NATURAL COMMUNITY INVENTORY OF THE WALDRON, AUSTIN, AND TARDY TRACTS OF THE TOWN OF WAITSFIELD

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This report describes the results of an inventory of the natural communities on the Waldron, Austin, and Tardy tracts owned by the town of Waitsfield. The Waldron parcel, or Wu Ledges, is a 125-acre tract of rugged forest land located on the east side of the Mad River at Irasville. Elevations of this tract range from 720-1120 feet above sea level. The 5-acre Austin and 7-acre Tardy tracts are primarily maintained fields along the Mad River upstream from the Waldron tract. Both of these tracts are in the Mad River floodplain. General descriptions of the three parcels are found in the individual baseline documentation reports prepared by the Vermont Land Trust. The Vermont Land Trust holds conservation easements on all three properties.

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The natural community inventory of the Waitsfield tracts was conducted during the summer and fall of 2005. Three days were spent in the field collecting information on the natural communities, including GPS coordinates of community locations. A Garmin 12 GPS unit, with ±15-meter accuracy, was used to collect waypoints. Hand-written field notes, including descriptions of natural communities and significant plants, accompany these GPS waypoints.

The primary product of the inventory is a map of all the natural communities found on the three tracts. Natural communities are a relatively new way of describing distinct and repeating units of vegetation, soils, animals, and ecological processes as they appear across the landscape. As defined in *Wetland, Woodland, Wildland*[*], a natural community is "an interacting assemblage of organisms, their physical environment, and the natural processes that affect them" (p.2). Because they depict areas with differing ecological characteristics, natural community maps are useful for conservation, both as an educational tool and as means of geographically displaying areas of conservation significance.

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[*] *Wetland, Woodland, and Wildland*: *A Guide to the Natural Communities of Vermont.* Elizabeth Thompson and Eric Sorenson, 2000, The Nature Conservancy and the Vermont Department of Fish and Wildlife.

The natural community map is a polygon shapefile created in ArcGIS (ArcMap) 9 at the Recreation Department GIS lab at Lyndon State College. The 1999 black and white digital orthophoto available through the Vermont Center for Geographic Information was used as a background to digitize the natural community polygons. Other digital layers used to help create the map include the Waitsfield 7.5' USGS topographic quadrangle, soil survey of the National Resource Conservation Service (formerly Soil Conservation Service), and shapefiles of the property boundaries and observation GPS points. A stereo pair of 1962 black and white aerial photographs (VT-62-H 21-240 and 241 flown 5-10-62) at a scale of roughly 1:20,000 were viewed stereoscopically to aid the digital mapping. A polygon shapefile of the natural community boundaries and a point shapefile of the GPS points accompany this report on a CD. A final version of the natural community map, including a legend of units, will also be provided in JPEG format on this CD, and as hardcopy color map.

For such a relatively small acreage, these Waitsfield town lands show a surprising diversity of natural communities. Table 1 provides a summary of the natural communities on the town lands while Table 2 (at end of report) is the attribute table of the natural community map. The attribute table contains data on each map polygon. The natural community map includes 75 polygons divided among 23 natural community types and variants. Types and variants are distinct mapping units, though for ranking purposes the variants are combined with the types from which they vary. Polygons range in size from 0.03-acre seeps and vernal pools to a 33-acre northern hardwood forest polygon. The bulk (60%) of the polygons are one acre or less in size. The varied topography and rivershore environments are major factors in creating both natural community type and patch size diversity.

Upland forests, particularly northern hardwood forest and hemlock forest (and hemlock-red spruce forest variant), dominate the landscape. Several hardwood forest types occur in the uplands beyond the typical northern hardwood forest. Sugar maple-white ash-jack-in-the-pulpit forest, also referred to as semi-rich northern hardwood forest, is found in a few locations with more fertile soils in lower slope and bottom landscape positions, as does rich northern hardwood forest. Inclusions within these larger northern hardwood forest types are very small units of northern hardwood talus woodland, open talus, and dry-mesic, semi-rich northern hardwood forest.

