

**WASHINGTON NATURAL HERITAGE PROGRAM
NATURAL AREA PRESERVE RECOMMENDATION**

Trombetta Canyon Natural Area Preserve

Presented to the Natural Heritage Advisory Council
October 24, 2007

LOCATION:

Trombetta Canyon proper (the Canyon) lies approximately 2 miles south southeast of Northport, Washington, in Stevens County. Figure 1 shows the location of this site in the state. Figure 2 shows the Canyon relative to the town of Northport. Figure 3 is an aerial photograph of the Canyon and surrounding areas.



Trombetta Canyon from the south.

The Canyon is almost entirely within the west half of Section 16, in Township 39 North, Range 40 East, with a sliver of land extending west into Section 17 and the mouth of the canyon reaching north into Section 9 and the extreme southeast corner of Section 8. The limestone/dolomite formation in which the Canyon is cut (the Formation) includes the southern third of Section 9, the western edge of Section 15, and the eastern two thirds of Section 17.

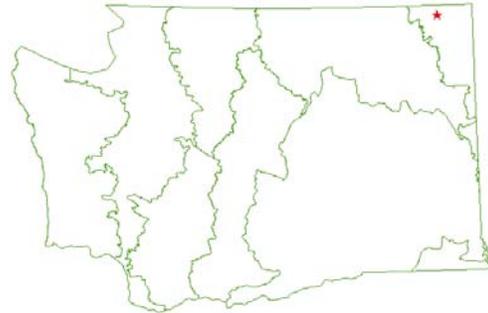


Figure 1. Location of the proposed Trombetta Canyon Natural Area Preserve in the Canadian Rockies ecoregion in Stevens County, Washington.

SIZE:

The Canyon includes approximately 270 acres; the Formation includes approximately 960 acres.

OWNERSHIP:

Most of the land within the Canyon is common school trust land (approximately 180 acres) managed by the Department of Natural Resources (see Figures 4 and 5), with a smaller amount in private ownership (approximately 90 acres). Figures 7 and 8 show two alternative Natural Area boundaries (see Justification section for a discussion of the two alternatives). The larger boundary includes approximately 720 acres of common school trust lands and 240 acres of private land. The DNR is currently negotiating a land exchange including parcels within this boundary, and the pattern of land ownership will likely change.

JUSTIFICATION:

Trombetta Canyon is a striking geological feature, consisting of a dry cliff-sided canyon incised in a raised limestone formation, with no apparent source of flowing water to have formed it. The canyon is isolated by cliff walls, extensive wetlands at the north end, and a single narrow entry point from the south; these all serve to limit entry by people and to insulate the area from disturbance. This isolation offers an uncommon opportunity for study of ecological processes without human-caused effects.

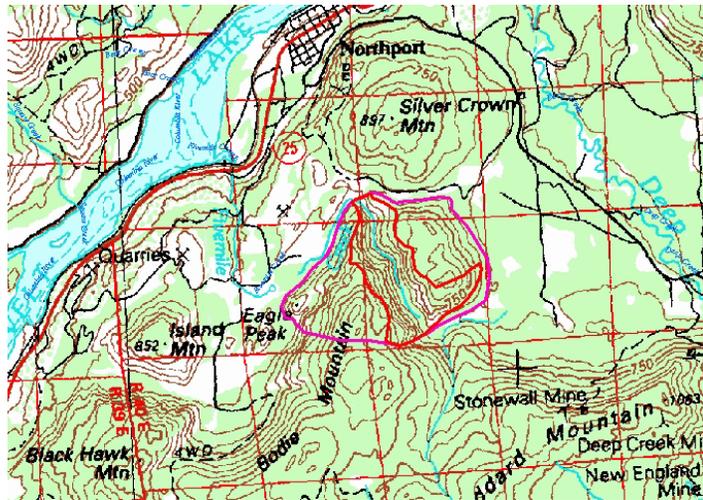


Figure 2. Location of Trombetta Canyon southeast of Northport, Washington. The purple and red polygons delineate alternative natural area boundaries.

