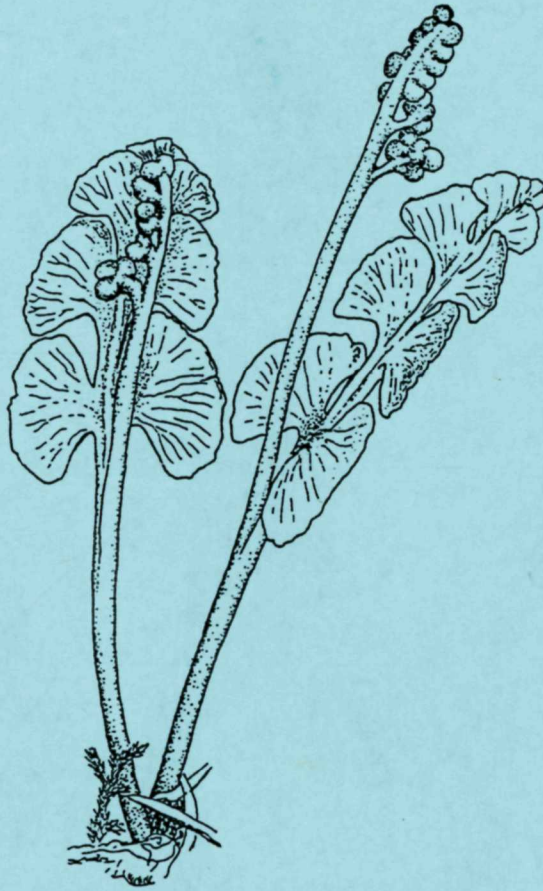


CCS BOTANICAL SURVEYS
1993

Galium kamschaticum, Woodwardia fimbriata, Buckhorn Wilderness



Botrychium lunaria (Wagner 92)

BOTANY CREW: Denise Roush and Margie Weissbach

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Dorothy Davis, USDA FS, Quinault

Beth Hathaway, USDA FS, Soleduck

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University of Washington

Washington State Department of Natural Resources Division of Land
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John Gamon

Frank Cook

Ed Schreiner, Olympic National Park

Summary of CCS Botanical Surveys 1993

Galium kamschaticum (boreal bedstraw) surveys were completed on areas of the Quinault and Hood Canal Ranger Districts where five known locations of boreal bedstraw exist. Four of these sites were revisited and complete sighting forms were completed. One location contained heavy blowdown and adjacent logging made it difficult to survey the site, consequently only a partial survey could be completed. Two ecology plots were taken and this habitat information will go into the ecology database. Available information from the State Natural Heritage database and from the district botanists was compiled and summarized in order to conduct an intuitive controlled survey for boreal bedstraw. Approximately, 180 acres of potential habitat were surveyed and 20 acres intensively surveyed. Additional subpopulations were found at each site however, no new populations could be located. Maps of this area have been marked for potential habitat and the GIS manuscripts for the existing sites were completed.

Buckhorn Wilderness surveys were completed over 28 miles of trail. Intuitive controlled surveys were completed over 1280 acres with the sighting locations being intensively surveyed. The Buckhorn Botanical Area was concentrated on as an area of study, due to the botanical diversity of this area. Seven sensitive species were found in the Wilderness, including the first documented report of Botrychium lunaria (moonwort) on the Olympic National Forest. Two ecology plots were completed and 18 sighting forms. All past sightings in this area were compiled from the Natural Heritage database and the forest files. These sightings were mapped on blue line quads and corresponding GIS manuscripts were completed. Associated species were studied, and herbarium specimens were collected.

Woodwardia fimbriata (chain-fern) surveys were completed over approximately 80 acres of the Hood Canal and Quilcene Ranger Districts. Three known locations just outside the forest boundary were visited and sighting forms completed. Habitat information was compiled from the Natural Heritage database and on the ground observations. Elevation may be a limiting factor in finding chain fern on the forest. The highest elevation the chain fern has been located at is about 700 feet. Some ideas on potential habitat were also gathered. Most plants were found to be at a Southerly aspect on road cutbanks. The chain fern was found in areas with seeps and with plants that indicate a wet habitat.

