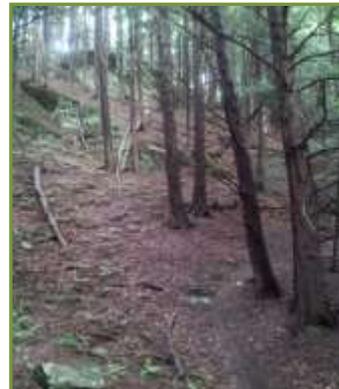


Wu Ledges Town Forest

Recreational Trails Inventory and Assessment



Prepared by:

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August 2013



Acknowledgements

This report was created by members of the Land Stewardship (LANDS) intern team based on our work done for the Waitsfield Conservation Commission in Waitsfield, Vermont during the summer of 2013. The LANDS crew would like to thank Mark Haberle for coordinating the project and gathering available resources and Leo Laferriere for introducing us to the Ledges.

We would also like to thank the Jamiesons for allowing us to access the area from their property.

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About LANDS

The field of conservation is rapidly evolving to meet the growing demands of society. New ideas and strategies are changing how we conserve and steward the land; The Land Stewardship Program (LANDS) is one of these new ideas. During the Great Depression, the Conservation Corps model was pioneered as a means to promote stewardship in the nation and provide jobs for the unemployed. The idea has since been reinvented 116 times by local and state corps across the United States. However, the general theme is the same: young people learning and growing through service. LANDS is an innovative *College Conservation Corps* designed to train tomorrow's conservationist practitioners and leaders, and is a pilot partnership between the University of Vermont and the Student Conservation Association in its seventh year of successful programming.

Thanks to college level education and prior experience in environmental science fields, LANDS interns are able to take on projects that are more technical than the work traditionally done by conservation crews. LANDS interns draft management plans, map areas of interest using GPS and GIS, inventory resources, survey for non-native species, survey soils, calculate carbon stocks, and even find time to build trails. Municipalities, land trusts, state agencies, university researchers, national forests and parks, and volunteer-managed conservation organizations all benefit from LANDS's high quality, affordable services. LANDS interns are advanced undergraduates and recent graduates with natural resource experience from all over the world, and they bring a wide range of skills and interests to the program. LANDS is a unique service-learning model that addresses an ever-expanding list of conservation needs, while training students as future environmental leaders.

Executive Summary

This report is a comprehensive recreation trail inventory and assessment of Wu Ledges Town Forest and two adjacent conservation easements. The three parcels total 163 acres and was acquired by the Town of Waitsfield, VT in 2004. There is an existing network of mountain biking trails that have never been mapped and are rarely used. The town Conservation Commission is in the process of creating a management plan that seeks to determine the ecological and recreational value of the property. A recreation trail inventory is considered an essential preliminary element because a more established mountain biking trail system has been proposed by the Mad River Riders that may use or alter existing trails.

To gain a greater understanding of the natural landscape of Wu Ledges, reference is made to the Forest Bird Habitat Assessment and Management Recommendations report compiled by Audubon Vermont in 2008. The report mapped natural communities in the Town Forest and shows that the majority of the property is classified as a Rich Northern Hardwood forest and Hemlock forest. Herbaceous species observed such as blue cohosh and maidenhair fern also indicate patches of Rich Northern Hardwood forest. Acidic site indicators were found on the Ledges, and wet site indicators were found scattered throughout the interior forest. No vernal pools or their indicator species were found on the property in late July, however, many eastern newts were seen suggesting these features may be present. Eastern newts are not vernal pool indicator species, but they are known to use them and rely on similar pond-like water bodies.

A field survey revealed that the trails within Wu Ledges and the easements are in good shape and suitable for broad recreational use beyond mountain biking. Some sections of the trails traverse “wet spots” due to their lack of drainage and subsequent water pooling. Other issues encountered included fallen logs and narrow trails that may become impassable in the near future if not in continuous use. Adjusting and maintaining these trails would both improve trail function and encourage additional recreational use. Increased signage and blazing would also help direct visitors in the right direction while on the property, and make it clear to the adjacent private landowners where the boundary of Wu Ledges extends. It is also recommended that the town of Waitsfield creates materials using information in this and previous reports to promote the Ledges and increase visitation to the area.

Table of Contents

Acknowledgements 2

About LANDS 2

Executive Summary 3

Introduction 5

Land Use History 5

Landscape Context 7

 Biophysical Region 7

 Climate 7

 Bedrock Geology 7

 Surficial Geology 8

 Soils 8

 Hydrology 8

Plants, Wildlife, and Indicator Species **Error! Bookmark not defined.**

Trail Inventory and Assessment 12

 Current Conditions 12

 Recommendations 13

Conclusion 17

Appendix A: Trail Condition Assessment Template 18

Appendix B: Maps 20

References 27



Introduction

Wu Ledges Town Forest comprises 125 acres in Waitsfield, Vermont and is managed by the Town of Waitsfield Conservation Commission. It is located southeast of the village and is bordered by Route 100 and the Mad River to the west. Two additional parcels with conservation easements connect directly to Wu Ledges on the eastern side of the forest and together the three parcels of land total 163 acres. The Conservation Commission is in the process of creating a management plan for Wu Ledges that will take into account both the natural and recreational value of the property. Currently, there is a maze of mountain biking trails that traverse both the Ledges and the easements and also cross into adjacent private properties. There are also former skid trails and logging roads throughout the western side of Wu Ledges. Our work involved mapping and assessing the existing recreational trail network at Wu Ledges to create a spatial dataset that could be used in the future by the Conservation Commission and the Mad River Riders to develop a mountain biking trail system. Also included in the assessment was the identification of core representative species to monitor habitat health in light of the extensive trail network, as well as the presence of any non-native invasive species. This report also seeks to describe the background of Wu Ledges and describe the physical and biological features which may affect or be affected by trail construction and maintenance. Conditions found on the trail are not only influenced by human use, but also what lies underneath, for example the soils or surficial geology. Current conditions of the trails and management recommendations are given within the report as well.



Land Use History

Wu Ledges was donated to the town of Waitsfield in 2004 (Draft Town Plan, 2012). Two additional easements, together totaling 38 acres, came under town management 4-5 years ago as part of an exchange with Hastings Meadow subdivision for development rights elsewhere (Draft Town Plan, 2012). The purpose of the easements, in addition to connecting forested land, is to facilitate public access to Wu Ledges for recreational users. Current access points are limited to two 50 foot wide easements: one at the end of Pine Hill Road and the other on Route 100 that requires fording the river (Town of Waitsfield, 2007). There is a history of logging on the property, with an operation as recent as 10 years ago that harvested sugar maple, beech, and eastern hemlock (Laferriere, L. Personal communication). Evidence of logging is visible throughout the property and includes blazes and basal scarring, as well as a series of skid roads that intersect the property. There has also been an attempt to maintain a large number of snags for bird habitat, so some trees have been girdled as well. Water bars were built on the main trail leading from the Jamieson property 30 years ago while logging operations were underway; however, their effectiveness has been limited after the devastation from Hurricane Irene (Laferriere, L. Personal communication).