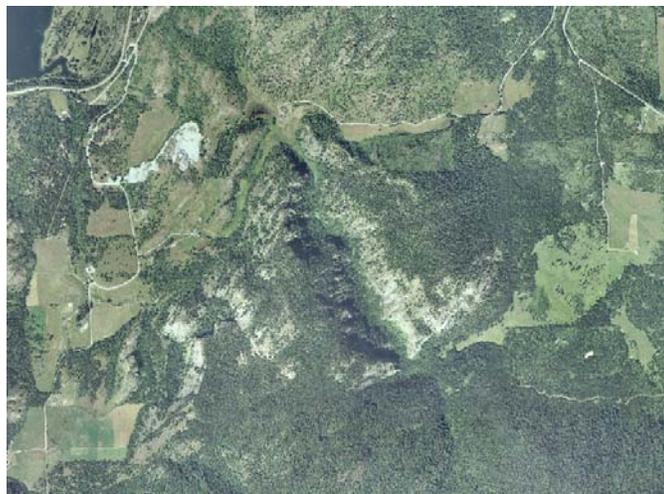


Figure 3. Aerial photograph of Trombetta Canyon and the surrounding areas. Note the Columbia River in the northwest corner of the photograph, and the quarry just to the northwest of the canyon.

The limestone cliffs provide habitat for two rare plant species, *Dryas drummondii* and *Cryptogramma stelleri*, and other limestone-dependent species, including *Pellaea glabella* subsp. *simplex*, a Watch List species. Trombetta Canyon also includes extensive scrub-shrub and emergent wetlands at its lower end, providing habitat for a third rare plant, *Salix candida*. *Platanthera hyperborea*, a relatively uncommon species also associated with limestone, also occurs in these wetlands.

Even though it is small in area, Trombetta Canyon is isolated from disturbance by its location and topography and offers protected habitat for a variety of other organisms, particularly those that may be adapted to limestone substrates.