Sighting forms were completed at all 28 locations which were visited. Twenty of these sites were revisits, eight were new locations, and twelve old sightings were not revisited this season. A total of 40 sensitive plant sightings were mapped on quad maps and GIS manuscripts were compiled.

Challenge Cost-Share Botany Projects

1993 Accomplishments

Botany Crew: Denise Roush and Margie Weissbach

SPECIES OF FOCUS:

Galium kamschaticum boreal bedstraw

3 sighting forms

Astragalus microcystis least bladderly milk-vetch

2 sighting forms

Botrychium lanceolatum lanced-leaved grape fern

4 sighting forms

Botrychium pinnatum Northern grape fern

2 sighting forms

Carex obtusata blunt sedge

1 sighting form

Erigeron aliciae Alice's fleabane

No sighting

Pellaea breweri Brewer's cliff-brake

No sighting

Poa grayana Gray's bluegrass

No sighting

Saxifraga debilis pygmy saxifraga

No sighting

Synthyris pinnatifida var. lanuginosa Cut-leaf kittentails

4 sightings

Woodwardia fimbriata chain-fern

2 sightings

ADDITIONAL SPECIES FOUND:

Aster sibiricus

1 revisit, species is really Aster radulinus

Botrychium lunaria Moonwort

2 sighting forms

Botrychium simplex little grape fern

1 sighting form

1993 ACCOMPLISHMENTS

A total of 23 sensitive plant sighting forms were completed this season. Eight of these were new sightings, and twenty of these were revisits to existing sites where new subpopulations were frequently found. Twelve old sightings were locations that we were not able to get back to. All 40 of these sensitive plant sightings were mapped on the quad maps and GIS overlays.

Approximately 28 miles of trails and surroundings were surveyed and over 1500 acres of potential habitat were surveyed. Approximately 1280 acres of the Buckhorn Wilderness was surveyed with the intuitively controlled method. Plot areas and sighting areas were covered intensively. Approximately 180 acres of boreal bedstraw habitat were intuitively surveyed and about 80 acres of chain-fern habitat were intuitively surveyed.

All sensitive plant sighting form locations were mapped on blue line quad maps and GIS manuscripts were completed for every boreal bedstraw sighting, all chain-fern sightings, and all sensitive plant sightings in the Buckhorn Wilderness.

Ecology reconnaissance plots consisted of identifying every plant species in a one tenth acre plot area and determining cover for each of these species.

Four ecology plots were completed for the following species:

Botany Plot #1 for boreal bedstraw

Botany Plot #2 for boreal bedstraw

Botany Plot #3 for least bladdery milk-vetch and cut-leaf kittentails

Botany Plot #4 for Cut-leaf kittentails, Botrychium lanceolatum, and Botrychium lunaria.

Ecology plots were permanently located and this data will be entered into the ecology database to help build predictive models for sensitive species habitat.

Galium kamtschaticum
Boreal Bedstraw Survey '93

The objective of this project was to find new populations and subpopulations as well as to build the predictive capabilities of the ecology database, within the given time constraints. This entailed relocating sensitive plant populations and documenting in greater detail the habitat in which it has been found.

To date there are five boreal bedstraw sightings on the forest and no new locations were identified during this survey. Three locations were revisited and Galium kamtschaticum (boreal bedstraw) was confirmed at all three sites. At two of these locations, botanists in previous years attempted unsuccessfully to relocate the populations. Perhaps this indicates that the population size fluctuates dramatically from year to year. Two ecology plots were completed, all species were identified and cover percentages measured on a permanent one tenth acre plot. This data will be entered into the ecology database and used to help predict the type of habitat in which you would expect to find boreal bedstraw. When a sufficient number of boreal bedstraw plots have been accumulated the ecology data base will be better able to more accurately predict boreal bedstraw habitat requirements.

