeneration in these flooded forests, although most of the seedlings do not survive their first year of spring flooding. Other shrubs include water willow (*Decodon verticillatus*) and green ash. Herbaceous cover is very sparse, and includes nodding beggar's-ticks (*Bidens cernua*), common water-horehound, lobed beggar's-ticks (*Bidens connata*), and rice cut-grass (*Leersia virginica*). The approximately 42 acres of this beach ridge type floodplain forest are in excellent condition and are the primary basis for assigning an overall quality rank of A to this occurrence.

Seven smaller areas of Lakeside Floodplain Forest at the Drowned Lands occur in a very different setting. These are wetland coves that are connected to the Drowned Land marshes to the west but otherwise surrounded by uplands. The community pattern in these coves is marsh on the lakeward side where flooding is most extreme and Lakeside Floodplain Forest at the landward end of the cove where the elevation is slightly higher. The presence of several inches of dark organic material at the surface of the otherwise clay soil profile indicates that alluvial deposition is a minor process in current development of these soils. Green ash is typically dominant in these cove forests, but silver maple may also be common. Shrub cover is very sparse and includes arrowwood (*Viburnum dentatum*), nannyberry (*Viburnum lentago*), and dogwoods (*Cornus sericea* and *C. amomum*). Herbs cover much of the ground, with sensitive fern most abundant. Other species include hop sedge (*Carex lupulina*), marsh fern (*Thelypteris palustris*), rice cut-grass, Virginia wild-rye (*Elymus virginicus*), false nettle (*Boehmeria cylindrica*), and tall white aster (*Aster lanceolatus*). Two rare plants grow at the interface between the marsh and the floodplain at the northern cove (mapped polygon 83) – arrow arum (*Peltandra virginica*) and false water pepper (*Polygonum hydropiperoides*). These cove forest

floodplains are generally younger forests than the beach ridge type and they are adjacent to abandoned agricultural lands. The exotic purple loosestrife is present in some of the floodplain forests.

Open Water/Aquatic Bed

Significance: High quality examples exist in the Drowned Lands but were not visited or ranked for this project.

Approximately 50 acres of open water and aquatic bed occur in the center of the Drowned Lands and are connected to the open water of Lake Champlain. These open water/aquatic bed communities are nearly surrounded by marsh and buttonbush swamp and are expected to be in excellent condition and to provide very important waterfowl habitat. Additional plant, natural community, and wildlife survey work is recommended for all of the highly significant open wetlands of the Drowned Lands.

Pond

Significance: One large and one small pond were not evaluated for this project.

Coggman Pond is a 26-acre pond surrounded by farm fields and some young clayplain forest. It is expected to provide important wildlife habitat, but it was not surveyed for this project. The pond has been surveyed by the Lakes and Ponds program of Vermont Department of Environmental Conservation. The aquatic species in the pond are indicative of high alkalinity and high nutrient conditions: common coontail (*Ceratophyllum demersum*), Siberian water-milfoil (*Myriophyllum sibiricum*), Eurasian water-milfoil (*Myriophyllum spicatum*), floating-heart (*Nymphoides cordata*), white waterlily (*Nymphaea odorata* ssp. *odorata* and *Nymphaea odorata* ssp. *tuberosa*), yellow waterlily (*Nuphar variegata*), floating pondweed (*Potamogeton natans*), curly pondweed (*Potamogeton crispus*), longleaf pondweed (*Potamogeton nodosus*), water chestnut (*Trapa natans*), duckweed (*Lemna* sp.), and water smartweed (*Polygonum amphibium*). The invasive exotic water chestnut is being hand-pulled from the pond annually, but there is currently no control of Eurasian water-milfoil.

