

Rec'd 10/30/89  
S.K.

THREATENED, ENDANGERED AND SENSITIVE PLANT SURVEY  
SKYKOMISH RIVER AND SPADA LAKE LAND EXCHANGES

October 27, 1989

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Under contract with USDA Forest Service  
Mt. Baker-Snoqualmie National Forest  
Purchase Order # 43-05M6-0328

## PART 1: Summary and Certification

A field survey for threatened, endangered, and sensitive plant species (TES) was undertaken in the 1989 field season as part of planned land transfers of public forest ownership to private forest ownership, and vice versa. Two potential land exchange areas and a portion of a third area were surveyed and are reported herein in accordance with purchase order #43-05M6-9-0328: National Forest land on Spada Lake (1442 acres); City of Tacoma land on the Skykomish River (715 acres plus an additional 373 chains); and the Bridal Veil parcel of the Champion International Lands on North Bend District (195 acres).

Three populations of sensitive plant species were located in the Skykomish River Exchange Area. Two populations of Botrichium lanceolatum (lance-leaved grape fern): one population in the Skyline Lake parcel and one in the Lowe Creek parcel. The third population was Botrichium pinnatum (St. John's moonwort), also located in the Skyline Lake parcel.

No sensitive plant species were located in the Spada Lake or Champion (Bridal Veil parcel) Exchange Areas.

## Table of Contents

I.	Summary and Certification . . . . .	i
II.	Methods . . . . .	1
III.	Description of Area Surveyed	
	A. Skykomish River Exchange . . . . .	3
	B. Champion Exchange (Bridal Veil parcel) . . . . .	14
	C. Spada Lake Exchange . . . . .	15
IV.	Results of Survey . . . . .	24
V.	Discussion of Areas Where Sensitive Plants Not Found . .	27
VI.	Recommendations and Suggestions . . . . .	29
	Appendices	
	A. List of Plant Species: Skykomish River Exchange Champion Exchange (Bridal Veil)	
	B. List of Plant Species: Spada Lake Exchange	
	C. Maps of Skykomish River, Spada Lake and Champion (Bridal Veil parcel) Exchanges	
	D. Aerial Photos Showing Locations of Surveyed Parcels	
	E. Sensitive Plant Siting Forms	
	F. Slides of Located Sensitive Plants and Micro- and Macro- Habitats	
	G. Background Information on <u>Botrichium</u> as a Genus	

## PART II: Methods

Transects were planned through each parcel using maps, aerial photos and the outline provided by the COR. The parcels were then systematically searched with the aid of hand compasses. Areas with high potential for TES species (cliffs, creekbeds, wetlands, old growth forest) were intensively surveyed.

The populations of sensitive plants were flagged with blue and white, and red and white flagging. Color slides were made of representatives of the population, and of the micro- and macro-habitats. Botrichiums were field identified and no collections were made.

All vascular plant species encountered in each parcel were identified, with the exception of grasses. Unless the grass was a dominant in the community, grasses were not identified. There were no potential grass TES species listed within the survey area.

Collections were made of plants not readily identified in the field, and those plants were then identified at the University of Washington and Western Washington University herbariums. The list of plant species for each surveyed area is presented as Appendix A to this report.

For convenience, each survey parcel will be referred to with a given name, usually taken from a nearby natural map feature. Locations for each named parcel are given in the Description of Area Surveyed section.

III  
DESCRIPTION OF AREA SURVEYED

## SKYKOMISH RIVER LAND EXCHANGE AREA

### Skyline Lake #1

Photo # 2283-82

Location: T26N, R13E, S11

203 acres

Elevation range: 3800'-5200'

Dates of survey: August 4, 8, 10, 1989

Surveyors: Florence Caplow, Debra Salstrom, Clayton Antieau, Joe Arnett

Possible sensitive species: Campanula lasiocarpa, Cassiope lycopodioides, Cryptogramma stelleri, Dryas drummondii, Loiseleuria procumbens, Ranunculus cooleyae, Saxifraga debilis, Dodecatheon pulchellum var. watsonii, Salix vestita, Botrichium pinnatum, B. montanum

This was a variable area including north- and south-facing talus, north-facing cliffs, an east/west ridge, boulder fields, and a dry, steep south-facing slope.

Above the north-facing talus was an array of Saxifrages: Saxifraga tolmei, S. punctata, and S. ferruginea. Menziesia ferruginea, Rhododendron albiflorum, and Abies amabilis were tucked under ledges. Along the ridge was a low cover of Vaccinium scoparius, Lupinus wyethii, Penstemon davidsonii, Cirsium edule, Vaccinium membranaceum, and Hieracium albiflorum.

Dry, steep south-facing slopes supported a low to moderate cover of Pachystima myrsinites, while drainages usually had a high cover of Alnus sinuata and Acer glabrum var. douglasii. The lower section of the south-facing slope was dominated by Pteridium aquilinum and Epilobium angustifolium. Vaccinium membranaceum dominated slopes in the eastern portion of the section, with Menziesia ferruginea and Acer glabrum var. douglasii in the northeast portion of the site.

Several transects were made across and down slopes. The survey was somewhat impaired by steep talus on the south-facing slopes. One population of Botrichium pinnatum and one population of Botrichium lanceolatum were found. Refer to Results section for details.

## Skyline Lake #2

Photo #2283-82

Location T26N, R13E, S11

37 acres

Elevation: 5000'-5400'

Date of survey: August 9, 1989

Surveyors: Florence Caplow, Debra Salstrom

Possible sensitive species: Botrichium lanceolatum, B. lunaria,  
B. minganense, B. montanum, B. pinnatum, Platanthera obtusata

Uncut large Abies amabilis and Tsuga mertensiana on a relatively gentle slope. Understory bare or with patches of Vaccinium membranaceum and Sorbus sitchensis. Generally low diversity of shrubs and forbs.

Two transects were walked from the southwest to the northeast, then from the northeast to the northwest, then to the southeast downslope. No sensitive species were found.

## Skyline Lake #3

Photo # 2283-82

Location: T26N, R13E, S11

25 chains

Elevation: 5092'

Date of survey: August 4, 1989

Surveyors: Debra Salstrom, Florence Caplow, Joe Arnett

Possible sensitive species: Botrichium montanum, B. pinnatum,  
Carex buxbaumii, C. saxatilis, and Gentiana douglasiana

The southeast end of the lakeshore was marshy, with Carex aquatilis, C. nigricans and Dodecatheon pulchellum var. pulchellum. The riparian zone was otherwise narrow with some Salix sitchensis and Vaccinium deliciosum. Potentilla flabellifolia and Veratrum viride dominated the rocky outlet drainage at the south end of the lake.

The perimeter of the lake was walked. No sensitive species were found.

#### Skyline Lake #4

Photo # 2283-82

Location: T26N, R13E, S11  
75 acres

Elevation: 4200'-5200'

Date of survey: August 9, 1989

Surveyors: Florence Caplow, Debra Salstrom

Possible species: Botrichium pinnatum, B. montanum,  
Loiseleuria procumbens, Dodecatheon pulchellum var.  
watsonii, and Salix vestita

An open subalpine forest of pole-sized Tsuga mertensiana and Abies amabilis, with a mostly open understory of Phyllodoce empetrifomis, Cassiope mertensiana, Luetkea pectinata and Vaccinium deliciosum. The meadow to the west of the lake was dominated by Carex nigricans. The lake outlet stream had a rich diversity of plant species, including Luina hypoleuca, Arnica amplexicaulis, Lupinus latifolia, and Veratrum viride.

Several transects were made. No sensitive species were found.