Information from the Washington State Natural Heritage database was compiled on the species so that the general habitat could be used as a field survey guide. Similiar habitat areas were surveyed for additional populations. The following information is a base at which to begin an intensive boreal bedstraw search:

Plant Association-

Generally, Silver Fir/ Alaska Huckleberry - Foamflower
Elevation Range- 1900'-3000'

Usually in moist cold coniferous forests, found in small openings in Silver Fir stands and wet seepy areas, sometimes in blowdown and small disturbance areas such as elk wallows.

Similar habitat was surveyed using an intuitive controlled method. Areas that have been surveyed in the past were mapped for reference during future surveys.

Identification of juvenile plants is extremely unreliable as the boreal can be difficult to distinguish from Galium oregonum (oregon bedstraw). It can be difficult to differentiate the adult plant species due to the variety within each species. We compared many plants to herbarium specimens and confirmed with the District Botanist or other plant specialists that were involved in the original sighting.

The compiling of past information and study of boreal bedstraw sites in great detail have led this this project to the following conclusions:

Boreal bedstraw seems to thrive and reproduce in an area once it is initially established there. Blowdown and other local disturbances such as elk wallows do not seem to inhibit but actually encourage boreal bedstraw populations. Possibly, the boreal bedstraw may need the soil surface to be slightly disrupted or perhaps once the duff layer is removed the plant can be more easily established.

There seems to be an unknown requirement or environmental element that boreal bedstraw needs in order to survive. Areas in which you would expect to see similar species were not found to have boreal bedstraw.

Juvenile plants are very difficult to identify and may lead you to believe that the boreal bedstraw is really more abundant than it is.

Further surveys of areas suspected to have boreal bedstraw need to be completed. Continue to monitor and measure confirmed populations to gain a better understanding of the species.

On the Olympic National Forest, boreal bedstraw has been found on slopes greater than 30% and generally a North to Northwest exposure. These areas have been located at midslope, with some saturated soils and mosses. Possibilities are areas of snow accumulation or snow chutes that stay moist throughout the year.

Identification tips for boreal bedstraw:

Galium kamtschaticum (boreal bedstraw)

- Two to four whorls of leaves on a plant (sometimes 5)
- The leaf base is evidently narrow, more or less wedge shaped
- The leaf margin is concavely rounded
- Inflorescence is few flowered, flowers generally 2-3 on each of the 1-3 terminal peduncles

Galium oreganum (oregon bedstraw)

- Five to eight whorls of leaves on the plant
- The leaf base is quite broad as it attaches to the stem
- The leaf margin is convexly rounded
- Several flowered with each primary peduncle branching

Buckhorn Wilderness Sensitive Plant Surveys

The Buckhorn Wilderness botanical surveys focused on the established botanical area, and regions within the botanical area which have not been very extensively documented in the past. These areas included Marmot Pass, Buckhorn Pass, Buckhorn Mountain, Tubal Cain Mine Trail, and the Silver Lake area, all of which are in the alpine and subalpine zone with some areas being difficult to access. Our initial list of species of focus gave us some guidelines on habitat and plant species to positively identify. Information on all past sightings in the Buckhorn Wilderness was retrieved from the Natural Heritage database and their original files, as well as the forest files. Initially, our surveys began with the reference of several old sightings in order to check on plant populations over time. We were able to accurately document the old sensitive plant sightings and sensitive species could be properly identified. In the past, sensitive plant sighting forms contained little information other than the general area and associated species (ie. Buckhorn Mtn, there was brewer's cliff-brake found on rock crevices). Most old sighting forms were extremely difficult to follow up on as they contained no map or detailed site information. We were able to complete 23 sighting forms for sensitive species which includes brand new population sightings.