Red Maple-Black Ash Seepage Swamp

Significance: Two small B-ranked examples of this forested swamp type (EOs 9 and 12)

Only four small locations of Red Maple-Black Ash Seepage Swamp were located on the Bald Mountain peninsula, and only two of these are large enough to qualify as element occurrences (mapped polygons 166 and 202). Both of these two swamps are fed by ground water seepage at their upslope margins and both swamps form the headwaters of small streams. The northern swamp (mapped polygon 166, observation point 37) is at the headwater of Big Hollow Brook. The southern swamp (mapped polygon 202, observation point 94) is at the headwater of a

tributary stream to Bumps Brook. Given their separation of nearly two miles, these two small swamps are remarkably similar. Both have open canopies (60 percent closure) that are dominated by black ash (*Fraxinus nigra*) and hemlock, with lesser amounts of yellow birch, red maple, and white pine. Winterberry is a common shrub and spicebush (*Lindera benzoin*) is also present. Herbs indicative of ground water seepage include foam flower, golden saxifrage (*Chrysosplenium americanum*), and white turtlehead (*Chelone glabra*). Other herbaceous species include sensitive fern, cinnamon fern, royal fern, crested wood fern (*Dryopteris cristata*), and bluejoint grass (*Calamagrostis canadensis*). Bryophytes cover the low hummocks and the hollows that do not contain permanent standing water: *Sphagnum magellanicum*, *Sphagnum fimbriatum*, *Sphagnum girgensohnii*, and *Thuidium delicatulum*. Both of these swamps are in good condition, showing no signs of recent human disturbance.

Red Maple-Black Gum Swamp

Significance: A-ranked example of this rare swamp type

This small Red Maple-Black Gum Swamp is an excellent example of this rare community type and is one of only two black gum swamps known from western Vermont. It is located in a one-acre depression at the top of the steep western slope of Bald Mountain. There is seasonal drainage out of the swamp to the west. Peat in the center of the swamp is over four feet deep, indicating that the swamp is many thousands of years old.

This swamp is mature, with no sign of human disturbance other than a minor amount of property boundary work on the eastern side. The canopy is open (65 percent cover) and there are several large standing dead trees in various states of decay. Black gum (*Nyssa sylvatica*) makes up 25 percent of the canopy and trees are up to 20 inches in diameter at breast height. A 19-inch diameter black gum was cored and was determined to be 308 years old! The other canopy species are red maple, hemlock, and white pine. There is 40 percent cover of shrubs, half of which is winterberry growing on the drier portions of the swamp, and half is buttonbush growing in wet hollows and in the large permanent pool on the western side of the swamp. Herbaceous plant diversity is low, with cinnamon fern covering much of the ground. Wool-grass (*Scirpus cyperinus*) and three-seeded sedge (*Carex trisperma*) are also present. Most of the hummocks are covered with moss – *Sphagnum magellanicum* and *Sphagnum angustifolium* are the dominant species.

Based on my site visit and the presence of flagging and survey markers on the eastern side of the swamp, it appears that most of the swamp is on the Buckner Preserve. However, the "conserved lands" GIS layer clearly shows this to be on Joe Howard's property.



Photo 15. Red Maple-Black Gum Swamp on the southern summit of Bald Mountain. The large pool dominated by buttonbush is in the foreground.

Shallow Emergent Marsh

***Significance:** local significance for wildlife habitat and potential future Wet Clayplain Forest*

Two small areas have been mapped as Shallow Emergent Marsh. Both of these wetlands have been disturbed in the past and both are likely to succeed Wet Clayplain Forest over time. The two areas of Shallow Emergent Marsh are very different in how they have developed.

The larger Shallow Emergent Marsh is located east of the summit of Austin Hill (mapped polygon 34). This nearly seven acre wetland was forested as recently as 12 years ago with a mix of hardwood and conifer species, based on review of 1992 and 1994 aerial photographs. Beaver have since flooded the forested wetland and by 2003 the beaver pond was already drained. Based on the presence of Livingston clay soils and remaining standing dead trees, this wetland was likely a high quality Wet Clayplain Forest prior to flooding. Standing dead trees remaining in the wetland include swamp white oak (*Quercus bicolor*), green ash, shagbark hickory,

hemlock, and white pine. There is shallow standing water in much of the marsh, although the beaver dam is not maintained. Marsh vegetation includes rice cut-grass, wool-grass, bluejoint grass, and hop sedge. It is likely that Wet Clayplain Forest will become re-established at this site over many years if there is no more beaver flooding. If beaver return to the area, marsh and pond communities may persist for many years.