#### Old Road #1

Photo # 1183-49

Location: T26N, R13E, S15  
63 chains

Elevation: 3000'

Date of survey: August 16, 1989

Surveyor: Debra Salstrom

Possible sensitive species: Platanthera chorisiana, Botrichium lanceolatum, B. lunaria, B. montanum, B. pinnatum

West of the road crossing the river supported a well-developed riparian area with Platanthera saccata, Carex stipata, Chrysanthemum leucanthemum, and Arnica amplexicaulis common. The riparian area was bounded by Alnus sinuata, Salix spp and Tsuga heterophylla. East of the road crossing river side-slopes ranged from 15-40%, with Acer circinatum and Vaccinium spp. dominating the narrow riparian area.

The surveyor walked the length of the river reach. No sensitive species were found.



## Old Road #2

Photo # 1983-173

Location: T26N, R13E, S15

104 acres

Elevation: 3100'-3400'

Date of survey: August 16, 1989

Surveyor: Florence Caplow

Possible sensitive species: Dodecatheon pulchellum var. watsonii, Botrichium lanceolatum, B. lunaria, B. montanum, B. minganense, Saxifraga debilis

The entire area had various levels of disturbance, including a former small town, abandoned railroad yards, railroad track beds, transmission lines and roads. The forested portion was dominated by Abies procera and Abies amabilis, with an understory of Clintonia uniflora and Smilacina stellata. The meadows supported dense, tall Pteridium aquilinum and Epilobium angustifolium with Alnus sinuata in the drainages.

Two transects were walked through the meadow portions and one transect was walked the length of the parcel through the more disturbed areas. No sensitive species were found.

## Martin Creek

Photo # 1983-62

Location: T26N, R12E, S24

40 acres

Elevation: 2200'-3000'

Date of Survey: July 28, 1989

Surveyor: Florence Caplow

Possible sensitive species: Botrichium lanceolatum, B. lunaria, B. minganense, B. montanum, B. pinnatum, Platanthera obtusata

Most of the parcel was second growth: dense, pole-sized timber, with Gaultheria shallon and Vaccinium parvifolium as common understory species. The area was also rich in unusual saprophytic species, including Hemitomes congestum, Pterospora andromedea and Allotropa virgata.

The surveyor made several transects through the parcel. No sensitive species were found. Two "monitor" species were seen in the parcel: Botrichium virginianum and Hemitomes congestum.

Beckler Peak #1 and #2

Photo # 1683-148

Location: T26N, R12E, S20

140 acres

Elevation: 3500-4950'

Date of survey: August 5, 1989

Surveyors: Debra Salstrom, Florence Caplow

Possible sensitive species: Botrichium lanceolatum, B. lunaria,  
B. minganense, B. montanum, B. pinnatum, Cimicifuga elata,  
Montia diffusa, Campanula lasiocarpa, Cryptogramma stelleri,  
Dodecatheon pulchellum var. watsonii, Ranunculus cooleyae,  
Saxifraga debilis

Projected wetland was actually a drainage choked with Alnus sinuata and Salix spp.. Much of the parcel was sparsely vegetated talus with Rubus parviflorus, Cryptogramma crispa, and Asplenium trichomanes. The forest was open Abies amabilis, with Amelanchier alnifolia, Pachystima myrsinites, Vaccinium parvifolium, Acer circinatum and a variety of forbs. Some of the 10-20' cliffs were dominated by Polystichum munitum.

Two transects were walked through the talus and through the forest. No sensitive species were found.

Beckler River

Photo #1179-96

Location: T26, R12E, S18

80 acres

Elevation: 1000'-1200'

Date of survey: July 27, 1989

Surveyors: Florence Caplow, Debra Salstrom

Possible sensitive species: Botrichium lanceolatum, B. lunaria,  
B. minganense, B. montanum, B. pinnatum, Cimicifuga elata,  
Montia diffusa

Eroding granite ledges and slides drained by several creeks. Dry rocky area between creeks typically supported Arctostaphylos uva-ursi, Cryptogramma crispa and Sedum oreganum. The forest consisted of an unusually high percentage of Chamaecyparis nootkatensis and Taxus brevifolia. Creek beds supported Acer glabrum var. douglasii, Alnus sinuata and Ribes bracteosum. Interesting species included Parnassia fimbriata var. fimbriata and Juniperus scopulorum.

Transects were made along each creek and across forested area. Talus slopes and cliffs restricted the survey in upper region of parcel. No sensitive species were found.

## The Station

Photo # 1083-192

Location: T26N, R11E, S25

50 acres

Elevation: 900'

Date of survey: July 21, 1989

Surveyor: Debra Salstrom

Possible species: Botrichium lanceolatum, B. lunaria, B. minganense, B. montanum, B. pinnatum, Cimicifuga elata, Montia diffusa

Primarily Tsuga heterophylla forest with understory ranging from Berberis nervosa to Streptopus roseus and Smilacina stellata. Small wetland with no standing water. Alnus rubra and Acer circinatum were along the riverbank.

The surveyor walked four transects, including all river frontage. No sensitive species were found.

## Boulder Creek

Photo # 1183-48

Location: T27N R11E S12 and T27N R12E S7, S18

100 chains

Elevation: 2400'-4000'

Date of survey: August 17, 1989

Surveyors: Florence Caplow and Clayton Antieou

Possible sensitive species: Platanthera chorisiana, Botrichium lanceolatum, B. lunaria, B. minganense, B. montanum, B. pinnatum, and Ranunculus cooleyae

Three east-west drainages in a large, recent clearcut. The creek farthest to the south (Boulder Creek) was generally open and rocky. Interesting habitats included: small cliffs with Adiantum pedatum, Blechnum spicant, and Tiarella unifoliata; and gravelly wet meadows with Parnassia fimbriata var. fimbriata, Aster modestus, Sanguisorba sitchensis, Arnica amplexicaulis and other forbs. The creek to the north of Boulder Creek could not be surveyed because of numerous waterfalls. The creek farthest to the north was filled with logging debris, but its upper sections had some interesting subalpine meadows with Carex aquatilis, Ligusticum grayii, Leptarrhena pyrolifolia, Erigeron peregrinus ssp. calycanthus and Juncus effusus.

Boulder Creek was walked in its entirety by both surveyors. The next creek to the north was walked to the first waterfall. The final creek was walked in its entirety. No sensitive species were found.

Grotto #1

Photo #883-82

Location: T26N, R10E, S17, 18, 20  
80 chains

Elevation: 800'

Date of survey: June 28, 1989

Surveyor: Debra Salstrom

Possible sensitive species: Cimicifuga elata, Montia diffusa

Gravelly and weedy riverfront with Salix spp., Alnus rubra, and Cornus stolonifera.

The riverfront was walked in entirety. No sensitive species were found.

Grotto #2

Photo #883-82

Location: T26N, R10E, S17, 18, 20

Elevation: 800-1200'

Dates of survey: June 27, 28, 29, 1989

Surveyor: Debra Salstrom

Possible sensitive species: Cimicifuga elata, Montia diffusa

Most of the area was mixed second growth. Some areas of dense pole timber with a depauperate understory. Potholes in flats near the river with Carex deweyana.

Unusual habitats: To the north of the road, rock knolls with ferns, moss, Heuchera micrantha, and Pachystima myrsinites. Wetlands to the north of the highway with Salix spp., Lysichitum americanum and Carex spp.

Each subarea was surveyed separately, with multiple transects. No sensitive species were found. Note: this is one of the "added" areas.

The Slide #1

Photo #783-91

Location: T26N, R11E, S18, 19

42 acres

Elevation: 2000'-4000'

Access was blocked by cliffs. Area could not be surveyed.