As part of this project we have compiled and mapped all past sighting information in the Buckhorn Wilderness. This pulls together all information that has been filed with the State Natural Heritage Program and past botanical expeditions of Forest Service personnel and Native Plant Society members. Many of the areas within the Buckhorns are noted for being very botanically rich, and further studies will need to be completed in these areas in order to further represent the botanical diversity of these areas.

The following species were searched for in the Buckhorn Wilderness:

Astragalus microcystis- Found at old and new sites, talus and scree slopes, primarily Western exposure, some populations in danger of trampling by human, deer, and mountain goat activity.

Botrychium lanceolatum, and pinnatum; species simplex and lunaria were also found. This group of ferns is still in question taxonomically. According to E.P. St. John (1949. The Evolution of the Ophioglossaceae of the Eastern United States. Quart. J. Florida Academy of Science 12: 207-219.) "The genus is peculiar in that it has a worldwide distribution but a small number of species." We found the genus at old and new locations, many species sometimes found at the same location, often in scree areas with little competition, usually growing in small clumps. Many of the plants we found were very small (1-5 cm) and were difficult to identify as they showed a high degree of intraspecific variation. These species generally need to be keyed with a more detailed key than Hitchcock provides. Wagner's key to the Botrychiums was used with Nelsa Buckingham's assistance in order to learn the proper identification techniques. Perhaps, the smaller size

of the Botrychiums we found is due to the alpine and subalpine environments they were found in. The proper way to collect Botrychiums was also written by Wagner; this entails simply cutting the plant cleanly at ground level after the spores have been released, and using caution not to disrupt the primordial leaf just below ground level. Our specimens were collected in this manner in late August 1993. Most of the plants we located were found in a somewhat disturbed area, whether it be from hikers, wildlife, or erosion in loose rocky sites.

Carex obtusata- found at past sighting locations, difficult to identify, a very small plant about 10 cm tall, dry and exposed sites usually in rocky outcrop areas.

Erigeron aliceae- We located the only past sighting in the Buckhorns which was Nelsa Buckingham's, she verified that this sighting was incorrectly added to the data base and Erigeron aliceae was not found to be at the headwaters of Copper Creek. We found no other plants that keyed out to the species aliceae.

Pellaea breweri- was not relocated on Buckhorn mountain in a rock crevice, location description vague.

Poa grayana- one old sight was visited but not reverified as we did not find this Poa, identification difficult and for this reason we feel that many of the Poa and Carex are not frequently found.

Saxifraga debilis- Though many Saxifraga were found and identified this rather distinctive plant was not found.

Synthyris pinnatifida var. lanuginosa- Found abundantly in revisited locations, probably under reported as once you reach a scree area and identify this plant it is found throughout a large area. It is found in areas where it has little competition.

Nelsa Buckingham looked over the plant specimen of Aster sibiricus var. meritus and verified that it was Aster radulinus, a more common species and that species sibiricus does not exist. This change needs to be made in the State Natural Heritage database.

Ecology plots

In order to compile more accurate and complete habitat data we chose to collect data taking permanent ecology data plots. Training was provided by Dave Peter so that ecology plot data could be accurately collected. Ecology plots were only completed after a positive identification of a sensitive plant species was made. Permanently referenced plots were located in areas that contained typical habitat for the sensitive plant species. The ecology plot data includes a detailed map, geologic information, plant sighting information, and intensive botanical information. Every species in a one tenth acre plot area is identified to species if possible. Each plant species is given a percentage cover on the plot area so that associated species

can be easily identified. Since many of the sensitive plant species are so small it is necessary to look around literally on your hands and knees to find every plant, this proves to be worthwhile as we usually came across more sensitive plants when we continued to comb the area. Particularly in the alpine areas one needs to be very "light footed" as you continually walk over your one tenth acre plot area or soon it will look as if it has been completely trampled. Many of the sensitive plant sightings are found on extremely loose and erosive soils and rocky ledges which leaves the plants vulnerable to damage.