Mountain bike trails have existed for several years, and attempts have been made to map the trail network but no spatial data exist. There has been a proposal by Mad River Riders to develop a more established, official mountain bike trail network on the property once spatial data are acquired. Visitation to the property is limited mostly to local landowners who help to maintain the trails for mountain biking. Other users are hikers with dogs, but due to limited public access and knowledge of the forest, the area in general is rarely visited. Also, most access to the property crosses through private property, limiting access to the public.

There was also evidence of a sugaring operation observed (see map on page 21). Tubing was found both inside and outside of the Lawton Easement, likely from adjacent private property owners who were unclear about where the boundaries of the Ledges or easements were. Signs in general are minimal. Three signs denoting Wu Ledges are located: one at the entrance via the Jamieson property, one at the ledges themselves, and one on the eastern boundary of the Waitsfield easement (see map on page 21). Boundaries in general are unmarked; however, while logging was in operation, there was a small amount of blazing on sections of the boundary.

Landscape Context

Biophysical Region

The Smith property lies within the Northern Green Mountains biophysical region. It includes many of Vermont's most familiar peaks, including Mount Mansfield, the tallest mountain in Vermont, and Camel's Hump. The Northern Green Mountains are composed primarily of schists, phyllites, quartzites, and gneisses. Many of Vermont's major rivers, including the Missisquoi, Lamoille, and Winooski, originate just east of the Green Mountains, creating valleys through the mountains that drain into Lake Champlain. Vegetation follows a pattern of elevational zonation, changing in composition as one moves from lower slopes to higher peaks. Wu Ledges ranges in elevation from 720-1160 feet. The region provides extensive habitat for species like black bear, white-tailed deer, and bobcat, and several bird species, including the rare Bicknell's thrush (Thompson & Sorenson, 2005).

Climate

The Green Mountains have a tremendous effect on the climate of this region. The mountains are generally much cooler than lower elevations; summer temperatures on the ridgeline are typically twenty degrees cooler than in the Champlain Valley. The shortest growing seasons and coldest winter temperatures in Vermont are found on the north-facing slopes of the high Green Mountains.

The Northern Green Mountains also typically experience some of the greatest rainfall in Vermont. Prevailing winds from the west cool the air as they travel over the mountains, and subsequently cause large amounts of both precipitation and condensation (Thompson & Sorenson, 2005).

Bedrock Geology

The bedrock of Wu Ledges is composed of sections of schist and quartzite (CZhn, CZf), phyllites (CZph, Co), and greenstone and amphibolite (CZpha) (See map on page 22). All of these different types of bedrock are metamorphic, meaning that they underwent a transformation from a previous type of rock due to high levels of heat and pressure. Metamorphic rock makes up the majority of the bedrock in the Green Mountains (Johnson, 1998). Of the different types of metamorphic rocks found on this site and in the state of Vermont, schist is the most common. It is green to gray in color, and has a wavy appearance as a result of heavy folding during geological processes. Schist often becomes exposed at higher elevations and at rocky outcrops (Johnson, 1998). Greenstone can be recognized in the field with weathering and moss growth (Thompson & Thompson, 1991). These typical bedrock types of the Green Mountains are non-calcareous, or lacking calcium-carbonate, and were formed in the Precambrian and Cambrian time periods, approximately 540 million years ago (Thompson and Sorenson, 2005).

Surficial Geology

Surficial geology refers to unconsolidated sediments that lie beneath the soil. The main form of surficial material on this property is glacial till. There are also important areas of bedrock exposure consisting of schists, phyllites, and amphibolites and greenstones (see map on page 23). There is a small section on the western border of the property along the Mad River that is a postglacial fluvial deposit. Much of the Northern Green Mountains biophysical region is covered with glacial till.

Soils

The soils found on the property include silt loams, fine sandy loams, and very rocky soils (see map on page 24). There is evidence of the rocky soils throughout the property and along trails.

The Tunbridge-Lyman complex soils, all very rocky, comprise the majority of the property and are distinguished by the slopes at which they occur. They are moderately well-drained, can be slightly acidic, and occur in mountainous or steep areas like Wu Ledges that receive more than 40 inches of rainfall a year (National Cooperative Soil Survey, 2012). These factors all support the classic Northern Hardwood vegetation found throughout the majority of the property. Along the Mad River boundary the soils are Waitsfield silt loams. These occur in less sloped areas but are extremely deep and also well-drained (National Cooperative Soil Survey, 2000). The northernmost part of the Wu Ledges (not including the easements) is dominated by Berkshire fine sandy loam. Sandy loams are well-drained and acidic, consistent with the eastern hemlock stand in this area. Because the majority of the soil series at Wu Ledges are well-drained, erosion potential is small, which is consistent with our field observations.

Hydrology

Steep topography, bedrock, and well-drained soils all influence the downhill movement of water in the property. Many streams were found particularly within low points and valleys between rock outcroppings on the property. These streams will drain into the Mad River which runs along the western edge of the property border. During the first days of fieldwork the ground and also trails were fairly dry and well-drained. Water had accumulated after a night of rainfall on the third field day, but even so, the soils were well-drained and excessive water pooling was not an issue.

Plants, Wildlife, and Indicator Species

The property area is located within a large forest block that is surrounded by development. The adjacent roads, residential properties, and Waitsfield Village all create significant edge effects on the property, which may affect the biodiversity of the interior forest.

The entire Wu Ledges property, including the easements, has been previously mapped as deer wintering habitat. Large portions of the property are dominated by Hemlock Forest or Hemlock-Northern Hardwood Forest, both ideal habitats for deer during the winter. Deer are inclined to winter in the area because of the mature to over mature dense stands of softwoods. The maturity of these trees highlights the space available for deer habitat but also indicates that the area is not ideal for other species, such as songbirds. Mature trees provide lots of shade to the forest floor and hinder regeneration of new hemlock or other saplings. Deer browse is also another factor THAT will affect the rate of regeneration in these areas. It is best to monitor these areas for excessive deer activity, and if necessary, apply barriers such as tubing or fences to prevent deer from browsing saplings too destructively.

The other portions of the forest mainly consist of Northern Hardwood Forest and its variations. There were many woody and herbaceous plants found throughout the property, which indicate the health of these hardwood forests. Striped maple, Canada mayflower and Indian cucumber root are all indicators of a Northern Hardwood Forest with low fertility soils. Striped maple is a large component of the forest vegetation, easily dominating the understory and midstory in the majority of the hardwood forest areas. Indicators of typical hardwood forests include shining clubmoss and painted and red trilliums, all three also plant species consistently found within the property.



