INTERIOR COLUMBIA BASIN ECOSYSTEM MANAGEMENT PROJECT ANALYSIS OF VASCULAR PLANTS

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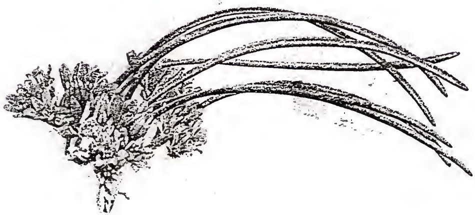

Preface

The following report was prepared by University scientists through cooperative agreement, project science staff, or contractors as part of the ongoing efforts of the Interior Columbia Basin Ecosystem Management Project, co-managed by the U.S. Forest Service and the Bureau of Land Management. It was prepared for the express purpose of compiling information, reviewing available literature, researching topics related to ecosystems within the Interior Columbia Basin, or exploring relationships among biophysical and economic/social resources.

This report has been reviewed by agency scientists as part of the ongoing ecosystem project. The report may be cited within the primary products produced by the project or it may have served its purposes by furthering our understanding of complex resource issues within the Basin. This report may become the basis for scientific journal articles or technical reports by the USDA Forest Service or USDI Bureau of Land Management. The attached report has not been through all the steps appropriate to final publishing as either a scientific journal article or a technical report.

INTERIOR COLUMBIA BASIN ECOSYSTEM MANAGEMENT PROJECT
ANALYSIS OF VASCULAR PLANTS

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The cover art of *Allium aaseae* was done by Kathy Golden. Reviewers of this document who deserve special thanks are Andy Kratz and Bob Moseley.

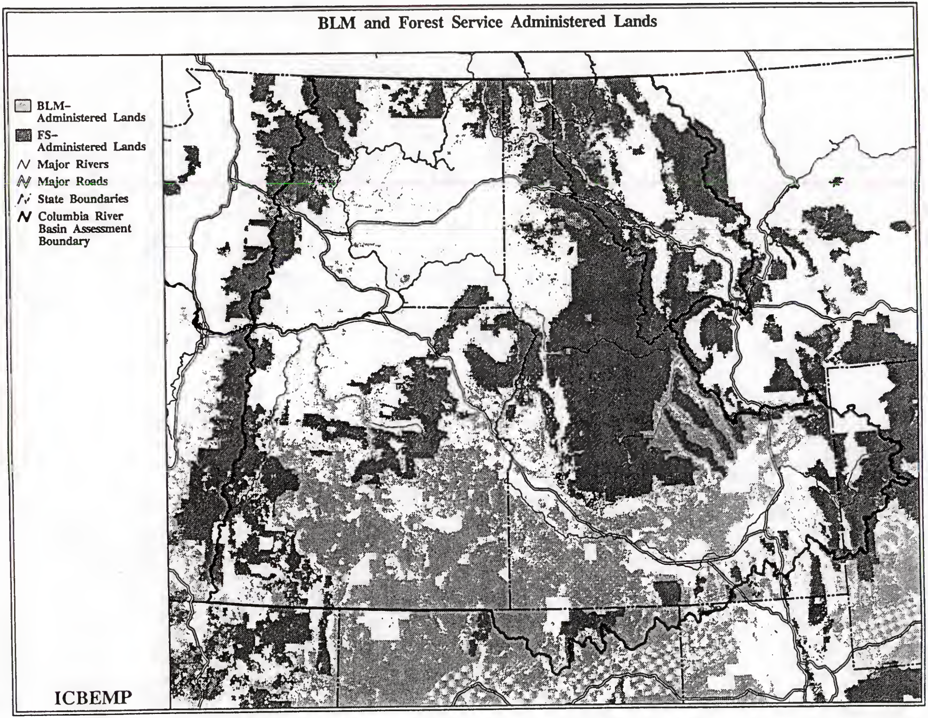
Steve Shelly and Wayne Owen put in countless hours on this project. Without their professional expertise, humor and companionship this document would have never been completed. A special thanks to my family, Maggie and David, for their patience and support.

It is the hope of the authors that this document be a starting point for the recognition of the incredible diversity, richness and complexity of the flora, both vascular and non-vascular, of the interior Columbia Basin and that this resource be better understood and protected.

INTRODUCTION

Vascular plants are the most ubiquitous and taxonomically diverse macroorganisms in the Interior Columbia Basin Ecosystem Management Project (ICBEMP) assessment area (Figure 1). These organisms function as primary producers, capturing sunlight and carbon, and producing oxygen, via the process of photosynthesis. As such, they are the most critical components in the maintenance of dynamic, functional ecosystems. Vascular plants provide foods for animals and fungi, stabilize watershed functions, provide habitat and cover for numerous organisms, influence climatic patterns on local and regional scales, contribute to soil development and stabilization, have specialized relationships with pollinators and seed dispersers, and provide a variety of other critical ecological functions such as nitrogen fixation. In addition to these essential ecological functions, vascular plants and plant communities (assemblages of species) provide the foundation for the economic and social fabric of the ICBEMP analysis area. Commercial resources critical to the region's economy are provided by vascular plants, including timber, forage, and other special plant products; these resources are harvested on both large and small scales. In addition, vascular plants are a very important part of the cultural history of native peoples in the Pacific Northwest. Thus, evaluation of the status of vascular plants is the most critical aspect of ecosystem analysis and management.

Owing to large-scale vegetation shifts related to climatic changes, the presence of a high diversity of geological substrates, and barriers to gene flow caused by mountainous topography and other geographical barriers, western North America has been an area of very active evolution for vascular plants. The flora of the ICBEMP assessment area reflects this history of divergence. The native flora of the Columbia River basin includes a spectacular diversity of plant taxa that range from geographically restricted endemics, some known only from one or a few occurrences, to those that are common and widespread across the ICBEMP assessment area. Vascular plant life forms range from the largest terrestrial organisms in the ICBEMP assessment area (trees up to 100 meters in height) to the smallest flowering plants known (aquatic plants in the genus *Wolffia*, the individuals of which are 1 mm or less in size). Especially noteworthy is the high number of endemic vascular plants whose ranges lie wholly or partially in the ICBEMP assessment area. There are 76 such plant taxa that are local endemics; these taxa are restricted to very small geographic areas (e.g., one portion of a mountain range, one canyon, etc.). Local endemics are often also restricted to highly specialized habitats, e.g., chemically unique rock outcrops such as serpentine. In addition, there are 70 plant taxa that are regional endemics; these have larger geographic ranges than local endemics, but are still confined to a relatively small region (e.g., southeast Washington, northern Idaho, and northwest Montana for a palouse grassland endemic). Regional endemics may also be closely associated with certain habitats, and their ranges may again lie either entirely within, or on, the ICBEMP assessment area boundary. An example of a local endemic is *Castilleja christii*, a species that occurs only on one single mountain summit in the Albion Range in south-central Idaho. *Penstemon lemhiensis,* an example of a regional endemic, occurs in four counties in southwest Montana and one county in adjacent east-central Idaho.



... Columbia Basin Ecosystem Management Project assessment area.

The evolutionary history and resultant floristic diversity of the analysis area is a reflection of the complexity of biophysical environments in the Columbia River basin. The influence of many of these environments has been manifested through natural selection in edaphically or physically unique habitats, e.g., chemically stringent substrates weathered from ultramafic (serpentine) or calcareous (limestone) bedrock, coarse-textured soils, and climatically harsh alpine environments. The presence of extreme environmental gradients with respect to temperature and moisture has also contributed to evolutionary diversification in the flora of the ICBEMP assessment area. The assessment area is unique in North America in containing habitats that range from extremely arid deserts to temperate rain forests, across elevations from sea level to over 14,000 feet. Owing to this floristic and environmental diversity, the Columbia River basin also contains a very large number of seral and climax plant community types.

The objectives of the ICBEMP vascular plant analysis were designed to contribute towards several broad goals outlined for the development of the Lower and Upper Columbia River Basin Environmental Impact Statements, including:

- an evaluation of the species and habitats currently of conservation concern.
- promote assurance of the viability of species through time.
- provision of information needed for the support of dynamic ecosystems.
- identification of the role of disturbance mechanisms in the maintenance of viability of species and rare habitats of conservation concern.

Specifically, ten analysis objectives of the Vascular Plant Task Group were used to contribute to these goals:

- summarization of biological, ecological and status information for plant taxa of rangewide conservation concern; these include federally listed or proposed taxa (threatened, endangered), federal candidate taxa (Category 1 and 2), and those taxa that are currently being recommended for such listing or candidate status.
- delineation of groups of species that are locally rare in the ICBEMP assessment area, by broad habitat categories.
- inventory and status assessment for rare plant communities.
- delineation of geographic areas that are important centers for endemism and high floristic diversity in vascular plants.
- determination of species of cultural importance to native American peoples in the interior Columbia River basin.

- delineation of research, development and application needs for further analyses of vascular plants.

- development of a preliminary checklist of the vascular flora of the interior Columbia River basin.

- inventory of conservation measures available for vascular plant species, including species conservation strategies, agreements and status reports (see Appendix 2), and *ex situ* conservation approaches.

- assessment of effects of EIS alternatives on vascular plant taxa of concern.

- development of objectives, standards and guides for: vascular plant taxa of federal and conservation concern, nonvascular plants and for habitats containing numerous state rare species within the ICBEMP.

With the exception of recommended mitigation measures (suggested standards and guides) found in the Conclusions section of this document, the assessment of nonvascular plants and fungi have not been included in this report with the exception of *Texosporium sancti-jacobi*, which is designated as sensitive by the BLM and Forest Service. The contract reports specific to bryophytes (Christy and Harpel 1995), fungi (Castellano 1994, Fogel 1994, Miller and Miller 1994, and Weber 1994), and lichens (Eversman 1994, Hammer 1995, Kaltenecker and Wicklow-Howard 1994, McCune 1994, Rosentreter 1995, Ryan 1994, Wicklow-Howard 1994, and Wicklow-Howard and Kaltenecker 1994) summarize the status of these species groups. Potentially rare taxa are discussed in each.

Given the broad goals of the ICBEMP scientific assessment, the Vascular Plant Task Group analysis represents a pioneering effort to integrate management and conservation of vascular plants into a basin-wide, biologically comprehensive approach to ecosystem management. This analysis uniquely spans government jurisdictional boundaries, and involved numerous federal, state, and local agencies and private organizations having an interest in plant conservation.

METHODS AND RESULTS

VASCULAR PLANT ANALYSIS AREAS

In order to adequately assess the status of plant species and plant communities of conservation concern, the ICBEMP assessment area was divided into thirteen "vascular plant analysis areas." This was necessary due to the large number of species and habitats needing evaluation, and to the large size of the ICBEMP assessment area. The vascular plant analysis areas, while not conforming to ecological or physiographic province boundaries in every case, were used in order to most efficiently examine the status of the vascular flora and plant communities via expert panels (described below). The 13 vascular plant analysis areas were Blue Mountains of Washington and Oregon, Columbia River Basin, East Cascades North, East Cascades South, High Lava Plains, Idaho North, Idaho South, Northern Nevada, Northern Utah, Okanogan Highlands, Oregon Basin and Range/Owyhee Uplands, Western Montana, and Western Wyoming.
Each analysis area had a coordinator who collected information for that area and assisted in the organization of panels, wrote the species narratives and introductions for their area. Coordinators were as follows: Kathy Ahlenslager, Okanogan Highlands, Columbia Basin, East Cascades North; Duane Atwood, Utah; Jerry Hustafa, Blue Mountains; Cathy Jean (with help from Amy Miller), Basin and Range, East Cascades South, High Lava Plains, Owyhee Uplands; Wayne Owen, Idaho North and South, Wyoming, Nevada; Steve Shelly, Montana.

Table 1 provides a crosswalk between the analysis areas and several other large-scale landscape deliniations.

TABLE 1. Area Crosswalk for Vascular Plant Analysis

STATE	VASCULAR PLANT ANALYSIS AREA	PHYSIOGRAPHIC PROVENCE*	BAILEY SECTIONS*
Idaho	Idaho South	Basin & Range Owyhee Uplands Snake River Plains, East Snake River Plains, West	M331D M332E M332F 342B 342C 342D

Idaho	Idaho North	Idaho Batholith Palouse Northern Rocky Mtns.	M332A M332F M332G M333A M333D 331A
Oregon	Basin & Range	Basin & Range	M261G 342B
Oregon	Blue Mountains	Blue Mountains	M332A 342H
Oregon	East Cascades South	High Cascades	M242C 331A
Oregon	High Lava Plains	High Lava Plains	M242C 342B
Oregon	Owyhee Upland	Owyhee Upland	342C
Montana	Montana	Northern Rocky Mtns. Western Great Plains	M332A M332B M333B M333C
Nevada	Nevada	Basin & Range Owyhee Uplands	342B 342C
Utah	Utah	Basin & Range	342B
Washington	Columbia Basin	Columbia Basin	331A 342I
Washington	East Cascades North	Northern Cascades Southern Washington Cascades	M242C
Washington	Okanogan Highlands	Okanogan Highlands	M242C M333A
Wyoming	Wyoming	Teton/Overthrust Ranges Yellowstone Plateau	M331A M331D

* Physiographic Provence does not read directly across to Bailey Sections. These categories are presented strictly alphanumerically.

The Blue Mountains of Washington and Oregon

The Blue Mountain Physiographic Province is situated in two states, Washington and Oregon. The southern boundary of this province is just north of Burns, Oregon, and the Harney Basin. From there it extends northeast through La Grande, Oregon, to just south of Pomeroy, Washington. The eastern boundary is clearly defined by the Snake River of Hells Canyon below the Seven Devils mountain range. From there, the Blue Mountains Province (BMP) extends west through John Day, to a few miles east of the confluence of the Crooked and Deschutes rivers near Prineville, Oregon.

Geologically, the BMP is remarkably complex. It spans an enormous variation in elevational ranges from canyons below 2,000 feet up through 10,000 foot mountain peaks. Several dominant mountain ranges punctuate the valleys, plains, canyons, plateaus, and hills of the BMP. The most notable ranges include the Ochoco, Strawberry-Aldrich, Greenhorn, Elkhorn, and Wallowa Mountains. The western portion of the BMP is comprised of ancient Paleozoic Era rock formations, including limestone, mudstone, sandstone, and siltstones (Franklin and Dyrness 1973). Later, Cenozoic Era vulcanism extruded deep layers of lava through numerous fissures to form the Clarno and Columbia River basalt flows (Johnson and Clausnitzer 1992). The Blue Mountains are thought to have uplifted through these basalt sheets (Johnson and Simon 1987). East of John Day, major ore deposits formed in the Strawberry, Greenhorn, and Elkhorn mountains during the Mesozoic Era. Here also the Columbia river basalts are prominent, surrounded by a matrix of Paleozoic formations comprised of schists, limestone, slate, argillite, tuff, chert, and siltstone (Franklin and Dyrness 1973). Mesozoic granitic rocks, limestones, shales and sandstones are prominently displayed in the Wallowa Mountains (Johnson and Simon 1987). Two dominant erosive events shaped these parent materials into the present terrain include hydrologic erosion and mass wasting and Pleistocene glaciation (Johnson and Simon 1987).

Soils within the BMP are highly variable due to the spectrum of parent material and weathering events. Two of the most influential events on soil development resulted from the ash deposits of Mt. Mazama and Glacier peak, and post glacial wind deposits of loess from central Washington (Johnson and Clausnitzer 1992). A majority of the soils fall into one of three broad categories: Residual, Ash-loess, and Mixed. Soil taxa development was further stratified by moisture and temperature regimes and is concisely summarized by McNab and Avers (1994). Plant communities evolving with this environment also played a key role in influencing the future development of vegetation and soil assemblages.

The enormous variation in topography, geology, elevation, and climatic factors create a well distributed mosaic of plant communities. The primary habitats found in the BMP are, Western ponderosa forest, Douglas-fir forest, Western spruce-fir forest, Juniper steppe woodland, sagebrush steppe, Wheatgrass-bluegrass grasslands and alpine meadows and barrens (Thomas 1979). Dissection of these habitats by stream action modification processes (Kovalchik 1987) has lead to a large degree of riparian habitat diversification at a local scale. At a broader scale, these general habitat types were influenced differently by the climatic forces mentioned above.

For example, the northern Blue Mountain foothills, slopes and ridgetops developed grasslands and rhizomatous shrublands via the influences of a maritime climate and the vegetation of the Palouse country to the north (Columbia Basin Province). This climatic regime also perpetuates pockets of refugia for plant species most often associated with habitat found west of the Cascade crest. By contrast, in the southern Blue Mountains the continental climate facilitates the development of sagebrush and juniper as commonly found in the Great Basin (Johnson and Clausnitzer 1992) to the south (Basin and Range Province).

The vegetation of the BMP has been further influenced by the actions of disturbance forces such as erosion, livestock or insects herbivory, and or fire. From the late 1800s through the mid 1900s millions of domestic sheep caused considerable changes in the plant communities of the BMP. Subsequent cattle grazing continues to confound the recovery from these impacts in many portions of the province. Historically, abundant late summer/early autumn convectional lightning storms provided for cyclic annual fires (Johnson and Clausnitzer 1992). Prior to Euro-American settlement the BMP experienced low intensity surface fires in fire resistant seral habitats (i.e., ponderosa pine and grasslands) at intervals around 5 to 25 years. Stand replacement fires (in stands such as lodgepole and grand-fir stands) were as important but less frequent at 50 to 200 years (Arno 1992). Such fire events inspired the name Blue Mountains because of the smoky haze enveloping the region each summer.

These characteristics are responsible for the high level of floristic diversity, and the large number of local endemic plant species. The numerous designated sensitive plant species found in the BMP are also partly a result of this unique habitat. However, human activities have contributed to the rareness of many of these species.

Columbia River Basin

The Columbia Basin encompasses about two-thirds of the area east of the Cascade Mountains in Washington. Topography includes gently undulating to moderately hilly slopes with isolated basaltic buttes and river cut canyons. Elevations range from about 400 ft. in elevation adjacent the Columbia River to about 1700 ft. Lava poured over most of the area during the Miocene epoch laying down a basalt layer. The channeled scablands is a unique geologic feature, comprising a series of dry deeply cut channels in the Columbia River basalt, forming a complex drainage network.

During the Pleistocene epoch, Palouse loess was deposited over much of the Province. The Palouse area is characterized by rolling hills and very fertile soils, which is now agricultural land. Most of the soils in this Province were formed under grassland or shrub-grassland vegetation. Precipitation is heaviest along the edge of the basin and decreases towards the center.

East Cascades North

The Cascade Mountains are mostly comprised of ancient sedimentary rocks, which were folded, partially metamorphosed and intruded by large granitic batholiths. Valleys are deep and steep sided. The mountain crest is relatively uniform in elevation (5000-7300 ft.) with two dormant volcanoes (Mt. Baker) dominating the skyline. Extensive glaciation sculptured the features of the Province from the Canadian border south to Snoqualmie Pass. Soils to the east of the crest show the drier conditions under which they formed and are influenced by volcanic ash and loess.

The topography from Snoqualmie Pass south to the Columbia River is less rugged Andesite and basalt flows are the dominate features on the landscape, which is a series of ridge crests separated by steep, deeply dissected valleys. Elevations of the crest are lower, from 3300-5600 ft. with three dormant volcanoes dotting the ridgelines (Mt. Rainier at over 12,200 ft., Mt. St. Helens and Mt. Adams). East of the crest soils are derived from andesite, sandstone or glacial till with textures of silt loams and loams.

East Cascades South

The East Cascades physiographic province consists of scattered volcanic peaks, smaller cinder cones and gently sloping, high pumice plateau. A mantle of pumice and ash from numerous volcanic eruptions, notably Mount Mazama, blankets bedrock and influences the ecology of the area. The province is occupied by coniferous forests interrupted by mosaics of shrub-steppe, subalpine and alpine meadows, and barrens. Shasta red fir and mountain hemlock are found in the high elevation forests in the southern portion, and Oregon white oak is found in lower elevations along the Columbia River and Klamath River Drainage. Elevations range from near sea level on the Columbia River to over 10,000 feet at the summit of the major volcanic peaks.

High Lava Plains

The High Lava Plains physiographic province consists of lava buttes, cinder cones and basaltic flows scattered across the region. Rhyolitic pumice from Newberry Crater (6400-1400 yrs bp) and Mount Mazama (7000-10,000 yrs bp) mantle much of the area . Paulina Peak, a shield volcano, is the largest volcanic peak. Fort Rock Valley, Christmas Lake and Fossil Lake held extensive bodies of water during the Pleistocene era. Today, playa lakes and basins with fluctuating water levels are common. *Artemisia* shrub-steppe and *Juniperus occidentalis* woodlands, tolerant of hot dry summers and cold winters, comprise the major vegetation types.

Idaho North

The Northern Idaho Ecoregion includes both central and northern Idaho. This area includes the northern Rocky Mountains and the eastern margin of the Columbia Basin.

The Rocky Mountain province in Idaho is usually divided into northern and central Idaho subunits. The geology of the northern subunit is highly mixed with belts of Precambrian and Cambrian igneous, sedimentary and metasedimentary rocks, Tertiary volcanics, and Quaternary depositional features. The vegetation of this area is dominated by moist mixed-coniferous forests. Dominant overstory species include western white pine, western red cedar, western hemlock, Douglas fir, and true firs. Floristically, this area is relatively rich. This is especially true of the "maritime refugium", an area that harbors many species that are more typical of western Cascade forests. Central Idaho geology is dominated by the Idaho batholith (Cretaceous in age) with lesser amounts of Tertiary volcanics and Quaternary depositional features. The vegetation of the Idaho batholith is dominated by coniferous forest, especially ponderosa pine, lodgepole pine, and Douglas-fir with lesser amounts of true firs. Central Idaho lacks the species diversity of the northern portion of the state but has a greater range of habitat types due to a broad range of shrublands, grasslands, and high mountain (alpine and subalpine) meadows. Central Idaho is also rich with geothermally influenced plant communities.

The Columbia Basin margin in Idaho includes the Palouse, the Seven Devils, and Columbia Uplands (also known as the Breaks). The Palouse region is predominantly rolling hills of Pleistocene loess that can be as much as 150 feet deep. This region was once an expansive fescue/wheatgrass grassland with a rich component of herbaceous perennial forbs. The vast majority of this area has been converted to agriculture in the last century and several of the species that were formerly common there are now restricted to tiny remnants of intact habitat. The Seven Devils area is a fault blocked series of Miocene and Jurassic volcanics with significant areas of marine metasedimentary and metavolcanic rocks. The Seven Devils is primarily a shrubland (sagebrush) and grassland with minor intrusions of ponderosa pine and Douglas-fir. The Columbia Uplands are between the Seven Devils and the Palouse and consequently are dominated by mixtures of Pleistocene loess, Miocene basalts, some Tertiary age sedimentary rocks and minor areas of metamorphics. This area is dominated by floristically diverse grasslands that are rich in herbaceous perennial forbs with ponderosa pine occurring on higher mountain slopes. The grassland and shrublands at the margin of the Columbia Basin all share the problem of significant habitat degradation from introduced plant species.

Idaho South

The southern Idaho Ecoregion includes the portions of the Owyhee uplift, the Snake River Plains, the Lemhi Range and Valley, the Lost River Range and Valleys, and the a portion of the Basin and Range province.

The Owyhee Uplift is a complex geological assemblage of Cretaceous granites (probably related to the Idaho Batholith), Miocene rhyolites (from both magma and ash sources), Miocene and Pliocene basalts, a variety of metamorphic rock (gneiss and cherts and limestones of Permian age), and Quaternary alluvium and colluvium. The vegetation of the Owyhee Uplift is a diverse mixture of arid woodlands (*Juniperus* spp.), mixed shrublands, and coniferous forests (Douglas-fir). The flora of this area is very rich in endemic species, a reflection of its isolation and azonal geology.

The geology of the Snake River Plains are dominated by igneous features. The western Snake River Plains are comprised of late Miocene and Pliocene olivine basalts mixed with welded ash and overlain by Pleistocene basalt flows. The eastern Snake River Plains generally lack the older olive basalts and has some more recent volcanic features (e.g., cinder cones). Both areas have a variety of Quaternary alluvial, colluvial, and lacustrine deposits and some active sand dunes. The Snake River Plains were once dominated by perennial grasses and shrubs with a rich ephemeral flora of herbaceous perennial. Much of this area has been converted to agricultural use or has been degraded from livestock grazing, exotic plant species, and an increased fire frequency. In areas of more recent volcanism on the eastern Snake River Plain there are large areas totally devoid of vegetation. The Snake River Plain is significantly more arid in its western reaches and in that area salt scrub type vegetation is commonly encountered.
The Lemhi and Lost River Ranges and there valleys a Basin and Range fault blocks that were isolated from the rest of the rest of the Basin and Range during the Pliocene.

The Basin and Range region of southeastern Idaho is an area of high topographic relief that is a result of extensive fault blocking during the Pliocene. The geology of the area is mixed and include a variety of Quaternary depositional features, Pliocene volcanics (ejecta, welded tuff, ash and flow rocks), Eocene granitic plutons, and marine sediments of much greater age. The Basin and Range regions of Idaho are dominated by sagebrush/bunchgrass habitats. There are however significant areas of pinyon/juniper woodlands and dry forests at higher elevations (Douglas-fir, lodgepole pine, and subalpine fir). The Basin and Range is also notable for its extensive aspen forests. This area is relatively rich floristically, a result of a diverse geologic history, steep gradients in topography and the isolating effects of remote mountain ranges inbedded in a sea of arid lowlands.

Northern Nevada

The Nevada portion of the Columbia River Basin is usually considered as a portion of the Owhyee Uplands (see Southern Idaho report). This area is a complex geological assemblage of Cretaceous granites, Miocene rhyolites (both from magma and ash sources), Miocene and Pliocene basalts, a variety of metamorphic rock (gneiss and cherts and limestones of Permian age), and Quaternary alluvium and colluvium. The vegetation of the Nevada portion of the assessment area is a diverse mixture of arid shrublands and grasslands, Juniper and Pinyon-Juniper woodlands, coniferous forests (Douglas-fir), and high elevation forb-graminoid meadows and open subalpine fir forests (often with scattered whitebark pine). Riparian areas in this area are important sources of habitat diversity throughout this portion of Nevada but have been very heavily impacted by livestock grazing.

Northern Utah

The Raft River and Goose Creek mountains were formed in post-Cretaceous times by an intrusive upheaval. The Raft River Mountains (trending east-west) and the Goose Creek Mountains (trending north-south) are located in the northwestern part of Box Elder County, Utah covering an area 45 miles by 10 miles. They rise from 6000 feet on the north and 5000 feet on the south, to nearly 10,000 feet at the highest point. Northern slope streams of the Raft River and Goose Creek mountains drain into the Raft River and Goose Creek respectively and then empty into the Snake River near Burley, Idaho. Together these ranges form part of the northern boundary of the Great Basin.

These isolated desert ranges are an important floristic element of the southern portion of the Upper Columbia River Basin (UCRB). Thirty-two rare, disjunct or edge-of-range species are located in this part of Utah. Most of these species are at the south edge of their range and a few are at the north edge of their range, making this a unique merging area. The complex mix of climate, isolation, topography, geology and biotic factors are important in the make up of the plant communities and floristic richness. Primary habitat types for the Raft River sub-unit are pygmy forest, riparian, coniferous forest and alpine tundra. The Goose Creek area lacks the coniferous and alpine community types. Very little is known about the vegetation types in the Goose Creek area. Storm patterns in this region are from the north, and since the mountain range lies primarily east-west, most of the precipitation of the area is dropped on the north slope. North to south winds have had significant influence on seed dispersal from northern communities into this area. The conifer community is primarily on the north slope due to cooler temperatures and higher precipitation. Riparian vegetation has been significantly altered by livestock grazing. The mountain meadows of higher elevations have dense stands of poisonous sneeze weed and false hellebore. It appears that livestock and deer grazing may have resulted in changes of grasslands and forb communities to sage brush which is being converted to juniper stands on the lower south slopes. The general contour of the Raft River section is rounded and gentle sloping except in canyons, small draws and pockets. These offer little opportunity for the existence of microclimates required for more mesophytic vegetation communities. Limestone parent materials are lacking which reduces the potential for a higher degree of endemism.

Because the Goose Creek/Raft River area is on the southern edge of the UCRB, the plant species occurring in the area are probably under stronger selection pressure than they are towards the center of their range. These pressures may have led to unique genetic adaptations. Four new species have been described in the area in the last decade and these are based on limited field work. Insufficient data are available on these rare species to address specific biological factors to determine their requirement and contribution to the habitat they occupy.

Okanogan Highlands

The Okanogan Highlands Province is characterized by upland areas separated by a series of broad north-south valleys. Slopes are moderate with broad, rounded summits. Most of the area is over 3300 ft. in elevation, although the main river valleys are lower and a handful of peaks reach to 7000 ft. The entire Province was covered by glacial ice during the Pleistocene epoch, resulting in deposits of glacial drift. Numerous rock types form a complex pattern of substrates ranging in age from Precambrian to late Tertiary.

In this Province soil pattern is tied to elevation. Soils in mountainous areas are derived from granitic parent materials, while those from glacial materials often have volcanic ash. Surface layers generally have silt loam texture and subsoils are gravelly loam. Lower in elevation, along river valleys and the southern border of the Province, soils formed under a drier climate with transitional forest-grassland vegetation with soil textures of sandy loam to loam. At the lowest elevations, along major river terraces and floodplains, soils are coarse textured and well drained with parent materials of glacial outwash sands and gravels.