Essential equipment needed for ecology plot surveys:

100' tape, compass, altimeter, clinometer, field notebook (write in the rain), tatum (plot cards), DBH tape, yellow paint, cedar plot stakes, cruising vest, sensitive plant sighting forms, "Flora of the Pacific Northwest", and of course rain gear.

PLANT ASSOCIATIONS

The key to forested plant associations is a good base to start from when trying to find the common habitat for a sensitive plant species. Many of the sensitive plant species are located in alpine and subalpine environments which can not be accurately defined by a forested plant association. Many of the subalpine species key into the Subalpine Fir/Common Juniper association. Valuable information can be obtained by continuing work on the non-forest plant associations. Ecology plot data provides plant association information in a very detailed form.

Future Botanical Surveys

Additional botanical surveys need to cover areas of potential habitat which are mapped in this appendix. Most sensitive plant sightings to date have been found in potential project areas or botanically unique areas where native plant enthusiasts come across them. While completing this survey better protocol methods for botanical evaluations were considered. Ideas for better data collection on sensitive plant sightings include:

- 1) Education, get more eyes out looking for these species, especially when people are in potential habitat areas.
- 2) Compile more complete sensitive plant sighting forms and keep this information up to date with spot monitoring over time.
- 3) Monitor and complete sighting forms on the endemic species of the Olympic Peninsula, these species could be indicators of a particular habitat type.

4) Continue to build the ecology plot database. In order to build any type of predictive models there must be some solid statistically backed data to lead botanists in the right direction.

Many areas of the Buckhorn botanical area have not been sufficiently surveyed or documented thoroughly, and there is a need for future studies. The Buckhorn Mountain area has many unique botanical features. The alpine ridges of Buckhorn Mountain were probably botanical refuges during the last glaciation and therefore harbor endemic species as well as species of unusual and disjunct distribution. The difficulty here is that much of the habitat is not readily accessible, due to talus rock slopes, the fragile environment and rock ledges. The impact of hikers, deer, and goat is another issue that needs to be considered. Additional information at the trailhead on the fragile alpine environment may be helpful in order to discourage backpackers from camping in sensitive meadows.

Plant associates from ecology plot data:
species listed in order of greatest percent cover

Ecology plot #3

Associates of Synthyris pinnatifida var. lanuginosa and Astragalus microcystis

Potentilla fruticosa
Arctostaphylos uva-ursi
Achillea millefolium
Juniperus communis
Arenaria obtusiloba
Polemonium pulcherrimum
Eriogonum ovalifolium
Erigeron compositus
Lupinus lepidus

Ecology plot #4

Associates of Synthyris pinnatifida var. lanuginosa, Botrychium lunaria, Botrychium lanceolatum.

Juniperus communis
Lupinus lepidus
Abies lasiocarpa
Potentilla fruticosa
Erigeron peregrinus
Arenaria obtusiloba
Arenaria rubella
unknown white lichen

Woodwardia fimbriata

CHAIN-FERN SURVEYS

The chain-fern is a large, evergreen, rhizomatous fern found from southern British Columbia to southern California, usually in coastal areas. Though it has not to date been found on the Olympic forest, there have been 5 recent sightings on the Peninsula, recorded with the natural heritage program. In this project we compiled the existing data on this species in order to determine the probability of its occurrence on the forest. We visited three sites (including one population of over 500 plants) to gather data on habitat and associated species, and then conducted controlled intuitive surveys in three areas of the forest that appeared to be possible habitat.

Most chain-fern sightings are at elevations under 100 feet and within a few miles of salt water. This excludes most of the Olympic National forest, but the forest is unusual in that it does include about 30 acres of forested coast line along the west side of the Hood canal. In addition, the forest includes several drainages within eight miles of the canal which may still be subjected to maritime weather influences such as fog and moderated temperatures.