Photo 16. Former Wet Clayplain Forest that was flooded by beaver in mid-1990s and is now Shallow Emergent Marsh (mapped polygon 34).

The smaller area of Shallow Emergent Marsh (mapped polygon 68) is located on the eastern end of a Lakeside Floodplain Forest associated with the Drowned Lands. This marsh is surrounded by old fields and early-successional clayplain forest. It is likely that this area was Wet Clayplain Forest prior to be cleared for agricultural use. The marsh is now dominated by purple loosestrife, with woolgrass, goldenrod (*Solidago* sp.), common cattail, retrorse sedge (*Carex retrorsa*), and blue vervain (*Verbena hastata*). The future of this disturbed marsh is unclear, but it is likely that forested wetland will return over time.

Silver Maple-Sensitive Fern Riverine Floodplain Forest

Significance: B-ranked example of this uncommon community type.

Riverine floodplain forest extends approximately 5 miles upstream from The Elbow, where East Bay meets the head of Lake Champlain. East Bay itself is the lower portion of the Poultney River, and more closely resembles a river than Lake Champlain proper. Therefore, the floodplain forest along the waterway has more characteristics of riverine than lakeshore floodplain forest. The valley in which East Bay lies is about 0.25 miles wide and is bounded by steep-sided low mountains in both Vermont and New York. The valley's landscape is a complex of forested levee, forested floodplain, and lower depressions filled with marsh or shrub swamp. Bay Road was constructed on the levee and some of the floodplain forest was cleared for agricultural use long ago.

Levee forest features an open canopy of green ash, basswood, and American elm (the majority of which are dead) and an understory of green ash, living and dead American elm and box-elder (*Acer negundo*), with a very occasional black ash. A gallery of silver maple overhangs the river, whose waters are 5 feet below the levee. Patches of tall shrubs, including nannyberry, box-elder, and arrowwood, alternate with dense growth of tall herbs, wood-nettle (*Laportea canadensis*), goldenrod (*Solidago gigantea*), sensitive fern and more than 30 less abundant species of herbs, ferns, and sedges. Twining throughout is a tangle of woody and herbaceous vines, including Virginia creeper, riverbank grape (*Vitis riparia*), hog-peanut (*Amphicarpaea bracteata*), virgin's bower (*Clematis virginiana*), and groundnut (*Apios americana*).

In great contrast to the diverse flora of the levee, the low floodplain forest is overwhelmingly dominated by a closed canopy of silver maple and green ash, and previously, American elm. Beneath this is a sea of sensitive fern in which wood-nettle is the only other herb species that accounts for more than one percent coverage. Soil also differs between levee and floodplain. The levee has more than 20 inches of very fine sandy loam, with mottles starting at 20-inch depth. The floodplain soil is silt loam with mottles evident at the surface and a water table only 16 inches down in September. Both soils are fertile and have pH 7.0-7.2.

Vernal Pool

Significance: Three A-ranked clusters of vernal pools are in excellent condition.

Three clusters of 18 Vernal Pools were identified near the summit of Austin Hill, on the south summit of Bald Mountain, and on the summit north of Big Hollow. These pools were grouped into three element occurrences. Together, they represent a high concentration of pools that is of statewide significance. Some of these pools were visited as part of this natural community mapping project and several of the pools north of Big Hollow were visited in 1999 and 2000 as part of the Vermont Fish and Wildlife Department/Department of Environmental Conservation Wetlands Bioassessment Project (VT DEC and VT FWD 2003).



Photo 17. Vernal Pool in the saddle of the Austin Hill summits (mapped polygon 23).