The Slide #2

Photo #783-91

Location: T26N, R11E, S18, 19  
40 acres

Elevation: 2200'

Date of Survey: August 2, 1989

Surveyors: Debra Salstrom, Florence Caplow

Possible sensitive species: Platanthera chorisiana, Botrichium lanceolatum, Carex buxbaumii, Coptis asplenifolia, Cimicifuga elata, Platanthera obtusata

The area consisted of talus slopes and dry drainages. The toe of the talus slopes held dense thickets of Acer circinatum, Oplopanax horridum and Rubus spectabilis. Polystichum munitum, Rubus ursinus and Vaccinium parvifolium were dominant in the understory. The cliffy sideslopes of the major drainage in the area were dominated by Valeriana sitchensis and Ribes bracteosum. Above the drainage was a very large area of stable, rather barren talus. Common species of the talus included Acer circinatum, Oplopanax horridum, Rhamnus purshiana, Ribes lacuster, and Cryptogramma crista.

Both surveyors walked across the thicket at the toe of the slope, up the creek to a cliff, up an unstable talus slope clothed with trees, and across open talus. No sensitive species were found.

The Slide #3

Photo # 783-91

Location: T26N, R11E, S18, 19  
15 chains

Elevation: 1000'-1200'

Date of survey: July 7, 1989

Surveyor: Debra Salstrom

Possible sensitive species: Botrichium lanceolatum, Cimicifuga elata, Montia diffusa

A rocky creek bed, mostly open. An overstory of Thuja plicata with Aruncus sylvestris and Sambucus racemosa below, generally with moss carpeting the ground. Lactuca muralis was very common close to the creek.

One transect was followed up the creek, another down. No sensitive species were found.

## Lowe Creek

Photo # 683-156

Location: T26N, R10E, S24, 25

338 acres

Elevation: 1800-4500'

Dates of survey: August 28, 29, 30, 1989

Surveyors: Debra Salstrom, Florence Caplow

Possible sensitive species: Botrichium lunaria, B. lanceolatum, B. montanum, B. pinnatum, Ranunculus cooleyae, Cassiope lycopodioides, Dodecatheon pulchellum var. watsonii, Coptis asplenifolia, Cimicifuga elata, Platanthera chorisiana, P. obtusata, Cryptogramma stelleri, Saxifraga debilis, Dryas drummondii, Gentiana douglasiana, Carex buxbaumii

The habitat types which were developed in the original plan proved impractical in the field. Instead, the parcel was broken up into five major habitat types or areas: riparian, forest, the ridge above the quarries, talus, and cliffs.

Riparian: Lowe Creek had a bouldery or bedrock substrate with generally steep and frequently cliffy sideslopes. Side creeks had unstable substrates of loose rock. Aruncus sylvestris, Oplopanax horridum, Rosa spp., Adiantum pedatum, and Ribes bracteosum were common species.

Side creeks were surveyed up to impassable cliffs. Lowe Creek was surveyed from the side to avoid cliffs and waterfalls. No sensitive species were found.

Forest: Abies amabilis forest with open understory of Dryopteris austriaca, Vaccinium spp., Blechnum spicant, and dense Acer circinatum in chutes and periodic open areas.

Two transects were taken through the forested area. No sensitive species were found.

Above quarries: Dense Tsuga heterophylla reproduction with Abies amabilis along the ridge. Common understory species were Menziesii feruginea, Gaultheria shallon, G. ovatifolium, Berberis nervosa, Lycopodium clavatum, and L. selago. Chamaecyparis nootkatensis was present along the ridge.

Talus: Varied from open talus with Cryptogramma crista, Acer macrophyllum, and Alnus rubra to quite dense tree cover of pole timber with Alnus rubra, Acer macrophyllum, Holodiscus discolor, Berberis nervosa, Rubus ursinus, and Ribes bracteosum. Talus bordering the upper reaches of Lowe Creek had dense Ribes bracteosum, Epilobium angustifolium, and Oplopanax horridum.

Several transects were walked across the talus slopes. A population of Botrichium lanceolatum was found on an overgrown roadbed in this habitat type. Refer to the Results section for more information on the population. Talus directly below the

quarries was quite disturbed. All large trees had been cut and quarry debris was widely scattered.

Cliffs: Large Pseudotsuga menziesii were scattered on cliffs that were dominated by Polypodium glycorrhiza, Sedum spp., Cryptogramma crispa, Linnaea borealis, and Heuchera micrantha.

Cliffs were scaled where possible, otherwise the upper edge or the base was surveyed. No sensitive species were found.

Some of the parcel was rendered inaccessible by cliffs or very steep slopes. Areas not surveyed included slopes to the northwest of the quarries, and the very steep slopes to the south of Lowe Creek.

#### Baring #1-#3

Photo #683-158

Location: T26N, R10 E, S11, 12, 13

118 acres and 70 chains

Elevation: 1000'-1400'

Dates of survey: June 6, 22, 1989

Surveyors: Debra Salstrom, Florence Caplow

Possible sensitive species: Botrichium lanceolatum, Montia diffusa, Coptis asplenifolia, Cimicifuga elata, Carex pauciflora, Epipactis gigantea

All three areas were surveyed as one unit, for logistical reasons. Baring #3 (riverfront) was gravelly, weedy and disturbed. Baring #2 was one of several wet openings dominated by Rubus spectabilis. Baring #1 was a generally open, mixed second growth forest with an understory of ferns and forbs in drier areas and R. spectabilis-Oplopanax horridum or Urtica dioica in wetter areas.

The most significant portion of Baring #1 was the swampy flat near the river. Meandering streams create a mosaic of small wooded wetlands.

Four transects were walked the length of the area (one along the river). No sensitive species were found.

#### Baring #4

Photo #683-158

Location: T26N, R10E, S11,12,13

33 acres

Elevation: 1200'-1800'

Cliffs surrounded the area. Access was attempted up an adjoining creek which ended in 30-foot waterfall. The area could not be surveyed.

Baring #5

Photo #683-158

Location: T26N, R10E, S11, 12, 13  
20 chains

Elevation: 1200-1500'

Date of survey: July 7, 1989

Surveyor: Florence Caplow

Possible sensitive species: Cimicifuga elata, Coptis asplenifolia, Epipactis gigantea

A steep gully without surface water. Primarily talus supporting a heavy brush of Acer circinatum, Rubus spectabilis, Oplopanax horridum and Ribes bracteosum.

The gully was surveyed twice--once up, once down. No sensitive species were found.

Snowslide Gully

Photo #80-160

Location: T26N, R10E, S3

40 acres

Elevation: 800-1000'

The parcel has been clearcut since 1984. The parcel was not surveyed.

Lake Isabel

Photo #77-077

Location: T27N, R10E, S1

65 acres

Elevation: 2800'-3600'

Uncut areas of the parcel appeared to be considerably less than 65 acres. Best access was over private roads which were blocked. A maze of roads not visible on the aerial photos and not delineated on the maps made access from Copperbell mine next to impossible.

One-half day was spent attempting access using the mining roads. Access was not evident, and the survey was not accomplished.



## CHAMPION LAND EXCHANGE AREA

### Bridal Veil

Photo # 78-092

Location: T26N, R10E, S30

195 acres

Elevation: 800'-1200'

Dates of Survey: June 19, 20, 21, August 1, 1989

Surveyors: Florence Caplow, Debra Salstrom

Possible sensitive species: Montia diffusa, Botrichium lanceolatum, B. lunaria, Cimicifuga elata, Platanthera obtusata, Carex macrochaeta

A varied parcel. Much of the area was second-growth Alnus rubra with Rubus spectabilis in the understory. These areas were not surveyed intensively. Survey focused on areas to the west and south of the road, adjacent to the steeper slopes at the base of Mt. Index.