Oregon Basin and Range, Owyhee Uplands

The Basin and Range Province consists of fault-block mountains and intervening basins characterized by internal drainage (Franklin and Dyrness 1973) and often containing shallow, saline lakes. Principal mountain ranges include Winter Rim, Abert Rim, the Pueblo and Trout Creek Mountains, Hart Mountain and Steens Mountain. Steens Mountain (elevation 9500 feet), a major northeast striking and gently west-northwest dipping fault block, encompasses the greatest contiguous area of high elevation lands within the province. The landform consists of rhyolitic extrusions, subordinate tuffs, and sedimentary rocks overlain by Steens Basalt (15.5-Ma), breccias and pyroclastics (Minor et al. 1988). Deep U-shaped canyons on the west slope are the result of Pleistocene glaciation. The Owyhee Uplands Province is characterized by less frequent faulting and generally less topographic relief than the Basin and Range province. It is principally drained by the Owyhee River which flows north into the Snake River. The geology of both provinces is comprised predominately of Miocene and Quaternary volcanics, and the diversity of substrates found within the region accounts for much of the habitat diversity. The ash beds of the Leslie Gulch and Succor Creek area (Owyhee Uplands), for example, support a number of local endemics. Elevations within the provinces range from 1,200 to 2930 meters (3900 to 9610 feet).

Low precipitation in the provinces (mean annual ppt. 180 to 300 mm (7 to 12 inches)) supports little more than dry shrubland, as forests are rare outside of riparian areas. The principle vegetative formation is big sagebrush (*Artemisia tridentata*) shrub-steppe (Franklin and Dyrness 1973). *Juniperus occidentalis* and bunchgrasses, including *Festuca idahoensis, Agropyron spicatum*, and *Elymus cinereus*, are common associates. *Artemisia arbuscula* and *A. rigida* communities are found on shallow, stony soils, while *A. cana* communities are found in moister bottomlands. Salt desert shrub communities are common in the alkaline soils of basins and lake margins and are generally dominated by *Atriplex confertifolia* and *Sarcobatus vermiculatus*. Higher order riparian areas commonly support gallery forests dominated by *Populus tremuloides* and/or *Populus trichocarpa*. *Salix* spp., may occur in similar habitat, or within wet meadows dominated by species of *Carex*.

Western Montana

The Montana ecoregion of the upper Columbia River Basin is typified by great variation in topography, vegetation types, geological characteristics and history, and climate. This highly varied environment, typical of the northern Rocky Mountains, creates a mosaic of forest, shrubland and grassland vegetation. In addition, wetland and alpine habitats, while occupying less landscape area than the latter vegetation types in many areas, contribute substantially to floristic and plant community diversity in western Montana. Species composition and productivity differ greatly within and among these major vegetation types (Mueggler and Stewart 1980).

The distribution of forest tree species and associated habitats in southwestern Montana, arranged by increasing altitude, is as follows: grassland (valley bottoms)/*Pinus flexilis* (limber pine)/*Pseudotsuga menziesii* (Douglas-fir)/*Pinus contorta* (lodgepole pine)/*Picea engelmannii* (Engelmann spruce)/*Abies lasiocarpa* (subalpine fir)/*Pinus albicaulis* (whitebark pine)/alpine tundra. In northwestern Montana, this elevational series is as follows: grassland (valley bottoms)/*Pinus ponderosa*/*Pseudotsuga menziesii*/*Picea engelmannii*/*Abies grandis*/*Thuja plicata*/*Tsuga heterophylla*/*Abies lasiocarpa* (*Tsuga mertensiana*)/*Pinus albicaulis*/*Larix lyallii*/alpine tundra (Pfister et al. 1977).

Grassland and shrubland habitats of western Montana have been classified into 13 and 16 habitat types, respectively, within 13 climax series (Mueggler and Stewart 1980). The five climax series for grasslands include the *Agropyron spicatum*, *Deschampsia caespitosa*, *Festuca idahoensis*, *Festuca scabrella* and *Stipa comata* series. The eight shrubland climax series include *Artemisia arbuscula*, *Artemisia tridentata*, *Artemisia tripartita*, *Cercocarpus ledifolius*, *Potentilla fruticosa*, *Purshia tridentata*, *Rhus trilobata* and *Sarcobatus vermiculatus* series (Mueggler and Stewart 1980).

General wetland habitats represented in western Montana include peatlands, riparian habitats, aquatic habitats, forested wetlands, and emergent wetlands. Alpine habitats occupy the least amount of acreage, on a landscape scale, but numerous rare species and uncommon vegetation types are entirely confined to these harsh environments (Lackschewitz 1991).

The Montana portion of the analysis area is prominently mountainous with intervening valleys. In northwestern and west-central Montana, valley base elevations range between 2,000 and 4,000 feet, and support either forests or grasslands. The major mountain ranges rise to elevations of 7,000 to 9,000 feet. These mountains support extensive forests up to subalpine levels, with a small amount of landscape area above the alpine timberline. In the southwestern portion of the state the grassy intermountain valleys are higher, generally 4,500 to 6,500 feet, and the major mountain ranges usually rise to 10,000 feet or higher (Pfister et al. 1977).

The surface geologic formation prevalent throughout most of northwestern Montana is the Precambrian Belt Series, consisting primarily of quartzites and argillites. The Idaho and Boulder Batholiths comprise the Bitterroot Range west of the Bitterroot Valley and much of the southern Sapphire and Anaconda-Pintlar ranges, as well as the mountains along the Continental Divide from Butte to Helena; their composition is predominantly granitic with inclusions of gneiss and schist. Volcanic and sedimentary rocks (both limestone and non-limestone) constitute most of the remainder of the Montana Rocky Mountains (Pfister et al. 1977). Many of the mountain areas near or east of the Continental Divide are geologically complex in contrast to areas farther west (Perry 1962).

Most of the prominent valleys in the Montana Rocky Mountains contain a layer of alluvium deposited by streams and glacial action. The majority of these areas support grassland, riparian, or cultivated vegetation, although substantial areas in northwestern Montana valleys support forests (Pfister et al. 1977).

Forest soils in western Montana are typically quite rocky, reflecting their mountainous setting. Because steep topography and rocky soils are so prevalent, sites capable of supporting a climatic climax are scarce over much of the forested landscape (Pfister et al. 1977).

The Continental Divide exerts a marked influence on the climate of Montana. West of the Continental Divide, the area has an inland climate strongly modified by moisture-laden air masses from the Pacific Ocean; precipitation is rather evenly distributed throughout the year, except for a dry period in July and August. East of the Continental Divide, the climate is decidedly continental. It is characterized by warm summers, with a high proportion of the precipitation falling between May and September and winter conditions consisting of invasions of subzero air followed by warm dry Chinook winds. Elevation also has a major effect on climate and thus on vegetation patterns. Except in extreme northwestern Montana, lowlands are semiarid and support either grassland or very dry forest types. Mountains are much cooler and often receive two to three times as much annual precipitation, most of it as snow. Above 8,000 feet in northern Montana and 9,500 feet in southern Montana, forests give way to alpine tundra. About 25 mountain ranges in the state support some tundra, which develops on sites having mean July temperatures of less than 50 degrees F (Arno 1970). Thus, the lower elevational limits of coniferous forests are controlled primarily by moisture, while the upper elevational limits are controlled primarily by temperature.

Western Wyoming

The Wyoming portion of the Columbia River Basin includes the west slope of the Teton Range, and portions of the Yellowstone Plateau.

The Tetons are a tilted Tertiary high angle fault block range that reaches elevations in excess of 13,000 ft.. The geology is a complex of Precambrian igneous and metamorphic rocks (gneisses and schists). The lowlands on the west slope of the range (the Columbia River Basin side) are overlain with mostly Tertiary volcanics. The east slope of the Tetons are heavily altered by Pleistocene glaciation. The vegetation of the Tetons is dominated by coniferous forests, primarily Doug-fir, lodgepole pine, and subalpine fir. At higher elevations, mixed forb and graminoid meadows are common. Talus and snowbank communities comprised mostly of perennial forbs are also common though usually small in extent.

The Yellowstone region of the assessment area is a heavily forested volcanic plateau surrounded on three sides by high relief mountain ranges and to the west by the Snake River High Plains. Yellowstone Lake occupies a small portion of the much larger Yellowstone caldera in the east central portion of the plateau. The volcanic geomorphology of the area is largely the result of two periods of activity, one in the late Cretaceous-early Tertiary and the other in middle to Late Tertiary times. Material from the former event is predominantly breccias, agglomerates, and flow basalts. The latter period produced extensive areas of rhyolite and welded tuff. A third period of volcanism that has left more recent marks on the surface geology of the Yellowstone landscape. Quaternary eruptions that formed the Yellowstone caldera (600,000 years ago) subsequently produced extensive rhyolite flows (2,000 feet thick in places). The volcanism and geothermal activity of Yellowstone is the result of tectonic migration of the underlying plate over a stationary mantle convection plume. The geothermal features of Yellowstone Park are largely located above zones of ring fractures within the Yellowstone caldera. Portions of the Yellowstone Plateau were glaciated in at least three distinct events during the Pleistocene.

The vegetation of the Yellowstone area is dominated by lodgepole pine and Doug-fir forests. There are however extensive graminoid meadow lands throughout the area with mixed forb-graminoid meadows being less common yet still frequent. In close proximity to many of the hydrogeothermal features there are barren communities made up of a small number of vascular plants (often grasses), algae, and cyanobacteria.

VASCULAR PLANT EXPERT PANEL PROCESS

The vascular plant expert panels included plant taxonomists and plant ecologists, from academia, federal and state government agencies and the private sector, who are familiar with the flora and vegetation in each analysis area. A large percentage of the professional botanical community in the ICBEMP assessment area was involved in the project via these panels. The intent of the expert panel process was to compile biological information and key environmental factors that affect the distribution, viability, health, fitness, abundance and trends of plant taxa or species groups in the ICBEMP assessment area. The panel process provided a means to compile "key environmental correlates" that affect populations or habitats of plant species, and that are not always available via extensive literature searches. Especially important information can reside in personal experience and observations, unpublished data and reports, and other "grey literature." Utilizing discussion and professional interaction, the panel process was designed to precipitate this information from the panel experts. Four separate analyses (the methods used for each are described below) were conducted by each panel; they included:

- Evaluation of vascular plant taxa of rangewide conservation concern.
- Analysis of habitat groups for other rare taxa.
- Delineation and status review of rare plant communities.
- Identification and description of areas of endemism and high floristic diversity.

The Science Integration Team constructed a species information form for use in capturing the panelists' knowledge and information, and to convert those data into a database. A scribe also recorded data and information that evolved out of discussions, and that were not readily captured on the form.

INFORMATION REQUEST AND RESULTANT CONTRACTS

Information regarding the abundance, trend, and viability assessments needed for sensitive plant species was requested from botanists on National Forests and BLM districts throughout the ICBEMP analysis area. This survey also included an inventory of existing conservation strategies, management guides, or similar plans for these taxa. Based on the results of this survey, assessments of species and habitat groups in five taxonomically complex genera were completed as separate contracts by individual experts; these genera included *Allium* (McNeal 1995), *Botrychium* (Zika 1995), *Carex* (Brainerd et al. 1995), *Mimulus* (Meinke 1995a), and *Penstemon* (Meinke 1995b). These assessments were subsequently peer-reviewed by members of the professional botanical community prior to incorporation into the ICBEMP vascular plant databases.

ANALYSIS COMPONENTS

The analysis for vascular plants consisted of eleven primary components. The first four analysis components were completed by the vascular plant expert panels, as outlined above; the remainder were accomplished by members of the Vascular Plant Task Group, ICBEMP Terrestrial staff members, or by independent contractors. Brief descriptions of each of the eleven components, including the methods for each, are as follows:

Vascular Plant Taxa of Rangewide Conservation Concern

As required by the charter for the ICBEMP, a primary focus of the vascular plant analysis was on taxa of conservation concern across their entire geographic ranges. These taxa include those currently listed as threatened or endangered under the federal Endangered Species Act, those that are candidates (Category 1 or 2) or officially proposed for such listing, and those with no current status that were recommended by the vascular plant expert panels for federal listing or candidate status. In some cases, species that were formerly Category 1 or 2 candidates, but are now in Category 3 (no longer being considered for federal listing), were also evaluated. Recent changes (Federal Register, vol 61, no. 40, 7596) were made to the list of species of plants and animals that are regarded as candidates for possible addition to the List of Endangered and Threatened Wildlife and Plants under the Endangered Species Act. These changes dropped the classifications of Category 1, Category 2, and category 3c in favor of simply listing species as candidates for listing. Most of the species that were classified as Category 1, 2, and 3c taxa are no longer included in the list of candidate species. These changes are not reflected in the references made to candidate species in this document.

Specific objectives for this analysis included the assignment of these taxa to five geographic distribution categories (local endemic, regional endemic, scattered, disjunct, and peripheral; defined below); delineation of critical environmental correlates, associated cover types (including climax and seral cover types), and threats for each taxon; assessment of species viability by analysis of the distribution of habitat, trends, threats, and number of occurrences for each; identification of primary threats to each taxon; and development of mitigation and management recommendations for the taxa where needed or appropriate.

Definitions for the geographic distribution categories are as follows:

- **local endemic** - populations are restricted to a very small geographic area (i.e., one portion of a mountain range, one canyon, etc.); these taxa are often also restricted to highly specialized habitats, and their range may lie either entirely within, or on, the ICBEMP Assessment Area boundary.

- **regional endemic** - populations inhabit a larger geographic area than that of a local endemic (i.e., southeast WA, northern ID, and northwest MT for a palouse endemic); these taxa may also be closely associated with certain habitats, and their range may lie either entirely within, or on, the ICBEMP Assessment Area boundary.

- **scattered** - populations are sparsely distributed within and outside the ICBEMP Assessment Area; the overall geographic range of these taxa is wide (i.e., they may be found in many western states), but they are nowhere common on the landscape.

- **disjunct** - populations within, or straddling, the ICBEMP Assessment Area boundary are substantially separated geographically from the remainder of the taxon's range.

- **peripheral** - populations within, or straddling, the ICBEMP Assessment Area boundary lie on the margin of the taxon's range, and are geographically contiguous with that range.

These species evaluations are a critical aspect of addressing the viability requirements included in the National Forest Management Act and the Federal Land Policy and Management Act. Due to the vast size of the analysis area (144 million acres), varying degrees of appropriateness of "fit" to the scale of analysis used in the ICBEMP were realized in analyzing the viability of plant taxa. Two broad categories emerged during the analysis: those plant species that could be modelled within the ICBEMP cover type and structural stage hierarchies using known environmental correlates, and those that could not be modelled owing to a lack of species-specific information and/or because of a "lack of fit" with the broad and mid-scale analysis levels. The latter case usually involved plant taxa that are tightly confined to highly specialized habitats that occupy very small (< 1 km^2) patches on the landscape, and which could thus not be resolved at the broader analysis scales.

Utilizing a variety of federal, state, and private data sources, the ICBEMP database manager compiled a list of all federal threatened, endangered, and proposed plant taxa, as well as those taxa designated as sensitive or otherwise of conservation concern by the U.S. Forest Service or the Bureau of Land Management. This list was then subdivided into 13 lists, each specific to one of the panel analysis areas. Taxa not currently listed, proposed or designated as candidates were also added to the panel lists, as deemed necessary by the panel members. Biological, ecological and status information for a total of 168 taxa were evaluated in this analysis. This analysis included the preparation of range maps for each taxon; these are presented in Appendix 1.

To initiate the expert panel process, all panel members completed an environmental correlate form as a group for the first taxon on their analysis area list. This was done to ensure that all members were interpreting and completing the forms consistently. Subsequently, the panelists then independently filled out forms for individual taxa on the analysis area list according to their knowledge of each one. After all forms were completed, each panelist verbally recounted the information he or she had recorded. A discussion about each species ensued for the purpose of information-sharing and to stimulate each panelist to add or elaborate on data or key environmental correlates. The content of these discussions was captured by the panel scribe. If, as a result of the discussion, any of the experts thought of needed additions to their forms, they took a brief time to edit them. However, they were instructed not to reach consensus if disagreements appeared, nor to write down what other experts were saying if it was not also part of their own experience with that taxon. When all forms were completed they were collected for subsequent entry into the ICBEMP vascular plant database.

Figure 2 is a map of the ICBEMP assessment area with information on the number of element occurrences over the number of taxa by county (Figure 2) which provides some information on areas of high concentrations of species that are tracked by heritage programs. Many of the species of conservation concern from this project were local endemics, this map reflects many of these species that have highly localized distributions.

Table 2 is a summary of the best available data at the time this report was prepared for each of the species of conservation concern. It presents a summary of species by geographic distribution. The table is followed by narratives for each species.

TABLE 2. List of Species of Conservation Concern by geographic distribution.

Locally Endemic Species

Abronia ammophila
Agrostis rossiae
Allium aaseae
Allium dictuon
Amsinckia carinata
Arabis suffrutescens var. *horizontalis*
Artemisia ludoviciana ssp. *estesii*
Astragalus anserinus
Astragalus applegatei
Astragalus atratus var. *inseptus*
Astragalus collinus var. *laurentii*
Astragalus columbianus
Astragalus howellii
Astragalus sinuatus
Astragalus tyghensis
Astragalus vexilliflexus var. *nubilus*
Balsamorhiza rosea
Botrychium pumicola
Calochortus longebarbatus var. *peckii*
Calochortus macrocarpus var. *maculosus*
Castilleja christii
Castilleja cryptantha
Castilleja pilosa var. *steenensis*
Castilleja rubida
Chrysothamnus parryi ssp. *montanus*
Claytonia lanceolata var. *flava*
Cymopterus davisii
Delphinium viridescens
Draba trichocarpa
Erigeron basalticus
Erigeron lackschewitzii
Erigeron salmonensis
Eriogonum chrysops
Eriogonum meledonum
Erythronium grandiflorum var. *nudipetalum*
Hackelia venusta
Haplopappus insecticruris
Ivesia rhypara var. *shellyi*
Lathyrus grimesii
Leptodactylon glabrum
Leptodactylon pungens ssp. *hazeliae*
Lesquerella carinata var. *languida*
Lesquerella humilis
Lomatium erythrocarpum
Lomatium greenmanii
Lomatium ochocense
Lomatium tuberosum
Luina serpentina
Lupinus cusickii
Mimulus hymenophyllus
Mimulus patulus
Mirabilis macfarlanei
Oenothera psammophila
Oxytropis campestris var. *wanapum*
Penstemon compactus
Penstemon idahoensis
Penstemon peckii
Petrophytum cinerascens
Phacelia lenta
Phacelia lutea var. *calva*
Phlox idahonis
Physaria didymocarpa var. *lyrata*
Primula alcalina
Ranunculus reconditus
Rubus bartonianus
Rubus nigerrimus
Saxifraga bryophora var. *tobiasiae*
Senecio ertterae

Sidalcea oregana var. *calva*
Silene seelyi
Stephanomeria malheurensis
Tauschia hooverii
Thelpodium howellii ssp. *spectablilis*
Thelypodium repandum
Trifolium leibergii
Trifolium thompsonii

Regionally Endemic Species

Arabis falcifructa
Arabis fecunda
Artemisia campestris var. *wormskioldii*
Aster jessicae
Aster mollis
Astragalus cusickii var. *sterilis*
Astragalus diaphanus var. *diurnus*
Astragalus mulfordiae
Astragalus onciformis
Astragalus paysonii
Astragalus peckii
Astragalus scaphoides
Astragalus solitarius
Astragalus tegetariodes
Astragalus yoder-williamsii
Calochortus longebarbatus var. *longebarbatus*
Calochortus nitidus
Camissonia pygmaea
Carex parryana ssp. *idahoa*
Castilleja chlorotica
Chaenactis cusickii
Claytonia umbellata
Collomia mazama
Cymopterus douglassii
Descurainia torulosa
Douglasia idahoensis
Erigeron latus
Erigeron salmonensis
Eriogonum crosbyae
Eriogonum cusickii
Eriogonum lewisii
Eriogonum prociduum
Grindelia howellii
Hackelia cronquistii
Haplopappus liatriformis
Haplopappus radiatus
Iliamna longisepala
Ivesia rhypara var. *rhypara*
Lepidium davisii
Lepidium papilliferum
Lesquerella carinata var. *carinata*
Lesquerella paysonii
Lesquerella pulchella
Limnathes floccosa var. *bellingeriana*
Lomatium suksdorfii
Lupinus biddlei
Mentzelia mollis
Mentzelia packardiae
Mimulus ampliatus
Mimulus clivicola
Mimulus evanescens
Mimulus jungermannioides
Mimulus pygmaeus
Mimulus washingtonensis var. *washingtonensis*
Oryzopsis hendersonii
Oryzopsis wallensis
Oxytropis campestris var. *columbiana*
Papaver pygmaeum
Penstemon barrettiae
Penstemon glaucinus
Penstemon lemhiensis
Phacelia minutissima
Physaria integrifolia var. monticola
Pleuropogon oregonus
Polemonium pectinatum
Potentilla cottamii
Silene spaldingii
Stanleya confertifolia
Thelypodium eucosmum
Trifolium douglasii
Trifolium owyheense

Scattered Species

Antennaria arcuata
Botrychium ascendens
Botrychium crenulatum
Botrychium paradoxum
Botrychium pedunculosum
Collomia renacta
Cymopterus nivalis
Cypripedium fasciculatum
Howellia aquatilis
Meconella oregana
Oryzopsis contracta
Phacelia inconspicua
Rorippa columbiae
Thelypodium howellii var. *howellii*

Disjunct Species

Astragalus pulsiferae var. *suksdorfii*
Musineon lineare
Parnassia kotzebui var. *pumila*
Perideridis erythrorhiza
Sullivantia hapemanii var. *hapemanii*
Tofeldia glutinosa ssp. *absona*

Peripheral Species

Carex lenticularis var. *dolia*
Sisyrinchium sarmentosum

Number of Occurrences / Number of Taxa

LEGEND

Number of Occurrences

- 0-49
- 50-199
- 200-299
- 300-443
- State Boundaries

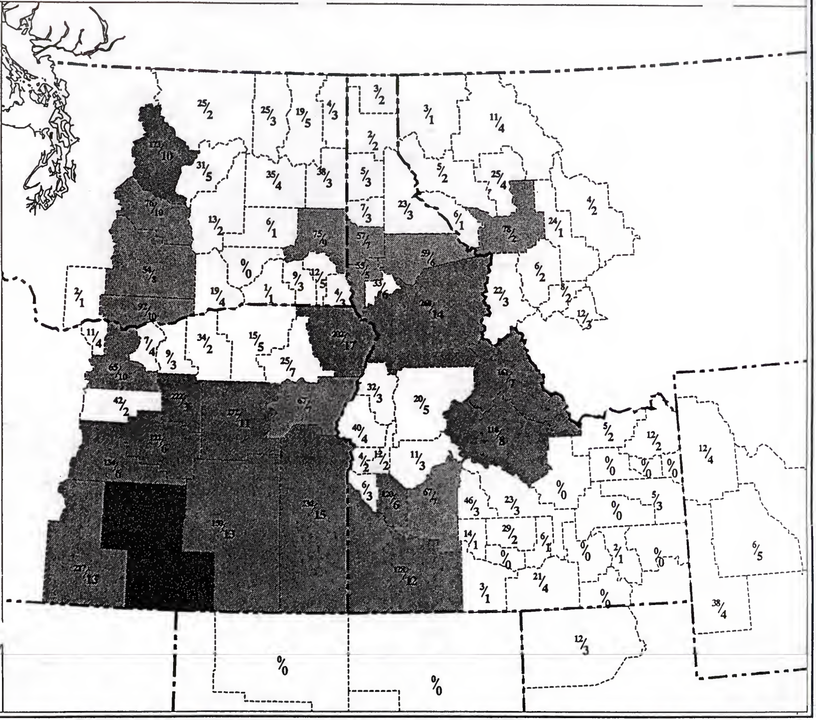


Figure 2. Map of the ICBEMP compiled from state Heritage Program data showing the number of element occurrences over the number of taxa found in the county

ICBEMP

Number of Taxa / Number of Occurrences

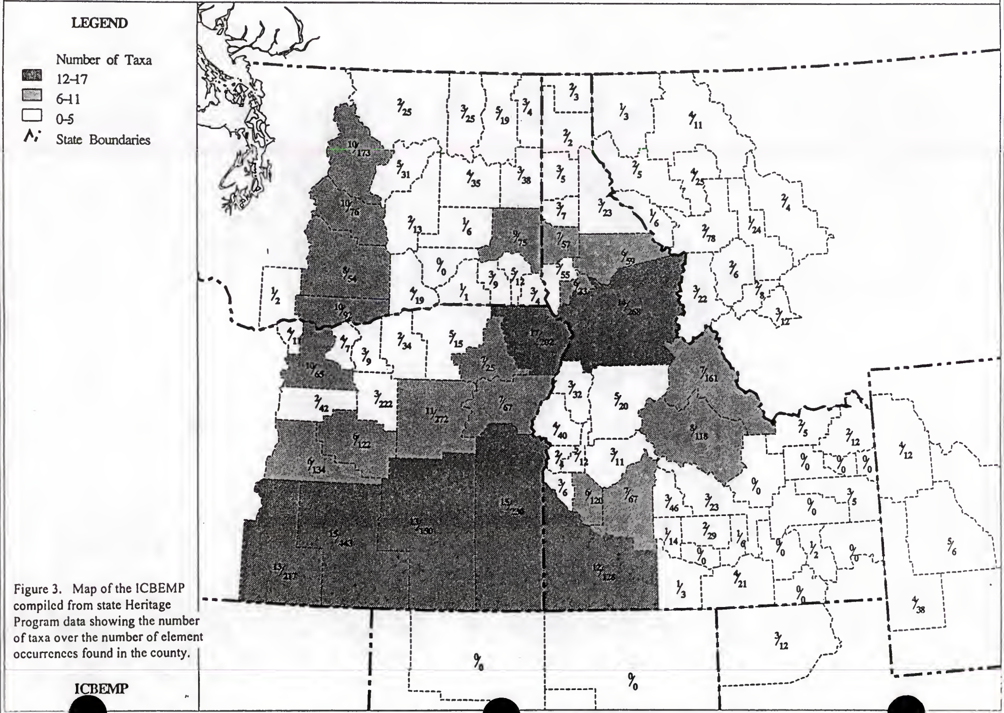


Figure 3. Map of the ICBEMP compiled from state Heritage Program data showing the number of taxa over the number of element occurrences found in the county.

Species Narratives

This information represents what was known about these taxa at the time the panels were conducted in 1994-1995. This information has not been updated to reflect the data collected in recent field seasons. The only updates have occurred for those species listed as Threatened or Endangered. Though dated, this information represents a starting point for analysis for these taxa across their range.

***Abronia ammophilla* Greene** is a local endemic found only on sand dunes and beaches around Yellowstone Lake, all in Yellowstone National Park, Wyoming. This species is unique because it occurs at elevations higher that other members of its genus (7,700 feet). Road building and trampling (mostly by humans) seem to have affected the greatest impacts to this species, causing the extirpation of at least one site. The population is estimated to be no more than 1,000 individuals. Demographic uncertainty related to a highly restricted distribution and small population size is also a significant threat to this species. *A. ammophilla* is currently in decline.

***Agrostis rossiae* Vassey** is a locally endemic annual grass found exclusively on hydrothermally warmed siliceous sinter in the Yellowstone, Wyoming region. It occurs at elevations between 7,250 and 7,400 feet. There are three primary occurrences in Yellowstone National Park divided into numerous local colonies. These colonies may fluctuate in size reflecting changes in thermal intensity and may become locally extirpated. This species is an important source of winter forage for wildlife, especially native ungulates. It is currently threatened by the invasion of exotic plant species and the development of thermal resources adjacent to Yellowstone National Park.

***Allium aaseae* Ownbey** is a local endemic restricted to Glenns Ferry sands between the Boise Front and Weiser, Idaho. The majority of *A. aaseae* populations are found in a narrow elevational band between 2,100 and 2,800 feet. This species prefers southerly aspects and may be found on sites with slopes of 15-80%. Typical *A. aaseae* sites have very low (<20%) vegetative cover. This species flowers in the very early spring and is thought to contribute significantly to the support of a diverse spring insect fauna. The primary threats to this species include land development, sand mining, and exotic plant species. Timber harvest, road building, and off-road vehicles (especially motorcycles) are also seen as significant threats to some populations. This onion is sensitive to any disturbance that disrupts the soil profile as it appears to require the coarse , sandy substrate, overlaying a clay layer. This species is frequently associate with two other rare taxa, *Astragalus mulfordiae* and *Lepidium papilliferum*. The threats from livestock grazing have been decreasing over recent years. Dr. D. McNeal of the University of the Pacific recently completed a taxonomic treatment of *A. aaseae* (McNeal 1993) and Dr. J. Smith of Boise State University is currently engaged in DNA research concerning the origins and evolution of *A. aaseae*. The Boise District BLM botanist (A. DeBolt) located several large populations of this species in the spring of 1995.