Dry-mesic, semi-rich northern hardwood forest is an innovation not found in *Wetland, Woodland, Wildland*. It is perhaps a variant of northern hardwood forest. On the Waitsfield lands, this unique community occurs on the south "nose" end of small ridge summits. It characteristically has a slightly broken canopy dominated by sugar maple and hop hornbeam, with lesser amounts of white ash and basswood. Red oak might be expected in such locations, but was not found on the parcels except for a couple widely scattered seedlings. The subcanopy and shrub layers are poorly developed. The well-developed herb layer of this community is distinctive. Grasses, especially false melic (*Schizachne purpurascens*), sedges (especially *Carex pedunculata*), compositae (*Aster cordifolius*, *Aster divaricatus*, *Solidago arguta*, and *Solidago caesia*), marginal wood-fern (*Dryopteris marginalis*), and Canada mayflower (*Maianthemum canadense*) are the dominant and characteristic species in the herb layer. While quite different

Table 1. Summary of natural communities broken down by landscape groups on three Waitsfield town lands. "# POLYS" refers to the number of polygons mapped for each natural community type. "NC RANK" is the natural community rank as determined by VNNHP; the range is from very rare (S1) to very common. "EO RANK" = Element occurrence (i.e. the particular example of a community) rank; determined through VNNHP ranking guidelines.

NATURAL COMMUNITY	ACRES	# POLYS	NC RANK	EO RANK
UPLAND HARDWOOD FORESTS				
northern hardwood forest	41.0	4	S5	C
sugar maple-white ash-jack-in-the-pulpit northern hardwood forest	7.0	4	S5	C
rich northern hardwood forest	5.3	5	S4	B
dry-mesic, semi-rich northern hardwood forest	1.5	5		
northern hardwood talus woodland	0.2	1	S3	D
UPLAND MIXED FORESTS				
hemlock-northern hardwood forest	14.9	10	S4	C
hemlock-white pine-northern hardwood forest	1.2	1	S4	C
UPLAND CONIFER FORESTS				
hemlock forest	29.1	12	S4	B
hemlock-red spruce forest	10.2	2	S4	B
SMALL DRY COMMUNITIES IN UPLANDS				
open talus	0.6	1	S2	D
temperate acidic cliff	0.1	1	S4	D
temperate acidic outcrop	0.1	1	S4	D
SMALL WETLAND COMMUNITIES IN UPLANDS				
hemlock-hardwood swamp	0.8	2	S2	C?
seep	0.4	6	S4	
vernal pool	0.2	2	S3	
VALLEY BOTTOM COMMUNITIES				
sugar maple-ostrich fern riverine floodplain forest	15.0	4	S2	D
river	5.0	2		
rivershore thickets and meadow	3.5	1		
shallow emergent marsh	0.8	2	S4	D
river cobble shore	0.5	6	S2	B
brook	0.4	1		
alder swamp	0.2	1	S5	D
riverside outcrop	< 0.1	1	S4	C
TOTAL	**137.8**	**75**		

floristically, this newly described community shares some characteristics of dry oak-hickory-hop hornbeam forest found at lower elevations in western Vermont and the lower Connecticut River Valley. Back's sedge (*Carex backii*) was discovered in this new community.

Hemlock forest and its variant hemlock-red spruce forest dominate the shallow, rocky soils found on the ridge tops and steep slopes of the Waldron tract uplands. While notably lacking an herb layer, these forests are generally the most mature and least disturbed on all the tracts. In one rare instance, hemlock forest occurs in a draw bottom (polygon Id 70 on natural community map). This is a particularly mature and beautiful forest with an extended seep draining it. Intermediate between the hardwood forest and hemlock forest is hemlock-northern hardwood forest community. This mixed canopy natural community occurs on slopes, oftentimes with quite deep and fertile soils. The mixed canopy composition defines this community more than the herb layer or soils.

Small natural communities embedded in the upland forests include both dry lands and wetlands. The small dry community types include single examples of open talus, temperate acidic outcrop, and temperate acidic cliff. While notable landscape features, the numerous shaded ledges found on the Waldron tract were not mapped as natural communities. Wetlands are rare throughout the three town lands, and particularly so on the upland slopes of the Waldron tract. Two very small hemlock-hardwood swamps and two vernal pools occur in shallow, perched basins. Only six seeps are mapped, though undoubtedly more occur on the Waldron tract. The seeps most frequently occur in draw bottoms, though sometimes can be found on steep slopes. While tiny in size, seeps add significantly to the biodiversity of the landscape.