Unusual habitats: Along the base of the steep cliffs and slopes; short, mossy cliffs with ferns, Lycopodiums, Boykinia elata and other Saxifrages; talus with Acer circinatum and a mossy understory; and the base of Bridal Veil Falls, in the spray line. These areas were surveyed twice: once for early-blooming species and once for later blooming species.

The parcel was divided into subareas which were surveyed separately, usually with multiple transects. No sensitive species were found. Note: this is one of the 'added' areas.

SPADA LAKE EXCHANGE AREA \*

Williamson Creek #1

Photo #77-079

Location: T29N, R9E, S24

7 acres

Elevation: 1400'

Date of survey: Sept. 1, 1989

Surveyor: Clayton Antieau

Possible species: Botrichium lanceolatum, B. lunaria, B. minganense, B. montanum, B. pinnatum

The stand was not surveyed. At the time of the survey, reservoir levels were high and cliffs blocked overland access. The stand appeared to be second growth conifer and Alnus rubra, an unlikely area for sensitive species to occur.

Williamson Creek #2

Photo # 77-079

Location: T29N, R9E, S23, 24, 25

10 acres

Elevation: 2000'

Date of survey: July 6, 1989

Surveyor: Debra Salstrom

Possible sensitive species: Botrichium lanceolatum, B. lunaria, B. minganense, B. montanum, B. pinnatum

A Thuja plicata-Tsuga heterophylla old growth forest on steep slopes with cliffs, boulders and blowdown. The understory was rather brushy, with Vaccinium spp. and Acer circinatum. Several drainages with Rubus spectabilis and Oplopanax horridum traversed the stand.

Two transects were taken through the area. No sensitive species were found.

Williamson Creek #3

Photo # 77-079

Location: T29N, R9E, S23, 24, 25

3 cliffs; 5 chains each

Elevation: 1600'

Dates of survey: August 3, 11, 1989

Surveyors: Debra Salstrom, Florence Caplow

Possible sensitive species: Ranunculus cooleyae, Botrichium lanceolatum, B. lunaria, B. minganense, B. montanum, B. pinnatum, Platanthera obtusata, P. chorisiana

Cliff #1: (surveyed, but not part of contract) Fifty foot cliff; western exposure. Gaultheria shallon, Rubus parviflorus dominated. Trees had been logged off cliff ledges.

Surveyed from top and bottom. No sensitive species were found.

Cliff #2: Seventy-five feet high with Acer circinatum, Thuja plicata and Boykinia elata dominating cracks and ledges. Barer areas supported mostly Menziesia ferruginea and Aruncus sylvester. Wetland at base.

Surveyed from base of cliff; wetland walked through. No sensitive species were found.

Cliff #3: Very disturbed, clothed with second growth. Cliff was approached but not surveyed.

#### Gilbert Creek #1

Photo # 76-054

Location: T29N, R9E, S23, 26

10 chains

Elevation: 1500-1600'

Date of survey: July 6, 1989

Surveyor: Florence Caplow

Possible sensitive species: Botrichium lanceolatum, B. lunaria, B. minganense, B. montanum, B. pinnatum, Platanthera chorisiana, P. obtusata

A rocky, open creek with little brush. Steep slopes down to the creek, but occasional flat areas with Alnus rubra, Thuja plicata and moist understory species.

The surveyor walked down one side of the creek and up the other. No sensitive species were found.

#### Boat Ramp #1

Photo # 75-136

Location: T29N, R9E, S22, 27

9 acres

Elevation: 1600'

The area had been clearcut since 1984, and was not surveyed.

Boat Ramp #2

Photo # 75-136

Location: T29N, R9E, S22, 27

11 acres

Elevation: 1600'

Date of survey: July 7, 1989

Surveyors: Debra Salstrom, Florence Caplow

Possible sensitive species: Botrichium lanceolatum, B. lunaria,  
B. minganense, B. montanum, B. pinnatum, Coptis  
asplenifolia, Platanthera chorisiana, P. obtusata, Carex  
pauciflora

An area of mixed deciduous forest on an unstable clay slope. The surveyors found very large Alnus rubra and Populus trichocarpa with brushy understory species. Small ridges in the area supported a young Tsuga heterophylla forest, with an understory of Vaccinium spp. and Blechnum spicant.

Four transects were walked the length of the area. No sensitive species were found.

Boat Ramp #3

Photo # 75-136

Location: T29N, R9E, S22, 27

11 acres

Elevation: 1800'

Possible sensitive species: Botrichium lanceolatum, B. lunaria,  
B. minganense, B. montanum, B. pinnatum

Stand consisted of a narrow band of small Tsuga heterophylla and Thuja plicata along a steep cliff. Clearcuts surrounding the stand had caused considerable blowdown.

The stand was not surveyed due to inaccessibility, extensive blowdown and low probability of sensitive species.

South Fork #1

Photo # 75-134

Location T29N, R9E, S34

127 acres

Elevation: 1600'-2400'

Date of survey: August 11, 1989

Surveyor: Clayton Antieau

Possible sensitive species: Botrichium lanceolatum, B. lunaria,  
B. minganense, B. montanum, B. pinnatum

A forest of large Tsuga heterophylla and Abies amabilis with very large Thuja plicata snags. Steep southwest-facing slopes with numerous seeps, streams and springs, interrupted by short cliffs. The understory varied from doghair Tsuga heterophylla to

Polystichum munitum and mesic forbs or Vaccinium spp.. The northernmost portion of the area had been recently logged.

The surveyor walked two complete northwest to southeast transects, and several transects parallel to the primary ones. The surveyor also focused on streams and cliffs as higher priority areas. No sensitive species were found.

#### South Fork #2

Photo #75-134

Location: T29N, R9E, S34

98 acres

Elevation: 1600'

Date of survey: Sept. 1, 1989

Surveyor: Clayton Antieau

Possible species: Botrichium lanceolatum, B. lunaria, B. minganense, B. montanum, B. pinnatum

Several small stands of old growth timber scattered on a northeast-facing slope. All were dominated by Abies amabilis with a moist, generally open understory, and many large Thuja plicata trees. A long strip of timber on the south side of the road had been harvested, as had been an area in the northeast quarter of section 33. These harvested areas were not surveyed.

The surveyor walked through each of the remaining stands. No sensitive species were found.

#### Switchback #1

Photo # 75-134

Location: T29N, R9E, S3

20 acres

Elevation: 2000'

Date of survey: August 25, 1989

Surveyor: Clayton Antieau

Possible species: Botrichium lanceolata, B. lunaria, B. minganense, B. montanum, B. pinnatum

A Tsuga heterophylla -Abies amabilis forest on a very steep slope interrupted by cliffs, with streams, seeps, and waterfalls. Much of the area was affected by windthrow from nearby clearcuts.

The surveyor walked above and below cliffs, and checked all drainages and waterfall areas. No sensitive species were found.

Spyhop #1

Photo #74-273

Location: T29N, R9E, S21, 28

40 acres

Elevation: 1800-2000'

Date of survey: August 3, 1989

Surveyors: Florence Caplow, Debra Salstrom

Possible sensitive species: Botrichium lanceolatum, B. lunaria,  
B. minganense, B. montanum, B. pinnatum

Mid-sized Abies amabilis and Tsuga heterophylla interspersed with pole timber. A sparse understory of Vaccinium spp. and a variety of ferns.

The surveyors walked two transects through the area. No sensitive species were found.