***Allium dictuon* St John** is a local endemic, known from four occurrences, in a one to two square mile area to the north and west of Weller Butte, on the Umatilla National Forest in Columbia

County, Washington. Sites range from 4,900 and 5,200 feet in elevation, on open, sparsely vegetated, shallow soils along the lower margins of basalt outcrops in weathered basalt scablands among *Festuca idahoensis* and *Poa sandbergii*. *Pinus ponderosa* in mixed stands of *Pseudotsuga menzesii* occurs at the margins. This bulb forming species tolerates fire and in general, its habitat doesn't burn intensely because of low fuel loading. Thus, around Weller Butte, scablands are often chosen for fire line location during fire suppression activities. Being very geographically restricted, *Allium dictuon* could be threatened by this kind of ground disturbance. Mc Neal (1995) speculates that solitary and social bees (*Apis mellifera*) and other insects may be responsible for pollination. Overall, little is known about the biology of this species. More species-specific survey and monitoring work is needed to assess the viability of this species.

***Amsinckia carinata* Nels. & Macbr.** is a local endemic known from six occurrences in northern Malheur Co., Oregon, covering a total area of less than 15 acres, with a majority of the populations on federal land. A facultatively autogamous annual, *A. carinata* occurs in xeric, relatively barren sites. Substrates derived from ash and welded tuffs are high in sodium, yellow to reddish in color, and gravelly to cobbly in texture. Soil development is poor, and harsh substrate conditions result in low vegetative cover. *Amsinckia tessellata* and *Atriplex spinosa* are nearby associates. Grazing is currently the most serious threat to the species. Cattle trails occur throughout the populations and grazing has enabled exotics, including Russian thistle (*Salsola kali*) and cheatgrass (*Bromus tectorum*), to invade sites that might otherwise support *A. carinata*. Off-road vehicle (ORV) traffic is also a potential threat and is heavy at some sites. Many areas have been closed to ORV traffic, and a BLM Conservation Agreement has been signed with the USFWS. Population trends for the species are unknown.

***Antennaria arcuata* Cronquist** is a scattered endemic found in scattered locations in Idaho, Nevada, and Wyoming though it is nowhere common. It is found at elevations between 4,950 and 8,000 feet on bare calcareous, alluvial soils. *A. arcuata* appears to be able to take advantage of periodic small disturbances for regeneration sites, though heavy disturbance is not well tolerated. The introduction of exotic species and activities that alter the hydrology (especially the water table) of its mountain meadow habitats are the greatest threats to the viability of *A. arcuata* populations. Land development and herbicide spray and drift are seen as significant but less immediate threats. Other identified threats to this species include trampling and haying. There is disagreement as to whether livestock grazing is a threat or not. Sexual reproduction is not known in this species. A DNA analysis of Idaho and Nevada populations (Bayer 1992) found that most of the genetic variation in this species is found within rather than among populations.

***Antennaria aromatica* Evert** is a scattered endemic species. It is found in portions of the Rocky Mountains from Colorado, Montana, and Wyoming, and one occurrence in the Wallowa Mountains of Wallowa County, Oregon. Here this species is found on Martin-Bridge limestone formations between 8,000 and 10,100 feet in elevation. This plant displays a distinguishing citronella-like odor (Evert 1984). It is often found with *Trisetum spicatum* on alpine scree, bare limestone ridgetops, cirque basins, alpine turf and xeric upper slopes. Though scattered across several states, it is not abundant at any location (Evert 1984). As an alpine species, it could be threatened by global warming, as its refugia would be limited. If populations of mountain goats in the Wallowa Mountains increase dramatically their foraging could impact *Antennaria aromatica*.

Arabis falcifructa **Rollins** is a regional endemic known from two drainage systems in northeastern Nevada, Northwestern Utah, and adjacent Idaho. Its preferred habitat correlates are north aspect slopes between 5,300 and 6,500 feet on soils with a high cover of cryptobiotic crust (>60%). *A. falcifructa* occurs on soils dominated by either sand or silt that usually have a significant fraction of volcanic ash or (in Utah) on metamorphic and quartzite rock outcrops. Livestock grazing and the invasion of exotic plant species are the greatest threats to populations of this rare mustard. Fire suppression, highway and road maintenance, and mining are also important threats to the continued viability of this species. The trend of this species is unknown throughout its range.

Arabis fecunda **Rollins** is a regional endemic, restricted to three counties in southwest Montana (Deerlodge, Ravalli, and Silver Bow counties). It is currently known from 20 occurrences within this geographic area, and occurs in or adjacent to the Highland, Pioneer, and Sapphire mountain ranges. The species is edaphically restricted as well, being wholly confined to alkaline soils derived from calcareous bedrock (typically limestone) that has been metamorphosed by batholithic intrusions (Lesica 1993a). These outcrops typically support sparse vegetation, which includes *Cercocarpus ledifolius* shrub stands, as well as other azonal stands of various bunchgrasses and perennial forbs. Known occurrences range from 4000 to 8000 feet elevation. Invasion of the habitat by exotic plants, especially *Centaurea maculosa* (spotted knapweed), is a serious threat to the populations in Ravalli County, and reduces recruitment rates (Lesica and Shelly 1990). The species is also frequently associated with cryptogamic crusts, and older, established plants show increased survival where intact crusts are present (Lesica and Shelly 1992). Enzyme electrophoretic studies of plants from five populations revealed a very small amount of interpopulation genetic variation; all plants sampled were monomorphic for 11 of 12 proteins. These data suggest that the species is highly inbred (Leeper et al. 1992). However, there is great variation in demographic and life history traits among populations; the variation in life history strategies is achieved through different proportions of plants that are iteroparous (repeatedly reproductive) or semelparous (having a single reproductive bout followed by death) (Lesica and Shelly 1995). Four years of intensive demographic monitoring at three sites has revealed that *A. fecunda* is a short-lived perennial with significant variation in recruitment rate, survivorship, age at maturity and fecundity among sites. Populations in the southern portion of the range appear to be stable, and will be most sensitive to changes that cause a reduction in recruitment, while northern populations may be declining and should be most sensitive to declines in adult survivorship (Lesica and Shelly 1994). Walsh (1992) found that the characters that most influenced survival and reproduction were size of the basal rosette (positive effect) and bolting (negative effect). A rangewide conservation strategy is needed for this species.

Arabis suffrutescens **Wats. var. *horizontalis* (Greene) Roll.** is a local endemic, known from six occurrences in the southern East Cascades province, Klamath Co., Oregon, with fewer than fifty individuals in each. It is found in the alpine zone of Crater Lake National Park at sites above 6500 feet. The perennial cruciferae is located on steep, barren slopes on light-colored, coarse-textured pumice soils. Associated species include *Arabis platycaule*, *Carex breweri*, *Erigeron peregrinus* and *Raillardella argentea*. Surrounding forested sites include *Pinus albicaulis*. Some trampling occurs by recreational hikers at Crater Lake caldera and Mt. Scott. Population trends are currently considered stable.

Artemisia campestris **L. ssp.** ***borealis*** **Hall & Clem. var.** ***wormskioldii*** **(Bess.) Cronq.** is a regional endemic known from the Columbia River Gorge. There are two occurrences in Klickitat County, Washington with one on federal land and although once known from two locations in Sherman County, Oregon, these are extirpated. The plant is restricted to a 300 ft. shoreline corridor along the river and range from 300 to 500 ft. in elevation. At one site several plants grow on a compacted river cobble terrace degraded from recreation users. There are scattered low shrubs with at least 50% bare ground. At the other sit, plants grow from crevices in basalt outcrops with less than 100 plants spread over a 30 by 100 ft. area. This biennial or perennial plant is susceptible to damage from raising the Priest Rapids Reservoir. Populations are small and isolated, which leads to the fragmentation of taxa. Historic sites are underwater in reservoirs. Significant threats include raising water levels of dams, ORVs, orchard development, and exotic plants.

Artemisia ludoviciana **Nutt. ssp.** ***estesii*** **Chamb.** is a local endemic of the Deschutes River, Oregon. A clonal perennial shrub, it grows immediately adjacent to the river on coarse, gravelly banks and exposed bedrock soils of *Salix*-dominated floodplains. Habitat is inundated during winter and early spring months, but is generally dry by summer. Thirteen occurrences are reported from three counties (Crook, Deschutes, Jefferson), with sites ranging from the Little Deschutes River near La Pine (Deschutes NF), to the Deschutes River, and from Benham Falls downstream to Lake Billy Chinook. Habitat is primarily on private land, but approximately fifty percent of sightings have been on BLM land. One population occurs on state land at Cline Falls. Pollination in *A. ludoviciana* ssp. *'estesii'* is anemophilous. Seeds mature in late summer and are dispersed primarily by water, and secondarily by wind. The species' occurrence along perennial riverine habitats makes it locally important as an anchor to stabilize stream banks and provide limited shade. Trampling by cattle and recreationists, and changes in hydrologic regime, especially a lowering of the water table, are considered threats. Potential displacement by exotic species is also a threat. Population trends are currently considered stable.

Aster jessicae **Piper** is a regional endemic currently restricted to tiny remnants of its former range in the Palouse of the Idaho panhandle, where most populations occur on private lands, and in adjacent southeastern Washington. In Washington, there are nine occurrences in Whitman County, all on private land. The populations are small in size and area. In northern Idaho, *A. jessicae* is restricted to silty loam soils or deep loess soils, where it may act as a soil stabilizer and occurs with other rare Palouse endemics such as *Haplopappus laitriformis* and *Silene spaldingii*. This species depends of periodic fires to maintain its habitat; however, such events are rare today. The greatest threats to *A. jessicae* stem directly from agricultural activities. In the past century, approximately 98% of *A. jessicae* populations and habitat have been lost to agricultural conversion. This species was once found primarily in *Festuca idahoensis* and *Symphoricarpus albus* plant communities with roughly 95% cover. Today, remnant populations are found with a variety of introduced and annual grasses and forbs and continue to be lost to housing developments and continuing agricultural conversion, though habitat management of relict populations may need to be complimented by restoration, as many of the sites have several exotic species. All populations occur in remnant habitats, especially eyebrows, the area between roads and fences, railroad right-of-ways, roadsides, and creeksides. Other ongoing threats include the elimination of the natural fire regime, livestock grazing, herbicide spray and drift, and the invasion of exotic species. The most recent status report on this species was done in 1991 (Lorain 1991a).

Aster mollis **Rydberg** is a regional endemic known primarily from the Bighorn Mountains, Wyoming with a single disjunct population within the assessment area (south of Yellowstone National Park) in Hoback Canyon that has not been relocated since 1922. It occurs in mountain meadows, forest edges, sagebrush grasslands, and open aspen stands. It prefers mesic sites on deep, alkaline or limestone derived soils. *A. mollis* could serve as a sensitive indicator species of good (or better) range conditions. Threats to this species are infrequent with the exception of livestock grazing which impacts populations directly by consumption and trampling and indirectly by facilitating the introduction of exotic plant species. Road construction associated with timber sales has been documented as a localized threat.

Astragalus anserinus **Atwood, Goodrich, & Welsh** is a regional endemic found on the tuffaceous ashes of the Goose Creek drainage of southern Idaho, Northwestern Utah, and northeastern Nevada at elevations between 4,500 and 6,000 feet. This nitrogen fixing species prefers sites with a southerly aspect and cover values of less than 20% (usually dominated by mountain big sage and juniper). Threats to this species stem largely from livestock grazing and the invasion of exotic plant species though fire suppression activities, mining, road maintenance, and herbicide spray drift are also seen as important challenges to local viability. The current trend for this species is downward.

Astragalus applegatei **Peck** is a federally listed endangered species. It is a local endemic known historically from seven populations, two of which are extant in Klamath Co., Oregon, near Klamath Falls. The species is limited to two narrow areas of occurrence within the southern portion of the East Cascades physiographic province, comprising a metapopulation of fewer than 20,000 individuals spread over a total area of less than ten acres. Of the two populations, one is on state land, but the largest occurs on private land leased by the Nature Conservancy. The species is a long-lived, deeply taprooted legume found in flat, open, seasonally moist remnants of floodplains characterized by *Poa nevadensis-Puccinella lemmonii* grasslands and salt desert shrub flats of the Klamath Basin. Sites range in elevation from 4000 to 4200 feet. *A. applegatei* is associated with *Sarcobatus, Distichlis,* and *Castilleja* species. Seasonal flooding at these sites may limit the dominance of other species and create favorable openings, and it is thought that historic drawdown of the water table may have eliminated some sites. Historically, agriculture conversion in the Klamath Valley was a major factor in the reduction of habitat. Today both agriculture and urban development may still impact small undetected relict sites on private land. Habitat conversion at the site of the principal population to exotic species, including quackgrass, cheatgrass, and *Melilotus* appears to be a significant cause of population decline. *A. applegatei* hosts an unknown species of beetle larvae and the adult stage of a number of genera of blue butterflies (Family Lycaenidae). Ground disturbance poses threats to pollinators, notably ground-nesting bees. With the loss of pollinators, gene flow and seed set are inhibited, and loss of fruits to predators may also result in significant losses. The endangerment of *A. applegatei* is considered very high and it is considered one of the most imperiled plants in Oregon as populations are on a decreasing trend.

Astragalus atratus **Wats. var.** ***inseptus*** **Barneby** is a local endemic native to the shallow basalt soils of the northern Snake River Plains in southern Idaho between Blaine and Elmore Counties. Populations of this nitrogen fixing forb are usually found between 2,900 and 5,600 feet in cool, clay rich soils. Vegetative cover of typical *A. atratus inseptus* sites range between 10-40%. This species is in decline as a result of several serious threats, most prominent being road building, land conversion, livestock grazing (especially trampling), the change in historic fire regimes, and the invasion of exotic plant species. Less immediate but still important threats stem from range improvements (especially seeding) and the use of herbicides. A 1991 (Smithman) status survey is available for this species.

Astragalus collinus **var.** ***laurentii*** **Barneby** is a local endemic in Oregon. In the Columbia River Basin Province, there are 31 locations in Gilliam, Morrow, Sherman and Umatilla Counties. All populations are fragmented, relictual occurrences mostly on road shoulders. None are in federal ownership. It occurs on fractured basaltic outcroppings from 1970 to 2700 ft. in elevation. Significant threats are exotic plants and development. Two populations have been destroyed in the city of Pendleton since 1972. It is a nitrogen fixer and contributes to soil stabilization.

Astragalus columbianus **Barneby** is a local endemic of south-central Washington. In the Columbia River Basin Province, it occurs in Yakima, Cadets and Benton Counties. Of the 32 occurrences, 24 are on federal land. Populations of this perennial usually consist of several hundred plants. This nitrogen fixer, is only found along the banks and hills of the Columbia River on compacted river cobble, loam, sandy loam, and basalt scablands with shallow basic soil. The plant ranges from 420 to 2500 ft. in elevation in big *Artemisia tridentata* and *A. rigida* plant communities where rainfall is 7 to 12 in. per year. Although very limited in range, populations may be large with hundreds of plants, even in disturbed areas. It shows an initial positive response to fire, but decreases in number as the cover of big sagebrush increases. Palatable to sheep and cows, grazing is a significant threat. This plant produces large fruit, which may provide food for other mammals also. Additional threats include military exercises and developments for orchards and recreation.

Astragalus diaphanus **Dougl. ex Hook. var.** ***diurnus*** **(Wats.) Barn.** is a regional edaphic endemic of the South Fork of the John Day and Columbia Rivers in Klickitat County Washington and Grant County, Oregon. There are no extant sites in Washington. This nitrogen fixing, annual species grows in *Juniperus occidentalis* woodland openings (<5% cover) with *Cercocarpus, Lewisia,* and *Eriogonum* species on thin well drained volcanic substrates suspected to be naturally low in available nitrogen. Site elevations range from 1,650 to 4,000 feet. Adequate winter and spring precipitation is required for seed production and germination. It has been removed from the Oregon Sensitive List because of its abundance and apparent positive response to perturbations as disturbance of seedbeds by animal trails and rill erosion is needed.

It is found on sandy soils derived from John Day volcanic ash. It provides soil stabilization for highly eroded soils. A change in fire regime is a significant threat. Pollination is by small bees or autogamy. Mature fruits are dispersed by wind, gravity, and overland water flow. Predation on fruits and minor herbivory by small mammals and insects also occurs.

Astragalus diaphanus var. *diurnus* sites overlay a significant source of cinders used in the maintenance of nearby roads, and a primary threat to this species is the potential excavation and subsequent invasion of these sites by exotic species. Changes in the historic fire regime and off-road vehicle use threaten this species.

***Astragalus howellii* Gray** is a local endemic of the lower Deschutes River watershed. It has a relatively broad ecological amplitude, occurring on sites ranging from lower and upper slopes, to ridges, on shallow gravelly lithosols. Ten occurrences are reported from the southern East Cascades and High Lava Plains provinces, Wasco Co., Oregon. Associated communities include, but are not limited to, *Pinus ponderosa* and *Quercus garryana* forested communities and *Artemisia tridentata-Agropyron spicatum* communities. The species is known to populate road banks and disturbed substrates, and its invasive habit contributes to a locally common distribution. *Astragalus howellii* habitats are often grazed, and the species itself is palatable to livestock. However, grazing does not appear to significantly impact species viability, and population trends are considered stable. Due to its pioneering characteristics, this species may flourish following wild or prescribed fires.

***Astragalus mulfordiae* M.E. Jones** is a regional endemic restricted to course, deep, and usually sandy soils in southwestern Idaho and adjacent Oregon (primarily the Glenns Ferry sands and related formations). Vegetative cover at typical *A. mulfordiae* sites is usually low (less than 20%) and is often dominated by bitterbrush (*Purshia tridentata*) with an occasional significant component of *Stipa comata*. Other common associates include *Balsamorhiza sagittata*, *Chrysothamnus viscidiflorus*, *Oryzopsis hymenoides* and *Penstemon acuminatus*. *A. mulfordiae* is found only on sites with a minimal slope of 10%. Populations being monitored in Idaho and Oregon both show distinct population declines in recent years (90% in some areas). Major threats to the viability of *A. mulfordiae* populations include mining, land development, changes in the historic fire regime, range seedings (especially with crested wheatgrass), and the invasion of exotic plant species. Livestock grazing and road building are problems in certain areas. One population has declined by over 90 percent within the last six years as a result of sheep and cattle grazing, and small mammal herbivory. Smithman (1993) completed a field survey of the eastern edge of this species range in Idaho and a conservation agreement for this species exists between the US Fish and Wildlife Service and the BLM. Owen, et al. (1994) found that all (or most) populations of *A. mulfordiae* are infected with a rust. The pathological impact of this fungus is unknown.

***Astragalus oniciformis* Barneby** is a regional endemic restricted to shady soils north of the Snake River between Picabo and Craters of the Moon National Monument in southern Idaho. It is immediately threatened by land development, road building, and the invasion of exotic species. Livestock grazing and the historic change in fire regimes are also threats. Current population levels of *A. oniciformis* are projected to be decreasing.

***Astragalus paysonii* (Rydb.) Barneby** is a regional endemic restricted to three eastern Idaho counties and western Wyoming. *A. paysonii* is found in early seral forests (especially lodgepole pine) at moderate elevations (4,000 to 9,600 feet). It seems to tolerate moderate levels of disturbance (consistent with its early seral habit), prefers sites with low relief, and grows best on well drained soils where canopy closure is between 15-45%. The factors that determine this species' distribution are poorly understood and there appears to be much unoccupied suitable habitat. Some authors have suggested that the species may be short lived and restricted to early successional environments (Fertig pers comm). In Wyoming, 15 of the 34 known occurrences are found within the ICBEMP assessment boundary, where the mean population size is 225 plants and all sites are on federal land. Data from Lorain (1990) for Idaho suggests an even smaller total population in Idaho. The greatest threats to the viability of *A. paysonii* populations include changes in the native fire regime and resultant alteration of in the historic distribution and size of forest structural stage patches. The invasion of exotic plant species and road building are also considered to be important threats to this species viability. A limited survey report for this species was completed in 1990 (Lorain).

***Astragalus peckii* Piper** is a regional endemic known from a total of thirty-eight occurrences reported from Klamath and Deschutes Counties, Oregon. In 1995 several new occurrence were discovered on the Chiloquin Ranger District of the Winema National Forest. The species is found on nearly level sites characterized by deep, dry, loose Mazama pumice or ash soils at elevations between 3,000 and 5,000 feet. *Astragalus peckii* is an early seral, perennial legume that occupies open, sunny sites in the coniferous or shrub canopy. Habitat is characterized primarily by *Juniperus occidentalis/Purshia tridentata*/bunchgrass, *Pinus ponderosa*, and *Artemisia tridentata* communities. It is also found in association with topographic climax *Pinus contorta* stands with *Purshia tridentata* understory. Its flowers appear to be pollinated by small bees, and seeds are dispersed by gravity and wind. As with other members of the genus, *A. peckii* fixes atmospheric nitrogen, although its contribution to the nitrogen budget in a *Purshia tridentata* community may be minimal. Populations of high density are known from recently disturbed habitats, and populations are stable to decreasing in trend. Threats to habitat are primarily associated with urbanization in central Oregon. Silviculture and fuels prescriptions to decrease canopy cover and diminish fuel loads while protecting the soil and seed bank could benefit the species.

***Astragalus pulsiferae* Gray var. *suksdorfii* (Howell) Barneby** is a disjunct perennial species in Washington with the rest of its range in the Sierra Nevada and Cascade Mountains of California. In the East Cascades North Province, it is known from three occurrences in Klickitat County, two of which are on federal land. Populations range from 35 to 600 plants and are found on volcanic soils. Its habitat includes, *Pinus ponderosa* woodlands on flat areas of sand and gravel, as well as disturbed roadsides and old roadbeds. Significant threats to this nitrogen fixer include changes in fire regimes, the invasion of exotic plants, and timber harvest.

***Astragalus scaphoides* (Jones) Rydb.** is a regional endemic restricted to talus slopes derived from Challis volcanics. This nitrogen fixing species is immediately threatened by livestock grazing, changes in the historic fire regimes, land development, and the invasion of exotic plant species. Current populations are projected to be stable.

Astragalus sinuatus **Piper** is a local endemic to southern Chelan County, Washington. The plant is known from nine occurrences in the East Cascades North Province. Five of these are on private land. Populations of this perennial may include several hundred plants scattered over tens of acres. It inhabits light porous, well-drained and relatively deep loam and basalt soils on southeastern to southwestern aspects on lower slopes, toe slopes, and mid-slopes. It ranges from 400 to 2000 ft. in elevation in the *Artemisia tridentata* and *Agropyron spicatum* plant community. Monitoring data for this nitrogen fixer shows that invasion by exotic plants is the major threat. Grazing has caused an increase in fuel for fires, where establishment after fire is poor for this species.

Astragalus solitarius **Peck** is a regional endemic of the Great Basin and Owyhee Uplands physiographic provinces, and adjacent Nevada. It is known in Oregon from seventy-five occurrences in Harney and Malheur Cos., many of which have been recently reported. The species is found on flat to rolling topography within *Artemisia tridentata* and pristine *Artemisia tridentata* ssp. *wyomingensis*/*Agropyron spicatum* communities, and occasionally in association with *Purshia tridentata* or *Atriplex spinosa* communities. Individuals frequently establish near the crown of *Artemisia*, and where solitary, away from the protective environment of the nurse plant, individuals are stunted. Collectively, *A. solitarius* populations are considered stable, although most sites are degraded as a result of grazing. Fire and livestock are considered threats where they lead to a loss of the shrub component and to increased competition from exotics, especially cheatgrass and crested wheatgrass. Mining claims are present at many sites, and the potential impacts of mining on the species requires monitoring.

Astragalus sterilis **Barneby (=*A. cusickii* var. *sterilis*)** is a regional endemic restricted to a variety of ash deposits in the northern Owyhee desert in Idaho into the Succor Creek and Leslie Gulch areas of adjacent Malheur County, Oregon. *A. sterilis* is found between 2,800 and 4,600 feet on steep slopes that are essentially devoid of vegetation. Populations are small, ranging from 11 to 50 individuals per site, and the species' entire range encompasses an area 30 by 15 miles. *Astragalus sterilis* is an early successional species, and while it colonizes newly exposed ash outcrops, it has not been found colonizing recently disturbed areas such as roadsides. This nitrogen fixing forb is subject to many threats, most significantly mining (especially zeolite and bentonite but also gold), the invasion of exotic plant species, and road building. Lesser yet still important threats stem from changes in the historic fire regime, livestock grazing (especially from trampling), land development (including seeding), and OHV's. A 1990 (Smithman) status survey is available for this species.

Astragalus tegetarioides **M.E. Jones** is a regional endemic found in the Basin and Range and Blue Mountains physiographic provinces. It is known in Oregon from at least fifty occurrences in Harney Co., only one of which occurs within the Basin and Range Province. Many new populations have been located recently (A. Kratz & N. Taylor, *pers. comm.*). Populations are distributed from near U.S. Highway 395 west to the Dry Mountain area near Riley, at elevations between 4800 and 5220 feet. All known populations are under public ownership (Meinke & Kaye 1992), and most recent sightings have been from the Snow Mountain RD, Ochoco NF, and secondarily from the northern end of the Burns and Lakeview Districts, BLM. *Astragalus tegetarioides* develops a deep taproot capable of exploiting late-season moisture, and individuals occupy cracks in tuffaceous and basalt outcrops, sites on poorly developed soils derived from pink welded tuffs, and occasionally on deeper soils in big sagebrush-dominated swales and in openings within ponderosa pine forest. Soils are generally shallow and stony, however, poorly to moderately drained, and comprised of ashy clays overlying heavily fissured bedrock (Meinke & Kaye 1992). Sage-scab flats supporting the species often interfinger up into ponderosa forest, and have likely been maintained historically by fire. The species has also been identified at a borrow pit on the Ochoco National Forest, and on abandoned skid roads, gravel roadbeds, and in roadside ditches. As the species is found on three diverse substrate types (bedrock, shallow gravelly soils, and deeper soils within swales), habitat relations and possible taxonomic differences require further attention. The species appears to be a poor competitor, and a thick litter layer or dense shrub overstory may inhibit its establishment. Within the ponderosa sites, associated species include *Artemisia arbuscula, A. tridentata, Purshia tridentata, Allium acuminatum, Calochortus macrocarpus, Ipomopsis aggregata, Mimulus nanus* and other annual forbs. Associated species at a disjunct rimrock-scrub site near Little Juniper Mountain include *Juniperus occidentalis, Artemisia rigida, A. arbuscula, Chrysothamnus nauseosus, C. viscidiflorus, Astragalus purshii, Lomatium nevadense, Lewisia rediviva, Agropyron spicatum,* and *Poa sandbergii.* The species appears to be insect pollinated, and habitat destruction leading to a reduction of ground-nesting pollinators could severely impact seed set. A monitoring study to assess impacts of timber harvest activities on *A. tegetarioides* was initiated on the Snow Mountain District, Ochoco NF, in 1991. Livestock grazing and invasion by exotics may also pose a threat. Future management of the species may require prescribed fire to maintain overstory openings in associated ponderosa pine communities.

***Astragalus tyghensis* Peck** is a local endemic known from twenty-four occurrences in Tygh Valley in eastern Wasco Co., Oregon. It occurs on deep, well-drained soils of the Bakeoven-Watama and Bakeoven-Maupin soil series in *Artemisia tridentata-Agropyron spicatum* communities along the edge of *Pinus ponderosa, Quercus garryana,* and *Juniperus occidentalis* mixed forest. Habitat is characterized by a mounded prairie topography. A deeply-taprooted perennial legume, its flowers provide nectar and pollen to native bees. Exotic annual grasses, including *Bromus tectorum* and *Taeniatherum caput-medusae,* are common on some sites. Agricultural conversion of habitats has caused fragmentation of populations and concurrent reduction or loss of gene flow. Removal of encroaching vegetation by prescribed fire may prove beneficial. Early demographic studies by the Oregon Department of Agriculture suggest that populations are stable, but many additional years of data are required to confirm an increasing trend.

***Astragalus vexilliflexus* Sheld. var. *nubilus* Barneby** is a local endemic known only from the White Cloud Peaks of Custer County, Idaho. It occurs on ridgecrests and upper slopes to an approximate elevation of 9,000 feet. Fewer than ten populations of this low-growing *Astragalus* are known though there is much unsurveyed habitat on the east side of the White Clouds. Current threats have been documented from recreation (especially off-road vehicle use on trails), mining, and grazing (though the impact of grazing is variable among sites). A survey report for this species was compiled in 1990 (Mancuso and Moseley) and a related report concerning *A. vexilliflexus* was prepared in 1994 (Moseley).

Astragalus yoder-williamsii **Barneby** is a regional endemic found in southwestern Idaho and adjacent Nevada at elevations between 4,560 and 6,000 feet on shallow to moderately deep, cool soils. This sparsely distributed, nitrogen fixing forb is threatened by historic changes in the native fire regime, road construction, mining, grazing (as a result of trampling), and range improvements (especially seeding, water developments, and juniper burning). The introduction of exotic species has threatened *A. yoder-williamsii* more by increasing fire frequency than through obvious direct competition. A recent status survey for this species is available (Mancuso and Moseley 1993a).

Balsamorhiza rosea **Nels. & Macbr.** is a local endemic in southern Washington and adjacent Oregon. In the Washington portion of the Columbia River Basin Province, this species is more abundant than previously thought. The single occurrence in Umatilla County, Oregon has been extirpated. It grows on fractured basaltic crevices, rocky ridgecrests, and butte summits from 1000 to 3500 ft. in elevation. Important threats include development of television, wind turbine and microwave tower sites; mining, and exotic weed invasion.