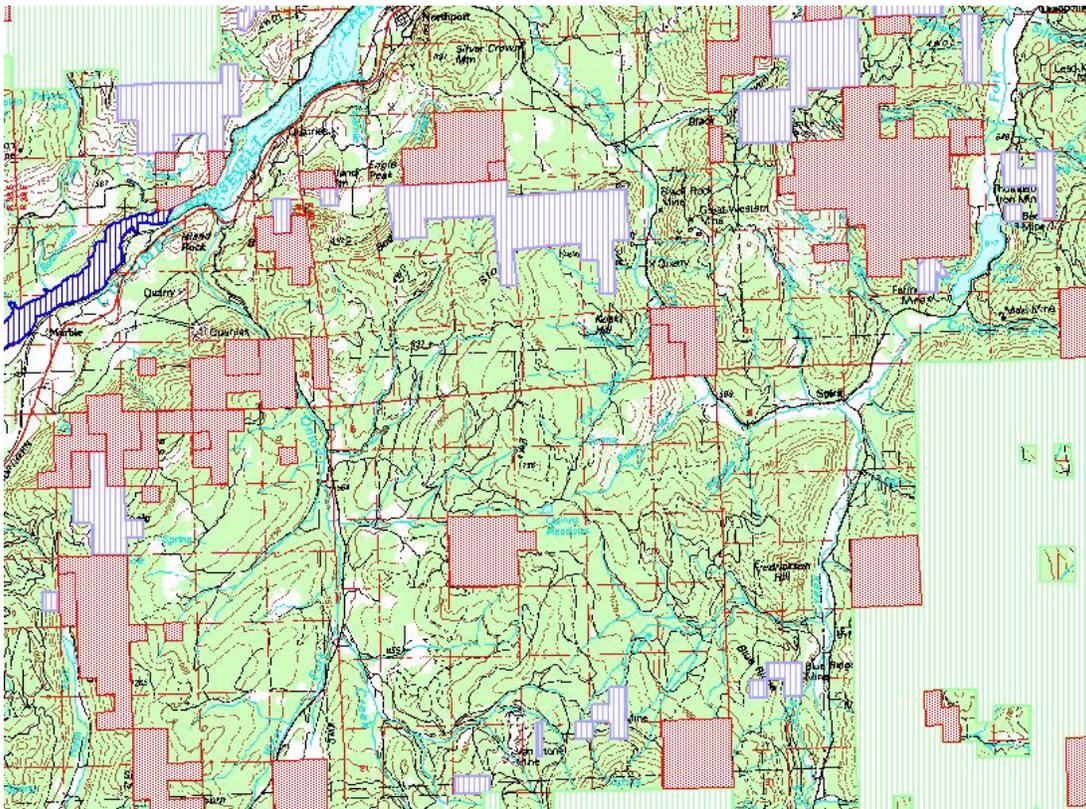


Figure 4. Public land ownership in the vicinity of Trombetta Canyon. The pink areas are DNR, lavender areas are BLM (as of February 23, 2007).

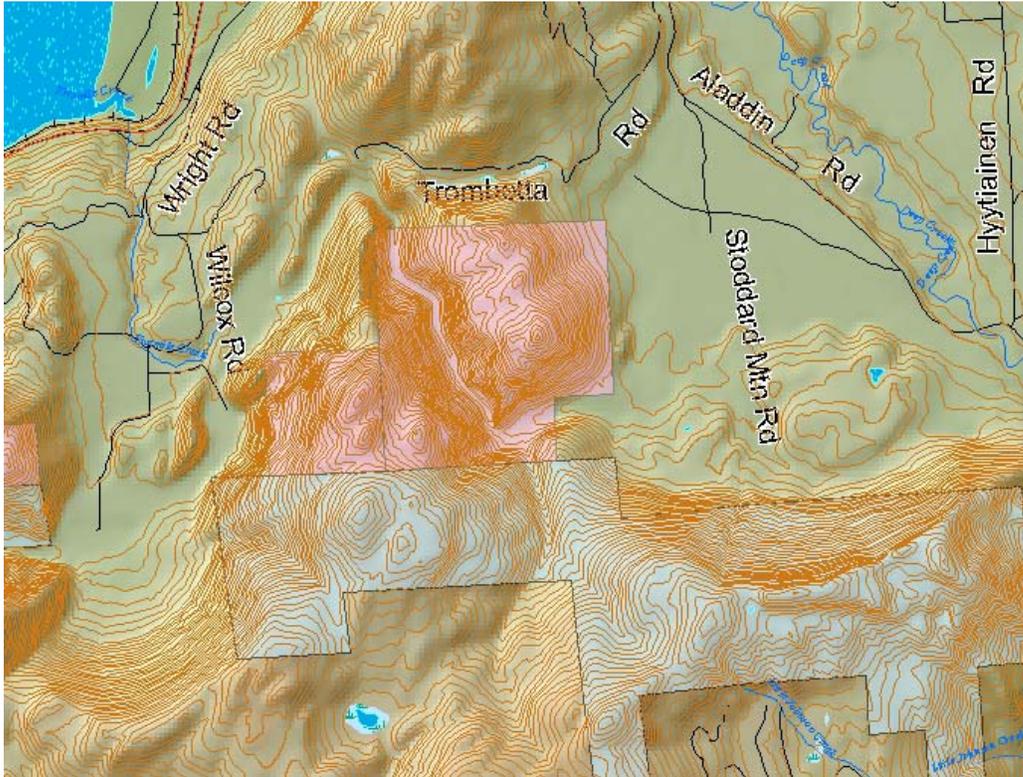


Figure 5. Public land ownership in the vicinity of Trombetta Canyon. The pink areas are DNR, blue areas are BLM (as of February 23, 2007).



Figure 6. Trombetta Canyon viewed from the north, from the Carlson property. A large emergent and scrub-shrub wetland, including *Salix candida*, lies in the center of the photograph, extending into the shadow. DNR property begins just south of the beginning of the shadow in the middle of the photo.