All three of the populations we visited occurred on steep (>40% slope), exposed road banks and rock outcrops with a southerly aspect and a high water table near seep areas with surface water year-round. The most common associated species all indicate a moist environment. For example, the black cottonwood, big-leaf maple, maidenhair fern, and sword fern were found at all three sites. Other associated species indicating a wet environment include the horsetail, coltsfoot, *Juncus* sp., willows, thistles and wild carrot. The species appears to be intolerant of competition, as it was only seen in areas with exposed soil and rock. In most cases it had no shade whatsoever and an exposure of 170 to 190 degrees.

The three surveys in areas of potential chain-fern habitat turned up no new populations. The coastal bluff along the Seal Rock campground had some of the associated species and exposed soil, but intensive searching found no chain-fern. The aspect along much of the coastline is easterly, and this may explain the species absence. The Falls Canyon area and the Duckabush drainage both had extensive rock outcrops with southerly exposures, but intensive surveys also failed to turn up any new chain-ferns. North of Lake Cushman on Mt. Rose and areas of the Hamma-Hamma drainage still need to be surveyed.

SUMMARY OF NEW POPULATIONS AND SUBPOPULATIONS FOUND

SPECIES	New populations	New subpopulations
<u>Galium kamschaticum</u>	0	3
<u>Astragalus microcystis</u>	0	2
<u>Botrychium lanceolatum</u>	2	1
<u>Botrychium pinnatum</u>	1	1
<u>Botrychium simplex</u>	1	0
<u>Botrychium lunaria</u>	2	0
<u>Synthyris pinnatifida</u> <u>var. lanuginosa</u>	3	4

9 TOTAL

11 TOTAL

GRAND TOTAL OF 20 - NEW SENSITIVE PLANT SIGHTINGS ON THE FOREST

Index for blue line quad maps and GIS manuscripts

red dots are new sightings black dots are old sites not seen in '93
green dots are old sites revisited in '93
blue dots were revisited but population not relocated in '93

1	<i>Galium kamtschaticum</i>	EO#7	Botany plot #1
2	<i>Galium kamtschaticum</i>	EO#28	Botany plot #2
3	<i>Galium kamtschaticum</i>	EO#1	
4	<i>Astragalus microcystis</i>	EO#10	
5	<i>Astragalus microcystis</i>	EO#2	Botany plot #3
6	<i>Synthyris pinnatifida</i> var. <i>lanuginosa</i>	EO#9	
7	<i>Erigeron aliciae</i>	EO#	Neg. revisit
8	<i>Botrychium pinnatum</i>	EO#5	
9	<i>Botrychium lanceolatum</i>	EO#12	Botany plot #4
10	<i>Botrychium lunaria</i>		
11	<i>Botrychium lunaria</i>		
12	<i>Botrychium lanceolatum</i>		
13	<i>Carex obtusata</i>	EO#4	
14	<i>Synthyris pinnatifida</i> var. <i>lanuginosa</i>	EO#10	
15	<i>Synthyris pinnatifida</i> var. <i>lanuginosa</i>		
16	<i>Synthyris pinnatifida</i> var. <i>lanuginosa</i>		Botany plot #4
17	<i>Botrychium lanceolatum</i>		
18	<i>Botrychium pinnatum</i>		
19	<i>Aster sibiricus</i>	EO#1	Neg. revisit
20	<i>Botrychium pinnatum</i>	EO#9	Change species
21	<i>Botrychium simplex</i>		
22	<i>Woodwardia fimbriata</i>	EO#	
23	<i>Woodwardia fimbriata</i>	EO#	
25	<i>Botrychium lanceolatum</i>	EO#34	
26	<i>Carex obtusata</i>	EO#7	
27	<i>Synthyris pinnatifida</i> var. <i>lanuginosa</i>	EO#16	
28	<i>Synthyris pinnatifida</i> var. <i>lanuginosa</i>	EO#13	
29	<i>Synthyris pinnatifida</i> var. <i>lanuginosa</i>	EO#14	
30	<i>Carex obtusata</i>	EO#1	
31	<i>Poa grayana</i>	EO#5	
32	<i>Pellaea breweri</i>	EO#9	
33	<i>Poa grayana</i>	EO#1	
34	<i>Saxifraga debilis</i>	EO#1	
35	<i>Carex obtusata</i>	EO#6	
36	<i>Galium kamtschaticum</i>	EO#3	
37	<i>Galium kamtschaticum</i>	EO#2	
38	<i>Synthyris pinnatifida</i> var. <i>lanuginosa</i>	EO#5	
39	<i>Synthyris pinnatifida</i> var. <i>lanuginosa</i>	EO#11	
40	<i>Carex obtusata</i>	EO#5	