The Spyhop #2

Photo #74-273

Location: T29N, R9E, S21, 28

60 chains

Elevation: 1400'

Dates of survey: July 5, 6, 1989

Surveyors: Debra Salstrom, Florence Caplow

Possible sensitive species: Botrichium lanceolatum, B. lunaria,  
B. minganense, B. montanum, B. pinnatum, Carex comosa, C. pauciflora,  
Coptis asplenifolia, Fritillaria camschatensis,  
Lobelia dortmanna, Platanthera obtusata, Montia diffusa

Two extensive, abandoned beaver complexes above Spada Lake along former stream channels. Dams, pools, channels and associated wetlands in 20-30 year old second-growth forest. An impressive diversity of wetland species was found in this area.

Surveys followed the course of the wetlands, generally with one person on either side of the wetlands. One arm of one of the wetlands was not surveyed. No sensitive species were found.

The Dam #1

Photo # 73-308

Location: T29N, R9E, S20, 29

120 acres

Elevation: 1600'-2000'

Dates of survey: July 10, 11, 1989

Surveyors: Florence Caplow, Debra Salstrom

Possible sensitive species: Botrichium lanceolatum, B. lunaria,  
B. minganense, B. montanum, B. pinnatum

A mature Thuja plicata-Tsuga heterophylla forest on north-facing slopes, with numerous small drainages. Generally closed canopy and open, moist understory. An unusual assemblage of species were present along the drainages and in small patches of sphagnum.

The survey was a series of four transects across the length of the area. No sensitive species were found.

#### The Dam #2

Photo #73-308

Location: T29N, R9E, S20, 29

10 acres

Elevation: 1400'

Date of survey: July 11, 1989

Surveyors: Debra Salstrom, Florence Caplow

Possible sensitive species: Botrichium lanceolatum, B. lunaria,  
B. minganense, B. montanum, B. pinnatum

Mostly west- and south-facing slopes above the Sultan River Canyon, with mature Tsuga heterophylla, Thuja plicata, and Abies amabilis. The understory was rich in ferns and sedges.

The area was surveyed to the edge of the canyon cliffs. No sensitive species were found.

#### The Dam #3

Photo #73-308

Location: T29N, R9E, S20, 29

20 chains

Elevation: 1600'

The area was a recent slide, probably caused by the clearcut above. It was not surveyed, due to danger and the low probability of sensitive species.

#### Olney Creek

Photo # 73-306

Location: T29N, R9E, S31, 32

280 acres

Elevation: 2000-2800'

Date of survey: August 18, 1989

Surveyors: Florence Caplow, Clayton Antieou

Possible species: Botrichium pinnatum

The entire area had been clearcut, with 6-10 inch diameter regrowth. Most of the parcel was not surveyed, due to its uniformity and low potential for sensitive species. The survey concentrated on the ridgetop along the north edge of the parcel

and on the bottomland area west of Olney Creek. The ridgetop was generally weedy, with the exception of one sphagnum bog to the north of the road. This bog had a rich assemblage of wetland species: Spirea douglasii, Athyrium filix-femina, Maianthemum dilatatum, Calamagrostis canadensis, Puccinellia pauciflora, Carex canescens, etc.. The bottomland area was moist second growth Tsuga heterophylla forest, with numerous drainages dominated by Rubus spectabilis and Oplopanax horridum.

The surveyors walked along the length of the ridge, then thoroughly explored the bottomland drainages. No sensitive species were found.

#### The Canyon #1

Photo # 72-341

Location: T29N, R9E, S30

277 acres

Elevation: 1200-1600'

Dates of survey: July 11, 12, 13, 1989

Surveyors: Florence Caplow, Debra Salstrom

Possible sensitive species: Botrichium lanceolatum, B. lunaria, B. minganense, B. montanum, B. pinnatum, Platanthera obtusata, Coptis asplenifolia

A mature Tsuga heterophylla forest, with scattered Thuja plicata, Pseudotsuga menziesii and Abies amabilis. The understory was generally dominated by Vaccinium spp. Drainages were choked with brush.

The cliffs in the center of the section had an unusual diversity of ferns and composites. Unfortunately, surveys along the cliffs were limited because of safety considerations.

A series of transects were walked through the area. In the eastern and western portions of the section surveys were done to the edge of the cliffs above the river. No sensitive species were found.

#### The Canyon #2

Photo #72-341

Location: T29N, R9E, S30

30 chains

Elevation: 1200-1600'

Dates of survey: June 14, July 12, 13, 1989

Surveyors: Debra Salstrom, Florence Caplow

Possible sensitive species: Carex comosa, C. stylosa, Fritillaria camschatensis, Lobelia dortmanna, Montia diffusa, Cimicifuga elata

Bottomlands of the Sultan River. Inland areas were very brushy with Alnus rubra, Acer circinatum, Rubus spectabilis, and Ribes



bracteosum. The river's edge had an interesting diversity of sedges and other forbs, including Erigeron spp., Juncus encifolius, Mimulus guttatus, Saxifraga mertensiana, etc.. Two small beaver ponds were found on the south side of the river, with a similar flora to the river's edge.

Surveys were transects both along river and in bottomlands. No sensitive species were found.

#### Blue Mountain

Photo # 71-328

Location: T29N, R8E, S23, 25, 26

120 acres

Elevation: 1200-2000'

Dates of survey: June 14, July 13, 26, 1989

Surveyors: Florence Caplow, Debra Salstrom

Possible species: Botrichium lanceolatum, B. lunaria, B. minganense, B. montanum, B. pinnatum, Coptis asplenifolia, Platanthera obtusata

A steep Tsuga heterophylla forest, with a sparse, open understory. Lush moss and moisture-loving forbs were found along the relatively undisturbed draws and creeks. An unusual area of eroded horizontal bedrock ledges was found on the south side of the river. The ledges supported an extraordinary range of species, including subalpine species such as Phyllodoce empetrifomis and Luina hypoleuca.

The south side of river was surveyed in entirety, where cliffs allowed access. All of the forest on the north side of river was surveyed except for a strip along river in section 26, where access was impeded by cliffs that dropped to the riverbed. No sensitive species were found.

#### Sultan River #1

Photo # 69-152

Location: T29N, R8E, S22, 27, 28

233 acres

Elevation: 600'-1400'

Dates of survey: July 19, 20, 25, 1989

Surveyors: Debra Salstrom, Florence Caplow

Possible species: Botrichium lanceolatum, B. lunaria, B. minganense, B. montanum, B. pinnatum, Carex Stylosa, Coptis asplenifolia, Fritillaria camschatensis, Platanthera obtusata

A forest of Tsuga heterophylla, Thuja plicata and Pseudotsuga menziesii with a sparse understory of Vaccinium spp., Blechnum spicant, and Polystichum munitum. Talus slopes supported dense Acer circinatum, Rubus spectabilis and Ribes bracteosum. Some of the parcel to the south of river had been cut.

Riverbanks were walked wherever cliffs allowed access. Most of the south bank was accessible. Cliffs restricted access along the north side of the river. Transects were taken at regular intervals into the forest. No sensitive species were found.

#### Sultan River #2

Photo # 69-152

Location: T29N, R8E, S22, 27, 28  
160 chains

Elevation: 600'-1000'

Date of survey: July 7, 1989

Surveyors: Florence Caplow, Debra Salstrom

Possible species: Carex comosa, C. stylosa, Fritillaria  
camschatensis, Montia diffusa, Cimicifuga elata

A riparian area of intermittent gravel/boulder and bedrock ledges and cliffs. Common species included Alnus rubra, Carex mertensii, Erigeron philadelphicus, and Arnica amplexicaulis.

Approximately one-fourth of the area was inaccessible. Surveyors walked the remaining riverback. No sensitive species were found.