Botrychium ascendens **W.H. Wagner** has a scattered distribution within its' geographic range of Alberta, British Columbia, Ontario and Yukon in Canada, and Alaska, California, Montana, Nevada, Oregon and Wyoming in the United States. It is rare throughout its range (Wagner and Wagner 1986, 1993). In Idaho, this species has been found in and near riparian areas within late seral, moist forests (western red-cedar with grand fir) that have greater than three inches of accumulated duff; this species is often found with other *Botrychium* species, especially *B. minganense*. In the Okanogan Highlands Province, this short-lived perennial is only known from one confirmed location, which is on National Forest Service land. This site in Ferry County is on the moist floodplain of a perennial stream in a late seral *Thuja plicata* and *Clintonia uniflora* forest. Canopy cover is 100% with a cedar duff layer. Elevation ranges from 3980 to 4120 ft. Three other species of *Botrychiums* occur with it, forming a "genus community." Sightings should be verified for correct identification, as this species is easily confused with others. *Botrychium ascendens* is currently verified from only one location in Montana, this based on a specimen collected by C.L. Hitchcock in 1948. This collection was made near the Chinese Wall, in the Bob Marshall Wilderness Area in northwest Montana. Another population may be located in the Little Belt Mountains of central Montana, but its identification has not been verified (W. Phillips, pers. comm.). Mycorrhizal fungi are required for spore germination and gametophyte development of *Botrychiums*. The major threats to *Botrychiums* in general are timber harvest (due to overstory removal), riparian disturbances, stand replacement fires.

Botrychium crenulatum **Wagner** is a species of scattered geographic distribution in the western United States, known to occur sporadically in the states of Arizona, California, Idaho, Montana, Oregon, Nevada, Utah, Washington and Wyoming (Flora of North America Association 1993). It is currently known from one verified occurrence in Montana, that having been last observed in 1984 in Lake County (Montana Natural Heritage Program database records, Helena), and three likely occurrences on the Kootenai National Forest in Lincoln County (L. Ferguson, pers. comm.). The species occurs in moist forests at lower elevations, typically in association with mature or old growth *Thuja plicata* (western red cedar) groves; the Lake County record was found at an elevation of 3,100 feet (Lesica and Shelly 1991). It is also described as occurring in "marshy and springy areas" (Flora of North America Association 1993). One of the Lincoln County populations was found in a highly disturbed roadside ditch, but this ditch does not have noxious weeds present, and is moist for most of the year (L. Ferguson, pers. comm.).

In the Okanogan Highlands Province, it occurs in 42 sites in Okanogan, Ferry, Stevens and Pend Oreille Counties, all on National Forest Service land. Although a few sites have over 100 plants, most populations have under 20. This species grows in moist areas, such as moist meadows, perennial or intermittent streams, and seeps in mid- to late seral forests of *Thuja plicata, Tsuga heterophylla* and *Picea engelmannii* with over 70% canopy cover. Sites range from 2030-5200 ft. in elevation and are on floodplains, in draws, ravines, and on lower slopes. It often occurs in "genus communities" with other species of *Botrychiums.*

In the East Cascades province of Washington, these short-lived perennial plants occur in moist openings and seeps, as well as near intermittent and perennial streams in *Thuja plicata* and *Tsuga heterophylla* forests over 100 years of age. Habitat characteristics include high organic matter, mafic soils with a high soil moisture, and a needle duff layer from 2 to 6 in. deep. Landforms encompass floodplains, draws, basins and midslopes from 3000 to 5500 ft. in elevation with over 20% canopy cover on northerly slopes of five to 30%. There are six occurrences that mostly consist of small (less than 50 individuals) populations.

In the Blue Mountain Province this *Botrychium* was known from eight occurrences in Union and Wallowa counties of Oregon. Recently, a single plant occurrence was confirmed from Grant County Oregon (Urban 1995), and an additional 15 occurrences have been reported from Crook and Harney Counties, in Oregon (Streier 1995). It is frequently misidentified, leading to occasional unverified reports in other areas (Zika 1992). In the Blue Mountain Province it has been reported growing in partially shady habitat between 4,800 and 6,000 feet in elevation. It is affiliated with year-round mesic, and semi permanently flooded marshy meadows and openings adjacent to Englemen's spruce, lodgepole pine, or grand fir stands. The soils at known sites are influenced by Quaternary surficial deposits or Hurwall Formation (Zika 1992) sedimentary, bedrock.

This species can be found in the same forest types as *B. ascendens* but usually prefers wetter, more mesic, sites. As with many *Botrychium* species, focused field surveys are needed in order to better understand the distribution, abundance and habitat relationships of *B. crenulatum.* Known threats derive from activities that alter canopy closure or drain its habitat (i.e., timber harvests and some livestock grazing activities) as this species is sensitive to changes in soil moisture levels . Other significant threats include fires that remove the canopy cover and change species composition, trampling from grazing, timber harvest (clearcuts), and road construction. *B. crenulatum* may tolerate low intensity fire if burning happens after sporulation in late summer or early fall; spring and summer burning is adverse. Although apparently tolerant of some ground disturbance, the level of such disturbance has not been quantified. It is threatened at many known locations by excessive trampling by campers and recreational livestock grazing.

Botrychium lunaria **(L.) Swartz** is a peripheral species in Washington, but is the most widespread of the moonworts ranging from Alaska over most of Canada to the northeastern and western U. S. In the Okanogan Highlands Province, it is known from 14 occurrences in Okanogan, Ferry and Stevens Counties. Most are on federal or state land with less than 10 plants at a site. It ranges in elevation from 3000 to 7400 ft. This species grows in late seral forests of *Thuja plicata* and *Tsuga heterophylla* with over 70% canopy cover in moist areas on floodplains, lower slopes, and midslopes on well-developed duff layers. In Okanogan County, it occurs in subalpine meadows with 0 to 30% canopy cover often on deer or sheep dung, in grassy openings, or near perennial streams. It often occurs in "genus communities" with other species of *Botrychiums*. Stand replacement fires and clearcuting are the biggest threats.

Botrychium paradoxum **Wagner** is a rare species of scattered geographic distribution, with occurrences known in Alberta, British Columbia and Saskatchewan in Canada, and Montana and Utah in the United States (Flora of North America Association 1993) but more sparsely distributed than *B. crenulatum*. In the Okanogan Highlands Province, there are four sightings in Ferry and Stevens Counties, each has fewer than 10 individuals and all are on National Forest Service land. This short-lived perennial inhabits late seral *Thuja plicata* forests on floodplains, stream terraces near perennial and intermittent streams, lower and midslopes, and compacted old roadbeds. It also is found in early seral *Pinus contorta* plant associations in moist grazed old homestead meadows. It ranges in elevation from 2480 to 3520 ft. and occurs in areas disturbed by campers and cattle.

Seven occurrences have been documented in Montana (Vanderhorst 1993), from Deer Lodge, Glacier, Granite and Pondera counties (Lesica and Shelly 1991; Vanderhorst 1993). One population was not relocated, despite surveys in 1986. In most of these locations *B. paradoxum* is found in "genus communities" (mixed populations that include other species of *Botrychium;* Wagner and Wagner 1983). Habitats include mesic grasslands, meadows adjacent to lakes, and openings in forests dominated by herbaceous species. The largest population documented rangewide, on the Deerlodge National Forest, occurs in near-pristine native montane *Festuca scabrella* grassland. Another site on the Deerlodge National Forest is highly disturbed by rodents and big game; this habitat supports many fewer, typically small and chlorotic, plants. A third location is threatened by off-road vehicle use, recreational impacts and, possibly, a mining claim (Vanderhorst 1993). Many members of the Ophioglossaceae, including species of *Botrychium,* have no root hairs and are considered to be dependent upon associated endophytic fungi for mineral absorption as well as, presumably, carbohydrate nutrition (Gifford and Foster 1989; Lellinger 1985; Wagner and Wagner 1981). This mycorrhizal relationship, found in both the subterranean gametophyte and the terrestrial sporophyte, is apparently responsible for allowing the evolution of partially achlorophyllous species such as *B. paradoxum* (Wagner and Wagner 1981). The species of symbiotic fungi are not known. Because of this obligatory symbiosis, which is poorly understood, species of *Botrychium* cannot be propagated and studied apart from the wild (Vanderhorst 1993).

In the Blue Mountain Province this species was known from two occurrences in the Wallowa Mountains of Wallowa County Oregon. A single plant occurrence was recently confirmed for Grant County Oregon (Urban 1995). In the Blue Mountain Province it grows between 5,000 and

5,500 feet in elevation, on soils influenced by Quaternary surficial deposits or Hurwall Formation sedimentary, (limy) bedrock (Zika 1992). It is most often associated with open mesic meadows of Tufted Hairgrass-sedge assemblages and alluvial fans. Sites in the Lostine and Hurricane drainages of the Wallowa Mountains are in full sun with partial afternoon shade (Zika 1992). Other occurrences in Washington and Oregon have not yet been confirmed, thus it remains one of the rarest botrychiums in this genus (Zika 1992).

Focused field surveys, especially in geographic areas adjacent to known populations, are needed for this, and many other, rare species of *Botrychiums*. The plants are often difficult to detect, given that they usually occur in the dense understory of the associated herbaceous vegetation. *B. paradoxum* may tolerate fire if low intensity burning occurs after sporulation in late summer or early fall; spring and summer burning is detrimental, though no monitoring has been conducted. Populations in the Wallowa mountains are at risk from hiker trampling and camping. Recreational packstock also pose a threat via grazing and trampling impacts.

***Botrychium pedunculosum* W.H. Wagner** is a species with a scattered distribution in Washington and Oregon. It is also found in a handful of locations in Alberta, British Columbia, and Saskatchewan. In the Okanogan Highlands Province, it is known from seven occurrences in Stevens and Pend Oreille Counties, all on National Forest land. There is also an herbarium collection from Ferry County, Washington. The type location is from the Lostine River, Wallowa County, Wallowa-Whitman National Forest, and from the literature from Union County, Oregon. In Washington, most populations are under 40 individuals, although one meadow site has over 1,000 plants. It grows in late seral *Thuja plicata* forests on lower slopes and in early seral *Pinus contorta* plant associations on the drier edge of grassy swales and moist grazed old homestead meadows. It is known from 2460 to 3350 ft. in elevation. It often occurs in "genus communities" with other species of *Botrychiums*. Exotic plants are a significant threat.

Botrychium pumicola* Cov.** is a local endemic that occupies alpine pumice barrens of the SE Cascade Range and coniferous forests of the southern pumice plateau. One hundred thirteen occurrences are reported from three Oregon counties (Deschutes, Klamath, Lake), ninety-three of which are from the East Cascades South, and twenty from the High Lava Plains physiographic provinces. Alpine populations are found on broad ridge tops ranging in elevation from 6500 to 8500 feet, while pumice plateau populations are generally found on planar or concave topographic surfaces between 4200 and 5150 feet. Sites are characterized by a ***Pinus contorta*, *Purshia tridentata and ***Festuca idahoensis*** or ***Stipa occidentalis*** community. ***Pinus ponderosa*** dominates some sites. Overstory canopy cover is relatively low, ranging from zero to 30 percent, with light shrub cover and only a trace of herbaceous cover. The litter layer is poorly developed. The species is edaphically restricted to loose, unweathered Mazama pumice and individuals are inconspicuous, owing to their small stature and pale foliage. Spores are wind dispersed and likely washed deep into the substrate pending germination. Whittier (1973, *in* Vrilakas, 1984) reports that *Botrychiums* may require a endophytic mycorrhizal symbiont for survival of both the sporophyte and subterranean gametophytic phase. The ability or inability of the mycorrhizal fungus to migrate may limit the distribution of the fern. Deer, elk and rodents lightly browse the plants, and it is thought that browsing pressure prior to sporulation may decrease fecundity. Population trends are considered stable, but some populations may be declining. Threats to *B.*

pumicola in the high desert are largely related to fire suppression. Mature *Pinus contorta* stands are subject to insect and disease outbreaks, and these stands have a significant build-up of natural fuels that, when ignited, may have the potential to superheat the soil and destroy the gametophyte. Vehicular traffic associated with wood cutting uproots plants in fragile pumice sites, and alpine sites are occasionally damaged by hikers.

Calochortus longebarbatus* Wats. var. *longebarbatus is a regional endemic with a broad but clustered distribution. The northern portion of its range extends from Yakima and Klickitat Cos., Washington, south to Wasco Co., Oregon. The southern portion falls within the southern East Cascades physiographic province and extends from Klamath and Lake Cos., Oregon, to the Modoc Plateau (Modoc, Shasta, Siskiyou Cos.) in northeastern California. Fifty-two occurrences are reported from Klamath and Lake Cos., and within this province, the Sycan district appears to have the greatest concentration of populations. In addition, there are two sites in Wasco County and four occurrences in Union County. The Wasco County sites have been reported to be similar to *Calochortus longebarbatus* var. *peckii* as some flowers appear to be sterile (R. Helliwell, pers. comm). In the Columbia River Basin Province, all four of the occurrences in Washington are on private land in Yakima, Klickitat, and Whitman Counties and there are 17 occurrences in Yakima and Klickitat Counties, mostly on private land. *Calochortus longebarbatus* var. *longebarbatus* is found on clay loams in vernally moist sites, notably within thin soiled swales and along stony drainages of open meadow habitats, riparian zones and floodplains. Typically these swales are distributed among a matrix of conifer stands, most often pine types. In this habitat it is most often found growing in a band along the most moist portions of dry meadows or the drier areas of wet meadows (Kaye 1991). Individuals are found on drier, higher ground within moist *Deschampsia cespitosa*-dominated meadows, in small forest openings, along intermittent or ephemeral stream courses and occasionally beneath *Pinus ponderosa* or *Pinus contorta* at the margins of open meadow and herbaceous vegetative cover is generally high (>75%). In Washington, *Calochortus longebarbatus* var. *longebarbatus* is found from 1800 to 3000 ft. in elevation and in Oregon, site elevations range from 4500 to 5500 feet.

Soil moisture appears to control the distribution and phenology of this perennial herb. The ephemeral moisture in *Calochortus* habitat is supplied either through precipitation or subsurface flow, but water does not collect at the site to create anaerobic soil conditions (Jokerst 1983). It appears that, winter and spring moisture levels determine the percentage of the population that will flower that season, with spring moisture being critical. *Calochortus longebarbatus* var. *longebarbatus*, a fertile diploid, reproduces from seed and vegetatively from a bulblet borne at the base of the plant. Significant variability in the expression of below-ground populations has made census and monitoring difficult. A major portion of the population resides in the below ground bulb bank. The bulb is embedded deep in the soil, and above ground structures may be absent in drier years. Ownbey (1940) suggests that modern populations are relicts of a distribution that was once more widespread. Alteration of the hydrologic regime due to many activities is a principle threat to this species. Channelization and construction of impoundments for livestock appear to have had a detrimental effect on populations. Herbivory, trampling, forage seeding, competition, and compaction of moist soils by livestock also create negative impacts. Sod forming exotic grasses also pose a major threat to this species. Many grazed meadow populations are still extant, although they may be of low quality; likewise, many meadow habitats suitable for *C. longebarbatus* var. *longebarbatus* do not support the subspecies. Timing and duration of livestock vistitation will influence the capability of this plant to withstand grazing impact. While early-season grazing is clearly detrimental, low to moderate late summer-fall grazing may be acceptable. Changes in the historical fire regime (fire suppression) may have impacted this species by allowing the encroachment of trees and shrubs onto its meadow/meadow edge habitat. *C. longebarbatus var. longebarbatus* is sensitive to spring/early summer burning but tolerates low intensity fall burning. Timber harvest and road construction threatens this species through changes in hydrology from soil compaction and site conversion on adjacent timber stands. Dispersed campsites (e.g., hunting camps) may also have the same effect. Intensive grazing in meadows with *C. longebarbatus* var. *longebarbatus* has been correlated with population declines (Kaye 1991). The population trends of are unknown, and it is suspected that some populations may be in decline. A conservation strategy is in place on the Fremont NF (Kaye and Wooley 1994) and in preparation on the Winema NF (Goldenberg and Jean 1995).

***Calochortus longebarbatus* Wats. var. *peckii* Ownb.** is a restricted local endemic. In the Blue Mountain Province it is known from 161 occurrences in Crook, Harney, and Wheeler counties, Oregon. It is found at sites ranging from 4300 to 5200 feet in elevation. Habitat is almost identical to that listed for *C. longebarbatus* var. *longebarbatus*, vernally moist, low gradient draws and streambeds, and in broad meadow basins where it is situated between the wettest parts of the meadow and the forested edge. Unlike its fertile diploid relative, *C. longebarbatus* var. *longebarbatus, C. longebarbatus var. peckii* is a sterile triploid (Fiedler and Zabell 1994), and reproduces vegetatively through the production of bulblets that form at the base of the plant and by bulbils that form in the flower axils (Kagan, pers. comm). Bulblet dispersal mechanisms are unclear, though rodents have been suspected. Genetic studies are currently underway to determine the phylogenetic affinities of *C. longebarbatus* var. *longebarbatus* and *C. longebarbatus* var. *peckii* (Fiedler and Zabell 1994). Monitoring studies were initiated in 1993 to assess the effects of fire and grazing on this species. Significant variability in the expression of below-ground populations has made census and monitoring difficult. A major portion of the population resides in the below ground bulb bank. The bulb is embedded deep in the soil, and above ground structures are absent in drier years. It appears that, winter and spring moisture levels determine the percentage of the population that will flower that season, with spring moisture being critical. While early-season grazing is clearly detrimental, low to moderate late summer-fall grazing may be acceptable. Changes in the historical fire regime (fire suppression) may have impacted this species by allowing the encroachment of trees and shrubs onto its meadow/meadow edge habitat. *C. longebarbatus var. peckii* is sensitive to spring/early summer burning but appears to tolerate low intensity fall burning. This species faces the same threats as reported above for *C. longebarbatus* var. *longebarbatus* in the Blue Mountain Province. A conservation strategy is in preparation on the Ochoco National Forest.

***Calochortus nitidus* Dougl.** is a regional endemic currently known only from scattered, isolated populations in Idaho and (historically) southeastern Washington but was once widely distributed throughout the Palouse region of northern Idaho and adjacent Washington from three sites on private land in Garfield and Whitman Counties. This species can be found in a broad range of late seral habitat types from Palouse grasslands to mixed Doug-fir/ponderosa pine stands. Extant populations are usually small and appear to be distributed along the margins of the species' former range. This very large flowered species can be difficult to survey for because flowering is precipitation dependent and consequently, population sizes appear to be highly variable between years. Though this species is highly palatable to cattle, grazing impacts vary among sites and the indirect impacts (soil compaction, facilitation of weed invasion, etc.) that contribute to habitat quality decline are a greater problem than simple consumption. The most recent status and survey report available for this species is Caicco 1992.

***Camissonia pygmae* (Douglas) Raven** is a regional endemic in Oregon and Washington, known only from historic locations in Wheeler, Crook, and Harney Counties in Oregon (though possibly rediscovered in Harney County by Holmgren in 1996) and is extant in Washington from Douglas, Grant and Franklin Counties. There were 10 occurrences recorded as of 1992, two historic, and eight recent. In 1992 BLM Botanist, Pam Camp tried to relocate these occurrences and was only able to find five (Camp 1992). The plant grows on ash soils derived from John Day volcanics and on the soil interface adjacent to basaltic cliffs on slopes of 30 to 60% from 1800 to 2000 ft. in elevation. Habitat has diminished from heavy trampling by cattle. Gravel operations, roadside spraying and drift, and exotic plant invasion are significant threats.

***Carex lenticularis* Michx. var. *dolia* (Jones) Standley** is a peripheral taxon in Montana, with the majority of its range extending northward through Alberta, British Columbia and Yukon in western Canada, to Alaska. Seven occurrences are currently documented for Montana, in Flathead and Glacier counties. These sites are all concentrated in two areas in Glacier National Park, and are the only occurrences known in the lower 48 United States (Lesica 1988). This variety occurs in shallow, wet, stony soil around streams and in seepage areas in the alpine zone, at elevations from 6,700 to 8,000 feet (Lesica and Shelly 1991; Standley 1985). Appropriate habitat appears to be limited in Glacier National Park, however; areas of gentle, perennially wet terrain over 7,000 feet are not common. Recreational impacts, and construction of recreational facilities such as boardwalk trails, have affected occurrences of this variety in the vicinity of Logan Pass, a heavily-used area of Glacier National Park. Invasion of occupied habitat by mosses, with resultant declines in numbers and flowering of *C. lenticularis* var. *dolia,* also appears to be a factor influencing this taxon (Lesica 1988).

***Carex parryana* Dewey ssp. *idahoa* (Bailey) Murray** is a regional endemic, restricted to southwest Montana and adjacent Idaho. Subspecies *idahoa* is very similar to ssp. *hallii*; Murray (1969) provides a key and discussion of this complex. Fourteen occurrences are currently documented in Montana, in Beaverhead, Madison, Powell and Silver Bow counties. It has recently been proposed for redesignation as a Category 2 candidate (it is currently in Category 3C) (B. Heidel, pers. comm.). The habitat for this taxon consists of wet meadows and minerotrophic fens in regions of calcareous parent material, at elevations of 6,500 to 8,500 feet; the sites are located in flat, depositional land form areas (Lesica and Shelly 1991; Montana VP panel notes). Most of the populations in Montana are small in size, and the habitat at many sites is in poor condition from heavy livestock grazing. In addition, one site has been modified by ditch diversions and irrigation, resulting in artificial flooding. A conservation strategy is needed for this taxon.

Castilleja chlorotica **Piper** is a regional endemic known from eighty-seven occurrences in Deschutes, Lake and Klamath Counties, Oregon. Holmgren (1971, *in* Wooley and Phillips, 1994) suggests that the present distribution is discontinuous and may be relictual from a formerly more widespread distribution. A "perennial forb that generally grows in shrub-graminoid openings on exposed, well-drained slopes and summits at mid to high elevations" (Wooley and Phillips, 1994), it also occurs at low to mid-elevation sites that are entirely shrub-dominated. *Castilleja chlorotica* is a hemi-parasite, most often on *Artemisia tridentata,* but is also found in association with *Purshia tridentata* in *Pinus ponderosa* or *Pinus contorta* communities. Flowers are pollinated by members of the genera *Bombus* and *Osmia*, and seeds are wind and gravity dispersed. The host-parasite relationship is of great importance when assessing threats and management implications. Species occurrence is strongly associated with canopy gaps or open canopy conditions where understory light, water, and nutrient availability are high. Prescribed fire and silvicultural treatments may enhance *C. chlorotica* habitat, but survival of mature *Artemisia tridentata* and *Purshia tridentata*, neither of which are fire resistant, requires appropriate timing and spatial arrangement of prescribed fire treatments for maintenance of the crucial hemi-parasitic relationship. An additional threat to these populations is the possibility that *C. chlorotica* may hybridize when other species of *Castilleja* are present. Populations are generally considered stable, although those located within *Pinus ponderosa* communities may be at risk due to fire suppression and high fuel loads. A species conservation strategy (Wooley and Phillips, 1994) is in place on the Fremont National Forest.

Castilleja christii **N. Holmgren** is a very localized endemic native to high elevation meadows atop Mt. Harrison in the Albion Range in southern Idaho (Moseley 1993). Extensive searches of adjacent areas have failed to locate additional populations. The US Fish and Wildlife Service, Sawtooth National Forest, and the Idaho Department of Fish and Game Conservation Data Center are currently building a conservation agreement for this species. The population trend for this species appears stable. The only threats to this species are from road improvements and the increasing recreational use of the site.

Castilleja cryptantha **Pennell & G. N. Jones** is a local endemic in Washington and only is known from the north side of Mt. Rainier. There are two occurrences, both on National Forest Service land in Yakima County. It is known from subalpine and alpine meadows on slopes of zero to 20%. It grows on pumice with organic debris, in well-developed deep soils, in areas with late snowpack and high soil moisture, and ranges from 4500 to 7000 ft. in elevation. This species is susceptible to changes in moisture regimes and needs a maritime climate. Seedling establishment for this perennial is thought to be infrequent in subalpine meadows. The biggest threats are human trampling and grazing by horses used for recreation. The invasion of conifers may also be a threat.

Castilleja pilosa **(S. Wats.) Rydb. var.** ***steenensis*** **(Penn.) N. Holmg.** is a local endemic restricted to high elevation sites (>6500 feet) on Steens Mountain, Harney Co., Oregon. Thirty-five occurrences have been reported, with some contiguous, where suitable habitat exists. Morphological and geographical characteristics manifest in the three varieties of *C. pilosa* suggest that the complex has recently evolved. *Castilleja pilosa* var. *steenensis* combines characters of both varieties *pilosa* and *longispica* (Cronquist *et al.* 1984). No overlap in occurrence of *C. pilosa* var. *steenensis* and *C. pilosa* var. *pilosa has been observed*, however. Variety *steenensis* generally occurs on exposed summit ridges and cirque rims, but is also found on northern aspects at lower elevations on the west side of Steens Mountain. It is found in forb-dominated communities, rather than in shrubland or grassland types. Sites are generally rocky and exposed, and total vegetative cover ranges from 5 to 30 percent. Grazing pressure is low in occupied communities, but the species has withstood historic overgrazing. Closely monitored, low-intensity grazing may favor *Castilleja* by reducing grass cover, as var. *steenensis* has been observed to decrease with an increase in bunchgrass. Fire suppression may have led to increased shrub cover and habitat loss. Recreation is a possible threat, where trampling becomes severe. Populations appear to be stable.

***Castilleja rubida* Piper** is a restricted local endemic, known from seven occurrences narrowly distributed in the Wallowa Mountains of Wallowa County in Northeast Oregon. It grows on substrates derived from Hurwal sedimentary soils or Martin-Bridge formation limestone. Its habitat is alpine scree, bare cliffs, alpine plateaus and ridgetops, cirque basins, alpine turf and upper slopes. This species is found between 7,500 and 10,100 feet in elevation, on all aspects, often with *Trisetum spicatum* , *Erigeron chrysopsidis* var. *brevifolius* and *Ivesia gormanii. Castilleja rubida* appears to be a partial parasite on these species as well as other native alpine grasses (Kagan 1987). Growing on cool mountain tops, this geographically restricted alpine species could be threatened by global warming as its refugia would be limited. Mountain goats in the area of *Castilleja rubida* do not appear to feed on this species (Kagan 1978)

***Chaenactis cusickii* Gray** is a regional ash endemic from the Owyhee River region of Oregon and adjacent Idaho. It is found at elevations between approximately 2000 and 4200 feet, on ash outcrops weathered to clay with low percolation rates. It is often associated with *Allium* spp. and a variety of annuals, including the rare *Mentzelia mollis*. Reactivation of bentonite and zeolite mining in the area poses a threat, and some sites have already been disturbed by such activity. Gold mining developments are proposed at one site. During high moisture years, invasion of *C. cusickii* habitat by exotics, notably *Lepidium perfoliatum* and *Centaurea solstitialis*, is also a threat. Livestock grazing and off-road vehicle (ORV) use are identified as moderate threats. This species is decreasing rapidly. A recent status report is available for this species (Moseley 1994).

***Chrysothamnus parryi* (Gray) Greene ssp. *montanus* L. Anderson** is locally endemic to a very small area in the Red Conglomerate Peaks of the Beaverhead Range, in Beaverhead County, Montana and adjacent Clark County, Idaho; the area occupied is less than 2,000 acres (Lesica 1992). It is currently known from four occurrences in this limited area, one of which extends into Montana. The taxon occurs near timberline on stony, poorly developed soils derived from calcareous parent material of the Beaverhead Conglomerate formation (Mancuso and Moseley 1990). Specifically, it occurs on slopes or windswept ridge crests with southerly exposure, between 8,000 and 10,000 feet (Mancuso and Moseley 1990). Most of the Montana portion of the Red Conglomerate Peaks area consists of north-facing slopes; thus, there is little available habitat in the state. The Montana site is at 9,300 feet on a 50% slope with a 170 degree aspect. The sites are sparsely vegetated; in Montana, total shrub, graminoid and forb cover were estimated to be 1%, 10% and 10% respectively. The total number of plants globally is estimated to be approximately 3,600 (Lesica 1992). This species is an important source of cover for wildlife in its windswept habitat. The habitat is remote, and there are no apparent threats at this time. However, small population sizes and local distribution make the taxon vulnerable to any disturbances in the area. The plant should be given consideration in all management decisions related to the Red Conglomerate Peaks area, and the condition of populations should be monitored (Lesica 1992).

***Claytonia lanceolata* Pursh var. *flava* (A. Nels.) C.L. Hitchcock** is a local endemic that occurs at the ecotone of *Artemisia cana*/forb/grass community and ephemerally wet meadows between 6,450 and 6,500 feet around Henry's Lake in southeastern Idaho. All populations of this taxon are on private land. Population trends are currently stable however threats due to introduced plant species and land conversion are seen as significant. This taxon is being reclassified as *Claytonia rosea* ssp. *multiscapa.*

***Claytonia umbellata* Wats.** is a regional endemic of Oregon. It is known from Wasco, Harney, and Crook Counties and California and Nevada. It grows on basaltic dry rock channels from 4000 to 4800 ft. in elevation, in biscuit scablands. Populations are small and the range of the plant has decreased. Significant threats include gravel pits and exotic weed invasion. Currently this species is on the "watch-list" for Oregon Heritage.