41 *Synthyris pinnatifida* E0#15
var. *lanuginosa*
42 *Woodwardia fimbriata*

Wood.data	
Genus	
1	<i>Acer glabrum</i>
2	<i>Achillea millefolium</i>
3	<i>Adiantum pedatum</i>
4	<i>Alnus rubra</i>
5	<i>Anaphalis margaritacea</i>
6	<i>Arbutus menziesii</i>
7	<i>Asplenium trichomanes</i>
8	<i>Athyrium filix-femina</i>
9	<i>Cardamine</i> sp.
10	<i>Cirsium</i> sp.
11	<i>Corylus cornuta</i>
12	<i>Daucus carota</i>
13	<i>Digitalis purpurea</i>
14	<i>Equisetum</i> sp.
15	<i>Fragaria virginiana</i>
16	<i>Galium</i> sp.
17	<i>Holodiscus discolor</i>
18	<i>Juncas</i> sp.
19	<i>Petasites frigidus</i>
20	<i>Philadelphus lewisii</i>
21	<i>Polypodium glycyrrhiza</i>
22	<i>Polystichum munitum</i>
23	<i>Populus trichocarpa</i>
24	<i>Pseudotsuga menziesii</i>
25	<i>Ranunculus muricatus</i>
26	<i>Rhamnus purshiana</i>
27	<i>Rhododendron macrophyllum</i>
28	<i>Rhus trilobata</i>
29	<i>Rosa gymnocarpa</i>
30	<i>Rubus discolor</i>
31	<i>Rubus lucodermis</i>
32	<i>Rubus parviflorus</i>
33	<i>Rubus pedatus</i>
34	<i>Salix</i> sp.
35	<i>Senecio</i> sp.
36	<i>Thuja plicata</i>
37	<i>Trientalis</i> sp.
38	<i>Tsuga heterophylla</i>
39	<i>Vaccinium ovatum</i>
40	<i>Vaccinium ovatum</i>
41	<i>Woodwardia fimbriata</i>

partial species list of chain-fern
plant associates

Galium.data	

Genus	

1	Abies amabilis
2	Alnus rubra
3	Anthyrium filix-femina
4	Blechnum spicant
5	Boykinia elata
6	Clintonia uniflora
7	Digitalis purpurea
8	Disporum smithii
9	Epilobium angustifolium
10	Equisetum arvense
11	Galium kamschaticum
12	Galium triflorum
13	Glyceria elata
14	Gymnocarpian dryopteris
15	Linnaea borealis
16	Luzula parviflora
17	Mimulus guttatus
18	Mitella ovalis
19	Osmorhiza chilensis
20	Poa leptocoma
21	Polystichum munitum
22	Ribes bracteosum
23	Rubus pedatus
24	Rubus spectabilis
25	Rumex acetosella
26	Sambucus racimosa
27	Scirpus microcarpus
28	Senecio triangularis
29	Stachys cooleyae
30	Tiarella uniflojata
31	Tiarells trifoliata
32	Tsuga heterophylla
33	Vaccinium alaskensis
34	Vaccinium ovatum
35	Vaccinium parviflorum
36	Valeriana sitchensis
37	Veronica chamaedrys
38	Viola glabella