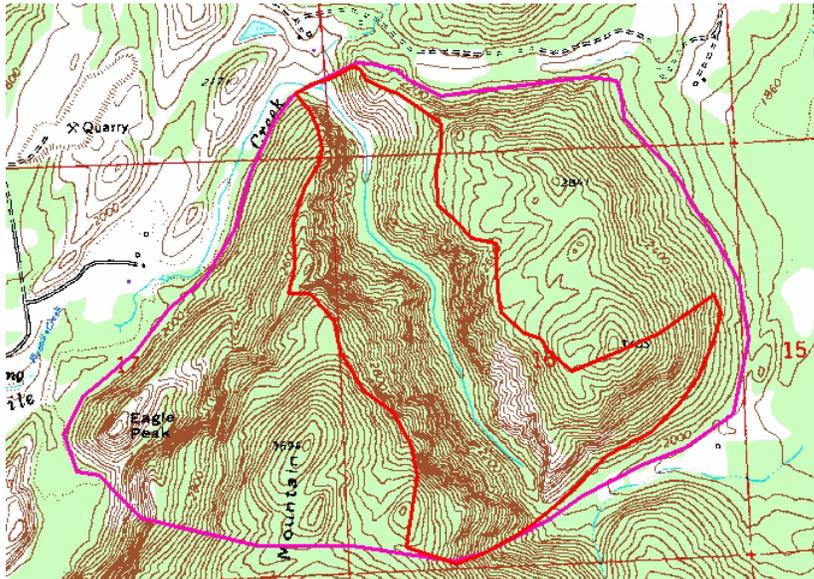


Figure 7. Alternatives for the proposed Trombetta Canyon NAP. The red line delineates the canyon proper; the purple line delineates the formation through which the canyon is cut. These sections are in Township 39 North, Range 40 East.

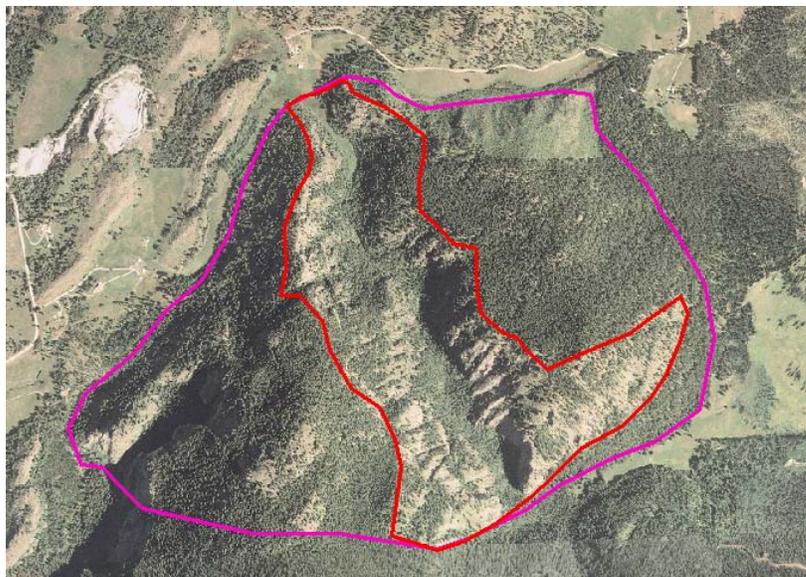


Figure 8. Alternatives for the proposed Trombetta Canyon NAP. The red line delineates the canyon proper; the purple line delineates the formation through which the canyon is cut.

LANDSCAPE SETTING AND PHYSICAL FEATURES:

The proposed Trombetta Canyon NAP occurs in the Selkirk Mountains, in the Canadian Rocky Mountains ecoregion. The elevation of the site ranges from 1,900-3,694 feet (576-1,119 meters).

GEOLOGY: Trombetta Canyon is composed of two geologic substrates: limestone and dolomite limestone (Figure. 9). These Ordovician-Cambrian age rocks (origin 550 million yrs ago) are part of a Jurassic age (145 mya) uplifting associated with the

accretion of terranes on to North America. All of the Okanogan Highlands were overridden by glaciers during the Pleistocene (1.6-.01 mya). How the canyon was formed is currently unknown but likely associated with erosion by glaciers and by glacial melt waters.



Figure 9. Trombetta Canyon, cliffs on the east wall; view is looking north. The snag is fire-charred and appears to be evidence of a past fire.