***Collomia mazama* Coville** is a regional endemic of the southern Cascade Range known from fourteen occurrences in the southern East Cascades province, Klamath Co., Oregon. A slender taprooted perennial, it occurs in open, mesic forest environments at elevations ranging from 4700 to 6500 feet. Soils include glacial tills and those of volcanic origin. Lower elevation sites are generally riparian. *Collomia mazama* is associated with young and multi-strata stands in *Abies magnifica* var. *shastensis*, *A. concolor* and *Tsuga mertensiana* forests. In *Pinus contorta* forests, *C. mazama* occupies stands where understory reinitiation is occurring. Fruits ripen in mid-to late summer, at which time seeds are ballistically expelled from the capsule. Recruitment appears highest on substrates where duff has been removed. Threats are low and are limited primarily to trampling by recreational hikers at Crater Lake National Park and along developed trails on the Klamath RD, Winema NF. The species is absent from clearcuts, but appears to persist in stands characterized by partially open canopies. Population trends are unknown at this time. A conservation strategy is being developed on the Winema NF, and genetic studies are being conducted in cooperation with the University of Idaho.

***Collomia renacta* Joyal** is a newly described scattered endemic known from three occurrences in south central Malheur Co., Oregon, including one site near Star Mountain, mainly in federal ownership and one occurrence in Nevada. *Collomia renacta* is an annual, believed to be autogamous, and is found on poorly developed, basalt-derived soils on southern aspects between 5200 and 5700 feet in elevation. Mature fruits are released *in situ*, and may be dispersed by passing animals. Grazing and road construction are possible threats, as is invasion of sites by exotics. If increased fire frequencies were to convert the native vegetation to communities dominated by exotic annuals, *C. renacta* would be unable to compete. Little is known about population trends at this time.

Cymopterus acaulis **(Pursh) Raf. var.** *greeleyorum* **Grimes & Packard** is a local endemic known from Malheur Co., Oregon, and from additional sites in Idaho. Occurrence data for Oregon is unavailable at this time. The species is found on Succor Creek Formation ash weathered to montmorillonite, and early spring precipitation is essential to successful reproduction and growth on these xeric sites. As with other ash endemics of the Owyhee Uplands, it is potentially threatened by mining, off-road vehicle (ORV) traffic, and other ground disturbing activities. Invasion of sites by exotic species may also be a threat. Population trends are unknown.

Cymopterus davisii **R.L. Hartman** is a local endemic occurring at high elevations on Mt. Harrison and Cache Peak in the Albion Range in southern Idaho. Little is known of this species other than that it occurs in subalpine grassy slopes and rock outcrops (Moseley 1993). This taxa occurs on relatively deep gravelly soils derived from quartzite, disturbed by pocket gophers, frost heaving or a similar type of disturbance. It generally occurs on north facing aspects, although there are south facing sites occurring in depressions where snow lies late into the summer. It does not occur on wind swept ridgelines where soils are shallow. Population vigor appears to be excellent. Threats appear to be minimal with exception of the influence of a radio transmission site on Mt. Harrison.

Cymopterus douglassii **R.L. Hartman & L. Constance** is a regional endemic found at high elevations on all aspects from flat ridgelines to relatively steep scree slopes in the Lost River and Lemhi Ranges in eastern Idaho. This species is usually found on carbonate substrates in subalpine basins, open subalpine woodlands and grasslands. The occurrences are limited in size but appear to be in otherwise good condition, with the populations dense and vigorous. Little is known about the biology or ecology of this species and no threats were identified during the panel process. The Idaho Conservation Data Center is currently preparing a status survey for this species.

Cymopterus nivalis **Hartman & Kirkpatrick** is a scattered endemic known from Idaho, Nevada, Utah, Montana, and Wyoming. The Oregon Basin and Range populations, including sites at Steens Mountain and Table Rock, represent the western most extent of the species. The dry, rocky sites on which it is found, notably volcanic tuffs and bald areas with less than 30% vegetation cover and at elevations between 4200 to 8900 feet. *Artemisia arbuscula* is a common associate. *Cymopterus nivalis* exploits early spring moisture provided by rainfall and snowmelt. A deeply-taprooted perennial, it aids in soil stabilization and nutrient cycling on otherwise sterile mineral substrates. Potential threats to the species include early season grazing and vehicle traffic. Road and area closures designed to protect two sites in Lake Co. have resulted in a significant increase in the number of individuals present at those sites. Population trends appear to be stable at this time.

Cypripedium fasciculatum **Kell.** is an orchid with a widely scattered distribution in the western United States; it is known to occur from southern British Columbia, Oregon, Washington, to southern California, east to Colorado, Idaho, Montana, Utah, and Wyoming (Brownell and Catling 1987). In Montana, 17 occurrences of the species have been documented in the northwest and west-central portions of the state, in Lake, Mineral and Sanders counties. The species occupies a variety of coniferous forest cover types, but in Montana it does not typically occur in stands that have a closed canopy; it prefers more open, mid-seral stand conditions. Associated cover types include Douglas-fir/ninebark, ponderosa pine, and western red cedar mixed conifer stands, usually in warmer microhabitats. In the Blue Mountains, one occurrence in Baker County, Oregon, has not been relocated since reported. In this province it is found between 2,500 and 6,500 feet in elevation under the filtered sunlight of open parkland-like conifer stands or deep shade of old growth conifers. It is also reported to be associated with *Holodiscus discolor* or *Pachistima myrsinites* on basalt derived soils. In Idaho, it is found on the river breaks of central and northern Idaho in low elevation (1,000 to 3,000 feet) forests with greater than 50% canopy closure, an area concurrent with the maritime refugium (sensu lato). In Washington, most of the 50 locations in Chelan, Kittitas, Klickitat and Yakima Counties are on federal and state land, yet it is known from only one occurrence each in Columbia and Garfield Counties, Washington. There are also two occurrences, both on public land in Whitman and Kittitas Counties, Washington. One isolated population is surrounded by wheat fields, so a significant threat is the isolation of populations as have under a dozen plants. It grows under mid- to late seral *Pseudotsuga menziesii/Pinus ponderosa* overstories with a closed herbaceous layer and variable shrub layer, mostly on northerly aspects about 4500 ft. in elevation. It can also be found in *Abies grandis* forests with Swauk sandstone, thick duff or sandy loam soils. Slopes range from 5 to 75% and canopy cover varies from 25 to 80%. Populations are on upper, mid- or lower slopes, as well as ridgetops. It ranges from 700 to 5300 ft. in elevation. It is limited to well-drained sites. Most populations are small and reproduction is low. At all sites in the ICBEMP the scattered, generally small, character of most of the populations seems to be contributing to poor reproductive success.

The pollination and reproductive biology of this mycotrophic species is poorly understood and apparently complex. The seed requires a mycorrhizal fungal associate to germinate and survive. Fruit set may be limited by pollinator availability. Also, pollinator success seems to be dependent on climatic conditions, a phenomenon that has been observed for other orchid species (Montana VP panel notes). Demographic monitoring studies have indicated that the plants may not be present above ground every year, which is also typical of many orchid species. Insect and ungulate herbivory threaten some populations. In fragmented forests, the thermal cover provided by overstory species frequently leads to livestock and wildlife trampling of *C. fasciculatum* in the understory. Spring burns, and severe stand replacement fires are harmful, but mild fall underburns may benefit *Cypripedium fasciculatum*. Historic changes in the native fire regime are considered a threat as is canopy removal; yet fire suppression, and resultant canopy closure, also do not appear to be suitable to the species. The effects of selective logging are not well understood. The mechanical impact and resulting increase in solar radiation from clear-cutting is detrimental to population viability. Recreation, road building, development , and off-road vehicles are also threats. The most recent status survey for this species is Moseley, 1992 (for the Caribou NF) and a species management guide was prepared for it in 1990. A conservation strategy is needed for this species in Montana and Idaho, as the occupied habitats are frequently targeted for timber harvesting.

***Delphinium viridescens* Leiberg** is a local endemic to the Wenatchee Mountains of Washington. In the East Cascades North Province, 24 locations are known in Chelan and Kittitas Counties, fourteen are on National Forest Service land. Populations range from 13 to several hundred plants along 300 ft. of a riparian area. This perennial plant occurs in moist openings in *Pseudotsuga menziesii* and *Pinus ponderosa* forests from 1500 to 4050 ft. in elevation. It is also found in openings in aspen groves and along the edges of shrub thickets, such as *Crateagus douglasii*. Other habitats include wet meadows, seeps, and roadsides. This plant tends to grow in poorly drained microsites, which dry out in the summer. Changes in hydrological regimes , grazing, timber harvest, and developments are major threats.

***Descurainia torulosa* Rollins** is a regional endemic of Wyoming, that occurs in the Absorka Mountains and the Rocksprings Uplift on sparsely vegetated sandy slopes at the base of cliffs and boulders of volcanic conglomerate or sandstone at elevations of greater than 8,300 feet. Populations of this alpine mustard are typically small, with the total population in this area of less than 200 plants, with a mean population size of 25 plants and some disappear for one or more years at a time. Populations seem to be decreasing though there is much interannual variation in numbers of individuals. On sites within the ICBEMP area, threats are considered low due to the inaccessibility and ruggedness of the sites. All known *D. torulosa* sites are on federal lands.

***Douglasia idahoensis* D. Henderson** is a regionally endemic primrose found on scattered north (NW-ENE) facing ridge systems on the Idaho Batholith. It is known only from Forest Service lands (Boise and Nez Perce NFs). The high elevation slopes (6,000-9,500 feet) that *D. idahoensis* inhabits typically have very low vegetation cover (typically 10-15% but ranging from 5-50%), and are very steep (slopes 4-100%). The majority of *D. idahoensis* populations occur on granite but one or two are known from quartzite. In all cases, the substrate is poorly differentiated, generally coarsely decomposed bedrock (residuum) with poor to high stability. This species is pollinated by a diverse assemblage of small bees and flies. A graduate student at the University of Idaho (Angela Sondenaa) is currently researching the reproductive ecology of this species. Changes in the fire regime seem to be a problem for this species. The large fires of 1994 burned over some populations on the Boise National Forest killing many individuals. Grazing (sheep) is a potential threat that is easy to mitigate with proper (effective) controls. Many populations of *D. idahoensis* occur near popular recreation sites and some human trampling and habitat disruption has been observed. Mining is a potential threat in some locations. Timber harvest is not viewed as a threat because it occurs in the whitebark pine and subalpine fir zones, species with little commercial value. The Boise National Forest, in conjunction with the US Fish and Wildlife Service is currently conducting a long-term monitoring study to assess the viability of the species at the southern margin of its range.

***Draba trichocarpa* Rollins** is locally endemic to the Stanely Basin of Idaho. It is restricted to southerly aspects with shallow gravely soils of decomposed granite at elevations of less than 7,500 feet. It is suspected that the specific microsites in which *D. trichocarpa* occurs are blown free of snow in winter. This species is found in approximately twenty small populations, some of which it shares with the rare *Eriogonum meledonum*. Current threats to *D. trichocarpa* population viability are seen as low but increasing development in the Stanley Basin has the potential to become a significant problem in the future (both through land alteration and associated increases in human activities such as recreation and road construction). Though seed viability of this species is known to be high, a three year monitoring study suggests that populations are in long-term decline (Moseley and Mancuso 1990,1991, and 1993). This taxa may occur with *D. trichocarpa* var. *treleasii* and the two varieties freely intergrade with one another.

***Erigeron basalticus* Hoover** is a local endemic to Yakima and Kittitas Counties in Washington. In the Columbia River Basin Province, there are nine occurrences, four of these are on federal land. It is known from basalt outcrops, cliffs, and cracks. Soils include colluvial and aeolian deposits. It ranges from 1300 to 1700 ft. in elevation on aspects from northwest to southeast, preferring the more northerly and generally not on direct south-facing sites. Lichens are often noticeable on the basalt. This perennial species provides showy flowers (food) within an area somewhat devoid of other showy species and blooms in the spring and fall. Plants trap wind-blown material for soil build-up in cracks. Construction of roads has probably meant the loss of habitat. Exotic plants are a significant threat.

***Erigeron lackschewitzii* Nesom & Weber** is a local endemic restricted to the Flathead and Rocky Mountain Front (Sawtooth) ranges in northwest Montana. The species is currently known from a total of 12 sites, in Flathead, Lewis and Clark, Pondera, and Teton counties, and an estimated total of approximately 1,800 individuals (Heidel 1993). It is confined to open, gravelly, calcareous soils and talus on ridge tops and in tundra in the alpine zone, and flowers in July and early August; this habitat serves as winter range for some big game species. The species is most frequently found on southwest aspects; it prefers midslopes between scree and toeslope turf, or gentle but highly exposed slope crests and ridgelines, at elevations from 6,400 to 8,200 feet. Most sites fall within the *Dryas octopetala/Carex* spp. plant association (Heidel 1993). Although the taxonomic recognition of this taxon has been questioned (i.e., Dorn 1984), recent systematic studies, employing morphological and molecular techniques, indicate that the species is sufficiently distinct from *E. ochroleucus* var. *scribneri*, its closest relative, to warrant species status (Kerstetter 1994). A persistent lack of pollen, coupled with the presence of fully formed achenes at a very early state of floret development, suggest apomixis (asexual reproduction of seeds). Populations of *E. lackschewitzii* most likely resulted from selection for traits often found in other polyploid derivatives that colonize areas left barren after glaciation, with maintenance of the adaptive genotype through apomixis (Kerstetter 1994). Nine of the 12 known occurrences are in or on the boundaries of two Wilderness Areas (Bob Marshall and Scapegoat wilderness areas). There has been little management activity in the occupied habitat apart from the construction of lookout towers, the latter having since been taking out of operation; proximity of hiking and pack trails near the populations also do not appear to pose potential threats, nor do disease, predation or grazing (Heidel 1993).

***Erigeron latus* (A. Nelson & J.F. Macbride) Cronquist** is a regional endemic native to rhyolitic gravels in southwestern Idaho and adjacent northern Nevada. It occurs on flats (slopes of less than 10%) at elevations ranging from 4,200 to 6,450 feet (Moseley and Mancuso 1993). The most serious threat to this species' viability is the invasion of exotic plants (especially from the consequent increase in fire frequency), though conflicts also arise from juniper eradication programs and livestock grazing.

Erigeron salmonensis **S.J. Brunsfeld & Nesom** is locally endemic to a 30 mile stretch of the Middle Fork Salmon River in Idaho, with a single disjunct population downstream from Shoup on the Salmon River. This species is restricted to north slopes and grows in cracks and ledges of massive cliffs and large rocky outcrops (primarily granite and metamorphics). The current population trend is assumed to be stable (though there is no monitoring data to support that supposition). Since most populations of *E. salmonensis* are in wilderness, the species is probably safe from most anthropogenic threats.

Eriogonum chrysops **Rydb.** is a very narrowly distributed local endemic of the Owyhee Uplands, with a range of 5 by 2 miles and total number of individuals less than 10,000. The species is known from five occurrences in Malheur Co., Oregon. Of the three main populations, one is on private land and the remainder are on BLM lands. The species is closely related to several other rare *Eriogonum* species in the *Eriogonum chrysops* complex, including: *E. crosbyae, E. prociduum, E. cusickii,* and *E. ochrocephalum* (Hitchcock *et al.* 1964). Habitat is scabland of shallow, rocky, basalt- and rhyolite-derived soils. Site topography ranges from nearly level areas to broad outcrops on ridges or hills. *Artemisia arbuscula* is a common associate. *E. chrysops* is a pioneer species, and vegetative cover at these sites is sparse, up to 2 percent cover. Individuals may aid in soil development by fracturing rocky substrates and contributing to litter accumulation. Threats are thought to be minimal, although trampling by livestock may be detrimental. Pedistled plants have been observed, indicating soil loss at least one site. Population trends are considered stable.

Eriogonum crosbyae **Reveal** is a local endemic occurring at nine sites in southern Lake and Harney Cos., Oregon, and at five sites in Nevada. Extensive searches have been performed, and new populations are not expected in Oregon. The species grows on gently rounded ridge tops and upper slopes on light brown or tan volcanic tuffs at elevations between 5280 and 6600 feet. Communities are characteristically barren, with vegetative cover of less than five percent. Associated species include *Ivesia rhypara* var. *rhypara*, as well as *Mentzelia albicaulis, Cryptantha* sp., *Gilia congesta, Lygodesmia spinosa, Atriplex spinosa, Astragalus tetrapterus, A. purshii, Orobanche fasciculata*, and *Penstemon speciosus.* The pollinators for this *Eriogonum* complex are specific to the taxon and include flies and wasps. Once mature, achenes break easily for wind dispersal. *Eriogonum crosbyae* populations are in a declining trend, as a gradual decrease has been observed in numbers over the last ten years. Gold mining and off-road vehicle (ORV) use are threats in Nevada, but do not yet appear to be impacting Oregon populations. An Oregon conservation agreement between the BLM and USFWS is slated for completion in 1995.

Eriogonum cusickii **M.E. Jones** is a regional endemic known from nine occurrences in northern Lake and Harney Counties, Oregon, in the Basin and Range physiographic province. Sites are located at elevations between 4400 and 5300 feet. *Eriogonum cusickii* is a pioneer species that grows on relatively flat, barren, welded tuff outcrops. Vegetative cover is sparse, rarely exceeding 5 percent. *Juniperus occidentalis* and *Artemisia arbuscula* are common associates, along with *Cymopterus nivalis, Lewisia rediviva, Gilia congesta, Lesquerella occidentalis*, and *Dimeresia howellii.* Population trends are considered stable, and monitoring has shown that some populations are increasing in size. Threats appear to be minimal, but invasion of roadside sites by exotics is a potential problem. Successful recovery of sites following an ORV closure suggests that off-road vehicle traffic has also been detrimental. All Oregon populations will be covered by a conservation agreement to be completed in 1995.

Eriogonum lewisii **Reveal** is a northern Nevada regional endemic that occurs at elevations between 7,300 and 9,600 feet on exposed ridgetops on poorly developed limestone or dolomite soils or residuum. Roads and mining are seen as significant threats to the viability of several populations. Fire suppression activities, exotic plant species, and livestock grazing are seen as important threats across the species' range. Population trends for this species appear to be downward.

Eriogonum meledonum **Reveal** is locally endemic to the Stanely Basin of central Idaho. It occurs at elevations below 7,500 feet on granite derived substrates (residuum) at sites with full exposure. Known populations appear to be stable but a preliminary monitoring study indicated that long-term viability may be in jeopardy (Moseley and Mancuso 1990, 1991, and 1993a). The most consistent threat to *E. meledonum* populations stems from trampling by livestock. Additionally, development and road construction may become threats to some populations as the human population in the Stanley Basin increases.

Eriogonum novonudum **Peck** is a regional endemic of the Owyhee Uplands. It is known from Malheur Co., Oregon, where it is found on gravelly-textured Leslie Gulch ash. Occurrence data is unavailable at this time, and it appears to be common and is no longer tracked by the Oregon Natural Heritage Program. Within communities that support *E. novonudum*, *Agropyron spicatum* is generally dominant. As with other ash endemics, the species is potentially threatened by livestock activity, notably trampling, and by recreational use, invasion of sites by exotic species and subsequent changes in the fire regime. Population trends are unknown.

Eriogonum prociduum **Reveal** is a regional endemic found in Lake and Klamath Counties, Oregon, as well as in northeast California and northwest Nevada. It inhabits gentle slopes and level areas of barren, rocky or gravelly soils with minimal vegetative cover. *Artemisia arbuscula* and *Juniperus occidentalis* generally occur adjacent to sites. Substrates include basalt, ash outcrops, and other volcanic rocks. *E. prociduum* is a perennial pollinated by flies and wasps. Mature achenes dihesce easily and seeds are wind dispersed. A road was constructed at one site, but the population is recovering following road closure. In general, population trends are considered stable. Threats appear to be minimal with the exception of off-road vehicle activity, and the species is considered stable across its range.

Erythronium grandiflorum **Pursh var. *nudipetalum* (Applegate) Hitchcock** is locally endemic to the Bear Valley area of Valley County, Idaho. Though its distribution is highly restricted, it is very common within its range. This species occurs in more or less moist meadows and meadow ecotones between 5,600 and 7,00 feet and may be able to invade small disturbances in the graminoid-forb matrix (e.g., gopher mounds). Practices that alter meadow hydrology such as diversions, creek dredging, and excessive grazing pressure are the major threats to *E. grandiflorum nudipetalum*.

Gratiola heterosepala **Mason & Bacig.** is a peripheral endemic known from one occurrence (elevation 5360 feet) in Lake Co., Oregon, and from sixteen additional sites within seven counties in northern California. An annual member of the Scrophulariaceae, it is found on clayey soils in shallow water and at the margins of vernal pools and stock ponds. The species flowers from mid-June to mid-July and is believed to be facultatively autogamous (L. Housley, *pers. comm.*). Field observations have shown no evidence of pre-dispersal seed predation, and seeds are likely dispersed by migrating waterfowl. Associated species include *Downingia laeta, Marsilea vestita, Plagiobothrys scouleri* var. *penicillatus, Eleocharis palustris,* and *Camissonia* sp. surrounded by a *Juniperus occidentalis/Artemisia arbuscula/Poa sandbergii* community. An exclosure established in 1993 on the Lakeview District BLM is being monitored to determine the effects of grazing on the species. Data collected between 1982 and 1991 shows population size at the Oregon site ranging from 2000 to 18,000 individuals. Potential threats include early season grazing, invasion by exotic species, and development in some areas. Population trends are currently considered stable.

Grindelia howellii **Steyermark** is a regional endemic with a bimodal geographic distribution; most of the occurrences are in west-central Montana, with several small occurrences also known in a very small area in north Idaho. It prefers southerly aspects in bluebunch wheatgrass/Sandberg bluegrass grasslands and openings in ponderosa pine and Douglas fir stands. The Montana occurrences, of which 60 are currently known to be extant (Pavek 1991), are in Missoula and Powell counties, in the Blackfoot, Clearwater and Swan River drainages (Shelly 1986). This species is found in a variety of disturbed and natural habitats, including roadsides, grazed pastures, pine plantations, forest openings, river terraces and native grasslands (Lesica and Shelly 1991). Numerous occurrences in Montana are adventive in disturbed habitats. Despite this ruderal response, populations in undisturbed grasslands are very uncommon. For this reason, and because the adventive populations are in most cases not likely to be viable over the long term, *G. howellii* has been retained as a Category 2 federal candidate. Follow-up surveys at 27 known sites in 1990 revealed that 10 occurrences had increased in numbers of plants, 15 had decreased, and two populations were essentially unchanged in size; ten locations have no new data available since 1986. Thus, as of 1990, a total estimate of about 16,000 individual plants, in 50 populations, was made (Pavek 1991). One of the largest populations, in native grassland habitat, was partially sprayed with herbicide in 1989, and is much smaller in size now (Pavek 1991). The invasion of its preferred sites by exotic plants is the greatest threat to the viability of this species. Historic changes in disturbance regimes and road construction are secondary but important threats. A species management guide for *G. howellii* on the St. Joe National Forest was prepared four years ago (Lorain 1991b).

Hackelia cronquistii **J.L. Gentry** is a regional endemic of the Owyhee Uplands and adjacent Idaho. It is known from forty-one occurrences comprising four population centers in Malheur Co., Oregon, and from one population center in Idaho. It can sometimes be found with *Astragalus mulfordiae*. Some populations have hundreds of plants, and one has thousands, but many are very small. In recent years, a number of new sites in Oregon have been reported from the Vale District BLM (J. Finley, *pers. comm.*). *Hackelia cronquistii* grows in communities of *Artemisia tridentata* ssp. *wyomingensis*, *Festuca idahoensis*, and *Oryzopsis hymenoides*. *H. cronquistii* probably requires small mammals to disperse its fruits. The species is generally found on north-facing slopes of sandy hills, in topographic depressions that hold late-season snowpack (nival zone). Site elevations range from 2100 to 3100 feet. Soils are sandy loams, possibly with argillic horizons (clay at 14-16"), that retain moisture close to the surface. Livestock grazing and exotic plant species (and the consequent increase in fire frequency) are considered the preeminent threat. The species is somewhat palatable and is highly impacted both by intense grazing and trampling. Rested sites are recovering, and it believed that population trends are stable to increasing. Off-road vehicle (ORV) traffic is a threat, and at least one site is heavily impacted. Catastrophic fires and conversion of sites to agricultural land or pasture are also potential threats.

Hackelia venusta **(Piper) St. John** is a local endemic to Chelan County in Washington. There are three occurrences, all on National Forest Service land. A perennial, it grows in dry loose granitic sand and crevices in granite or talus. It ranges from 1000 to 7400 ft. in elevation. Disturbance may be necessary to maintain populations. Exotic plant invasion and road sanding are the greatest threats. Since it is does not compete well with other plants, fires removing competing vegetation are probably beneficial and fire suppression would affect it negatively.

Haplopappus insecticruris **Henderson** is a local endemic found exclusively on the Camas Prairie of central Idaho and in some related meadow complexes immediately westward toward Cat Creek (in Camas and Elmore Counties, respectively). It is currently restricted to vernally wet meadows and flats with shallow, basalt derived soils. Approximately 99% of this species former habitat has been converted to agricultural uses. Population trends currently appear stable though significantly reduced from historic numbers. Extensive surveys for this species in 1994 (Blackburn) located many new populations on the northwest margin of its range. There is some inconsistency in the plants' response to livestock grazing and trampling so that it is currently unclear whether that activity is in conflict with the conservation of this species. Introduced species, land conversion, and herbicide use seem to pose the greatest consistent threats to today's populations.

Haplopappus liatriformis **(Greene) St. John** is a regional endemic that was once widely distributed throughout the Palouse Prairie of southeastern Washington and the Craig Mountain area in adjacent Idaho. There are 26 sites in Spokane, Whitman, and Benton Counties of Washington. Most populations are under 100 individuals. Found in deep, well drained, loess soils between 2,000 and 4,800 feet, *H. liatriformis* shuns forested sites but can occur in grassland/ponderosa pine mosaics throughout its range. *H. liatriformis* occurs with some of the other Palouse endemics and grows best in stable sites in good ecological condition and does poorly in areas grazed or weedy. Most populations of this species are very small and suffer from extreme fragmentation and isolation. All are threatened by land conversion, grazing, and herbicide spray and drift. Additionally, the invasion of exotic species is making much of *H. liatriformis*' habitat unsuitable. The greatest challenge to the conservation of this species is that most populations occur on private land.

Haplopappus radiatus **(Nutt.) Cronq.** is a regional endemic of the Owyhee Uplands and Blue Mountains province on the hillsides in the southern end of the Snake River Canyon , with five occurrences in northern Malheur County, Oregon, and is known from Idaho County, Idaho, and

34 occurrences in southern Baker County. It is found on steep (10-90% slope) rocky hillsides and gravely terraces at elevations between 1800 and 6,100 feet although most populations are found below 3,500 feet. *H. radiatus* occurs on basalt derived soils with high clay content or calcareous derived soil, possibly from shale. Populations across the taxa's range appear to be decreasing. Sites are relatively harsh and barren, with communities often typified by *Artemisia tridentata* and *Agropyron spicatum*. It is sensitive to annual levels of precipitation, with late summer rains appearing to be essential for this species to complete its reproductive cycle and population vigor has been observed to decline when less that 11 inches of precipitation per year. The threats to *H. radiatus* are numerous and include livestock grazing, introduced exotic plant species (and the consequent change in the historic fire regime), herbicide spray and drift, and insect seed predation. Less immediate but important threats stem from mining (at least at some sites), timber harvest, and road construction (Mancuso and Moseley 1993b). Grasshoppers also threaten some populations in years of insect outbreaks. Invasion of exotic weeds is impacting both plant survival and seedling establishment. Therefore, it is threatened by increased fire frequency and/ or intensity, and a disrupted historical pattern of wildfires. Road work activities exacerbate this situation by causing further soil disturbance and by facilitating increased traffic (more seed vectors).