Partial species list for boreal bedstraw
plant associates

Genus

- 1 *Abies lasiocarpa*
- 2 *Achillea millefolium*
- 3 *Allium cernuum*
- 4 *Anemone drummondii*
- 5 *Antennaria alpina*
- 6 *Arenaria obtusiloba*
- 7 *Arenaria rubella*
- 8 *Bromus cernatus*
- 9 *Campanula piperi*
- 10 *Campanula rotundifolia*
- 11 *Carex obtusata*
- 12 *Epilobium alpinum*
- 13 *Erigeron compositus*
- 14 *Erigeron peregrinus*
- 15 *Festuca ovinata*
- 16 *Gentiana amarella*
- 17 *Geum triflorum*
- 18 *Holcus lanatus*
- 19 *Juniperus communis*
- 20 *Lupinus lepidus*
- 21 *Oxytropis campestris*
- 22 *Phacelia sericea*
- 23 *Phlox diffusa*
- 24 *Phyllodoce empetrifolia*
- 25 *Poa scabrella*
- 26 *Potentilla diversifolia*
- 27 *Potentilla fructicosa*
- 28 *Saxifraga bronchialis*
- 29 *Saxifraga caespitosa*
- 30 *Sedum lanceolatum*
- 31 *Trisetum spicatum*

Partial species list for Wet Weather RNA

Genus	
1	<i>Abies lasiocarpa</i>
2	<i>Achillea millefolium</i>
3	<i>Agoseris aurantiaca</i>
4	<i>Antennaria alpina</i>
5	<i>Arctostaphylos uva-ursi</i>
6	<i>Arenaria aculeata</i>
7	<i>Arenaria capillaris</i>
8	<i>Arenaria obtusiloba</i>
9	<i>Astragalus microcystis</i>
10	<i>Campanula piperi</i>
11	<i>Campanula rotentifolia</i>
12	<i>Campanula scouleri</i>
13	<i>Erigeron compositus</i>
14	<i>Erigeron peregrinus</i>
15	<i>Eriogonum ovalifolium</i>
16	<i>Juniperus communis</i>
17	<i>Luetkea pectinata</i>
18	<i>Lupinus latifolia</i>
19	<i>Lupinus lepidus</i>
20	<i>Orthocarpus imbricatus</i>
21	<i>Oxytropus campestris</i>
22	<i>Pedicularis racemosa</i>
23	<i>Polemonium pulcherrimum</i>
24	<i>Potentilla fruticosa</i>
25	<i>Saxifraga bronchialis</i>
26	<i>Saxifraga caesptiosa</i>
27	<i>Synthyris pinnatifida</i> var. <i>lanuginosa</i>
28	<i>Trisetum spicatum</i>

Partial species list for plants in the
Marmot Pass to Buckhorn Pass Area

- 1 *Abies lasiocarpa*
- 2 *Achillea millefolium*
- 3 *Agoseris aurantiaca*
- 4 *Antennaria alpina*
- 5 *Arctostaphylos uva-ursi*
- 6 *Arenaria aculeata*
- 7 *Arenaria capillaris*
- 8 *Arenaria obtusiloba*
- 9 *Astragalus microcystis*
- 10 *Campanula piperi*
- 11 *Campanula rotentifolia*
- 12 *Campanula scouleri*
- 13 *Erigeron compositus*
- 14 *Erigeron peregrinus*
- 15 *Eriogonum ovalifolium*
- 16 *Juniperus communis*
- 17 *Luetkea pectinata*
- 18 *Lupinus latifolia*
- 19 *Lupinus lepidus*
- 20 *Orthocarpus imbricatus*
- 21 *Oxytropus campestris*
- 22 *Pedicularis racemosa*
- 23 *Polemonium pulcherrimum*
- 24 *Potentilla fruticosa*
- 25 *Saxifraga bronchialis*
- 26 *Saxifraga caesptiosa*
- 27 *Synthyris pinnatifida* var. *lanuginosa*
- 28 *Trisetum spicatum*