The Canyon is a steep sided ravine cut into limestone and dolomite. The topographic relief from the canyon bottom to the top of the slopes is nearly 1,800 feet, with sheer cliffs several hundred feet high. The south end of the canyon is a divide between the canyon itself, which drains northwest into Fivemile Creek, and the fields on the southern approach, which drain into Deep Creek. Both of these creeks eventually flow into the Columbia River where it is impounded in Roosevelt Lake.

Climate data from Northport collected from 1920 to 2007 is summarized below; the conditions at Trombetta Canyon are likely to be very similar to these (NOAA 2007):

Period of Record Monthly Climate Summary

Period of Record : 1/ 1/1920 to 5/31/2007

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	31.9	38.9	50.9	63.3	73.0	79.6	88.5	87.4	76.4	59.7	42.0	33.4	60.4
Average Min. Temperature (F)	19.8	22.6	28.4	34.7	41.6	47.8	51.3	49.9	43.1	35.8	29.1	23.1	35.6
Average Total Precipitation (in.)	2.08	1.40	1.45	1.43	1.82	2.07	1.05	1.03	1.13	1.49	2.09	2.44	19.47
Average Total SnowFall (in.)	18.6	8.6	2.5	0.1	0.0	0.0	0.0	0.0	0.0	0.1	6.3	17.5	53.7
Average Snow Depth (in.)	10	9	2	0	0	0	0	0	0	0	1	4	2

Percent of possible observations for period of record.

Max. Temp.: 89.3% Min. Temp.: 89.4% Precipitation: 89.8% Snowfall: 89.3% Snow Depth: 88.3%

PRIMARY ELEMENTS (2007 Washington Natural Heritage Plan):

Rare Plant Elements

2	G5/S1	<i>Salix candida</i> , hoary willow	2
3	G5/S2	<i>Dryas drummondii</i> , yellow mountain avens	40
3	G5/S3	<i>Cryptogramma stelleri</i> , Steller’s rockbrake	1

***Salix candida* (sage willow)** is threatened in Washington. An estimated two dozen plants occur on private land in the lower part of the Canyon, in an extensive scrub-shrub wetland. Three occurrences of this species have been previously reported in Washington: two of these are in northern Pend Oreille County and one is in northern Stevens County.

***Dryas drummondii* (yellow mountain-avens)** is sensitive in Washington, and abundant on cliffs on both sides of the canyon. Five occurrences were previously recorded for this species statewide, one in the Olympic mountains, one in the north Cascades in Snohomish County near Darrington, and three near the Pend Oreille River in Pend Oreille County. Surveys from the Boundary Reservoir in 2007 reported three element

occurrences in that area. Sighting forms have not yet been submitted to the Natural Heritage Program.

Cryptogramma stelleri (**slender rockbrake**) is sensitive in Washington. We only saw one vegetative plant, and so the identity of this species here needs to be confirmed. The element occurrence is based on a verbal report by Kathy Ahlenslager, the Colville National Forest botanist, that Jean Wood reported this species from this location. Six occurrences were previously reported from Washington, four in the vicinity of the Chelan/Okanogan County crest. The other two are historical records, one from 1883 north of Ellensburg, and one from 1924 from Z Canyon, on the Pend Oreille River in Pend Oreille County. Surveys from the Boundary Reservoir in 2007 reported four element occurrences in that area. Sighting forms have not yet been submitted to the Natural Heritage Program.

Other Botanical Elements

Several other plants of interest occur in the Canyon: *Pellaea glabella* subsp. *simplex* grows on limestone cliffs. This fern was formerly considered sensitive in Washington, and is currently on the state Watch List. At least one fern specialist considers the northern Washington plants to be morphologically distinct from other members of this variety in the state (Ed Alverson, personal communication). *Platanthera hyperborea* is another uncommon species at the site; it is associated with calcareous wetlands.