Shining clubmoss

Also found within the Northern Hardwood Forest of the property were some colluvial rich site indicators. A few patches of blue cohosh were located in the eastern part of the property, within the easements. Maidenhair fern was also found scattered throughout the entire property. In overgrown areas, where the vegetation encroaches onto the trail, wood nettle, another rich site indicator plant, was found in sparse amounts. These colluvial rich site indicators suggest that the soil in these smaller areas is calcareous and of higher fertility. While these patches of Rich Northern Hardwood are significant, they are not large enough to be considered separate natural communities within the property.

In areas with depressions and streams, sensitive fern was found in large amounts, indicating wet sites. Along the ledges facing westward, acidic site indicators were found, include low-bush blueberry and intermediate wood fern (Thompson, 1999).

There are multiple small streams which run through the property and drain into the Mad River. Wet spots and depressions were found within the forest, but as of now no vernal pools or seeps have been identified on the property. Many juvenile eastern newts (in the red eft stage) were found on and off the trail in both hardwood and softwood dominated areas. Eastern newts require a “contiguous mosaic of often shifting ponds and forested uplands for their life cycle (VMC, 2009).” The small pools and streams found on the property are important for these newts as they mature and seek to reside in water. If the ponds and forests begin to become isolated through habitat fragmentation, the newts will become at risk and may struggle to survive.



Juvenile eastern newt found off trail

No non-native invasive species were found within the Wu Ledges or easement boundaries. Just outside of the southernmost boundary of the Lawton easement several large patches of barberry were found. The barberry was not fully mature and could be eradicated through chemical treatments. This area is located very close to an access point into the easement; it is important to monitor this considering that the trail and entrance to the property is a clear possible vector for more barberry or other invasives. A few large shrubs of honeysuckle were found along an old logging road that runs adjacent to the Mad River. No invasive plants were seen along any of the streams that flowed through the property.



Trail Inventory and Assessment

Current Conditions

All trails within Wu Ledges and the two adjacent easements were mapped. There is a complex network of trails on the property, most of which lead either to the Ledges themselves or into adjacent private land (see map on page 20). According to the 2012 Draft Town Plan, this may be because trails rights on adjacent land are also under easement. While this may be legal, public access points to the property remain limited, unmarked, and inaccessible for both hikers and bikers not living on surrounding property. Most users are entering on established paths through private property that connect to the main trail leading to the Ledges. In particular, visitors appear to be parking on Bridge Street in Waitsfield and walking up through the cemetery to access Wu Ledges. Other primary users appear to be nearby residents for whom public access points do not matter.

The majority of the trails throughout Wu Ledges have no signs of damage or deterioration and are suitable for mountain biking and hiking. In general, erosion was absent and drainage was sufficient, thus not posing a problem for recreational users. While trails varied in width, all were wide enough for both bikers and hikers.



Two trails representative of the overall trail condition at Wu Ledges

Several short sections of trails were overgrown with shrubs or ferns, particularly in the northwest and northeast corners of the Ledges, providing evidence of their limited use. Only periodically were there wet spots of concern, fallen logs, or evidence of human use found, as noted on the map on page 21. Trails throughout the conifer-dominated areas that have sandy, acidic Berkshire series soils were the most difficult to follow because of the lack of understory that grows in such shaded conditions. They are also much more soft than trails in the Northern Hardwood area of Wu Ledges and could be more susceptible to erosion should a proper mountain biking trail system be established.

A trail assessment template created for this property was used at these spots of concern, as well as for general assessment of the property (see Appendix A).

Recommendations

Though most of the trails are in good condition, it is important to monitor trails that may have the potential to become wet or eroded. As marked on the Points of Interest map on page 21, wet spots may be places where logs, boards, or other structures can be put in place to help curb the effects of poor drainage. Water bars are also a suitable structure that can prevent areas of the trail from pooling water in the first place.



Poor drainage on trail

Trails are a possible vector for invasive plant species to enter the property. Monitoring of the access points to the property is an important step that can be taken to prevent spread of these species. As noted previously, patches of barberry were found just outside the southern border of the Lawton easement, and these populations can easily spread into the property via the trail. Honeysuckle was also found in large patches along a logging road (see map on page 21) that travels through the property. Though the honeysuckle is located outside the property, it is still possible to spread into the area.



Honeysuckle bush on logging road

Signage is something of major need within the property. Currently, there are only three signs for the Wu Ledges property: one is located on the trail from the Jamiesons, at the ledges, and the other on the eastern boundary of the Waitsfield easement. Signage is crucial to helping visitors understand where the property boundaries are and prevent them from entering private property. We recommend that signage also be placed on any trails that should be closed so that hikers and bikers will know which direction to follow. This will help at intersections that include trails leading out of the boundary, such as the intersection where there is barbed wire on the points of

interest map on page 21. Signs should also be present at all public access points to the property. In the southern portion of the Lawton easement, there is evidence of a sugaring operation. Most of the operation is on private property, but some tubing and other use extends into the property. Boundary marking of the Wu Ledges property is recommended to prevent unauthorized use of the area.



Current efforts to direct hikers and bikers onto the correct trail

In areas dominated by hemlock trees, there is very little leaf cover and it is difficult to determine where the trail extends next. It is clear that in these areas, bikers have run into the same problem, considering there are shortcuts and bike tracks visible off the main trail. Signs or blazes would be extremely helpful in these areas so that only one trail is used, preventing extraneous damage to the surrounding ground cover. Additionally, in the case of an established mountain biking trail network, we recommend that signage informing hikers of mountain biking activity on the property be placed throughout the property for safety purposes.



Signage or blazes needed in these areas to determine where trail leads

We also recommend that either the Conservation Commission or the town of Waitsfield advertise the desired public entrances to Wu Ledges. Currently, many visitors are entering the property through private land. Waitsfield acquired the easements in order to create public access points into the property, but without advertisement of these access points, residents of the town may not know of their existence. We recommend that literature (such as a brochure or website) be created highlighting the access points. This may also help bring more residents and other visitors into the natural area.

Conclusion

The town of Waitsfield has indicated that a major goal of the Wu Ledges property is “to maintain existing non-motorized recreational opportunities,” which remains true of this area. Restricting use of motorized bikes and vehicles has allowed the trails at Wu Ledges to develop into approximately six miles of self-maintained, suitable trails for hiking and mountain biking. The trail inventory and assessment suggest that both Wu Ledges and the Lawton and Waitsfield easements are healthy and in excellent shape for recreational use. Wu Ledges is a desirable area to visit, however, there are improvements that can be made to the property. Small portions of the trail need to be monitored or maintained but only for reasons such as minor wet spots or fallen trees. It is recommended that more frequent signage be strategically placed to help direct visitors onto the correct trails and keep them off surrounding private property. We also recommended monitoring the areas of concern on the trail for maintenance, and erecting drainage structures in the appropriate areas. If the town of Waitsfield creates literature highlighting the natural features and recreational opportunities of the property, it is likely that more visitors will come to enjoy recreational activities. Wu Ledges may be a lesser known feature of Waitsfield, but it has the opportunity to become a frequently visited town treasure.