All of the pools are small, with only the excellent pool in the saddle between the two summits of Austin Hill exceeding one quarter of an acre. Most of the pools have nearly closed canopies from trees in the surrounding upland forests – the largest pools tend to have the most open canopies. Several of the pools north of Big Hollow have hemlock canopies, although the majority of the pools are surrounded by hardwood forests. Vegetation in Vernal Pools is extremely variable, largely depending on the hydrologic regime of each pool. Pools that hold water long into the summer tend to have few herbaceous perennials, but may have buttonbush, which tolerates long periods of flooding. Herbaceous cover is typically low. Herbaceous species present in some pools include common hop sedge, Tuckerman's sedge (*Carex tuckermanii*), sensitive fern, and beggar's ticks (*Bidens* sp.). Amphibian breeding surveys were not included in this study, but were for the Wetland Bioassessment project mentioned above. Wood frog (*Rana sylvatica*) and spotted salamander (*Ambystoma maculatum*) were found in two of the pools north of Big Hollow (mapped polygons 150 and 216), and Jefferson's salamander (*Ambystoma jeffersonianum*), a rare species, was found in one of the pools (mapped polygon 150).

Wet Clayplain Forest

Significance: C-ranked example (EO 28) is small but in good condition.

On the Bald Mountain peninsula, Wet Clayplain Forest typically occurs as very small patches of wetland forest in isolated basins on Kingsbury and Livingston soils. These dense, wet soils hold water for long periods of the growing season, creating conditions that favor many wetland plant species. Two patches of Wet Clayplain Forest that occur on the eastern side of the peninsula (mapped polygons 36 and 155) together form a small but significant element occurrence (EO 28). Only the northern portion is on the Buckner Preserve.

The northern portion of this Wet Clayplain Forest (mapped polygon 155) is just over two acres. It occurs on a small patch of Kingsbury silty clay loam soil, the northern half of which has been maintained as a field where there is a small cabin. Otherwise, this patch of Wet Clayplain Forest is surrounded by upland forest. The Wet Clayplain Forest soils have mottling to the surface indicating long periods of saturation. The canopy of this young forest is 90 percent closed and is composed of a mix of green ash, red maple, bigtooth aspen, basswood, hemlock, and white pine. Muscledwood is common in the understory. Ground cover includes sensitive fern, false nettle, sedges (*Carex* spp.), and the bryophytes *Sphagnum magellanicum* and *Bazzania trilobata*. Because this forest is young and does not include many of the characteristic canopy species, it was assigned a C-rank for condition.

The southern portion of this Wet Clayplain Forest (mapped polygon 36) is just less than two acres and occurs at the northern end of a larger patch of the very wet Livingston silty clay loam. The canopy of this mature forest is dominated by hemlock, with lesser amounts of American elm (*Ulmus americana*), green ash, shagbark hickory, white pine, red maple, and on slightly higher ground, sugar maple. Three large trees that may be pignut hickory (*Carya glabra*), a rare species in Vermont, also occur here, but the identification of these trees should be confirmed during the growing season. Muscledwood is the dominant understory species. Herbaceous cover includes sensitive fern, foam flower, crested wood fern (*Dryopteris cristata*), maidenhair fern, and false nettle. A species of the moss genus *Brachythecium* is common on the wet ground. The southern portion of this Livingston soil patch has been flooded by beaver and only scattered dead or dying trees remain. Although this wetland was mapped as Shallow Emergent Marsh (mapped polygon 34), it appears that it was all Wet Clayplain Forest based on the species of trees remaining – swamp white oak (*Quercus bicolor*), green ash, shagbark hickory, hemlock, and white pine. It is unclear whether Wet Clayplain Forest will return to this beaver flooded area in the future.

Conclusions

The Helen W. Buckner Memorial Preserve and the rest of the Bald Mountain peninsula is one of Vermont's most significant natural areas. This area provides secure habitat for many rare and common species of plants and animals. As a result of this study, 27 upland and wetland natural community types have been documented. The study identified 31 element occurrences (significant examples) of these natural communities. The example of Dry Oak-Hickory-Hophornbeam Forest at Bald Mountain is the largest known in Vermont. The size of the Mesic Maple-Ash-Hickory-Oak Forest, Transition Hardwood Limestone Talus Woodland, Temperate Hemlock Forest and Silver Maple-Sensitive Fern Riverine Floodplain Forest are also some of the largest in the state. The Open Talus and cliff communities are some of the finest in Vermont. The two large element occurrences of Mesic Clayplain Forest are not as mature as some other known examples, but may provide the best opportunity to restore clayplain forest in a largely intact forested landscape.

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