The valley bottom natural communities are strongly influenced by human activities as well as natural river processes. The largest of these natural communities on town lands is the sugar maple-ostrich fern riverine floodplain forest. Though largely fields at present, these bottomlands sit within the floodplain of the Mad River according to the Natural Resources Conservation Service 's Washington County soil survey. The floodplain on the Waldron and Tardy tracts are mapped as a well-drained Waitsfield silt loam, while the Austin tract is mapped as a poorly-drained Rumney fine sandy loam. Both soils are described as "areas on flood plains that are frequently flooded by stream overflow for brief periods." Field work for this project corroborated the alluvial character of these soils, though the soil textures in the field varied widely from those of the soil descriptions. Remnant patches of this floodplain forest can be found above the "rivershore thickets and meadow" community on the Waldron tract (polygon 71), and on the east bank of the Mad River just upstream from the Tardy tract. The single example of "rivershore thickets and meadow" community was formerly pasture land according to Jack Smith, a long-time Waitsfield resident. Dominated by many non-native species, this rivershore meadow is clearly degraded from its original condition. It was mapped as new natural community (i.e. not found in *Wetland, Woodland, Wildland*) for lack of being able to clearly classify it. Prior to being grazed, it was likely at least partially forested. The loamy fine sand soil, however, might have precluded sugar maple from dominating the canopy.

Other valley bottom communities found on the town lands include both palustrine wetlands (the shallow emergent marsh and alder swamp on the Austin tract), and open rivershore communities (cobble shore and riverside outcrop). Several cobble shores, including both mid-channel and shoreline bars, occur along this reach of the Mad River. Given their position actually in the river channel, these cobble shores are flooded annually, if not several times a years, by both floods and high water. The Mad River channel and the Mill Brook channel are mapped as distinct communities, though neither is found in *Wetland, Woodland, Wildland*. According to the classification of aquatic communities in Vermont[f], this reach of the Mad River might be classified as Type 4: Lower reaches of small rivers, while Mill Brook might be Type 2: Cold, headwater mountain stream or Type 3: Moderately-sized mountain stream. Stream geomorphologists and aquatic biologists should be consulted for a better classification of these stream reaches.

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[f] *A Classification of the Aquatic Communities of Vermont*. Prepared by The Aquatic Classification Workgroup for The Nature Conservancy and the Vermont Biodiversity Project, October 1998.

Three natural communities found on the town tracts are significant on a state level according to natural community ranking guidelines of VNNHP: hemlock forest (including hemlock-red spruce forest), rich northern hardwood forest, and river cobble shore. State significance for a particular example of a natural community (element occurrence) is determined by the rank of the example and the natural community type's rarity rank, or S-rank. Community type S-ranks are given by VNNHP and listed in *Wetland, Woodland, Wildland*. Element occurrence ranks are determined through evaluations of the size, condition, and landscape context of the natural communities. Because of their close proximity, most of the polygons of a particular natural community type (including variants in some cases) are combined and ranked as a single unit. For example, the size of hemlock forest for ranking purposes includes 12 hemlock forest polygons and two hemlock-red spruce forest polygons for a total of 39.3 acres. Natural community type and element occurrence ranks are shown in Table 1. Newly described natural communities and certain communities lacking ranking guidelines are missing rank information in the table.

Three uncommon plants (S3 species according to VNNHP) were found on the Waldron parcel during the mapping work. A small population (25 plants) of Back's sedge (*Carex backii*) occurs in one of the dry-mesic, semi-rich northern hardwood forest units (waypoint 040 in polygon 32). Colonies of glade fern (*Diplazium pycnocarpon*) grow in rich northern hardwood forest polygons 21 and 23 (waypoints 051 and 116, respectively). Wild millet (*Milium effusum*) was noted as rare at a seep (polygon 57, waypoint 047), though it likely occurs in rich northern hardwood forest elsewhere. Other native plant species of note include slippery elm (*Ulmus rubra*) in semi-rich northern hardwood forest (polygon 39, waypoint 034) and a few clumps of maidenhair spleenwort (*Asplenium trichomanes*) found on scattered upland ledges. A small population of a wild-rye (*Elymus* sp.) was found in rich northern hardwood forest polygon 21 (waypoint 050). Pending verification by other botanists, this may be the very rare (S1) downy wild rye (*Elymus villosus*).

Three invasive plants – Japanese knotweed (*Polygonum cuspidatum*), purple loosestrife (*Lythrum salicaria*), and Morrow's honeysuckle (*Lonicera morrowii*) - occur along the Mad River on the town lands. The Japanese knotweed and Morrow's honeysuckle are especially prevalent in the "rivershore thickets and meadow" natural community on the Waldron tract, while the purple loosestrife occurs on a cobble shore upstream. Goutweed (*Aegopodium podagraria*) was not observed on the town lands, but occurs in a small patch of intact sugar maple-ostrich fern riverine floodplain forest on the east bank of the Mad River immediately upstream from the Tardy tract.