Appendix A: Trail Condition Assessment Template

Trail Condition Assessment

Date: _____/_____/_____

Site: _____

Name: _____

Trail: _____

Section: _____

Weather Conditions: _____

General Trail Condition:

Very Wet _____ Wet _____ Normal _____ Dry _____ Frozen _____ Other _____

Average Width: _____

Leaf Cover (%): _____

Blazes and Signage:

Condition	Quantity	Notes/Observations: _____
_____ Good	_____ Good	_____
_____ Fair	_____ Too Few	_____
_____ Poor	_____ Too Many	_____

Drainage:

_____ Draining properly	Notes/Observations: _____
_____ Draining onto or across trail bed	_____
_____ Water staying on trail bed	_____
_____ Needs drainage structure (boards, waterbar, etc.)	

Is erosion present on the trail? _____

Cultural Features:

_____ Sugaring evidence _____ Springs

Other: _____

Trailside Vegetation:

_____ Invasives If known, which species? _____

_____ Fallen logs Location: _____

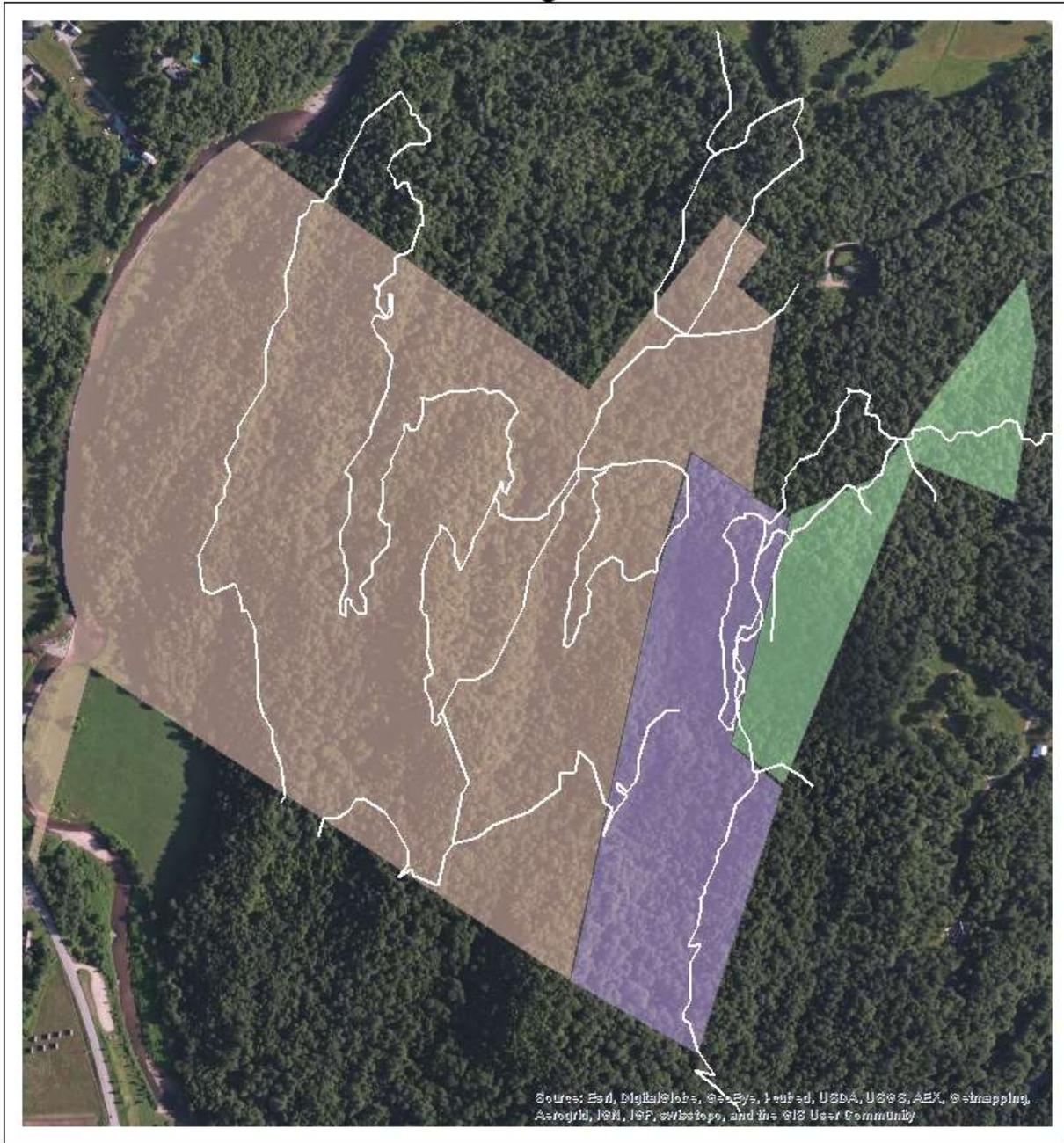
_____ Overhanging branches Location: _____

_____ Beaver activity Location: _____

Other Notes/Observations:

Appendix B: Maps

Wu Ledges Trails

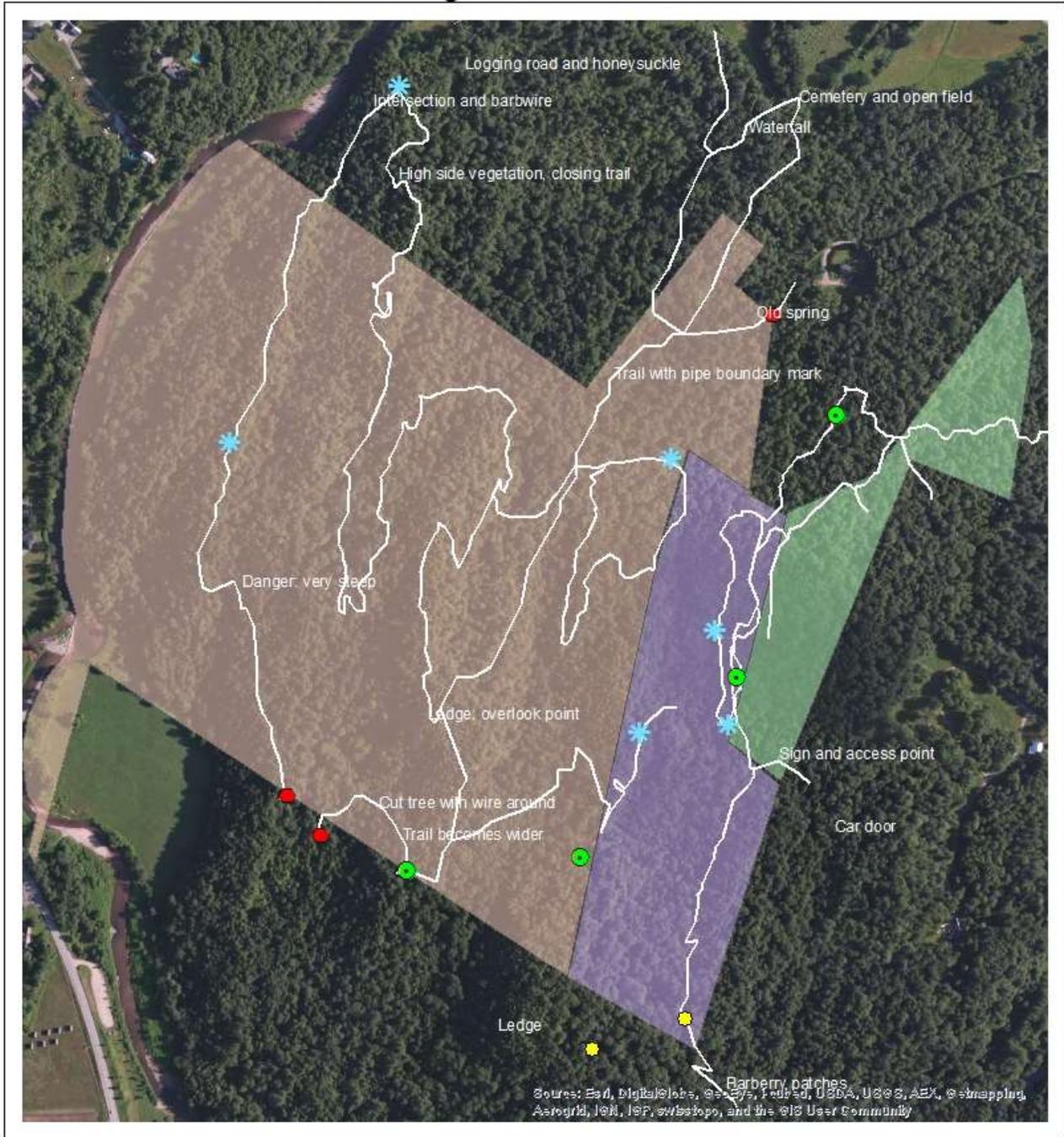


0 175 350 700 1,050 1,400 Feet

Map created by:
UVM Land Stewardship Program (LANDS), July 2013
Data Source: VLT & Waitsfield Conservation Commission



Wu Ledges Points of Interest



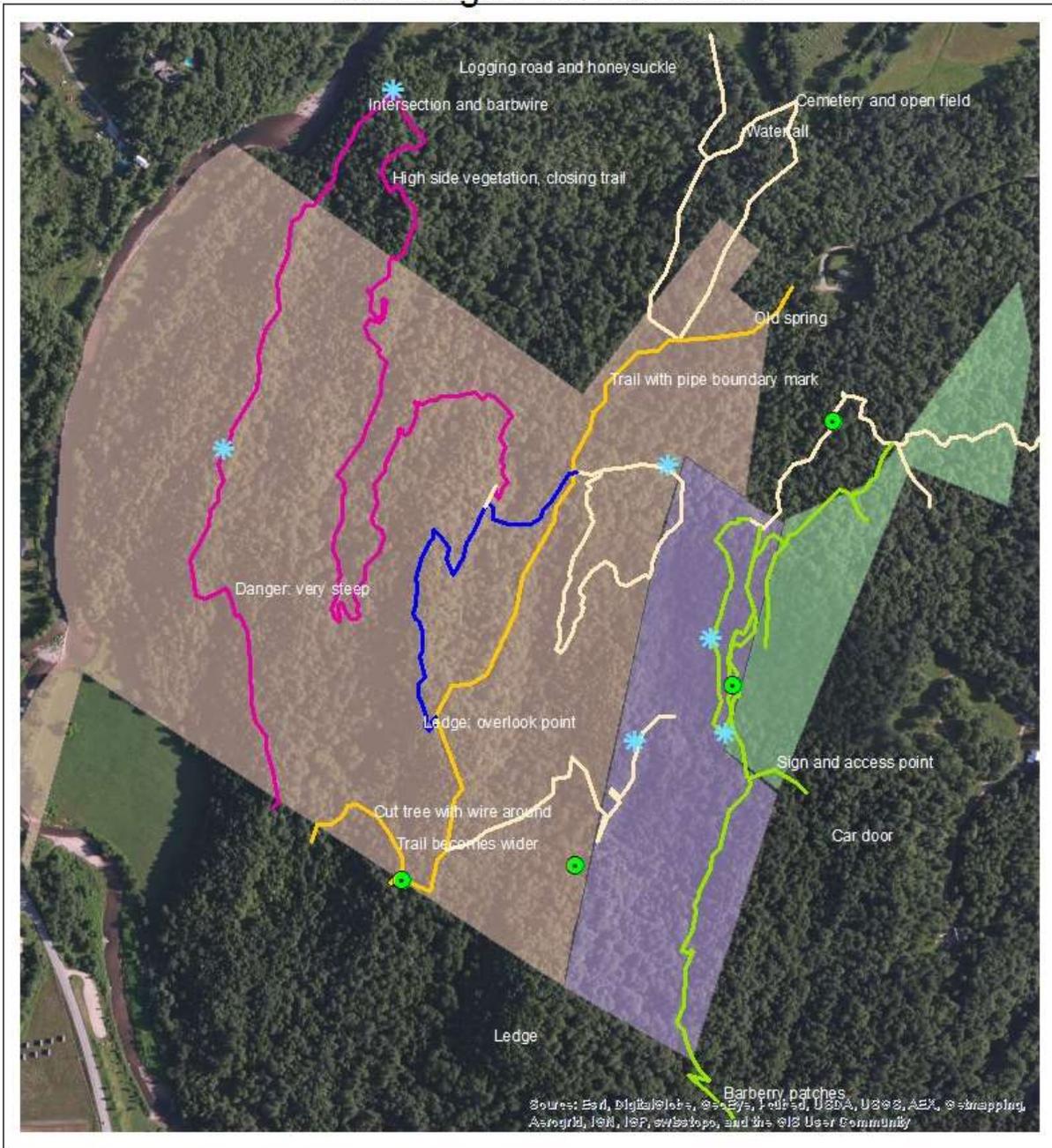
0 175 350 700 1,050 1,400 Feet

Map created by:
 UVM Land Stewardship Program (LANDS), July 2013
 Data Source: VLT & Waitsfield Conservation Commission