#### The End #1 and #2

Photo # 68-108

Location: T29N, R8E, S32  
20 acres, 50 chains

Elevation: 600'

Date of survey: July 20, 1989

Surveyor: Debra Salstrom, Florence Caplow

Possible sensitive species: Botrychium lanceolatum, B. lunaria,  
B. minganense, B. montanum, B. pinnatum, Montia diffusa,  
Cimicifuga elata

The forest was second-growth closed-canopy, with a sparse understory of Vaccinium parvifolium, Polystichum munitum, and Blechnum spicant. Below the dam, the trees were smaller and the topography was steeper with large slides. The riverbanks were gravelly, with scattered large boulders. Cliffs occupied most of the west margin of the river.

Two transects were walked through the forest and along the river. Some of the west side of the river was inaccessible because of cliffs. No sensitive species were found.

#### PART IV. Results of Survey

Two populations of Botrichium lanceolatum (lance-leaved grapefern) and one population of Botrichium pinnatum (St. John's moonwort) were located during the survey, in the Skykomish River Exchange Area. Both species are considered "sensitive" in the state of Washington, and are included in the USFS Region 6 Sensitive Plant List.

The species in the genus Botrichium or "grapefern" are related to other, more common ferns. Botrichiums, however, belong to an older, more primitive family than most ferns. Each Botrichium has a fleshy rhizome deeply buried in the soil, and each year the rhizome produces one small frond, usually less than 10 inches high. The frond is divided into two segments: a fertile segment (the sporophore), and a sterile segment (the tropophore). The small round sporangia on the fertile frond resemble a bunch of grapes: hence the name. See Appendix G for more information on Botrichium biology.

Because of their small size and relative obscurity, little research has been conducted on the biology and taxonomy of the genus. Although Botrichiums can tolerate some disturbance, several species are listed as "sensitive" in this state, because of the historically small number of individuals known.

##### Botrichium lanceolatum--Lowe Creek

A population of eight individuals of B. lanceolatum was found in the Lowe Creek area (T26N R10E S14) at an elevation of 2200 feet on a SE-facing slope of the Lowe Creek valley. The entire slope was stabilized talus, with a thin organic layer supporting a second-growth forest of Pseudotsuga menziesii and Alnus rubra. The population was found to the west of a switchback on a overgrown roadbed, beneath Acer macrophyllum and young Pseudotsuga menziesii canopy. Associates included Acer circinatum, Ribes lacustre, Polystichum munitum, Achlys triphylla and Petasites frigidus. Canopy coverage from trees and shrubs was over 75 percent. The site seemed moist, based on the presence of nearby stands of Alnus sinuata and Salix spp.

The eight B. lanceolatum individuals were scattered over an area of approximately 6 x 18 feet, and varied from 2 to 10 inches high. Mature sporangia were present. Some of the plants were missing portions of sporophore segments, which may be the result of herbivory by picas or other small mammals.

Generally, second-growth forest is poor habitat for sensitive species. Botrichiums, however, can do well in somewhat disturbed environments. This population may have regenerated from populations on the cliffs directly above the site, which have had less direct disturbance. Because the population is located so close to an old roadbed, the potential for direct human impact is

high. Repeated trampling, logging or re-opening of the road would all have deleterious effects. For more specific information on this population, see Appendix E.

#### Unknown Botrichium--Lowe Creek

Two individuals of an unusual variant Botrichium were found approximately 60 feet east of the main population, in the center of the abandoned roadbed. One individual had two fertile segments and no sterile segment. The other individual had one fertile segment and no sterile segments. According to Dr. W.H. Wagner of the University of Michigan, these could possibly represent a new species or hybrid, or they may simply be unusual forms of B. lanceolatum. A collection will be made in 1990 and will be sent to Dr. Wagner for verification. Meanwhile this section of the abandoned roadbed should be considered extremely sensitive. For more specific information about the population, see Appendix E.

#### Botrichium lanceolatum--Skyline Lake

The other population of B. lanceolatum was found in the Skyline Lake parcel (T26N R14E S11). Eighty-five individuals were scattered over an area approximately 250 feet long and 60 feet wide, at an elevation of 3800 feet on a gentle, south-facing slope. Most of the population was above a portion of the Old Cascade Highway in an open, subalpine meadow dominated by Pteridium aquilinum and Epilobium angustifolium. A small number of B. lanceolatum were also found below the road and in a small meadow to the east of the primary population. The substrate was similar to that of the Lowe Creek population: thin soil over stabilized talus slope. Associates included Pteridium aquilinum, Epilobium angustifolium, Clintonia uniflora, and occasional scattered shrubs, including Vaccinium membranaceum, Sorbus scopulina and Pachystima myrsinites. Canopy coverage from ferns and forbs ranged from 30 to 80 percent. Botrichium multifidum was also found interspersed with B. lanceolatum. B. multifidum is not a sensitive species.

Individuals of B. lanceolatum were generally 2-10 inches high, and approximately 10% of the population was missing portions of fertile segments, which may be the result of herbivory by picas or other small mammals.

The population appeared to be flourishing, both above and below the road. However, future road work or expansion of recreational facilities associated with Stevens Pass could have strong impacts on these plants, considering their confinement to a localized habitat. (Approximately two miles of the slope on which the population was found was surveyed, and no other B. lanceolatum were found.) For more specific information on the population, see Appendix E.

Botrichium pinnatum--Skyline Lake

One population of Botrichium pinnatum was found in the Skyline Lake parcel, approximately 1/2 mile east of the B. lanceolatum site (T26N R14E S11). Ten individuals were scattered over a 75 foot section of a shallow, dry gully, at an elevation of 4700 ft. on a SW facing slope. Most of the slope was meadow dominated by Rubus parviflorus, Pachystima myrsinites, Vaccinium membranaceum, Epilobium angustifolium, Valeriana sitchensis and Lupinus latifolia, with scattered Abies lasiocarpa. The drainage was unstable and rocky, with occasional areas of thin soil formation. The vegetation of the gully included Thuja plicata, scattered Alnus sinuata and Rubus parviflorus and an occasionally dense herbaceous layer of Valeriana sitchensis, Castilleja miniata, Lupinus latifolius and Epilobium angustifolium. B. pinnatum was generally found beneath this herbaceous layer, shielded from direct sunlight. The individuals were all less than 6 inches high, and showed no signs of herbivory. For more detailed information, see Appendix E.

This unstable drainage has natural levels of disturbance which appear to be acceptable to the population. However, the cliff nearby is listed in a popular guide to rock climbs of the area, and future expansion of the ski area could also affect the population.

## PART V: Discussion of Areas Where Sensitive Plants Not Found

Possible reasons that sensitive species were not found in more areas are many-fold.

Much of the surveyed land appeared to be relatively pristine. Sensitive species are rare and unusual even in pristine areas, and many have very specific habitat requirements. Sensitive species may have been absent from the surveyed area because of lack of diseminules or because specific habitat requirements were not met.

Many sensitive species populations are small, and given the large acreage that was surveyed, some populations may have been missed.

Although surveyors followed the original plan for the timing of the survey, annual variation in flowering time may have caused certain populations to be identifiable earlier or later than the actual survey time.

Access was blocked by cliffs to parts of some of the parcels with high sensitive species potential. This was particularly true at the top of the Lowe Creek drainage, in parts of the Slide and Baring survey areas (Skykomish River Exchange), and in the Sultan River Canyon (Spada Lake Exchange).

Some of the parcels, particularly in the Spada Lake Exchange Area, and in the Beckler River and Station parcels (Skykomish River Exchange) were small and were surrounded by clear cuts. Drainages through those small parcels were often washed-out and unstable soils were exposed. These disturbances allow access to weedy species which may then displace sensitive native species.

Some of the surveyed area was in even-aged second growth forest where potential for sensitive species is lower than in old growth. Other areas had been heavily impacted by old logging roads and railroad grades.

There are a relatively small number of sensitive species likely to be found in low elevation forests of the west Cascades. Much of the contracted area was below 2600 feet.