Table 2. Attribute table containing information on individual polygons of the natural community map of the Waldron, Austin, and Tardy tracts, Waitsfield town lands.

Polygon Id	Natural Community	Acres	Notes
1	river cobble shore	0.1	cobble grading to gravel and sand. Part of much larger channel bar off property.
2	shallow emergent marsh	0.3	A back channel impounded by beaver dam. Loaded with water cress.
3	river cobble shore	0.1	Narrow bar on east bank of river.
4	river cobble shore	0.0	Mid channel bar in Mad River. Does not show on orthophoto.
5	sugar maple-ostrich fern riverine floodplain forest	4.3	Valley bottom land with some low and high spots. Now a field. Includes some road fill.
6	river	1.2	Main channel of Mad River. Small fairly high gradient reach upstream from bridge.
7	river cobble shore	0.1	Part of mid-channel bar in Mad River immed. upstream from bridge.
8	dry-mesic, semi-rich northern hardwood forest	0.2	40x15m flat-topped hogback summit glade, with raspberry and Schizachne (false melic).
9	hemlock forest	0.7	With 10-15m shaded cliff at bottom. Little lime
10	dry-mesic, semi-rich northern hardwood forest	0.3	New variant of northern hardwood forest. Sugar maple-hop hornbeam; Schizachne. On S.-facing nose.
11	hemlock-northern hardwood forest	1.0	
12	hemlock forest	1.7	Undisturbed; on SE boundary summit. Hemlock to 50cm dbh. Nice.
13	northern hardwood forest	4.7	
14	dry-mesic, semi-rich northern hardwood forest	0.3	Small hogback separating small parallel drainages. Here with lots of hay-scented fern in addition.
15	river cobble shore	0.0	Needs verification
16	seep	0.0	30x10m. Carex scabrata-Impatiens capensis dominated.
17	shallow emergent marsh	0.5	Dominated by Phalaris arundinacea. Likely old river channel.
18	alder swamp	0.2	Part of small wetland complex W. of river.
19	temperate acidic outcrop	0.1	10m wide band on brow of cliff. Patchy lowbush blueberry. Great views to W. & S.
20	temperate acidic cliff	0.1	~15m high, mostly sunny, W.-facing above big talus area. Small cave at base.
21	rich northern hardwood forest	0.8	Includes both rich rocky and fern glade variants. Glade and Goldies ferns here.
22	open talus	0.6	40x40m sunny boulder talus, facing SE, with mtn. maple copses.
23	rich northern hardwood forest	2.6	Fern glade variant in bottom of small drainage. Glade fern (Diplazium) and Goldies fern.
24	hemlock-northern hardwood forest	2.2	
25	sugar maple-ostrich fern riverine floodplain forest	3.4	West bank valley bottomland. Hayfield and old field. Might include some upland.
26	seep	0.1	7x40m at S. end of swamp.
27	river cobble shore	0.2	Mid-channel cobble bar at mouth of Mill Brook. Nice small example.
28	brook	0.4	Mill Brook to mid-channel. Large brook coming down from mountains.
29	riverside outcrop	0.0	10x15m; acidic outcrop. Degraded. Sunny. Solidago nemoralis, Danthonia spicata, Fragaria.
30	dry-mesic, semi-rich northern hardwood forest	0.5	Steep, rocky SW-SSW-facing slope. With some rich woods species. Marg. wood fern and Carex. pedunculata
31	vernal pool	0.1	60x5-10m. Exposed leaf mold in latter Aug05. One 25m2 patch of Cx. lupulina.