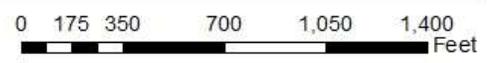


- Boundary
- Fallen Log
- Tubing
- ✦ Wet spot
- Trails

Wu Ledges Trail Condition

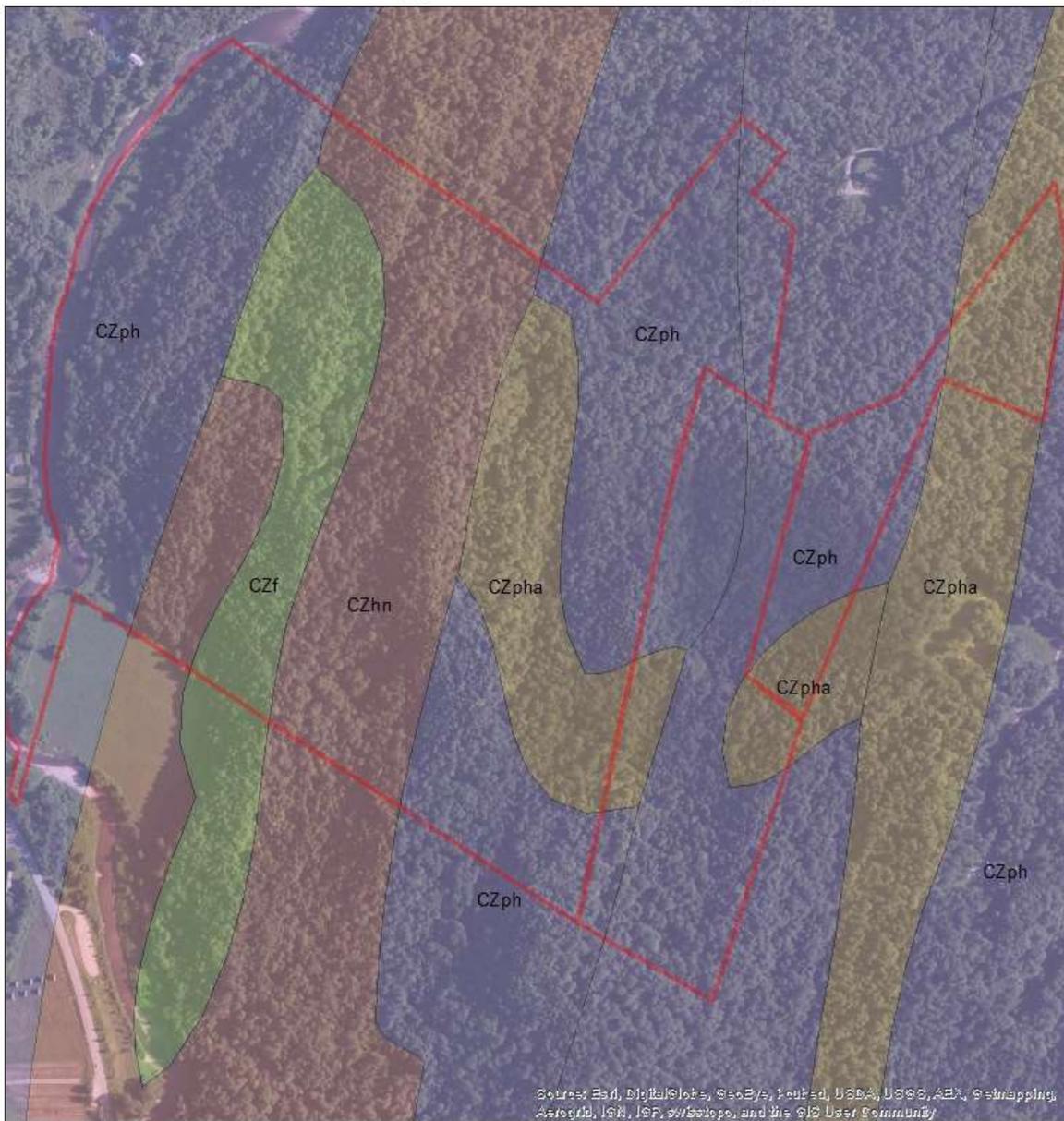


- Fallen Log
- ★ Wet spot
- Additional trails
- 1
- 2
- 3
- 4



Map created by:
 UVM Land Stewardship Program (LANDS), July 2013
 Data Source: VLT & Waitsfield Conservation Commission