Ecosystem Elements

<u>Priority in plan</u>	<u>Global/ State Rank</u>	<u>Element name</u>	<u>Estimated Area (acres)</u>	
2	G3S3	<i>Tsuga heterophylla</i> / <i>Aralia nudicaulis</i> forest association	20	20
3	G5S3	<i>Pseudotsuga menziesii</i> / <i>Physocarpus malvaceus</i> forest association	50	250
+	G4S4	<i>Pseudotsuga menziesii</i> / <i>Physocarpus malvaceus</i> / <i>Linnaea borealis</i> forest association	10	100
1	or	Calciferos Wetland	7	7
2		Low Elevation Freshwater Wetland		

A large scrub-shrub and emergent wetland at the lower, north end of the canyon is part of a very low gradient valley bottom. Most of this wetland has been grazed, currently by horses. The wetland “pasture” is dominated by *Juncus balticus*, *Poa pratensis*, and *Carex interior*, with occasional *Petasites sagittatus*. *Scripus validus* increases toward the canyon in more persistent water. One *Phalaris arundinacea* patch was observed. Edges of the herbaceous wetland are lined with *Alnus incana* and open water. Farther into the canyon, the wetland is dominated by *Typha latifolia* and *Carex cusickii*. Associated species include *Petasites sagittatus*, *Carex vesicaria*, and *Carex utriculata*. *Salix candida*, *Salix rigida*, and *Alnus incana* are associated wetland shrubs.

Forests immediately adjacent to the wetlands are dominated by combinations of *Betula papyifera*, *Populus tremuloides* and/or *Thuja plicata*. Understory shrubs include *Cornus sericea*, *Rubus parvifolia*, and *Alnus incana* with prominent herbaceous species *Aralia nudicaulis*, *Athyrium filix-femina*, *Circaea alpina*, and *Tiarella unifoliata*.

Most of the canyon bottom is an upland environment that does not contain a stream channel or riparian vegetation; the bottom of the canyon appears completely dry, without any evidence of recent surface flow. A few areas of concave topography in the lower part of the canyon include patches of wetland species. Most of the canyon bottom is vegetated with conifers in the overstory, primarily *Thuja plicata* and *Pseudotsuga menziesii* less than 14” DBH. *Betula papyifera* is common in the same size class. Large (2-3 feet DBH) *Larix occidentalis* and one *Pinus monticola* appear as isolated individuals. *Taxus brevifolia*, *Corylus cornuta*, and *Acer glabrum* form dense shrub patches. *Aralia nudicaulis*, *Clintonia uniflora*, and *Tiarella unifoliata* are common understory plants that indicate the *Thuja plicata* / *Aralia nudicaulis* forest association. Charred logs and stumps are occasionally present in the canyon bottom. Old cut stumps are frequently seen with the logs from them lying on the ground nearby. The reason they were cut is not evident. No roads or other human made features are present.

The lower slopes of the canyon sides, below limestone and dolomite cliffs, supports forests and open shrublands. The following communities were observed on the toe slope to the cliff face:

- Toe slope - *Pseudotsuga menziesii*-(*Thuja plicata*-*Betula papyifera*) / *Corylus cornuta*-*Acer glabrum* / *Aralia nudicaulis*-*Clintonia uniflora*-*Cornus unalaskensis*-*Linnaea borealis*
- Stabilized talus - *Pseudotsuga menziesii* – *Betula papyifera* / *Acer glabrum*-*Physocarpus malvaceus* / *Symphoricarpos albus*-*Spiraea betulifolia* / *Linnaea borealis*
- Less stabilized talus - *Pseudotsuga menziesii* / *Amelanchier alnifolia*- *Corylus cornuta* / *Symphoricarpos albus*-*Toxicodendron rydbergii*-*Rosa gymnocarpa* / *Maianthemum racemosum*
- Cliff base - *Amelanchier alnifolia*-*Philadelphus lewisii*-(*Juniperus scopulorum*) / *Mahonia aquilifolium*-*Pseudoroegneria spicata*
- Cliff - *Pinus ponderosa*-*Pseudotsuga menziesii* / *Philadelphus lewisii* / *Pseudoroegneria spicata*

The forests on the surrounding Formation are *Pseudotsuga menziesii* / *Physocarpus malvaceous* and *Pseudotsuga menziesii* / *Physocarpus malvaceous* / *Linnaea borealis* forest associations.

Some of the vegetation in Trombetta Canyon has strong affinities to the following vegetation type, which has been described in the Rocky Mountains and Great Plains.