32	dry-mesic, semi-rich northern hardwood forest	0.2	New variant. 70x15m, on S.-facing ridge nose. Lot of Schizachne. Carex backii rare.
33	sugar maple-ostrich fern riverine floodplain forest	4.4	Now fields adjacent river. Needs soil work. Contains low, wet ground of old river channel.
34	vernal pool	0.0	20x3m at N. end of defile. Dry in latter Aug05. May not be suitable for amphibian. repro.
35	northern hardwood talus woodland	0.2	20x50m below 5-10m schist ledge. Carpeted with marginal wood fern.
36	hemlock-hardwood swamp	0.6	Variant of hemlock swamp. Seepage influenced. 40%canopy of YB, H, RM, RS. 1 WP & 2 BA.
37	hemlock forest	0.6	Associated with N-S ledge E. of swamp. This shows as hardwood forest in 1962 photo.
38	hemlock-northern hardwood forest	0.4	At divide between N & S drains.
39	sugar maple-white ash-jack-in-the-pulpit northern hardwood forest	3.6	Toe slope forest, including some rocky areas and oldfield valley bottom. One mature slippery elm.
40	seep	0.1	20x20m Glyceria melicaria-touch-me-not-Deparia acrosticoides dominated seep. Drains N.
41	hemlock-red spruce forest	5.6	Lot of pole spruce right on summit; mature spruce scattered among dom. hemlock. Mature.
42	hemlock-red spruce forest	4.6	On summit, dense, mature, even-aged forest, with some white pine. Some charcoal on surface.
43	sugar maple-white ash-jack-in-the-pulpit northern hardwood forest	1.1	In bottom of headwater drainage. Large canopy breaks after recent logging. Dense fern glade.
44	hemlock-northern hardwood forest	0.3	On rocky convex slope.
45	hemlock-hardwood swamp	0.2	20x50m swamp perched in trough. Drains S. Small opening in center. Huge red maple log.
46	hemlock forest	0.4	On small bedrock hillock. Diverse herb cover on slopes, abundant Schizachne.
47	rich northern hardwood forest	0.2	fern (ostrich, maidenhair, silvery glade) glade associated with small drainage. ferns.
48	hemlock-northern hardwood forest	0.7	Hard to classify on photos.
49	rich northern hardwood forest	1.6	Fern glade type in swale, with 30% sugar maple canopy. Dense ostrich fern
50	hemlock forest	0.6	
51	hemlock-northern hardwood forest	2.5	
52	hemlock forest	9.6	
53	seep	0.0	7x20m Glyceria melicaria seep above upper waterfall.
54	seep	0.0	Steeply sloping Glyceria melicaria & Carex scabrata seep, 5x20m.
55	hemlock-northern hardwood forest	0.3	This is somewhat enriched.
56	hemlock forest	0.5	Mature hemlock on steep northwest-facing slope. Hemlock 60-80cm dbh. No groundcover.
57	seep	0.1	30x15m at confluence of 2 drainages. Mostly shaded. Very gently sloping.
58	northern hardwood forest	2.3	Includes some semi-rich fern glade forest in bottom. Very mature.
59	northern hardwood forest	33.3	The matrix forest unit. Includes some semi-rich forest not mapped.
60	hemlock forest	4.1	Includes some white pine, red spruce and very small outcrop openings.
61	sugar maple-white ash-jack-in-the-pulpit northern hardwood forest	0.5	Variant of northern hardwood forest. Includes grove of large sugar maple. Gradational boundaries.
62	hemlock-northern hardwood forest	2.0	Recently thinned. One large healthy butternut; others off property to N.
63	rich northern hardwood forest	0.1	40x40m pocket above Jack Smith springhouse. Huge butternut log. Steep, W-facing ledge to E.
64	hemlock forest	1.4	On hogback
65	northern hardwood forest	0.7	Steep-sided draw with woods rd. Yellow birch-Dryopteris intermedia dominated.

66	sugar maple-white ash-jack-in-the-pulpit northern hardwood forest	1.8	Mature, even-aged at base of ledges and steep slope. Some cherry and paper birch.
67	hemlock-northern hardwood forest	2.9	In narrow draw between hogbacks.
68	hemlock-northern hardwood forest	2.6	Includes pockets of hemlock forest on small hogback outcrops. Mature condition. Small brook.
69	hemlock forest	3.9	Shallow to bedrock; may include some hemlock-hardwood on deeper soil
70	hemlock forest	1.3	In draw with 5-10m wide seep drainage. Very mature and remote.
71	sugar maple-ostrich fern riverine floodplain forest	2.9	25m wide band on terrace up against slope. Pole sugar & red maple. 1 large butternut.
72	hemlock forest	4.4	2nd ridge E. of river.
73	hemlock-white pine-northern hardwood forest	1.2	Hemlock-white pine w/ no understory; moss groundcover. Well-developed spodozol.
74	rivershore thickets and meadow	3.5	Former pasture. Could be floodplain forest. Beaked hazelnut and Japanese knotweed thickets.
75	river	3.7	Mad River channel. Fairly high gradient small river.
	TOTAL	137.8	