Wu Ledges Bedrock Geology

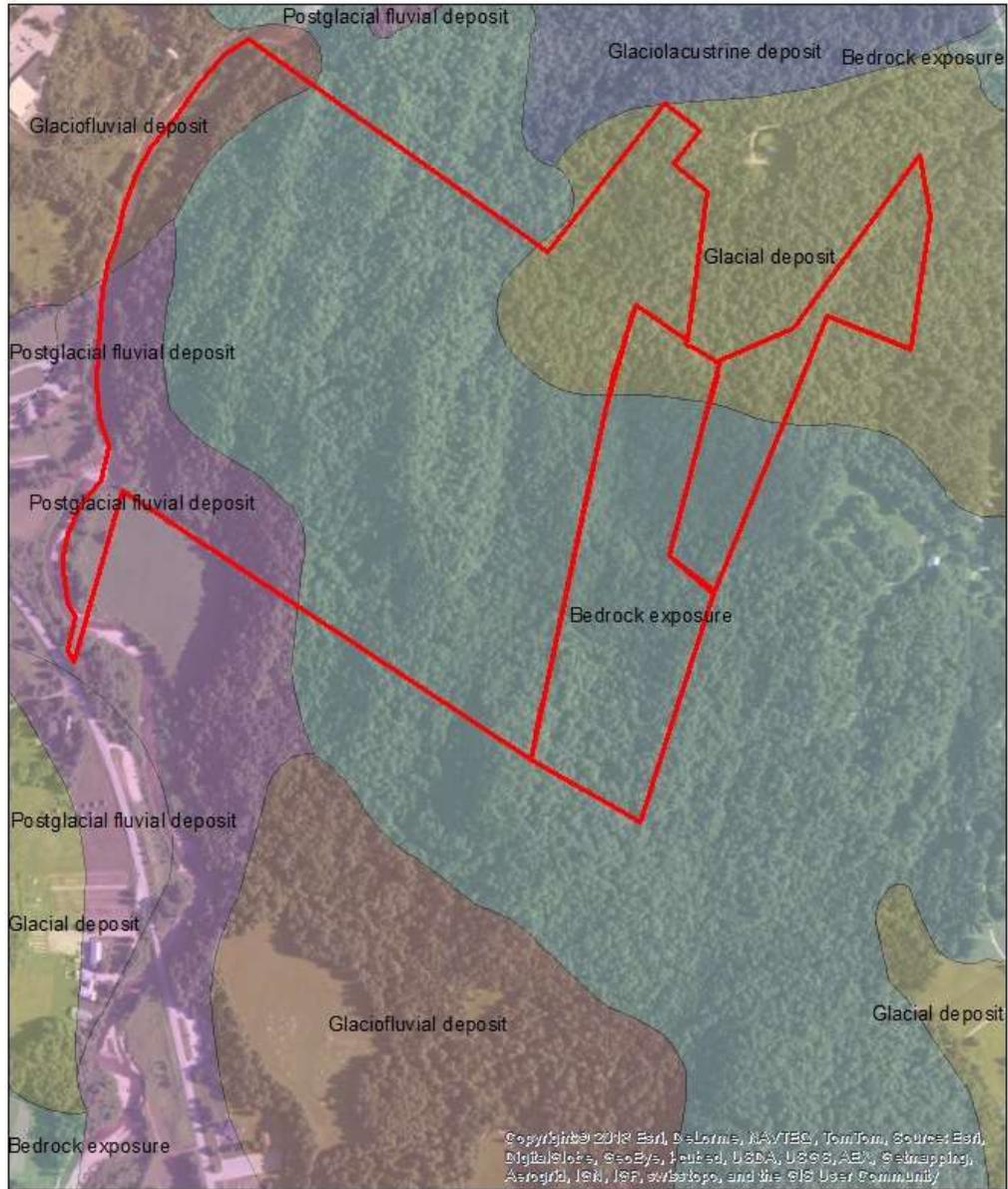


Bedrock

- CZf, Allbite schist
- CZhn, Hazens Notch Formation
- CZph, Phyllite member
- CZpha, Amphibolite and greenstone member
- Co, Carbonaceous phyllite member

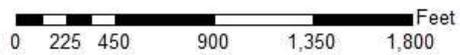


Wu Ledges Surficial Geology

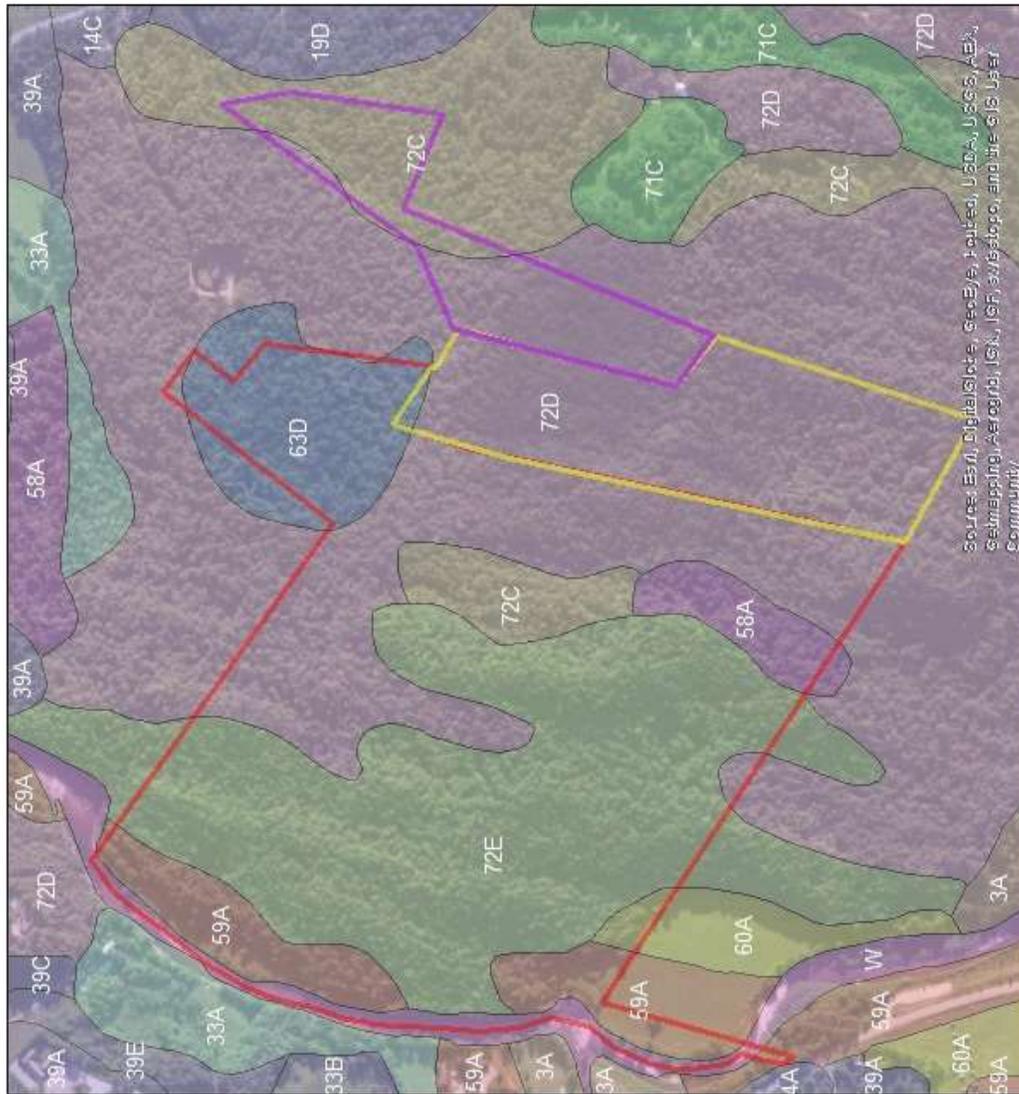


Surficial Geology

- Bedrock exposure
- Glacial deposit
- Glaciofluvial deposit
- Glaciolacustrine deposit
- Postglacial fluvial deposit