***Howellia aquatilis* A. Gray** is a monotypic genus with a scattered geographic distribution in the Pacific Northwest. The following information has been compiled from numerous status reports, publications and monitoring studies, including Gamon 1992, Lesica 1992, Lesica et al. 1988, Roe and Shelly 1992, Schassberger and Shelly 1991, Shelly 1988, Shelly 1989, Shelly and Moseley 1988, and Shelly and Schassberger 1990. *Howellia aquatilis* is known to be extant in the states of Idaho, Montana and Washington. It is historically known to have occurred in California (central Coast Range) and Oregon (in the Willamette Valley and near Portland); these previously known sites have not been relocated despite intensive field surveys in both states. Within its extant range, *H. aquatilis* is currently known from a total of 110 occurrences. There are two main centers of distribution within this range - one in the Swan River valley in Montana (58 occurrences), and one in the vicinity of Spokane, Washington (48 occurrences) mostly on public land, where population sizes vary from one to 1000 plants found from 400 to 2320 ft. in elevation. Two occurrences are known in northern Idaho in private ownership, and two others are found in western Washington. Despite this seemingly large number of occurrences, the total occupied habitat known worldwide is less than 100 acres. The Montana occurrences are all in Lake and Missoula counties. *Howellia aquatilis* is strictly aquatic and is also an annual. The plants typically bloom by June in Montana; they continue flowering until late summer, depending on how quickly the wetland habitat dries out. The species is restricted to small pothole ponds or the quiet water of shallow, abandoned river oxbows. These wetland habitats typically occur in a matrix of dense forest vegetation. All known sites have at least some deciduous tree cover (usually aspen, but sometimes birch) around a portion of the pond. *Pinus ponderosa* forests surround the ponds and *Cornus stolonifera* is usually present along the perimeters. The bottom surfaces of the wetlands consist of firm, consolidated clay and organic sediments. These wetlands are generally filled by snowmelt run-off and spring rains, but then dry out to varying degrees by late summer or early fall, depending on annual patterns of temperature and precipitation. In the Swan River valley of Montana, the small ponds in which it grows lie in depressions that were left as the continental glaciers retreated approximately 10,000 years ago. These depressions occur where blocks of ice, buried in the glacial till, later melted. The ponds are typically shallow, averaging one to two feet deep during the middle of summer. This drying is critical to the species' life cycle; the seeds will only germinate if they are exposed to the atmosphere. After the seedlings appear, usually in October, they overwinter under the snowpack. Then, in late spring and early summer the plants resume growth in the water that accumulates in the ponds. This ecological relationship has a profound influence on the size of the occurrences from year to year; the summer climate determines the degree of pond drying, and hence the amount of seed germination in the fall. If fall seed germination is much reduced, few plants are present the following summer. These highly specialized ecological adaptations make *H. aquatilis* vulnerable to a variety of natural environmental changes over the short and long term, such as advancing vegetation succession or climate change. However, the species has also been affected by land management activities and habitat destruction as well. In Oregon, most of the historical locations are within urban or suburban areas that have been extensively developed, and unsuccessful field surveys in the remaining habitat in these areas indicates that these sites have been lost. Additionally, construction of dams along the Columbia and Willamette rivers has led to a decline of suitable wetland habitats. Elsewhere in its range, including the historical location in California, livestock grazing and trampling may have eliminated occurrences. In Montana, timber harvesting has occurred immediately adjacent to a number of occupied ponds, with resultant effects on the habitat. Also, roads built immediately adjacent to some ponds have resulted in increased sedimentation from road dust. In the bottomlands near the Idaho occurrences, habitat has been altered by roads, residential housing, and cultivation. Historic sites in Idaho are known to have been extirpated and the unique vernal pools that this species occupies are threatened range-wide by sedimentation, invasion of exotic species, and alterations in hydrology (including the drainage of wetlands). In Washington, several ponds near known occurrences have been altered to improve waterfowl habitat. Habitat encroachment by *Phalaris arundinacea* (reed canary grass), an aggressive wetland species, is also occurring in Montana and Washington, where all sites have been invaded. Monitoring of plant numbers in selected ponds has revealed annual fluctuations from over a thousand plants to fewer than a dozen. This fluctuation means that the seed bank is of great importance to the long-term persistence of the occurrences. The longevity of the seeds is unknown, but studies indicate that it may be short. Lesica et al. (1988) found no detectable genetic variation, either within the occurrences or across the range of the species; this is also very unique, especially considering the species' annual life cycle and wide geographic distribution - factors that typically promote genetic variation. *Howellia aquatilis* was federally listed as threatened by the U.S. Fish and Wildlife Service (USFWS) in July, 1994. In addition, the Flathead National Forest in Montana is in the process of amending its Forest Plan to adopt conservation measures for the species, including a recently approved conservation strategy (Mantas 1995). This strategy provides protection around occupied, as well as suitable but unoccupied, habitats.

***Iliamna longisepala* (Torr.) Wiggins** regional endemic in Washington. In the Columbia River Basin Province, it occurs at 13 sites in Douglas, Chelan, and Kittitas Counties. Ten of these sites are on private land. Populations are small in size, usually less than 30 individuals. This showy shrub occurs in relatively lush riparian areas, but on the periphery of the riparian vegetation in draw bottoms, mid-slopes and upper slopes. It inhabits relatively dry, well-drained sites, which are generally within microsites that may retain water longer than adjacent microsites. Fire suppression is detrimental to this plant. Changes in riparian vegetation associated with land-use could have negative impacts. Exotic weed invasion is also a threat as well as activities in the riparian area that impact the structure, function and species composition of the plant community.

Ivesia rhypara* B. Ertter & Reveal var. *rhypara is regional endemic to northern Nevada and a small portion of southeastern Oregon. This species occurs on poorly developed soils derived from hydrothermally altered welded tuff. It prefers sites at elevations between 5,390 and 5,600 feet with a southerly aspect. This plant is strongly impacted by livestock trampling and also suffers threats from mining, exotic plant species, road maintenance, range improvements, and fire suppression activities. Population trends for this species is in decline in Oregon.

***Ivesia rhypara* Ertter & Reveal var. *shellyi* Ertter** is a local endemic found in the Basin and Range physiographic province, in Lake and Harney Cos., Oregon. It was discovered in 1985 by Steve Shelly, then a BLM botanist. It is known from four occurrences within three distinct population centers, in canyons and near Juniper Mountain, east of Alkali Lake. All known sites are on federal land. The species occupies microsites created by eroding pumice inclusions within tuffaceous outcrops, generally on steep to vertical rock faces. Some populations are reported to be extremely large and cover extensive areas of rimrock. Threats to the species are minimal, and populations are considered stable.

***Lathyrus grimesii* Barneby** is a local endemic know only from the Independence Mountains of northern Nevada. It occurs on stony, clay rich soils and talus slopes in an elevational band between 6,100 and 8,300 feet. Important threats to populations of *L. grimesii* include livestock grazing, mining, the impacts of exotic plants (and the herbicides used to control them), and changes in the historic fire regime. Populations of this species are often large and currently appear to be stable.

***Lepidium davisii* Rollins** is a regional endemic with highly specific habitat requirements that is native to southwestern Idaho and adjacent Oregon. It only occurs in barren (<5% cover), internally drained and seasonally flooded, hard bottomed playas within an elevational band between 2,500 and 5,000 feet. Waterfowl are believed to aid in seed dispersal. Playa surveys in recent years have added considerably to the knowledge of this species' range. These playas are widely distributed in the range of *L. davisii* but are infrequent and are disappearing rapidly. Playas become unsuitable habitat if they are compacted (as happens when livestock congregate there), disturbed by OHV traffic (a common occurrence), or are invaded by exotic plant species (attributable to several causes). Several populations have been lost in the last two decades from reservoir development and the increase in range fire frequency. Overall, this species is in marked decline, especially in the portion of its range north of the Snake River. Monitoring of this species is ongoing at Mountain Home Air Force Base (Bernatas and Moseley 1991). A BLM Conservation Agreement signed with the USFWS in 1995 protects sites on the Vale and Burns Districts, Oregon.

***Lepidium papilliferum* (Henderson) A. Nelson & J.F. McBride** is a regional endemic native to the Snake River Plains of southwestern Idaho. Like *L. davisii*, this species' preferred habitat is the bottom of small, internally drained playas (slick spots). *L. papilliferum* occasionally occurs with *Texosporium sancti-jacobi*. This species is in decline throughout its range due to many threats, especially land development, livestock grazing (most through the action of trampling and soil disturbance in the slick spots), and exotic plant species (that both invade the disturbed slick spots and have increased the historic fire frequency). There are populations of *L. papilliferum* on the military training range south of Boise, Idaho that are threatened by tank traffic. Both the Boise District BLM and the Army National Guard are currently involved in monitoring and population genetics studies of *L. papilliferum* and the most recent status survey for this species is Moseley (1994).

***Leptodactylon glabrum* Patterson & Yoder-Williams** is a local endemic native to the canyons of southwestern Idaho and adjacent northern Nevada. It prefers to grow on rhyolitic cliff faces and overhangs within an elevational range of 3,300 and 4,500 feet. This species is currently being monitored in the Bruneau River Canyon of southern Idaho . Though nearly nothing is known about this species' biology, there seems to be no significant discernible threats. If there were hydrological developments in the Bruneau River Canyon a significant proportion of this species could be lost.

***Leptodactylon pungens* (Torrey) Nutt. ssp. *hazeliae* Meinke** is a local endemic restricted to south and west aspect vertical basalt cliff faces in the middle Snake (Hells Canyon) and lower Salmon River corridors at elevations between 975 and 2,000 feet. Populations of this species appear to be stable though some loses occurred in the past when the reservoirs on the Snake River were filled. Seedling establishment has never been observed. Most of the known populations are near popular trails or roads and thus may be threatened by maintenance activities. Today, the only significant threat to this species is drift from herbicide spraying to control noxious weeds (especially yellow starthistle, *Centaurea solstitialis*).

Lesquerella carinata* Rollins var. *carinata is a regional endemic known from the Lemhi and Lost River Ranges in Idaho and Teton County, Wyoming. It prefers rocky foothill slopes and ridges of limestone, slate and shale and the gravel of sparsely vegetated slopes and ridgecrests in the mountains at elevations between 6,500 and 8,500 feet. The vegetation at *L. carinata* sites is typically low. Though this species is often found on calcareous substrates it is not restricted to such sites. *L. carinata* is fairly common within its range.

***Lesquerella carinata* Rollins var. *languida* Rollins** is a local endemic restricted to the Garnet Range in west-central Montana. This newly described variety (Rollins 1993) is currently known from four occurrences, all in Granite County, and the total known occupied area is about 200 acres (Vanderhorst 1995). It is confined to substrates derived from the Mission Canyon limestone of the Madison group (Schassberger 1991), and at least much of its range is confined to a zone of high calcium limestone. It grows in loose, gravelly soils, usually on steep, southerly exposed slopes with a hot, dry microclimate. It occurs in the ponderosa pine zone, in open woodlands, bitterbrush shrublands, grasslands, and on barren scree slopes. The taxon is insect-pollinated and primarily outcrossing, although selfing has been detected (Greenlee 1994). Evidence of a seed bank was found in monitoring transects at one site, where over twice as many seedlings were born in 1993 as the number of seeds calculated to have been produce in the plots in 1992 (Greenlee 1994). Populations of *Lesquerella carinata* var. *languida* are capable of high levels of reproduction but may also be subject to high mortality. The populations may go through boom/bust cycles, with high seedling establishment, low mortality, and high population growth rates in favorable (moist) years, but few seedlings, high mortality, and population decline in stressful (dry) years (Greenlee 1994). The primary threat to populations is invasion by spotted knapweed, which has been shown to negatively impact growth and survival (Greenlee 1994). Removal of knapweed from experimental plots increased vigor and, most importantly, adult survivorship. Damage by aerial herbicide spraying and cattle trampling has also been observed (Achuff and Roe 1992; Schassberger 1991). Also, adults and seedlings were found to have a positive spatial relationship with bunchgrasses at a relatively hot, dry site; the taxon appears to use bunchgrasses as nurse plants in stressful years, but not in less stressful years (Greenlee and Calloway in prep.; Greenlee 1994). This taxon is currently proposed by the Bureau of Land Management for sensitive status on such lands in Montana (USDI Bureau of Land Management 1993), but no management policy or plan is currently in place for it. It has been recommended that this taxa be changed to a Category 1 federal candidate, owing to its limited range and threats from invasion of spotted knapweed (Vanderhorst 1995).

Lesquerella humilis **Rollins** is a local endemic, narrowly restricted to four small occurrences in the Bitterroot Mountains in Ravalli County, Montana. This species is one of the rarest plants in Montana, with approximately 2,500 to 3,000 individuals observed during the course of recent surveys (Montana Natural Heritage Program database records, Helena). It occurs at elevations from 6,900 to 9,587 feet, in krummholz stands of *Pinus albicaulis*, and in open, windswept alpine areas (Lesica and Shelly 1991; Shelly 1988). As with many taxa in the genus *Lesquerella*, it occurs in open, rocky substrates, in this case on metamorphic substrates influenced by granitic intrusions. These metamorphic rocks, mostly gneiss and schist, were locally penetrated by granite in the northern portion of the Bitterroot Mountains, and the rocks are reddish-orange in color; thus, the species appears to be edaphically restricted to this area of unusual bedrock geology (Shelly 1988). While the majority of the species' range lies within or on the border of the Selway-Bitterroot Wilderness Area, it is of conservation concern owing to its rarity. One occurrence is being impacted by recreational use, as a popular hiking trail traverses a portion of the occupied habitat (Achuff 1990; Shelly 1988). A small portion of a recently discovered population occurs in an area disturbed during the construction of a dam, but the majority of this occurrence is in undisturbed, native habitat (Montana Natural Heritage Program database records, Helena). Intensive surveys on adjacent summits, and throughout the Bitterroot Range, have failed to locate any additional populations (Achuff 1990; Shelly 1988). A species management plan should be prepared for this taxon.

Lesquerella paysonii **Rollins** is a regional endemic, currently known to occur in Idaho, Wyoming and southwest Montana. This species occurs on barren, rocky slopes and ridgelines at elevations between 6,300 and 10,000 feet. Its preferred substrates are gravely and calcareous though it is also known from talus, residuum, and areas of mass wasting. The known range of this taxa has been greatly expanded in the last five years due to greater survey intensity in western Wyoming, where populations in Wyoming are more abundant than in southeastern Idaho. The taxonomic disposition of the single occurrence suspected in Montana is currently being reevaluated, but is likely to be this species (B. Heidel, pers. comm.). Invasion by spotted knapweed is occurring along the lower slopes at this site, but has not seriously spread into the majority of the habitat. Light grazing of the associated grasslands has occurred in the past, but does not seem to have adversely affected much of the population. The area where *L. paysonii* occurs has been proposed as a Botanical Special Interest Area by the Deerlodge National Forest; if this designation is completed, a management plan should be developed for the area and the rare species that occur there, including *L. paysonii.* Oil and gas exploration, mining and the invasion of noxious weeds are threats to this species.

***Lesquerella* sp. novum ("*pulchella*")** is a regional endemic in southwest Montana. It is currently known from seven sites in Beaverhead County, at elevations from 6,320 to 9,600 feet in the Centennial and Pioneer mountain ranges (Heidel 1993). This taxon, which was previously thought to represent *L. carinata*, has been determined to represent a new, undescribed species by Dr. R.C. Rollins, Harvard University (Heidel 1993). Within its geographic range, it is nearly restricted to Madison Group limestone. It is further restricted to plant communities where groundcover is open and competition is reduced. Lower, foothills populations are in dry Agropyron spicatum communities or *Cercocarpus ledifolius* communities. Upper elevation populations are in dry grasslands or open parklands of *Pinus albicaulis* and *Abies lasiocarpa* on north and east aspects, extending down into *Pseudotsuga menziesii-Carex geyeri* association on south aspects (Heidel 1993). Three foothills sites are in grass-dominated communities grazed by livestock. While no plants appeared to be grazed, they are potentially affected by trampling by livestock. The upper-elevation sites in the Pioneer Mountains are in an area of concentrated mining activity, and active mines or mining claims are adjacent to five occurrences. Timber harvesting and weed invasion are not currently threatening the known occurrences (Heidel 1993). It is recommended that this taxon be designated as sensitive by both the USDA Forest Service and the USDI Bureau of Land Management (Heidel 1993).

***Limnanthes floccosa* How. ssp. *bellingeriana* (Peck) Arroyo** is a regional endemic found on volcanic plateaus in southern Jackson and Klamath Cos., Oregon, and in north central California. Twenty-six occurrences are reported from BLM and private lands in Oregon, with the greatest concentrations found near the rim of the Klamath River Canyon. Seven of the 15 Oregon records are of the populations are within the ICBEMP assessment boundary. Subspecies *bellingeriana* is found in moist meadows and vernal pool habitats, in intermittently wet, stony flats. Soils range from extremely stony or gravelly loams to clay loams. Soil permeability is low in some sites, resulting in seasonal ponding within microtopographic depressions. Sites in Oregon are on level or moderately sloping ground at elevations between 1800 and 4200 feet. All reported sites occur within or adjacent to open coniferous forest dominated by *Pinus ponderosa*, often in association with *Quercus garryana*. Adequate moisture from winter and spring precipitation is required for successful fruit production, and for fall seed germination. A facultatively autogamous annual species, *L. floccosa* ssp. *bellingeriana* generally drops its seed in the immediate vicinity of the parent plant, although some seed may be dispersed by rodents or large herbivores. Potential threats to the species include catastrophic fire, grazing, trampling and soil compaction due to livestock activity, and timber harvest activity, including skidding and site preparation. Population trends are unknown at this time. A BLM Conservation Strategy for populations in Oregon is in preparation (1995).

Lomatium erythrocarpum **Meinke and Const.** is a small, highly restricted local endemic. Six occurrences (Brooks 1995) are known from the Elkhorn Mountains of Baker County in Northeast Oregon. It is found between 7,000 and 8,500 feet in elevation on steep, dry, south slopes. It is found on alpine and subalpine barrens, gravelly granodiorite soils and argillite talus. Less typically it can be found on limestone substrates (Brooks 1995). It tends to grow on the ecotone between the shrub-steppe and subalpine woodland (Meinke and Constance 1984) or among whitebark pine with a canopy cover less than 20%. It frequently grows in association with *Polygonium phytolaccaefolium*, and high elevation stands of *Cercocarpus ledifolius* and *Artemisia tridentata*. This geographically restricted, high elevation species is threatened by global warming, as refugia are limited. If populations of mountain goats in the Elkhorn Mountains increase dramatically their foraging and trailing activities could be an impact.

Lomatium greenmanii **Mathias** is a local endemic species. It is only known from two occurrences, on Mount Howard and Ruby Peak in the Wallowa Mountains, Wallow County, Oregon. It is found between 7,500 and 9,000 feet in elevation, mostly on a course substrate of fractured basalt altered to greenstone, and influenced by adjacent Hurwall limestone formations. *L. greenmanii* inhabits ridgetops and low to moderate slopes on alpine scree, barrens, and turf. Occasionally it is found among sparse whitebark pine parklands. Primary associated species include *Eriogonum ovalifolium* ssp. *depressum, Castilleja chrysantha,* and *Trisetum spicatum* (Kagan 1987b) Its mountain top habitat makes this parsley vulnerable to global warming. The Mount Howard population is situated among a network of trails fed by a tourist tramway, where an average of 25,00 people per season visit this location each summer (Hustafa 1995). There are significant threats at this site from trail deterioration, trail maintenance and trampling from off-trail hikers. Recent efforts to modify and control the pattern of use has been met with limited success. Monitoring of this species, initiated in 1992 by the Oregon Department of Agriculture should indicate whether the populations on Mount Howard are in decline or stable.

Lomatium ochocense **Helliwell and Constance.** is a very restricted local endemic that was discovered in 1994. Currently it is known from one occurrence (population) on the Ochoco National Forest and four occurrences on the Prineville District of the BLM in the Ochoco Mountains of Crook County, Oregon along the North Fork of the Crooked River. It has been found between 1300 and 1400 meters in elevation, on basalt scablands (tablelands). In 1995, populations ranged from 25 to 10,000 individuals. It grows on shallow basalt lithosolic soils classified as Clayey-skeletal, frigid Argixerols. Here it is restricted to terrain where there is exposed fractured bedrock (Picture Gorge formation) supporting an *Artemisia rigida/Poa sandbergii* plant association (Helliwell & Constance 1995). In addition, *Oryzopsis hendersonii* was found at the Type location as well as four other Lomatium species. It is currently being submitted for publication (Helliwell & Constance 1995).

Lomatium suksdorfii **(S. Wats.) Coult. & Rose** is a regional endemic of the Columbia River Gorge portion of the East Cascades. It is known from five occurrences in Hood River and Wasco Counties, Oregon, and from Klickitat County in the Klickitat and White Salmon River drainages in Washington with the largest population in Oregon in private ownership. Approximately half of the 23 occurrences in Washington are on public land in the Columbia River Basin Province. Populations usually consist of several hundred individuals. The species is found growing on exposed, rocky, steep to shallow slopes supporting *Quercus garryana,* and often *Pinus ponderosa* and *Juniperus occidentalis* woodlands. Common herbaceous associates are *Agropyron spicatum* and *Balsamorhiza sagittata.* Substrates include poorly developed mineral soils, sands, and loams, with a fair amount of rock on the surface and basalt outcrops; but not on ridgelines or in draw bottoms. Aspects vary from northwest to southeast. It ranges in elevation from 120 to 3600 ft. While *L. suksdorfii*'s persistence on these xeric substrates is likely aided by a deeply-rooted habit, grazing and associated increases in weedy annuals may be negatively impacting seedling recruitment at some sites. Urban development and threats posed to potential lepidopteran pollinators by BT spraying have also been suggested for populations in Washington (J. Gammon, *pers. comm.*). Fruits are large, and dispersal mechanisms are not well understood. Population trends are unknown. Mining is also a threat.

***Lomatium tuberosum* Hoover** is a local endemic to Yakima, Grant, Kittitas, and Benton Counties, Washington. In the Columbia River Basin Province, 14 of the 24 occurrences in Washington are on private land. Populations usually consist of several hundred plants. It grows on unstabilized basaltic talus among shrub-steppe vegetation on 15 to 90 percent slopes. It ranges from 460 to 4000 ft. in elevation. Although the tuberous root of this perennial is eaten by Native Americans, it is not a major food source. It also provides food for small animals.

***Luina serpentina* Cronq.** is a highly restricted local endemic, known from 18 occurrences in the Aldrich Mountains of Grant county, Oregon. This stout perennial inhabits moderate to steep serpentine slopes such as those found along Fields Creek. It is found at sites between 3,300 and 5,900 feet in elevation, on talus slopes in openings among the surrounding ponderosa pine forest. *Luina serpentina* is pollinated by butterflies and in its sparse habitat, it appears to be an important local source of nectar for these insects. However studies have found that there is very little genetic variation among populations and almost all seeds are sterile. This poor seed set, in addition to being geographically and edaphically restricted to high elevations in the Aldrich Mountains, make this species easily threatened by habitat disrupting events such as global warming and ground disturbing management actions.

***Lupinus biddlei* Hend. ex C.P. Smith** is a regional endemic, found in the Great Basin and Owyhee Uplands physiographic provinces. It is known from thirty-two occurrences in Harney and Malheur Counties, Oregon. One occurrence is reported from Wheeler Co., Oregon, in the High Lava Plains province. *Lupinus biddlei* has recently been subsumed under *L. polyphyllus* by Barneby (1989). Two flowering forms, a white- and blue-flowered morphology, have been identified. *Lupinus biddlei*, the white-flowered form from Harney Co. and an adjacent site at Warm Springs Reservoir in Malheur Co. is not sympatric with the more common blue flowered form. Further study is required to determine whether the white-flowered form deserves special taxonomic status. The species is found on a variety of soil types including alluvial, aeolian, clayey-sedimentary soils, and soils derived from basalt. Major associates include *Agropyron spicatum, Poa sandbergii*, and *Artemisia tridentata*. The species grows on low hills, slopes and flats. Number of individuals within a given population, and percent of those flowering, varies with annual precipitation. Population trends are considered stable. The species is able to survive fire, but seedling recruitment may be inhibited by cheatgrass invasion. Individuals have been found growing in areas seeded with crested wheatgrass, however. Grazing and mining are threats, especially with respect to their impact on plant community composition. The species is found at the proposed Grassy Mountain Gold Mine, south of Vale.

Lupinus cusickii **Wats.** is a local endemic, known from one occurrence in Baker County, Oregon, near Unity Reservoir. It is found on clay and volcanic ash (pluvial lake ash sediments). This lupine grows in basins, drainage channels, and along the toe and mid slope between 3,800 and 4,000 feet in elevation. It inhabits terrain associated with juniper, sagebrush, bunchgrass and occasionally squaw apple. *Lupinus cusickii* is being impacted by off-road vehicle use and to a lesser degree, livestock trampling.

Meconella oregana **Nutt. in T. & G.** has a scattered distribution in Washington and Oregon. It ranges west of the Cascades Mountains from southern British Columbia south to California. In the Columbia River Basin Province, it is known from three occurrences in Klickitat County, all on National Forest Service land along the Columbia River Gorge from 200 to 1000 ft. in elevation. It occurs in openings with *Agropyron spicatum* in the *Quercus garryana* and *Pinus ponderosa* zone on slopes and ridgetops. One population of this annual included several hundred plants. Winter and spring moisture are important, but sites dry out by early summer. The greatest threats are increases in annual exotics, changes in species composition from grazing, and changes in hydrologic regimes. This plant is only visible for a week and is very small, thus making surveying difficult.

Mentzelia mollis **M.E. Peck** is a regionally endemic annual found in ash beds of the Owyhee Uplands of eastern Oregon and adjacent southwestern Idaho, and in Nevada in the Black Rock Desert. It is known in Oregon from eighteen occurrences in Malheur Co., specifically on Succor Creek and Leslie Gulch ash that has been weathered to montmorillonite (ash containing bentonite and montmorillonite) that decompose to clays (e.g., the Succor Creek formation). Suitable ashbeds occur at elevations between 2,500 and 4,800 ft. and typically have less than 15% vegetative cover. At least two sites are known to be on private land. Substrates are characterized by a high concentration of calcium, sodium and potassium ions. The timing of precipitation is key to the growth of *M. mollis*, and individuals establish within cracks in the drying clay where water availability is greatest. Communities are composed primarily of annuals, and cover is generally sparse. Associates include *Cleome platycaule, Phacelia lutea, Sitanion hystrix*, and *Artemisia tridentata* and *Chrysothamnus nauseosus* in low frequencies. Several populations of this species have been lost to mining activities and many sites have been severely degraded by livestock trampling and invasion by exotic plant species. Range improvements (such as seeding) and OHVs are also responsible for the degradation of several *M. mollis* sites. Livestock grazing and invasion of sites by exotics are threats, especially during wet years. Introduced annuals, notably yellow star thistle (*Centaurea solstitialis*) and whitetop (*Cardaria draba*) may be abundant, and whitetop encroachment has been observed at one fenced site. Fire suppression efforts have resulted in mechanical disturbance of some sites.

Mentzelia packardiae **Glad.** is a regional endemic, known from thirteen occurrences on the Leslie Gulch ash flow in Malheur Co., Oregon, and from one site in northern Nevada that is thought to have been extirpated. Inventory for the species is believed to be generally complete.

The species has not been found west of the Owyhee Reservoir, nor has it been located at Succor Creek. At Leslie Gulch the species grows on the Spring Creek tuff unit, on yellow-green, gravelly talus ash hydrothermally altered welded tuffs at elevations below 5,600 ft in soils that are zeolite clay-rich and have a high potassium content. *Senecio ertterae*, and occasionally *Eriogonum novonudum*, are associates. *Atriplex confertifolia* and *Agropyron spicatum* have encroached onto one of the sites, displacing some individuals of *M. packardiae*. Grazing has been identified as a threat as a decrease in *M. packardiae* has been observed where individuals are concentrated at toeslopes, in areas where cattle graze and trample the soil. Competition with exotics (especially *Bromus tectorum* and *Lepidium perfoliatum*), fire suppression activities, exotic plant species OHVs, and range improvements appear to be significant threats to the viability of this species in Nevada. The ash contains zeolites (Grimes 1984), but mining claims on occupied sites have been abolished. High recreation use in Leslie Gulch has resulted in some sites having been trampled by visitors. A BLM-USFWS Conservation Agreement established for Leslie Gulch protects known sites in Oregon. The range of *M. packardiae* has been thoroughly inventoried and the species is currently in decline.

***Mimulus ampliatus* Grant (= *M. washingtonensis* Gand. ssp. *ampliatus* (Grant) Meinke)** is regional endemic that has been infrequently collected. It is probably much rarer and more vulnerable than *Mimulus washingtonensis*. It is suspected to occur in Wallowa County, Washington, though it is currently known only from Nez Perce, Idaho, and Lewis Counties, Idaho (Meinke 1995). Populations require vernal moisture but other habitat requirements are not understood. Populations trends for this taxa are unknown.

***Mimulus clivicola* Greenm.** is a regional endemic, from Idaho, Washington and Oregon. In the Blue Mountain Province, this diminutive spring annual is known from 18 occurrences in Baker and Wallowa Counties of northeast Oregon, and approximately one hundred occurrences in ten northern and central Idaho counties. In the Blue Mountain Province it is found between 2,500 and 5,800 feet in elevation, on open mineral soil such as loose, basalt derived sand or fine gravel slopes, or rocky, talus outcrops on all but due north aspects. These openings appear to be shallow soiled, sparsely vegetated areas among a matrix of bunchgrass slopes, snowberry shrub-fields, and stringers of ponderosa pine timber. *M. clivicola* appears to prefer the more mesic microsites among terrain occasionally shared with *M. nanus*. Frequently populations in Hells Canyon National Recreation Area, are associated with *Cammassia cusickii* on moderate slopes. It is likely pollinated by ants (Lorain 1991) and small flies (Hustafa 1995). This species appears to have complex seed bank biology, as it exhibits erratic population fluctuations in flowering individuals in relation to annual weather conditions (Lorain 1991). *Mimulus clivicola* habitat is threatened by log decking and disturbances from livestock trampling and trailing that are greater than the historical levels associated with deer and elk travel. Habitat degradation that results in weed invasion also threatens this species. There are no specific studies that accurately reflect the long-term population trends of this taxa.