***Pinus ponderosa* Limestone Cliff Sparse Vegetation**

Translated Name: Ponderosa Pine Limestone Cliff Sparse Vegetation

Common Name: Ponderosa Pine Limestone Cliff

Unique Identifier: CEGL002055

Classification Approach: International Vegetation Classification (IVC)

Summary: This type is found in ponderosa pine-dominated areas of the Black Hills and possibly the western mountain regions of the United States. At Wind Cave National Park in South Dakota, stands are found around large exposures of Pahasapa and Minnekahta limestones. These cliffs occur on ridgetops, slopes and in drainage bottoms. Also at Wind Cave NP, cliffs of limestone have very sparse vegetative cover at most. Where smaller outcrops occur, they often are surrounded by some type of ponderosa pine forest or woodland. Several shrub species are often found associated with limestone rock outcrops, including *Prunus virginiana*, *Rhus trilobata* and *Toxicodendron pubescens*.

Ecological Condition:

Overall the Canyon appears relatively undisturbed, with the visible exception of the occasional old stumps. There are very few weeds within the Canyon, and only an occasional trace of a trail in the Canyon bottom.

Current use:

Most of the proposed NAP is currently accessible only across private land, and access by the public is limited. The area may get occasional use by hunters, horseback riders, or hikers. Old fields on DNR land at the southern edge of the site were historically used for grazing livestock but have not been grazed for an undetermined period of time.

OTHER FEATURES:

<u>Feature</u>	<u>Area (acres)</u>
Cliff and talus	180
Scrub-shrub wetland	5
Emergent wetland	5

OTHER KNOWN EXAMPLES:

Limestone formations are uncommon in Washington State, though fairly abundant in the northeast part of the state. Limestone cliffs along the Boundary reservoir in the Pend Oreille River also include element occurrences of *Dryas drummondii* and *Cryptogramma stelleri*.

PRESERVE DESIGN:

The two potential ecological boundaries of the proposed NAP are shown in Figure 7. The more narrowly delineated NAP is limited to Trombetta canyon itself, and would be intended to protect habitat for the cliff dwelling species and those in the wetland that forms at the northern end of the canyon. The more broadly drawn line circumscribes the limestone formation through which Trombetta canyon is cut, and includes the forests that occur in these uplands. (See Figure 6).

MANAGEMENT CONSIDERATIONS:

The guiding principle for management of the NAP would be "...to allow natural ecological and geological processes to predominate, while controlling activities that directly or indirectly modify these processes." It does not appear that this proposed NAP would require intensive management. Access is very limited, the potential damage from the occasional foot traffic appears minimal.

Threats: Timber harvest in or adjacent to the canyon may affect hydrology of the wetland at the lower portion of the canyon, or run-off on the canyon walls itself. Limestone mining occurs in the general area.

Specific management considerations are discussed below.

Roads

Roads pose a particular threat because of the ground disturbance associated with their use and maintenance and because of their potential to function as vectors for weeds. Currently there are very few non-native species in the canyon itself; the heaviest weed infestations are on the old grazing land at the northern edge and the pasture at the north end. There are currently no roads into the canyon, and hardly a visible footpath. The most effective practice for containing weeds transported along roads or trails is frequent surveillance and quick eradication of new introductions.

Weed Control

Almost no weeds occur within the proposed NAP, and the most effective management would be periodic survey and rapid treatment if invasive species are detected. At least one patch of *Phalaris arundinacea* is present on the private land in the northern part of the NAP. Early removal of this plant may be prudent, if the land owner agrees.

Fencing

Because grazing animals are in adjacent areas, limited fencing may be required in the future at each end of the canyon.

REFERENCES:

Ahlenslager, Kathy. Colville National Forest botanist. Personal communication, 2007

Alverson, Ed. Personal communication, 2007

Easterbrook, D.J., and D.A. Rahm. 1970. Landforms of Washington. Union Printing Co., Bellingham, WA. 156p.