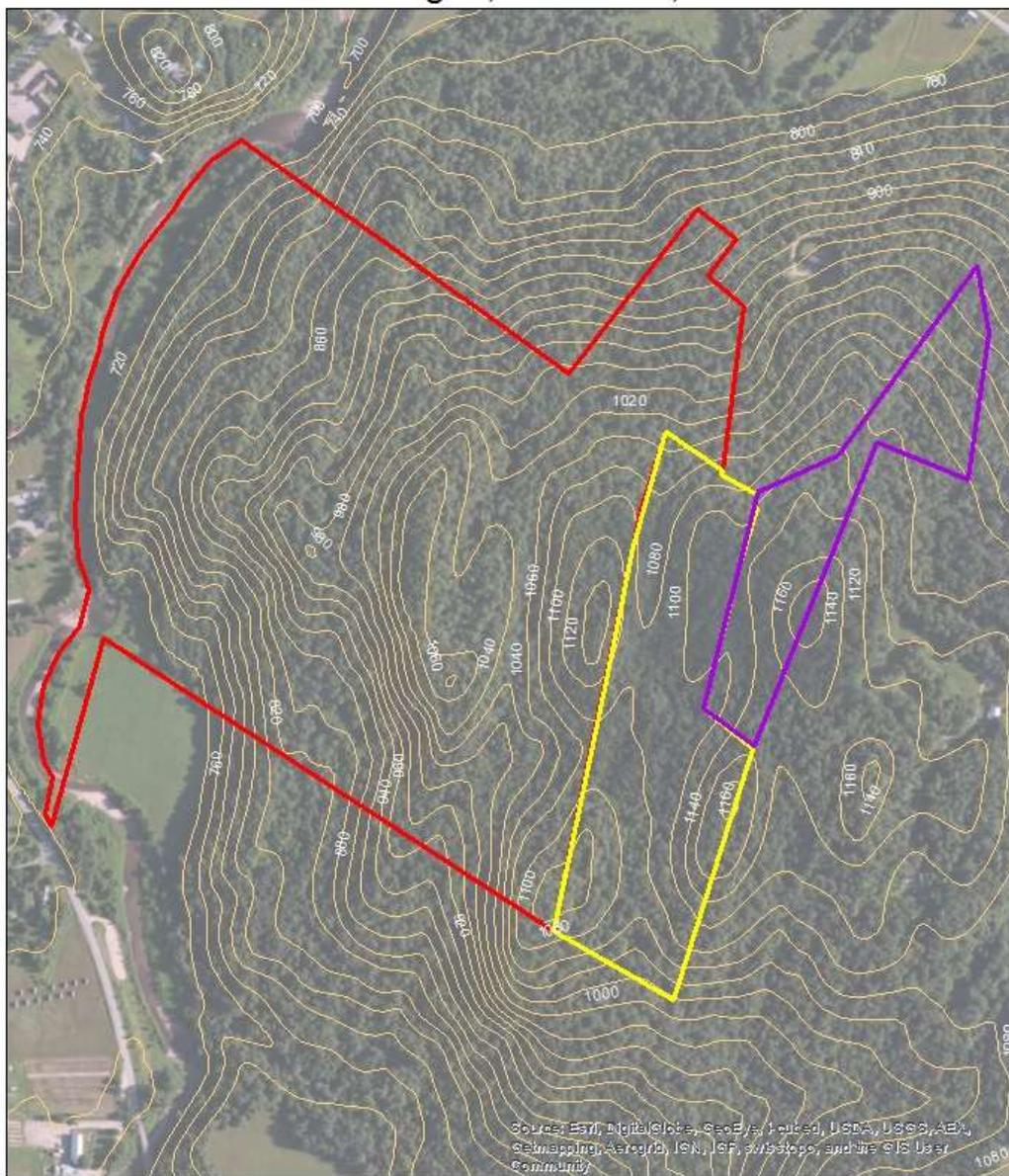
Wu Ledges Soil Map



Source: Esri, DigitalGlobe, GeoEye, AeroVista, USDA, USGS, AeroVista, Swire, GEBCO, IGN, Swire, and the GIS User Community

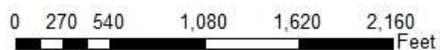
- Legend**
- Soil Type**
 - Not in the boundary
 - MU SYM**
 - 33A - Machias fine sandy loam, 0 to 3 percent slopes
 - 3A - Rumney fine sandy loam, 0 to 2 percent slopes
 - 58A - Grange silt loam, 0 to 3 percent slopes
 - 59A - Waits field silt loam, 0 to 3 percent slope
 - 60A - Weider very fine silt loam, 0 to 3 percent slope
 - 63D - Berks fine sandy loam, 15 to 35 percent slopes
 - 71C - Turnbridge-Lyman complex, 3 to 15 percent slopes, rocky
 - 72C - Turnbridge-Lyman complex, 8 to 15 percent slopes, very rocky
 - 72D - Turnbridge-Lyman complex, 15 to 35 percent slopes, very rocky
 - 72E - Turnbridge-Lyman complex, 35 to 60 percent slopes, very rocky
 - W - Water

Topography Wu Ledges, Waitsfield, VT



Source: Esri, DigitalGlobe, GeoEye, IGN, USDA, USAF, AeroGRID, IGN, ISN, INR, Swisstopo, and the GIS User Community

-  Elevation 20 ft contour
-  Lawton Easement
-  Waitsfield Easement
-  Wu Ledges



Map created by UVM LANDS 2013
Data Source: VCGI, VLT, Town of Waitsfield

References

- Burgess, K. (2007). Native Vermont amphibians. Retrieved from [http://www.vtfishandwildlife.com/vtcritters/factsheets/other/The Vermont Reptile and Amphibian Atlas Project/Amphibians_part_2_SalamanderPoster.pdf](http://www.vtfishandwildlife.com/vtcritters/factsheets/other/The_Vermont_Reptile_and_Amphibian_Atlas_Project/Amphibians_part_2_SalamanderPoster.pdf)
- Draft town plan: 11a. natural resources. (2012). Town of Waitsfield, VT. Retrieved from http://www.waitsfieldvt.us/townplan/waitsfeld_town_plan_2012-03-15_draft_ch11_natural_resources.pdf
- Laferriere, L. Personal Communication. 2013, July 25.
- Mad River Valley Planning District. (2007). Natural heritage element inventory and assessment for Waitsfield and Fayston, Vermont. Retrieved from http://www.waitsfieldvt.us/docs/1MadRiver_NRI_Report_04-07.pdf
- National Cooperative Soil Survey. (2012). *Tunbridge series*. Retrieved from https://soilseries.sc.egov.usda.gov/OSD_Docs/T/TUNBRIDGE.html
- National Cooperative Soil Survey. (2000). *Waitsfield series*. Retrieved from https://soilseries.sc.egov.usda.gov/OSD_Docs/W/WAITSFIELD.html
- Elizabeth Thompson. (1999). Vascular Plants of Vermont's Upland Forests: Species to know if you want to know the woods.
- Town of Waitsfield (2007). Wu ledges municipal forest: Interim management plan. Retrieved from http://www.waitsfieldvt.us/recreation/wu_ledges.cfm
- Vermont monitoring cooperative. (2009). Vermont's changing forests. Retrieved from <http://www.uvm.edu/vmc/documents/synthesisReport.pdf>
- Worthley, A. (2008). Forest bird habitat assessment and management recommendations. Audubon Vermont.