Even though sensitive species were not found in all the areas, many of the surveyed areas had an interesting floristic diversity. The Sultan River Valley (Spada Lake Exchange) for example, is unique in that it is a relatively undisturbed low elevation valley with magnificent cliffs and areas of unusual rock formations where species more often found at higher elevations were sometimes present. Two species on the Washington Natural Heritage Program's monitor list were found in the Martin Creek drainage (Hemitomes congestum and Botrichium virginianum; Skykomish River Exchange). Lycopodium selago, which has sensitive status in Oregon, was present in throughout Skykomish Exchange

Area. Although this plant is not considered sensitive in Washington, the Washington populations may become more important if the Oregon populations become more threatened.

## PART VI: Recommendations and Suggestions

We recommend that road crews be notified of the presence of the Botrichium lanceolatum population near the Old Cascade Highway (Forest Service Road 6099), since roadwork poses a threat to at least those individual plants closest to and below the road.

We recommend that impacts to the populations of Botrichium lanceolatum and Botrichium pinnatum in the Steven's Pass/Skyline Lake area be considered if future recreational development or expansion of current facilities is planned for the area.

We recommend that any plans for reopening the road in the Lowe Creek parcel take into consideration the proximity of both Botrichium lanceolatum and a possible unknown species of Botrichium.

If botanical work is done on the district in the future, we suggest that the Bridal Veil Falls/Mt. Index area, the Martin Creek area, the Beckler Peak area, and the Steven's Pass area all have potential for sensitive or uncommon plant species.

If the Washington Department of Natural Resources acquires the Sultan River Canyon, we suggest that they are notified of the botanical uniqueness of the canyon. There are very few river canyons in the lowland west Cascades which are as undisturbed and are as unusual floristically as the canyon of the Sultan River.

Finally, we would like to reiterate that our survey does not negate the need for further botanical work on the district. On the contrary, the presence of three previously unknown sensitive plant populations reinforces the importance of rare plant surveys in areas which will be affected by ownership changes, timber management, road building or other Forest Service operations.



## APPENDIX B

The species lists for each parcel of the Spada Lake Exchange Area is presented below. Only scientific names are given. Where the word "spp." is used, generally the plant which was seen was not in flower, or could only be identified to genus.

LIST OF PLANT SPECIES  
Spada Exchange Area

TREES

	Williamson Creek #2	Williamson Creek #3	Williamson Creek #4	Gilbert Creek	Boat Ramp #2	South Fork #1	South Fork #2	Switchback	Spyhop #1	Spyhop #2	The Dam #1	The Dam #2	Olney Creek	Canyon #1	Canyon #2	Blue Mountain	Sultan River #1	Sultan River #2	The End #1	The End #2
<i>Abies amabilis</i>	x		x	x	x	x	x	x	x	x	x	x	x	x		x	x			
<i>A. lasiocarpa</i>																				
<i>A. procera</i>																				
<i>Acer circinatum</i>		x	x			x		x			x	x		x		x	x	x	x	
<i>A. glabrum</i>																				
<i>var. douglasii</i>																	x		x	x
<i>A. macrophyllum</i>	x				x	x									x		x	x	x	
<i>Alnus rubra</i>	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x
<i>Cornus stolonifera</i>	x													x	x				x	x
<i>Picea sitchensis</i>																	x	x	x	
<i>Populus trichocarpa</i>						x	x										x			
<i>Pseudotsuga menziesii</i>								x			x		x	x			x		x	
<i>Rhamnus purshiana</i>													x		x				x	
<i>Salix sitchensis</i>												x								
<i>Salix</i> spp.		x	x						x	x					x		x	x	x	x
<i>Taxus brevifolia</i>	x					x					x			x			x	x		x
<i>Thuja plicata</i>	x	x	x	x	x	x	x	x			x		x	x		x	x	x	x	x
<i>Tsuga heterophylla</i>	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

SHRUBS

<i>Aruncus sylvestris</i>	x	x	x	x				x	x	x	x	x	x	x	x	x	x		x	x
<i>Berberis nervosa</i>						x	x	x			x	x		x		x	x			
<i>Cladanthamnus pyroliflorus</i>		x						x								x	x	x		
<i>Cytisus scoparius</i>													x							
<i>Gaultheria ovatifolium</i>													x	x						
<i>G. shallon</i>	x	x				x	x	x			x	x	x	x		x	x	x	x	x
<i>Menziesia ferruginea</i>	x	x		x		x	x	x	x	x	x		x	x		x	x			
<i>Oemleria cerasiformis</i>																	x		x	

LIST OF PLANT SPECIES  
Spada Exchange Area

HRUBS (cont.)

[illegible]

'ERNS, CLUBMOSES

[illegible]

LIST OF PLANT SPECIES  
Spada Exchange Area (cont.)

FERNS, CLUBMOSES (cont.)

	Williamson Creek #2	Williamson Creek #3	Williamson Creek #4	Gilbert Creek	Root Ranch #2	South Fork #1	South Fork #2	Switzback	Springs #1	Springs #2	The Dam #1	The Dam #2	O'Leary Creek	Canyon #1	Canyon #2	Blue Mountain	Sultan River #1	Sultan River #2	The End #1	The End #2
<i>Blechnum spicant</i>	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Dryopteris austriaca</i>		x							x	x		x	x	x			x			
<i>Luzula setacea</i>		x			x					x	x					x	x	x		x
<i>Gymnocarpium dryopteris</i>	x	x		x	x	x			x		x		x	x		x	x			
<i>Polypodium clavatum</i>	x	x			x				x		x	x	x	x		x	x		x	
<i>P. selago</i>		x	x		x	x		x				x		x		x	x			
<i>Polypodium glycyrrhiza</i>			x			x								x	x	x	x		x	x
<i>Polystichum munitum</i>	x	x		x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x
<i>Pteridium aquilinum</i>		x								x						x				

SEDGES, RUSHES, GRASSES, ETC.

<i>Calamagrostis canadensis</i>													x							
<i>C. aurea</i>													x							
<i>C. canescens</i>										x		x	x							
<i>C. deweyana</i>		x		x	x					x	x	x	x	x	x	x	x	x	x	
<i>C. hendersonii</i>																	x			
<i>C. laeviculmis</i>										x			x			x	x	x	x	
<i>C. lenticularis</i>										x			x							
<i>C. mertensii</i>		x	x							x	x	x	x		x	x	x	x	x	x
<i>C. pachystachia</i>																				
<i>C. scopulorum</i>																				
<i>C. sitchensis</i>										x							x			
<i>C. spectabilis</i>																				
<i>C. stipata</i>		x								x						x		x	x	
<i>C. vesicaria</i>										x										
<i>Juncus articulatus</i>																x	x	x	x	
<i>J. encifolius</i>		x	x							x			x			x	x	x	x	
<i>J. tenuis</i>																x				
<i>Juncus effusus</i>		x	x			x				x			x			x	x	x	x	
<i>Luzula campestris</i>				x		x	x	x		x	x			x					x	

PLANT SPECIES LIST  
Spada Exchange Area (cont.)