Geologic maps of Washington

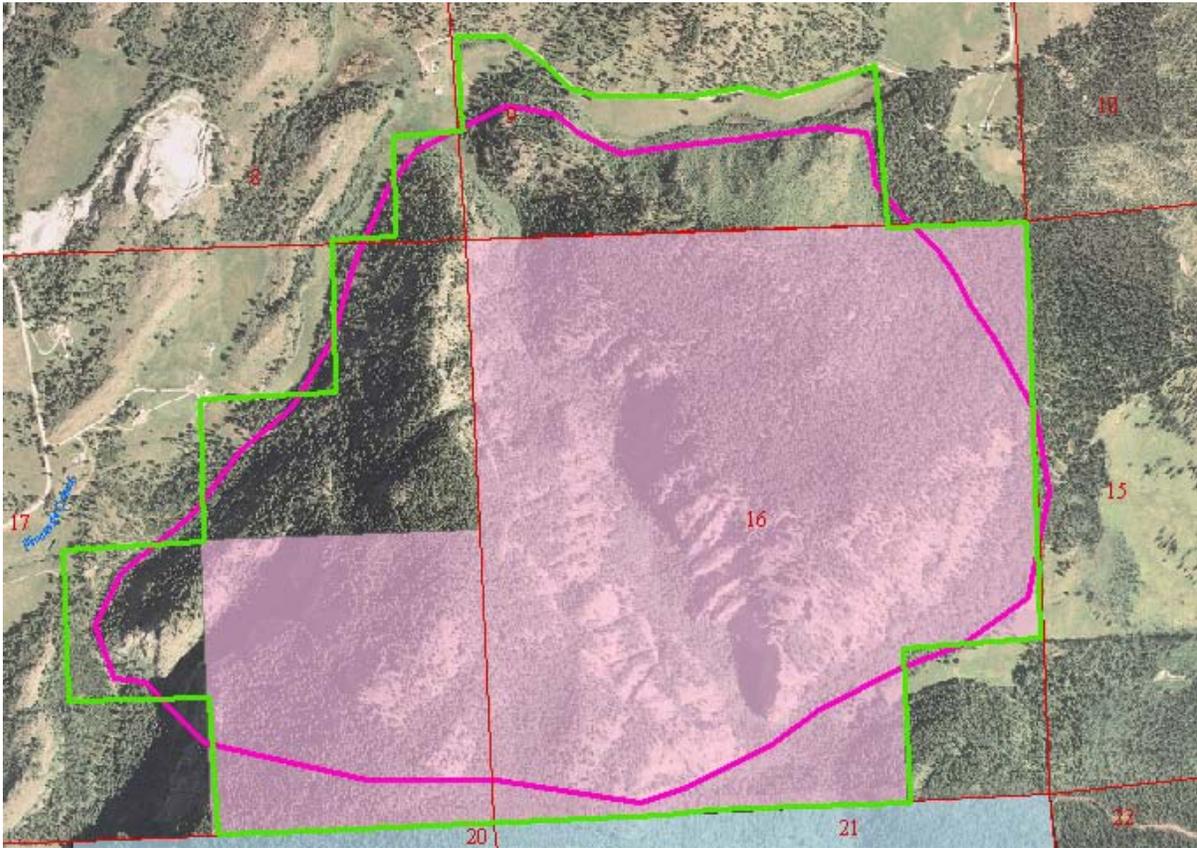
National Oceanic and Atmospheric Administration (NOAA) 2007. Western Regional Climate Center, accessed on-line October 11, 2007 at <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?wa5946>

Wood, Jean. 1997. A Floristic Inventory of the Vascular Plants of the Western Colville National Forest and Vicinity, Washington. M.S., Department of Botany, December 1997.

Wood, Jean. Umatilla National Forest botanist, Personal communication, 2007

Prepared by: Joseph Arnett and Rex Crawford

Final Trombetta Canyon Recommended Boundary



Trombetta Canyon proposed Natural Area Preserve. This map was generated in response to the Natural Heritage Advisory Council's direction to staff at the October 24, 2007 meeting. The Council approved the proposed natural area (purple line), but requested that a more easily and legally delineated boundary be drawn to incorporate the purple (ecological) boundary. The green line represents the boundary recommended by the Natural Heritage Advisory Council, for Natural Area Preserve designation, to the Commissioner of Public Lands.

Map created by:
Joe Arnett
Natural Heritage Program
January 2, 2008