***Mimulus evanescens* Meinke** is a newly described regional endemic of mid-elevation riparian sites in the Great Basin. Historically the plant occurred from SW Idaho to NE California but is currently known only from two extant populations, one near Drews Reservoir in Lake Co., Oregon, and one in Lassen Co., California. The population in California has been extant for at least six years, while the one in Oregon has only recently been discovered. Occurrence of this autogamous annual species is highly correlated with ephemerally moist sites, including perennial and intermittent streams and receding margins of lakes, ponds and reservoirs. Sites range from approximately 3600 to 5400 feet in elevation and are found within the sagebrush-juniper vegetation zone. Substrates include muds and gravelly to rocky basaltic sands. Associated species include *Artemisia tridentata, Juniperus occidentalis, Mimulus floribundus, M. suksdorfii, Porterella carnosula, Collinsia grandiflora, C. parviflora, Downingia* sp., *Mimetanthe pilosa*, and *Heterocodon rariflorum* (Meinke 1995). Fall and winter precipitation is important for germination and reproduction. Seeds are dispersed by flowing water, wind and gravity. Dormancy is interrupted by cool moist stratification or, to a lesser degree, time. Reproduction may be precocious in response to drought. Population trends of this species are unknown. Significant changes in reservoir water levels is a potential threat, as a population may need to migrate into the sagebrush zone where competition with exotic annuals is high. Habitat alteration by livestock is also a potential threat. This plant is considered extremely rare and vulnerable throughout it's range (Meinke 1995).

Mimulus hymenophyllus **Meinke** is a narrowly local endemic and is found in and west of Hell's Canyon to the Grande Ronde River in eastern Oregon and one historic collection at Pittsburg Landing in western Idaho. It occurs only on rock walls and steep, vertical, shaded cliffs above shrub thickets (predominantly *Physocarpus, Amelanchier, Ribes,* and *Rosa*) in steep draws along perennial cold water creeks. It is often associated with species of *Arabis, Bolandra, Heuchera, Penstemon, Saxifraga, Sedum, Selaginella, Stellaria, Thelypodium, Tonella, Viola*, and a variety of ferns and bryophytes. The Pittsburg Landing site in Idaho is atypical for *M. hymenophyllus* and is heavily altered by intense cattle grazing. *M. hymenophyllus* is not currently directly threatened by human activities however, overstory removal and hydrological changes could seriously harm known populations.

Mimulus jungermannioides **Suksd.** is a regional endemic known from Washington and Oregon. The one occurrence in Klickitat County from the Columbia River Gorge National Scenic Area is thought to be extirpated. It is also known from 13 sites in Gilliam, Sherman, Umatilla Counties, and four occurrences in Wasco Co., Oregon. In Umatilla County it is on private land. It requires perennial seepage and grows from 150 to 1000 ft. in elevation. The species is typically found growing on shaded vertical basaltic and limestone cliff crevices and overhangs in riverine canyons, or stream bank areas or washes where ground water seeps and perched water tables maintain a moist substrate. A highly specialized, largely clonal species, *M. jungermannioides* is unique in that regeneration usually results from subterranean bulb-like turions arising at the end of negatively-phototropic stolons produced annually in the late summer and fall. Flowers are pollinated by small bees or are autogamous, and although seeds are plentiful, viable, and germinate easily, establishment of sexually developed plants is rarely observed. Preliminary molecular and morphological evidence from a study in progress at Oregon State University, funded by the Prineville BLM, suggests that clonal growth in *M. jungermannioides* may be responsible, at least in part, for local genetic fixation (R. Meinke, *pers. comm.*). The dependence of this cliff obligate species upon perennial seeps suggests that the maintenance of an available water supply is critical to population viability. Significant threats include fire, blasting of cliffs for road construction, spray drift from roadside weed control and development. The species is currently considered stable throughout its range, though opportunities for population expansion are extremely limited. This species may represent a remnant of a pre-Hypsithermal plant community, adapted to a much wetter overall climate, that retreated to dripping cliffs as the CRB became more arid in the Holocene.

Mimulus patulus **Pennell** is a local endemic known from the Oregon portion of the Hell's Canyon NRA and extreme northeastern Oregon (Wallowa County). Historic collections from this species have been made from extreme southeast Washington and adjacent Idaho, where it may possibly still exist, though many of the historic sites are now under water from Snake River impoundments This species is similar in appearance to *M. hymenophyllus*, *M. washingtonensis*, and *M. guttatus*. This species is suspected, but not known, to occur in Idaho. *M. patulus* occurs on damp ground, cliffs, and roadcuts in the mosaic of bunchgrass and/or sparse conifer stands along the northeast slope of the Wallowa Mountains uplands. These moist microsites of basalt substrate are often located with various species of *Astragalus*, *Lomatium*, *Allium*, and *Delphinium*, usually with a significant weedy component dominated by annual bromes and fescues.

Mimulus pygmaeus **Grant** is a regional endemic of the Klamath River Basin, in the southern end of the East Cascades physiographic province. It is known from twenty-seven occurrences in southern Klamath and Lake Cos. and the eastern margin of Jackson Co., Oregon, with a site near Thompson Reservoir representing the northernmost population. Occurrence of this reproductively precocious annual is correlated with vernally moist, poor to moderately-drained sites characterized by heavy, ash-clay soils. Almost all occurrences are known from USFS and BLM land, and in wet years flowering plants are prolific and recent studies (Meinke et. al. 1993) indicate that this species may actually be widespread and locally common in wet years in south central Oregon. The species is often found within a narrow ecotone between wet meadow and *Artemisia* zones, in open areas of *Artemisia arbuscula* scabrock communities, or within the high water zone of perennial streams. *M. pygmaeus* is a short-lived self-pollinator with an extensive seed bank. When in fruit, mature capsules tend to persist on the stem, and so the entire plant may act as a dispersal unit. Dihescence and dispersal are by water, as capsules must soak prior to releasing seeds. Fire and scouring by spring floods may play a role in maintaining shrub openings favorable to species viability. A conservation strategy (Meinke 1994) is in effect for the Winema and Fremont National Forests. The population trends for this taxa are unknown as the seed bank biology is not fully known.

Mimulus washingtonensis **Gand. var. *washingtonensis*** is a regional endemic of the Blue Mountains and High Lava Plains provinces of Oregon and from southeastern Washington in the Columbia Gorge, where it is known from one site at 3500 ft. in elevation in a wet seep along a steep intermittent stream with slopes of 20 to 75% on a southern aspect on basalt. This plant also occurs in Idaho. In Oregon the largest number of occurrences (317) are in the John Day Basin of Wheeler and Grant Counties (25 on Prineville BLM) from two new occurrences in Crook County (R. Halverson, *pers. comm.*), and 19 occurrences in Morrow Co. (Urban 1995). This species is edaphically limited to metamorphosed volcanic soils comprised of weathered tuffaceous sediments derived from John Day Buff formations. It has been found between 2,000 and 4,000 feet in elevation. Occurrence of this annual is correlated with ephemeral or perennial rivulets and seeps on shallow basaltic scree and gravelly soils over bedrock, and may be locally abundant in wet years. Plant cover is commonly low (<5%) and sites are devoid of associated vegetation. Sites are nitrogen-limited and a species of *Nostoc* (cyanobacteria) is a common associate that may compensate for the lack of available soil nitrogen. As with other annual members of the *Mimulus* genus, sufficient precipitation is needed during the fall and winter months to maintain hydrologic site characteristics and to facilitate germination. It inhabits seasonally moist patches and seepage areas in otherwise dry, open, highly erodible soils. Its seed bank biology is not well understood and enormous fluctuations in populations size are observed between dry and moist years. Populations are rare or absent during drought years, but are considered stable overall. Livestock trampling is a minor threat. In Washington, timber harvest and road building would adversely impact known populations. It is also threatened by the invasion of exotic grass species, especially annual bromes, which displace this sensitive species. Where *Mimulus guttatus* shares disturbed sites with *M. washingtonensis* var. *washingtonensis*, the latter shows evidence of depressed seed set due to shared pollinators and contamination of the stigmas.

***Mirabilis bigelovii* Gray var. *retrorsa* (Heller) Munz** is a disjunct endemic known from Harney and Malheur Counties, Oregon, and from California, Nevada, Utah, Arizona and northwest Mexico. It occurs in Oregon on barren basalt outcrops and talus slopes, including sites near Owyhee Reservoir and Alvord Lake, at elevations between 2500' and 2800'. Inventories have not yet been completed for the species, but within its range the highest population concentrations are found in California. Potential threats to the species include establishment of gravel pits within its habitat. Population trends are considered stable.

***Mirabilis macfarlanei* Constance & Rollins** is a listed threatened species and an endemic found in the mid and lower Snake River and lower Salmon River canyons. It prefers sites with full exposure though it occurs on a variety of aspects and slope positions at elevations between 1,000 and 2,800 feet. It can be found on a variety of substrates ranging from deep loamy to rocky loam soils, to rocky talus or fine gravelly and sandy basalt soils. The most notable associated vegetation includes *Agropyron spicatum* on the better sites and *Asclepias cryptoceras* on some of the sparsely vegetated basalt gravel sites. This perennial grows from a deep-seated tuberous root that can send out several rhizomes to form large intermingled clones. Winter and early spring rainfall significantly affects plant vigor. Direct and indirect impacts of livestock grazing (including the introduction of exotic plant species) have significantly altered the habitat of this species in the past. Most *M. macfarlanei* sites have cheatgrass (*Bromus tectorum*), knapweeds (*Centaurea* spp.), and yellow starthistle (*Centaurea solstitialis*). The threat from exotics plants is due to both direct habitat conversion and herbicide use. Today, livestock grazing is still considered to effect populations of *M. macfarlanei* but the impact of this activity varies greatly with the season. Population trends for this species are unclear. While ongoing surveys have located additional populations, no one has yet observed a seedling in the field. *M. macfarlanei* is the host for a rare leaf mining moth's larvae, *Lithariapteryx sp. nov.* (Baker 1985). The BLM has been monitoring some populations of this for 15 years and there is an ongoing research project (Barnes and Wolf 1994) at Utah State University investigating inter- and intrapopulation genetic variability.

***Musineon lineare* (Rydberg)** is a disjunct species known in Idaho only from the Bloomington Lake cirque in the Bear River Range (Moseley, 1992). The main body of this species range is in central Utah. That population of approximately 200 individuals occurs at 8,800 feet in scree and rocky outcrops on the northwest face of the cirque. This species appears to be well protected at this site.

***Oenothera psammophila* (A. Nelson & J.F. McBride) W.L. Wagner, Stockhouse, & Klein** is a local endemic restricted to the drifting St. Anthony sand dunes of Fremont County, Idaho. This species tends to colonize the trailing edges of the dunes where bedrock (basalt) is within one meter of the surface. The major threat to the viability of populations of *O. psammophila* is OHVs. The BLM is currently drafting a conservation strategy for this species. Populations trends for this species are considered stable.

***Oryzopsis contracta* (Johnson) Shechter** is a scattered endemic from the Wyoming Basin from Beaverhead County, Montana into northern Colorado. It is known from a limited number of sites within the assessment area, which are at the periphery of the species' range. It occupies a broad range of soil types and aspects in sagebrush grasslands at elevations between 4,800 and 7,800 feet This species is threatened by high grazing pressure and some sites may be threatened by habitat conversion. Surveys in recent years have identified many new sites and the panel suggested that 3C might be a more appropriate Federal status than C2.

***Oryzopsis (Achnatherum) hendersonii* Vasey** is a regional endemic found in Yakima and Kittitas Counties in Washington and Wasco and Crook Counties, Oregon on shallow lithosolic substrates or welded tuffs in open habitat within a matrix of ponderosa pine and bunchgrass stands. It prefers gentle slopes or level ground with soils containing a high levels of weathered basalt gravel and rock, basaltic scablands and frost-heaved soils, with stone stripes and net patterns. It is reported to be associated with *Poa secunda, Artemisia rigida, Eriogonum strictum,* and *E. douglasii* species on scablands (Vrilakas 1990). Populations of this strongly tufted perennial grass are small and scattered. Elevations range from 2200 to 5400 feet in elevation. Significant threats to the viability of *O. hendersonii* populations include livestock trampling, grazing and trailing, salt blocking, the invasion of exotic plant species, road construction and OHV traffic.

***Oryzopsis (Achnatherum) wallowensis* Maze and K.A. Robson** is a regional endemic currently being proposed as a new species by Jack Maze and Kali Robson, University of British Columbia. It is primarily found in Wallowa County, Oregon with a few populations known from the north slope of the Ochoco Mountains, in Crook County (Maze 1995). Occurrences for this species of *Oryzopsis* are likely mixed in with reports for *O. hendersonii*. It differs prominently from *O. hendersonii* in its drooping inflorescence. Although other morphological differences exists, its habitat affinity is sympatric with that described for *O. hendersonii*. Both species face similar threats.

***Oxytropis campestris* (L.) DC. var. *columbiana* (St. John) Barneby** is a regional endemic in the Pacific Northwest. The taxonomic disposition of this variety has been the subject of uncertainty, based on varying opinions of systematists who have examined specimens from

Montana; this situation is summarized by Lesica (1992). Until such time as further taxonomic work is completed, in the interest of conserving biological diversity the taxon has been nominated for Category 2 candidate status. The habitat for this taxon consists of gravel shores and river bars that are subject to wave action (Lesica 1992). In northwest Montana, six occurrences have been documented on the shores of Flathead Lake in Lake County. In addition, 13 sites were located along the North Fork Flathead River in Flathead County; however, these populations appear to be intermediate, both in morphology and habitat, between varieties. *columbiana* and *gracilis* (Lesica 1992). *Oxytropis campestris* var. *columbiana* is also known from northeast Washington, from gravelly banks along the Columbia River, but these populations are believed to have been mostly extirpated by habitat destruction as a result of the construction of Grand Coulee Dam. The habitat on Flathead Lake in Montana is threatened by residential development, and possibly also lake level regulation (Hungry Horse and Kerr dams) and invasion by spotted knapweed (Lesica 1992). Molecular systematic studies would be useful in clarifying the taxonomic status of this variety; in the interim, Category 2 candidate status is deemed appropriate.

***Oxytropis campestris* (L.) DC. var. *wanapum* Joyal** is a local endemic to Grant County, Washington. The single occurrence of this recently described species is on federal land. This perennial grows on ridges and adjacent north-facing slopes on fine, sandy, and coarse-grained soil. Documented threats to this species and its habitat include exotic weed invasion and recreation. Population trends for *O. campestris wanapum* are unknown.

***Papaver pygmaeum* Rydb.** is a regional endemic known to occur in northwest Montana, and in southern Alberta and British Columbia, Canada (Lesica and Shelly 1991). It is documented from nine locations in Montana (Montana Natural Heritage Program database records, Helena), in Flathead and Glacier counties, but is reported to be "locally common at many locations in Glacier National Park" (Lesica and Shelly 1991). It occurs in the Flathead, Lewis and Livingston mountain ranges. The habitat of the species consists of open, stony soil on gentle slopes and ridge tops in the alpine zone, at approximate elevations of 7,200 to 8,200 feet (Lesica and Shelly 1991). Although frequent in this geographic area, population sizes are small, and demographic population monitoring is advised to assess population stability (Montana VP panel notes). The taxonomic disposition of this species has been questioned; in an alternative treatment, Welsh et al. (1987) consider it a form of the widespread *P. radicatum,* but this opinion is not universally held (Montana VP panel notes). Known populations are in well-protected or unthreatened areas, such as Glacier National Park.

***Parnassia kotzebuei* Cham. ex Spreng. var. *pumila* C. L. Hitchc. & Ownbey** is a disjunct species known from the Cascade Mountains of Okanogan County in Washington. The center of this taxa's range is the mountains of British Columbia. The Okanogan site of five individuals is on National Forest Service land near the entrance of an active mine on copper ore bedrock and talus. It is on a north aspect on moist mossy ledges at the base of an overhanging granitic cliff on soil that does not dry out. The ground surface is 30 to 100% bare and slopes are 45 to 90%. This perennial plant is a Pleistocene relict. Significant threats include mining, landslides, change in fire regimes, grazing, development, and timber harvest. There is some uncertainty concerning the validity of the variety *pumila* among taxonomists; however, given the great extent of the disjunction, this issue does not effect the Washington Natural Heritage Program's commitment to tracking this taxa.

***Penstemon barrettiae* Gray** is a regional endemic to Klickitat County in Washington and adjacent Oregon. It is restricted in Washington to the Columbia Gorge and Klickitat River, where nine of 13 occurrences are on private land. This species inhabits fractured basalt cliffs and walls with limited annual seepage, rock outcrops and open talus with less than 30% canopy cover, and above the riparian vegetation of these major rivers. It is also found on cliffs within a matrix of xeric bunchgrass, shrub steppe and/or open canopied forest margins. Slopes vary from zero to 90%. *Penstemon barrettiae* occurs in the *Quercus garryana/Pinus ponderosa* zone up to 3200 ft. in elevation. The showy flowers are pollinated by large native bees, members of *Osmia* and *Bombus*, and fruit production is probably correlated with presence of these pollinators. Seeds are probably dispersed by wind and gravity, as no specialized dispersal mechanism is known. Although the range is well known, distributions within the range are not. Population trends are unknown , although rock gardeners and *Penstemon* horticultural specialists have extensively collected from wild populations in the past, depleting sites. The plant is readily propagated and is currently available at some nurseries. Hybridization of *P. barrettiae* with other species from similar habitat, including *P. fruticosus* has been noted. Significant threats include road construction and quarrying, collection, grazing, exotic weed invasion, and timber harvest. Damming of the Columbia River destroyed several populations.

***Penstemon compactus* (Keck) Crosswhite** is a local endemic known only from federal lands in the Bear River Range, near the Utah border in Franklin County, Idaho. It is found on rocky, limestone or dolomite derived soils between 7,200 and 9,400 ft. Sites are in high elevation, subalpine ridges and open areas, upper slope and open rocky habitat of mountain big sage and Douglas fir parkland. There are eight sites in analysis area and, apparently, no immediate threats.

***Penstemon glaucinus* Penn.** is a regional endemic of the Klamath River basin known from thirty-seven occurrences in Klamath and Lake Counties, Oregon. It is found in openings and in the understory of mid- to high elevation (5900-8400 feet) forests of *Pinus contorta, Pinus ponderosa, Pinus albicalus,* or *Tsuga mertensiana* composition. Soils are poorly developed and well-drained, usually of volcanic origin, shallow, often sandy-loamy, volcanic soil, sometimes along rocky points or ridgelines or occasionally in stony meadows. It is often associated with *Arctostaphylos, Holodiscus, Lomatium, Lupinus, Catilleja, Artemisia* and *Eriogonum*. Flowers are pollinated by members of the genera *Bombus* and *Osmia*. The species is found in communities of all successional stages, but is most abundant in early seral, post disturbance stands or stands that are naturally open. Though there are no long term data to evaluate persistence of populations in disturbed sites. A hardy perennial with extensive horizontal and vertical rhizomes, it is an early colonizer on old road beds and slash pile burns. Both fire and Silviculture prescriptions that decrease overstory cover may promote colonization. Populations reportedly spread once ground cover is removed (Vincent and Vincent 1980). Therefore, populations may be limited by fuel build up promoted by fire suppression. Fire also appears to scarify seed and thus facilitate germination. Seedlings are seldom observed, but large clonal patches are frequently found within the understory community. Population trends are considered stable. A Conservation Strategy prepared for the Fremont National Forest (Wooley 1993) is in effect.

***Penstemon idahoensis* Atwood & Welsh** is a local endemic inhabiting tuffaceous ash beds in the Goose Creek drainage. These sites tend to be relatively barren, having less than 10% cover. *P. lemhiensis* doesn't seem to have a preferred slope position though it is rarely found in drainage bottoms. The population trend of this species is unknown. Threats to local population viability include the invasion of exotic species, development, road construction, and herbicide spray and drift. Domestic livestock poses a threat to this species from trampling and indirectly by degrading upslope areas.

***Penstemon lemhiensis* (Keck) Keck and Cronq.** is a regional endemic occurring in southwest Montana and adjacent east-central Idaho. The species primarily occurs in sagebrush-bunchgrass community types (*Artemisia tridentata/Agropyron spicatum,* and *Artemisia tridentata/Festuca idahoensis*), but is also known from low-elevation *Pinus ponderosa/Purshia tridentata* and higher elevation subalpine forb meadows and openings; occurrences span elevations from approximately 4,000 to 8,000 feet. Populations have been found on soils weathered from granite, limestone, and other rock types with textures generally being gravelly loams. This species is adapted to natural disturbance regimes and readily invades some types of openings. This broad range of habitats and elevations is unusual for a species of restricted geographic range, and is probably a result of the biogeographic divergence pattern in this group of *Penstemon*s, as opposed to selection for adaptation to specialized habitats (Shelly 1990b). This and related *Penstemon* species have an apparently close pollination relationship with vespid wasps, though these wasps are not the only insect visitors (Shelly 1990b). The effects of fire suppression on the habitat and population dynamics of this species are not well-understood quantitatively, but it is highly likely that resultant vegetation succession, especially in sagebrush-bunchgrass habitats, has caused population declines (Shelly and Achuff 1992). Demographic monitoring studies at three locations in Montana revealed drastic declines in survival of established plants from 1989 to 1993, most probably as a result of prevailing drought conditions over the last eight years (Shelly 1990a; Shelly and Achuff 1992; Shelly and Heidel 1993). Although plants will grow in disturbed habitats such as roadbanks, they are never abundant in these situations, and these small ruderal populations do not contribute substantially to the long-term viability of the species. The average population size rangewide is small, with fewer than five populations that could be considered large, core populations (Shelly 1990b). Forest management practices of the last century, especially fire suppression and timber harvest, have caused a significant decline in the frequency of natural regeneration sites for this species. The invasion of exotic species and herbicide spraying are known to threaten some sites. This species is being cultivated for garden enthusiasts, primarily from commercially grown stock plants. A rangewide species conservation strategy is currently being completed.

***Penstemon "nikei"*.** This unpublished epithet represents a series of populations with unique morphological traits, possibly related to *P. miser* Meinke unpbl. being tracked by the Vale District of the BLM (J. Findley, *pers. comm.*). Known only from Malheur County, OR in appropriate sites in the northeastern and east-central parts of the county. This edaphically restricted species has perhaps the most specialized habitat of all rare *Penstemon*s in the CRB as it occurs only on unique eroded clay/ash or diatomaceous substrates, within the sage scrub. The slopes are usually naturally barren due to the harshness of the physical environment. Additional inventory is a necessity and could be easily conducted using soil maps. Search should focus in Malheur County, Oregon and in appropriate areas of southern Idaho and northern Nevada. Mining and ORVs may be threats. Little is known about this plant and basic inventory and biological info is needed, substrate disturbance is a threat.

***Penstemon peckii* Penn.** is a local endemic of the Metolius Basin, known from seventy-four occurrences in the southern East Cascades and High Lava Plains provinces, Jefferson and Deschutes Counties, Oregon. It is found at elevations between 2600 and 4000 feet in open, early to mid-seral *Pinus ponderosa* forests merging to the forest-meadow ecotone under an open or partially closed canopy of the dry meadow. Site topography is level to slightly inclined, and occasionally concave. Soils are deep, well-drained, gravelly-loam to rocky or sandy and of basaltic origin. Habitat occurs along recovering fluvial surfaces, streambanks, floodplain and sites characterized by at least vernal moisture. High soil moisture in the spring and summer is required for seedling germination and establishment. The species tolerates moderate disturbances and establishment may be facilitated by fire and silviculture prescriptions that open the canopy from below. Conversely, clearcuts and intensive site preparation have destroyed some populations. The infestation of diffuse and spotted knapweed in riparian recreation sites is a growing threat to the species. The metapopulation was considered stable (although some individual populations are declining in response to closed canopy conditions likely a result of fire suppression) until populations identified as critical for species persistence in the completed species management guide were disposed of in a land exchange.

***Perideridia erythrorhiza* (Piper) Chuang & Const.** is a disjunct endemic from the *Quercus garryana* grasslands of the west Cascades and is extremely rare in the east Cascades where it is known from two sites in Klamath Co., Oregon. Recent unpublished molecular data (Baldwin, *communication by letter*) reveals separate lineages and suggests that the eastside and westside populations are genetically distinct. Within the East Cascades South physiographic province, the species is found at elevations of approximately 4200 feet in moist meadows dominated by *Deschampsia cespitosa, Poa pratensis, Koeleria cristata,* and *Festuca idahoensis, and* surrounded by mixed coniferous forests. Soils are silt-clays and loams and are generally moister than those occupied by more common species of *Perideridia*. The tuberous roots are used as a food source by native Americans. In western Oregon this species is threatened by urban expansion. Within the East Cascades province, sites fall under Federal ownership but are threatened by trampling and soil compaction resulting from livestock grazing. Direct herbivory is minor. The diking and draining of meadows around Klamath Lake may have permanently reduced the available habitat for this species. Collectively, population trends are declining; the trend for the East Cascades populations is unknown.

***Petrophytum cinerascens* (Piper) Rydb.** is a local endemic along the Columbia River in Chelan and Douglas Counties, Washington, where there are three locations; all of which are on private land. It inhabits gneiss, rhyolite, and andesite rock cliffs and outcrops on slopes to 90% where other vegetation is sparse from 700 to 1600 ft. in elevation. This perennial forms mats from one square foot to six by three feet in size. Populations range from 100 mats to 1,000. It does not occur north of the southern terminus of continental glaciation and may be a good indicator of global warming. Road-widening would destroy habitat.

Phacelia inconspicua **Greene** is a scattered endemic known from southwestern Idaho and northern Nevada. This rare annual occurs on sandy loams with surface sand and gravels. It prefers but is not restricted to, nival zones. In Idaho, sites range in elevation from 5,000 to 6,000 feet. Populations of *P. inconspicua* are typically small, isolated, and seasonally ephemeral. Significant threats to populations, stem from livestock grazing, mining, and introduced plant species (both from competitive exclusion and alterations of the historic fire regime). This species appears to be stable at the present time.

Phacelia lenta **Piper** is a local endemic to Douglas County, Washington. All nine of the occurrences in the Columbia River Basin Province are on private land. Populations often consist of several hundred plants. This perennial inhabits cracks and ledges in exposed basalt cliffs and talus from 1300 to 3400 ft. in elevation. This plant may fracture basalt. The showy flowers probably provide pollen and nectar for insects.

Phacelia lutea **(Hook. & Arn.) J.T. Howell var. *calva*** is a local endemic known from 13 occurrences in Owyhee Co., Idaho. The species occurs on weathered Sucker Creek Formation ash, and grey-white to dark brown montmorillonite and bentonite clays characterized by very low percolation rates. Sites range from approximately 4000 to 4800 feet in elevation and are generally found on barren, gentle, south or southwest facing slopes. Early spring moisture is crucial to successful establishment, and abundance of individuals in a given year is highly correlated with precipitation levels. Associates may include *Sitanion hystrix*, *Cleomella macbrideana*, *Chaenactis douglasii*, *Lomatium* sp., *Phacelia lutea* var. *lutea*, and *Mentzelia mollis*. As with other ash endemics, potential threats include trampling by livestock, off-road vehicle (ORV) traffic, and mining activity. Population trends are unknown.

Phacelia lutea **(Hook. & Arn.) J.T. Howell var. *mackenzieorum* Grimes & Packard** is a regional endemic known from Malheur Co., Oregon. There are three sites in Malheur County. The species occurs on green-yellow Leslie Gulch tuff-talus characterized by high percolation rates. Early spring moisture is crucial to successful establishment, and abundance of individuals in a given year is highly correlated with precipitation levels. Potential threats include trampling by livestock, off-road vehicle (ORV) traffic, and possible mining activity. Population trends are unknown.

Phacelia minutissima **Henderson** is a scattered endemic ephemeral annual known from the upper Intermountain region. Historic collections of this species list a range of habitats though most are taken from seeps in sage or aspen on vernally wet side slopes of ephemeral (zero-order) drainages or mountain meadow complexes, where the plant is dependant upon spring and summer moisture for flowering. Recent collections in southern Idaho have been made in *Veratrum* stands down-slope from aspen, especially at sites with open understories. Soil conditions are usually well drained yet silty. Typical site elevations range between 5,000 and 8,200 feet. Threats to local populations and suitable habitat for *P. minutissima* include livestock grazing (mostly through soil disturbance), mining (especially in northern Utah), the invasion of exotic plant species, and range improvements (especially water developments). Changes in fire frequencies may also represent a threat to some populations. The conservation status of this species was assessed recently (Moseley 1995a). The Boise National Forest and the Boise District BLM are conducting extensive surveys for this species in 1995 and 1996. This species was rediscovered in the Wallowa Mountains, Oregon in 1996.

***Phlox idahonis* Wherry** is a local endemic found near Headquarters, Idaho. Currently, 98% of known *P. idahonis* sites are owned by Potlatch Corp. The historic range of this species is unknown. This species is found in low gradient streamside and grass/forb meadows in cold air sinks between 2,800 and 3,300 ft. It prefers an open canopy and is adapted to periodic fire. Much of the habitat for this species has been altered by grazing, land conversion, and fire suppression (by the consequent invasion of trees into its meadow habitat). Current threats include the lack of fire and hydrological alterations to its meadow habitat. There are permanent monitoring plots in place for this species (Moseley and Crawford 1993).

***Physaria didymocarpa* (Hook) Gray var. *lyrata* C.L. Hitchcock** is a local endemic restricted to talus slopes in the Challis volcanics in central Idaho. Conservation agreements between the USFWS and BLM had been in place from 1984 until 1995 when the BLM declined to renew the 1990 agreement. The major threat to the viability of *P. didymocarpa lyrata* populations is mining. All populations of *P. didymocarpa lyrata* are in decline and all are currently experiencing some level of human disturbance.