SEDGES, RUSHES, GRASSES, ETC. (cont.)	Williamson Creek #2	Williamson Creek #3	Williamson Creek #4	Gilbert Creek	Boat Ramp #2	South Fork #1	South Fork #2	Switchback	Springs #1	Springs #2	The Dam #1	The Dam #2	Olinay Creek	Canyon #1	Canyon #2	Bare Mountain	Sutton River #1	Sutton River #2	The End #1	The End #2
<i>Luzula parviflora</i>		X							X				X			X	X	X	X	X
<i>Phalaris arundinacea</i>																				
<i>Scirpus microcarpus</i>		X	X							X			X			X	X	X		
<i>Sparganium emersum</i>										X										
<i>Typha latifolia</i>										X										
FORBS																				
<i>Achillea millefolium</i>										X										
<i>Actea rubra</i>	X	X	X		X					X	X		X	X		X	X		X	
<i>Adenocaulon bicolor</i>						X								X			X			
<i>Anaphalis margaritacea</i>			X	X				X	X	X	X		X		X	X	X	X	X	X
<i>Angelica genuflexa</i>			X														X	X		
<i>Aquilegia formosa</i>			X							X						X	X	X	X	X
<i>Arnica amplexicaulis</i>																X	X	X	X	X
<i>Artemisia</i> spp.																X				
<i>Asarum caudatum</i>				X	X	X	X	X		X	X		X				X			
<i>Aster chilensis</i>																X	X			
<i>A. modestus</i>																X	X	X	X	X
<i>A. occidentalis</i>			X																	
<i>Boykinia elata</i>	X	X	X	X						X	X	X	X	X	X	X	X	X	X	X
<i>Campanula rotundifolia</i>																X	X	X		X
<i>Cardamine oligosperma</i>																	X			
<i>Cassiope mertensiana</i>																				
<i>Chimophila menziesii</i>	X					X	X	X			X								X	
<i>Chrysanthemum leucanthemum</i>			X								X					X	X	X	X	
<i>Cicuta douglasii</i>																X	X			X
<i>Circaea alpina</i>	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	
<i>Cirsium</i> spp.			X							X					X	X		X	X	X
<i>Clintonia uniflora</i>						X	X	X	X			X		X		X				

[illegible]

PLANT SPECIES LIST  
Spada Exchange Area (cont.).

FORBS (cont.)

	Williamson Creek #2	Williamson Creek #3	Williamson Creek #4	Gilbert Creek	Boat Ramp #2	South Fork #1	South Fork #2	Smithback	Sp. hop #1	Sp. hop #2	The Dam #1	The Dam #2	Olney Creek	Canyon #1	Canyon #2	Bare Mountain	Sultan River #1	Sultan River #2	The End #1	The End #2
<i>Listera cordata</i>											X			X		X				
<i>Lonicera caerulea</i>														X						
<i>Luina hypoleuca</i>																				
<i>Lysichitum americanum</i>	X				X		X	X		X	X	X	X		X	X	X	X	X	
<i>Ladia</i> spp.																				
<i>Maianthemum dilatatum</i>	X	X			X		X	X	X	X	X	X	X	X	X	X	X			
<i>Mertensia paniculata</i>																				
var. <i>borealis</i>																				
<i>Mimulus alsinoides</i>				X										X						
<i>M. dentatus</i>			X												X					
<i>M. guttatus</i>				X				X		X							X	X	X	
<i>M. lewisii</i>				X																
<i>Monotropa uniflora</i>																	X			
<i>Montia parvifolia</i>	X		X	X						X							X	X	X	X
<i>M. sibirica</i>	X	X	X	X	X	X						X	X	X	X	X	X	X	X	X
<i>M. scorpioides</i> ( <i>Myosotis</i> )			X												X			X	X	
<i>Oenanthe sarmentosa</i>			X							X					X	X	X	X	X	X
<i>Orobancha uniflora</i>						X														
<i>Osmorhiza chilensis</i>			X		X						X		X	X	X	X				
<i>Penstemon serrulatus</i>		X		X							X		X	X	X	X				
<i>Petasites frigidus</i>																				
var. <i>palmatus</i>			X	X	X				X	X	X	X	X		X	X	X	X		
<i>Pinguicula vulgaris</i>																				
<i>Plantago lanceolata</i>																	X	X	X	
<i>P. major</i>			X														X	X		
<i>Platanthera saccata</i>														X						
<i>Prenanthes alata</i>																				
<i>Prunella vulgaris</i>			X							X			X		X	X	X	X		X
<i>Pterospora andromedea</i>													X		X	X	X	X		
<i>Puccinellia pauciflora</i>													X							

PLANT SPECIES LIST  
Spada Exchange Area (cont.)

ORBS (cont.)

	Williamson Creek #2	Williamson Creek #3	Williamson Creek #4	Gilbert Creek	Boag Ramp #2	South Fork #1	South Fork #2	Switchback	Springs #1	Springs #2	The Dam #1	The Dam #2	Oleary Creek	Canyon #1	Canyon #2	Blue Mountain	Sultan River #1	Sultan River #2	The End #1	The End #2
<i>Lyrola uniflora</i>											X			X						
<i>Anunculus repens</i>																X	X	X	X	X
<i>A. uncinatus</i>															X		X	X		
<i>Coriaria islandica</i>			X														X			
<i>Urtica acetosella</i>													X							
<i>U. crispa</i>			X						X						X	X	X	X	X	
<i> Saxifraga ferruginea</i>				X											X	X	X	X	X	
<i>S. mertensiana</i>			X												X	X	X	X		X
<i>Malacina racemosa</i>														X			X			
<i>M. stellata</i>						X	X	X	X		X	X	X	X	X	X				
<i> Solidago canadensis</i>		X								X			X					X		
<i> Lachys cooleyae</i>			X	X						X			X		X	X	X	X	X	
<i> Bellaria calycantha</i>				X						X					X	X	X	X	X	
<i>B. crispa</i>													X							
<i>B. longipes</i>													X		X	X	X	X		
<i> Creptopus amplexifolius</i>	X	X				X			X		X	X	X	X		X	X			
<i> Creptopus spp.</i>																X	X			
<i> Taraxacum officinales</i>																	X			
<i> Larella trifoliata</i>					X	X	X	X	X		X	X	X	X		X	X		X	
<i>L. unifoliata</i>	X	X							X	X			X	X	X	X	X		X	
<i> Olmlea menziesii</i>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
<i> Lautvetteria caroliniensis</i>																	X			
<i> Lillium ovatum</i>	X			X		X	X		X	X	X	X	X	X	X	X	X		X	
<i> L. dioica</i>				X					X											
<i> Lleriana dioica</i>									X											
<i>L. sitchensis</i>																	X	X		
<i>Lleriana spp.</i>																				
<i> Eratrum viride</i>			X											X	X				X	
<i> Erionica americana</i>			X												X	X				
<i>E. biloba</i>										X					X	X		X	X	
<i>E. spp.</i>		X		X		X	X	X	X				X		X		X		X	X



ADDITIONAL PLANT SPECIES  
Spada Exchange Area

	WILLIAMSON CR #2	WILLIAMSON CR #3	WILLIAMSON CR #4	GILBERT CREEK	BOAT RAMP #2	SOUTH FORK #1	SOUTH FORK #2	SWITCHBACK	SPYHOP #1	SPYHOP #2	THE DAM #1	THE DAM #2	OLNEY CREEK	CANYON #1	CANYON #2	BLUE MOUNTAIN	SULTAN R. #1	SULTAN R. #2	THE END #1	THE END #2
<i>Alnus sinuata</i>													X							
<i>Amelanchier alnifolia</i>		X											X							
<i>Carex aquatilis</i>			X																	
<i>Cryptogramma crispa</i>													X	X						
<i>Holodiscus discolor</i>													X							
<i>Lycopodium anotinum</i>											X	X	X			X	X			
<i>Montia perfoliata</i>									X		X		X							
<i>Nuphar polysepalum</i>										X			X							
<i>Pyrola secunda</i>						X														
<i>Rhododendron albicaulis</i>									X				X							
<i>Rubus laciniatus</i>													X							
<i>Rubus pubescens</i>					X					X			X							
<i>Trientalis latifolia</i>			X			X							X							
<i>Vaccinium membranaceum</i>													X							