***Physaria integrifolia* (Rollins) Lichvar var. *monticola* Lichvar** is a regional endemic found in the Salt River and Wyoming Ranges of western Wyoming at fewer than thirty sites (ten within the Columbia River Basin) and in the Caribou Range in Bonneville County, Idaho. Its preferred habitat is sagebrush slopes, seeps, sloughing clays, rocky or talus slopes or ridges, or summit residuum. This taxa may be no more than a form of the species and is currently being reconsidered by Rollins (who did not include it in his recent Cruciferae of North America) and is no longer being tracked by Wyoming Heritage due to its uncertain taxonomic status (Fertig pers comm). The trend for this taxa appears to be stable.

***Pleuropogon oreganus* Chase** is a regional endemic known from Lake County, in southeastern Oregon, and Union County, in northeastern Oregon. All known sites are on private land. None of the known sites occur on public land. *Pleuropogon oreganus* habitat is characterized by level, moist meadows with slow moving water at elevations between 3,600 and 5,600 feet. Common associated species include *Deschampsia cespitosa, Hordeum brachyantherum, Poa cusickii, Eleocharis palustris* and *Carex nebrascensis*. The species may have been more widespread in the past, but grazing and related activities have reduced habitat and population numbers. Livestock presence in these habitats is identified as an extreme threat, and spring grazing has proven detrimental. The specific impacts of grazing that effect this species are trampling and churning of the wet soils, and by the lowering of the water table associated with downcutting and channelization. Following site modification by cattle, subsequent increases in exotic plant species (including pasture grasses) also threaten this species. A portion of the Lake County populations are protected under a Nature Conservancy easement agreement with private landowners. Population trends are unknown, though probably declining.

***Polemonium pectinatum* Greene** has a regional distribution, endemic to east-central Washington. In the Columbia River Basin Province, 32 of the 40 occurrences in Lincoln, Whitman and Adams Counties are on private land. Populations usually include several hundred individuals. It grows in alluvial and colluvial soils, often with a mix of loess and glacially derived material. It ranges from 1480 to 2300 ft. in elevation. This perennial tends to do best in those sites that are in good ecological condition. Sites invaded with *Bromus tectorum* or *Poa pratensis* have very small populations. There is generally no or only a limited tree component in the shrub and bunchgrass communities where this perennial is found. Historically known from the Palouse, but due to land conversion to agriculture with its accompanying hydrological changes, it has been extirpated. Loss of habitat is still a high threat. Heavy grazing, invasion of exotic species, and drawing down water tables from water developments are significant threats. Isolation and fragmentation of populations may have resulted in a loss of viability.

***Potentilla cottamii* N. Holmgren** is a regional endemic found in Utah at two sites in the southern Raft River Range. It is confined to schist and quartzite substrates and occupies cracks, crevices, and recesses in high elevation (9,440-9,740 feet) rocky outcrops on north and shaded south aspect slopes. Mining is the greatest existing threat to this species though roads and livestock grazing can be a problem.

***Primula alcalina* A. Cholewa & D. Henderson** is a local endemic known from low gradient streamside meadows in the Beaverhead Mountains at elevations between 6,294 and 6,720 ft. The streams in which this species is found are continually fed by springs thereby maintaining stable flow levels throughout the year. Soils are alkaline, fine textured, and have a high organic fraction. Seed dispersal is highly localized. The conservation biology of this species has been studied in some depth (Kelso 1991, Muir and Moseley 1994, and Moseley 1995b). Land ownership of *P. alcalina* sites is mixed (25% State and Federal, and 75% private). Direct threats to population viability have been documented to stem from livestock grazing and the invasion of exotic plant species. Moderate threats from recreational use of *P. alcalina* habitat have also been noted. This species is in decline throughout its range.

***Ranunculus reconditis* Nels. & Macbr.** is a local endemic found on open grassy hillslopes underlain by rocky basaltic substrates in Lincoln and Klickitat Counties (where there are nine occurrences), Washington and Wasco County, Oregon, where there are three occurrences. Populations usually consist of several hundred plants. It grows primarily in *Festuca idahoensis*, *Purshia tridentata*, and *Hieracium cynoglossoides* grasslands, but also in open oak stands from 1900 to 4000 ft. in elevation. This species occurs on the upper one-third of slopes and ridges, on all aspects. This perennial withstands low to moderate grazing, but is very susceptible to prolonged or high intensity grazing. Its potential habitat has decreased from land conversion. This early flowering species probably provides an early food source for pollinators and herbivores. Threats are from loss of habitat and conversion of potential habitat though population trends are considered stable at this time.

***Rorippa columbiae* Suksdorf ex Howell** is a scattered endemic; distributed from the Columbia River south to the Great Basin and East Cascades with disjunctions in California and New

Mexico. It is known from one site in Klickitat County, Wa., in the Columbia River Gorge on private land. Species occurrences are limited to the margins of intermittent and perennial streambanks, channel bottoms, cobble bars with fine silty matrices, and lake margins that are at least seasonally flooded or sand and rocky cobble. Site elevations range from 4100 to 5320 feet. Vegetative cover is generally less than 15 percent, with overstory openings maintained by channel scouring or seasonal flooding. Common associates include *Camissonia tanacetifolia, Coreopsis akinsonia, Phalaris arundinacea Downingia* spp., *Potentilla* spp., *Rumex* spp., *Artemisia cana*, and *Juncus* spp. The species is facultatively autogamous and while there are many stems only a low percentage of these reproduce sexually. Fruits ripen in mid- to late summer and are dispersed by gravity, wind, and most effectively by moving water. The species is negatively impacted by heavy grazing and trampling, these having caused the extirpation of some sites. This species is further threatened by variable water levels from dams and the invasion of exotic plant species. The condition of many populations appears to be declining. The majority of sites occur on public land, and a range-wide Conservation Strategy is currently being developed by the USFS, BLM and Oregon Department of Agriculture.

***Rubus bartonianus* Peck** is a local endemic found in Hell's Canyon on rocky scree slopes, lower slopes, canyon bottoms, and occasionally into the river bottom at elevations between 1,000 and 4,500 feet. Its habitat is generally described as a heterogenous shrubland. Though geographically restricted, it is locally common. There are very few threats to the viability of most populations of *R. bartonianus*. In limited areas, livestock grazing and recreation trail maintenance have been a problem. Exclusion of fire may have allowed fuel loads to accumulate, leading to more intense, potentially threatening fires, but the fire ecology of *Rubus bartonianus* is not well understood. Much habitat, and likely a large number of individuals were destroyed by the construction of Hell's Canyon Dam and the reservoir it created. In 1995, the Idaho Native Plant Society recommended that this species be reduced in Federal status from C2 to 3C.

***Rubus nigerrimus* (Greene) Rydb.** is a locally distributed endemic species in the Snake River Canyon and adjacent tributaries in southeastern Washington. In the Columbia River Basin Province, the 19 occurrences are all on private land in Whitman and Garfield Counties. Populations are small. It is found in draws and canyon bottoms, although very rarely on mid- and upper slopes. Elevations range from 700 to 2400 ft. along the Snake River and up to the breaks. This perennial provides soil stabilization, berries for birds, and cover for birds and small mammals. Flooding from dams on the Snake River have probably inundated historic sites and many sites are severely impacted from grazing. Exotic species such as *Rubus discolor* and *R. laciniatus* threaten populations. A change in fire regime is a significant threat.

***Saxifraga bryophora* A.Gray var. *tobiasiae* Grimes & Packard** is a highly localized endemic known from a single area on Bruin Mountain north of McCall, Idaho on the Payette NF. It occurs on open rocky slopes of small terraces and on gravely ridge tops between 7,500 and 7,650 feet. There is no information on the threats to or viability of the known populations, however the extensive fires on the Payette National Forest in 1994 caused the extirpation of one of the five known sites for this taxa.

***Senecio ertterae* Barkley** is a local ash endemic, known from eleven occurrences in Leslie

Gulch, in the Owyhee Uplands of Malheur Co., Oregon. It is a late-flowering annual, and moisture provided by summer and early fall thundershowers appears to be critical to population fitness. The species is found on lower slopes and in desert washes on greenish-gray gravelly tuffaceous ash. Vegetative cover rarely exceeds five percent, and associated species are limited to annuals. *Senecio etterae* is favored by hydrologic disturbance, and increased significantly in abundance following a summer flash flood in 1986. Livestock grazing and trampling is a potential threat, and cattle trails exist at several sites. Invasion of sites by exotics, including peppergrass and cheatgrass, and potential invasion by whitetop, yellow star thistle, and Scotch thistle may also pose a threat. Zeolite mining is not an immediate threat, but could become one if mining were initiated within *Senecio* habitat. Recreational development and foot traffic may also be potential threats. Populations are considered stable at this time.

***Sidalcea oregana* (Nutt.) Gray var. *calva* C. L. Hitchc.** is a local endemic, found in the Wenatchee Mountains in Chelan and Kittitas Counties in Washington, where three of the five sites in the East Cascades North Province are on public land. Four more are historical and probably extirpated and three other sites have not be able to be relocated. It occurs in moist seeps, springs, riparian areas, and meadows with surface water or saturated upper soil profiles in the spring, but dry by the end of the summer. This perennial grows in areas with 100% vegetative cover. It occurs from 1380 to 5060 ft. in elevation. Since this plant occurs in habitat in early successional stages, fire may play a role in the development and maintenance of populations. The addition of cattle excrement may be a threat. Physical disturbance during timber harvest, changes in fire regime as it affects hydrology, and erosion associated with grazing are significant threats.

***Silene seelyi* Morton & Thompson** is a local endemic to the Wenatchee Mountains of southern Chelan and adjacent Kittitas Counties in Washington. There are 20 occurrences in Chelan and Kittitas Counties, most of which are on National Forest Service land. A perennial known from shaded crevices in ultramafic to basaltic cliffs and rock outcrops, it occasionally occurs among boulders in talus. Plants grow from 1500 to 7000 ft. in elevation. Habitat types include *Pinus ponderosa, Pseudotsuga menziesii* and *Picea engelmannii* with canopy cover less than 30% and slopes 15 to 20%. Population sizes are small, ranging from two to 50 individuals. Threats from road construction and rock climbing are significant.

***Silene spaldingii* Watson** is a regional endemic and part of the Palouse Prairie flora. Globally, this species is known from southeastern British Columbia, southeastern Washington, northeastern Oregon, northwestern Montana, and northern Idaho. It occurs at elevations between 2,800 and 5,100 feet. Most of the populations are on private land. It prefers deep (loess) soils and is usually found on ridgetops and slopes (5-60%) with any aspect. It grows in *Festuca idahoensis* and *Pinus ponderosa* plant communities. Most populations of *S. spaldingii* are on private lands. *Silene spaldingii* is typically pollinated by bumblebees but, due to the frequently small populations sizes, the maintenance of a viable and effective pollinator fauna is problematic. Experimental exclusion of pollinators resulted in high levels of inbreeding depression, as measured by several reproductive parameters. This suggests that the presence of pollinators is critical to population viability (Lesica 1993b). Significant historic threats to this species include agricultural land conversions and the disruption of the native fire regime. Today, threats to the viability of this species stem from continued habitat conversion, livestock grazing, the lack of fire, the invasion of exotic plant species, and herbicide spray and drift. Since most populations of *S. spaldingii* are reproductive isolated, the viability of the species is at risk from genetic and demographic stochasticity. This species has recently been recommended for placement in Category 1, and a listing petition has been submitted to the U.S. Fish and Wildlife Service by the Montana Native Plant Society and other interested parties.

***Sisyrinchium sarmentosum* Suksd. ex Greene** is a peripheral species in Washington. There are two occurrences in Klickitat County, both on private land. Population sizes range from 100 to 200 plants. This perennial inhabits subalpine and montane meadows in the *Abies grandis* and *A. amabilis* zones. It is found in wet seeps and areas wet in spring and midsummer. Soils are deep to medium deep and are derived from volcanics, primarily basalt, aeolian, glacial till, colluvium, alluvium and residuum. Sites range from 1200 to 6000 ft. in elevation with slopes of less than 15%. The species is sensitive to changes in water regime. It is palatable and sensitive to grazing and trampling, as well as the exotic plants introduced by cattle and people. Fire could have a positive influence in creating openings of potential habitat, as well as a negative influence by changing the hydrology of basins. Developments also threaten its habitat.

***Stanleya confertifolia* (Robins.) Howell** is a regional endemic known from the Baker Co., Oregon, to southeastern Oregon Harney, Malheur and east to Idaho in Owhyee and Washington Counties. The species is an annual (occasional biennial) found on open, barren ashy and sandy sites, on plains and low hills. Flowers bloom from May to June, and early spring precipitation appears crucial to successful establishment and seed set. Little is known regarding potential threats to, and population trends of, this species.

***Stephanomeria malheurensis* Gottlieb** is a federally listed, endangered local neoendemic. An autogamous annual species, it is found at one site in the Basin and Range Province, in Harney Co., Oregon, where it grows on an ancient lake bed of very gentle slope that was uplifted during pre-Pleistocene times. Substrates are gravelly sandy loams. Almost all known extant *S. malhuerensis* is derived from an outplanting of progeny raised at the Berry Botanic Garden, Portland, Oregon, from material stored at the University of California, Davis. Population size varies annually with precipitation. Associated species at the site include *Artemisia tridentata* ssp. *wyomingensis, Chrysothamnus* spp., and *Elymus cinereus*. *Stephanomeria malheurensis* is closely related to *S. exigua*, which is sympatric, and has been derived from the latter species by a change to a self-pollinating breeding system. Historically, this species was on a decreasing trend, and the current trend remains unchanged. The site has been fenced to exclude grazing, but low seed set, seed predation and cheatgrass invasion pose considerable threats to the species' viability. The population resides on an old zeolite mining claim, and renewed interest in mining may introduce a future threat.

Sullivantia hypomania* (Counter & Fischer) Counter var. *hypomania in Idaho is disjunct from the primary range of this taxa. It is found in the lower canyons of the Middle Fork Salmon River and its tributaries. It is restricted to shaded cliff faces in the spray and splash zones around waterfalls. Idaho populations of *S. hypomania hypomania* are all located in wilderness and have no discernible threats.

Tauschia hoverii **Math. & Const.** is a local endemic, found in Yakima and Kittitas Counties, Washington. In the Columbia River Basin Province, 20 of the 39 occurrences are on federal land. Populations of this small perennial often number into the thousands. It grows on basalt scablands in the *Artemisia rigida* and *Poa secunda* habitat type on lithosol soils on zero to five percent slopes. It ranges in elevation from 1700 to 3270 ft. It is an important root for the Yakima Wanapum Indians. Threats from grazing and roads are high.

Texosporium sancti-jacobi **(Tuck.) Nadv.** is a regionally endemic lichen found in southern Idaho and eastern Oregon that requires good, or excellent range conditions. It is usually found on old humus or decadent *Poa secunda* clumps. Elevations of known *Texosporium* sites range between 2,400 and 3,300 ft. This species is in decline due to threats from degrading range conditions (attributed to livestock grazing, changes in fire frequency, land conversion, and introduced vascular plants). Four sites burned in range fires in 1996. A single disjunct collection of this species was made in Pinnacles National Monument, California (McCune 1992).

Thelypodium eucosmum **Robins** is a restricted regional endemic distributed mainly within the upper John Day River watershed in Grant and Wheeler Counties, Oregon. It is found between 1,200 and 3,900 feet in elevation, on deep volcanic silt (John Day volcanics), light colored montmorillonite clays, and pyroclastic metasedimentary soils. It is associated with ephemeral streambeds, and open juniper - sagebrush - bunchgrass communities typically on ashy-clay soils in *Juniperus occidentalis* woodlands. Though most often observed to be biennial it can persist for two or three years under some conditions. It is highly palatable and desirable to wild and domestic ungulates. Livestock grazing practices and habitat conversion to agricultural lands have dramatically reduced its distribution and available habitat. Changes in the historic fire regime leading to fewer fires of greater intensity damage *Thelypodium eucosmum* rosettes and its seed bed, especially directly under juniper.

Thelypodium howellii **Wats. ssp.** *howellii* is a scattered endemic known from a small hand-full of historic collections in Crook, Deschutes, Grant, Harney, Lake and Klamath Counties, Oregon, and from five populations near Susanville in northeastern California. It is currently considered extinct in Oregon. It is a biennial species that occurs on moist, alkaline soils in river valleys, at the margins of ponds and lakes, and within alkaline meadows and plains. Historic site elevations ranged from 4500 to 4700 feet. Grazing by livestock is the greatest threat to the species.

Thelypodium howellii **Wats. ssp.** *spectabilis* **(Peck) Al-Shehbaz** is a local endemic known from Union, Baker (Baker Valley), and Malheur Counties, Oregon. Several occurrences have been extirpated in the recent past (Youtie 1995). This species is associated with alkaline bottomlands, basins, flats, and floodplains. It is commonly associated with *Sarcobatus vermiculatus, Elymus cinereus,* and *Deschampsia cespitosa* at sites between 3,200 and 3,400 feet in elevation. This species is highly palatable and desirable to wild and domestic ungulates. Spring and summer grazing is harmful but fall grazing may provide satisfactory results by impacting competing vegetation. All known populations are on private land. This plant is one of the most imperiled plants in Oregon.

***Thelypodium repandum* Rollins** is a local endemic restricted to the Challis volcanics and associated metamorphics. This annual mustard is found exclusively on steep talus slopes. Populations appear to be stable at this time. Identified significant threats to this species include road construction and mining. Limited threats stem from livestock grazing and exotic species. Long term monitoring of *T. repandum* is ongoing.

***Tofieldia glutinosa* (Michx.) Pers. ssp. *absona* Davis** is a boreal disjunct species known from a single site on Priest Lake in northern Idaho. It is restricted to sphagnum peat substrates. Threats to this species at Priest Lake include land development and alterations to the local hydrologic regime. This species is both difficult to locate and identify. There may be more suitable habitat in northern Idaho.

***Trifolium douglasii* House** is a regional endemic only known from three sites in Whitman County, Washington and six sites in Umatilla and Union Counties, Oregon. It inhabits moist, temporarily flooded meadows and forested wetlands, and streambanks. Historically, this species was found from Spokane County, Washington to Baker County Oregon and east to adjacent Idaho. *Trifolium douglasii* has been severely impacted by habitat conversion to agricultural uses and by seeding of exotic grass species, although it may tolerate some rotational grazing regimes. The effects of fire on this clover are not known but spring burns are likely detrimental to its early spring seed production.

***Trifolium owyheense* Gilkey** is a regional endemic species restricted to the ash deposits of southwestern Idaho and adjacent Oregon. The annual prevalence and reproductive capacity of this species depends on soil moisture availability. It prefers sparse sites (less than 30% cover) with modest slopes (0-30%). Known populations occur between 2,600 and 4,500 ft. The trend of this species is unknown. Changes in the historic fire regime, mining, the invasion of exotic species, and OHVs are all seen as significant and important threats to *T. owyheense*. Lesser but still important threats stem from livestock grazing and road construction.

***Trifolium thompsonii* Morton** is a local endemic in Washington in eastern Chelan and Douglas Counties, where there is one occurrence on private land in Douglas County. In the rest of the East Cascades province there are 20 occurrences with the majority of sites on federal land. Although its range is restricted, its habitat is highly variable. This perennial grows on basalt scablands, as well as areas with deeper soils of loess and sandy loam. Found at elevations from 1000 to 3700 feet in plant communities of *Artemisia tridentata, Purshia tridentata/Festuca idahoensis* and *Agropyron spicatum-F. idahoensis* with less than 20% cover. It seems to be more abundant on sites with northerly aspects Population sizes range from 40 up to one with 2,000 plants scattered over several acres. The population in Douglas County in the Columbia River Basin province is atypical, as the others in eastern Washington are on moderately steep slopes in a mosaic of forest and grassland. It provides pollen and nectar for bees, and fixes nitrogen. Exotic weed invasion and development are threats.

Eriogonum codium **Reveal, Caplow & K. Beck,** ***sp. nov.*** is a local endemic recently described as a new species found in 1994 on the Hanford Nuclear Reservation, Benton Co., Washington. Found on the northern edge of Umtanum Ridge, about 38 air miles northwest of Richland, Washington, on volcanic soils associated with *Grayia spinosa, Artemisia tridentata, Salvia dorii, Hesperostipa comata,* and *Psuedorogeneria spicata*. The basalt desert buckwheat is highly restricted in distribution. The only known population occurs at elevations ranging between 340 and 400 m on flat to gently sloping substrates at the top edge of the steep, north-facing basalt cliffs of Umatanum Ridge overlooking the Columbia River. Approximately 5000 plants grow interuptedly in a narrow band 2.5 km long and generally less than 30 m wide. The new species occurs exclusively on the exposed basaltic flow top of the Lolo Flow of the priest Rapids Member of the Wanapum Formation, with the gaps in the population correlating with the absence of exposed flow top. Umtanum Ridge is currently managed by the U.S. Department of energy. the Hanford Site has large areas of relatively undisturbed, high-quality shrub-steppe vegetation due to the cessation of virtually all agricultural and grazing activities when the site was established in 1943. Therefore, this plant does not appear to be threatened by human activities at this time. Change in ownership or changes in the Dept. of Energy's management policies which would permit grazing or agriculture or even recreational petrified wood collectors could potentially effect the viability of this highly restricted species

Lesquerella tuplashensis **Rollins, Beck & Caplow,** ***sp. nov.*** is another newly discovered local endemic recently discovered on the Hanford Nuclear Reservation, adjacent to the Hanford Reach of the Columbia River. Named after the White Bluffs of the Columbia River where the species occurs, "tuplash" is a place name for the White Bluffs in the Sahaptin language. Closely related to *L. douglasii*, *L. tuplashensis,* grows on the upper edge and upper face of the White Bluffs adjacent to the Columbia River. The only known population is found on the upper zone and top of a near vertical exposure of cemented, highly alkaline calcium carbonate paleosol (a "caliche" soil). Highly restricted in its distribution, the White Bluffs population may be the only one of the species, though several similar areas were searched. The population is approximately two to seven m wide and extends for 17 km along the upper edge of the bluffs. Vegetation cover along the bluffs is sparse and includes several other plant species that are rare in Washington, including: *Cryptantha spiculifera, Astragalus geyeri, Cuscuta denticulata,* and *Camissonia pygmaea.* Management threats are similar to *Eriogonum codium.*

Rare Species Habitat Group Analysis

The ICBEMP database manager used Natural Heritage Program records to produce a list of plant taxa considered rare at the state level. As for the species of rangewide conservation concern, this list was then sorted to produce sublists specific to individual panel analysis areas. The task of the expert panels was to sort these taxa into groups that share similar ecological requirements, as determined by broad habitat affinities. The Vascular Plant Task Group of the Science Integration Team provided six broad habitat types for the panelists to use in grouping the species: alpine, aquatic/riparian, forests, grasslands, rock, and shrublands.

The panelists first reviewed the analysis area list of state rare taxa and made additions and deletions as needed. They then grouped the taxa into one or more of the habitat categories, and assessed the degree of threat to those habitats.

Lastly, with reference to the 45 CRB, SRM and SAF cover types (Tables 3 and 4) that were used in the ICBEMP assessment, panelists decided how finely they wanted to subdivide the broad habitat categories (e.g., into subgroups based on more specific cover types, such as rough fescue and Idaho fescue types within the broader grassland category, or into elevation zones, such as low- and high-elevation grasslands). Lists of rare plant species associated with each habitat group or subgroup were then compiled, and environmental correlate forms were completed for those groups/subgroups in an approach similar to that used for the individual taxon assessments. Upon completion of the habitat group forms, the lists were reviewed to make sure all rare taxa were addressed.

TABLE 3. CRB, SRM and SAF cover type vegetation codes.

VEG CODE	Description
CRB003	Shrub or Herb / Tree Regen
CRB005	Alpine Tundra
CRB006	Barren
CRB007	Herbaceous Wetlands
CRB008	Pacific Silver Fir / Mt. Hemlock
CRBS01	Juniper Woodlands
CRBS02	Mixed Conifer Woodlands
CRBS03	Juniper / Sagebrush
CRBS04	Big Sagebrush
CRBS05	Shrub Wetlands
CRBS06	Agropyron Bunchgrass
CRBS07	Native Forb
VEG CODE	Description
CRBS08	Exotic Forbs / Annual Grass
CRBS09	Grand Fir / White Fir
CRBS10	Whitebark Pine / Alpine Larch

CRBS11	Red Fir
CRBS12	Cropland / Hay / Pasture
CRBS13	Fescue-Bunchgrass
CRBS19	Urban
CRBS20	Water
SAF205	Mt. Hemlock
SAF206	Engelmann Spruce / Subalpine Fir
SAF208	Whitebark Pine
SAF210	Interior Douglas-fir
SAF212	Western Larch
SAF215	Western White Pine
SAF217	Aspen
SAF218	Lodgepole Pine
SAF219	Limber Pine
SAF227	Western Red Cedar / Western Hemlock
SAF233	Oregon White Oak
SAF235	Cottonwood / Willow
SAF237	Interior Ponderosa Pine
SAF243	Sierra Nevada Mixed Conifer
SAF245	Pacific Ponderosa Pine
SRM104	Antelope Bitterbrush / Bluebunch Wheat Grass
SRM402	Mt. Big Sagebrush
SRM406	Low Sage
SRM414	Salt Desert Shrub
SRM421	Chokecherry / Serviceberry / Rose

TABLE 4. Forest and nonforest structural stages and their abbreviations

Acronym	Definition
si	stand initiation
seoc	stem exclusion open canopy
secc	stem exclusion closed canopy
ur	understory re-initiation
yfms	young forest multi-story
ofms	old forest multi-story
ofss	old forest single stratum
w_si	woodland stand initiation

w_se	woodland stem exclusion
w_ur	woodland understory re-initiation
w_oms	woodland old multi-story
w_oss	woodland old single stratum
nf	nonforest (not forest,shrubland or herbland)
oh	open herbland
ch	closed herbland
ols	open low and medium shrubs
cls	closed low and medium shrubs
ots	open tall shrubs
cts	closed tall shrubs

The results of this analysis is presented in appendix 3. In each section of the analysis, a list of species by major habitat group is provided with GIS attributes and themes. This information is given to facilitate planning efforts in for future ecosystem management projects. Each section is prefaced with a short description of the important general physical attributes of each habitat group and a short discussion of the impacts of current and historic land use practices. In each case, the generalities have been stressed. We recognize that there is and always will be variation with the Interior Columbia Basin with respect to the intensity and nature of threats.

Rare Plant Communities

With increases in human influences on ecological processes, vegetation structure and function, there has been a significant loss of native plant communities and ecosystems across the United States (Nature Conservancy 1974). Concerns for the maintenance of diversity exists fall all its interactive levels, including genetics, species, communities, and ecosystems (Langner and Flather 1994). Concerns such as these prompted the need to identify and assess the status of rare plant communities within the Columbia River Basin.

An inventory and assessment of the status of rare plant communities was conducted by Maria Mantas for this analysis in 1995. Lists of plant communities (including potential vegetation types, community types and plant associations) were obtained for each state in the ICBEMP assessment area, in consultation with the Natural Heritage Programs and Conservation Data Centers. Priority for assessment was placed on 223 plant communities ranked by the Heritage

Program as globally rare (G1 and G2). A G1 community is defined as: Critically imperiled globally because of extreme rarity (5 or fewer occurrences) or because of some factor making it vulnerable to extinction; G2: Imperiled globally because of rarity (6 to 20 occurrences) or because of other factors demonstrably making it vulnerable to extinction throughout its range. Communities ranked as G3 (either very rare and local throughout its range or found locally in a restricted range or because of other factors making it vulnerable to extinction throughout its range (20 to 100 occurrences)) were omitted from assessment. State-ranked communities that are not ranked as G1 or G2 were also omitted, due to the complexity of analyzing the potentially large number of communities had they been included. Where possible, rarity class, threats, trends, and distribution within the Columbia River Basin were identified. This information was gathered through the expert panel process and from Natural Heritage Program/Conservation Data Center ecologists.

Plant Communities that were inherently rare because of a unique set of abiotic features, and those that were once more common, but reduced due to management, as especially vulnerable to extirpation. For example, the bunchgrass grasslands of the Palouse region, once expansive in area, have been reduced to a few remanent stands due to agricultural conversion. Low elevation cedar/hemlock old-growth forests, on the other hand, may never have occupied a large portion of the landscape, yet have been disproportionately affected due to the extraction of large volumes of timber available in this highly productive areas. It is hoped that the information given here will assist managers by placing the concerns for sustainability of these communities in context with their status on a regional scale. In addition, potential for restoration of some communities may be prioritized and perhaps expedited by knowledge as to which communities are globally at risk, and what the known threats are for these unique areas.

Plant communities are assemblages of organisms that are repeatable over the landscape (Bourgeron and Engelking 1994). Many classification systems have been applied to characterize a grouping of plant species as a definable unit. Although there is still a need for continued classification and standardization, the Natural Heritage Program Network has gone far in compiling and standardizing a classification of plant communities in the Western United States. This work (Bourgeron and Engelking 1994) was used as the basis for identifying rare plant communities that occur in the Columbia River Basin. The results of the rare plant community analysis is presented in appendix 4.

Plant Taxa of Cultural Importance

There was a separate working group within the Interior Columbia Basin Ecosystem Management Project's Science Team dedicated to coordinating with Native American Tribes. In support of their effort, and to help assure the continued harvestabilty of culturally significant plants, an analysis of species by vegetation type and seral stage is provided in appendix 5. This list of species is not to be considered a complete listing of plants used by the Indian people of the project area. It is apparent that there was once a much wider recognition and utilization of the native flora than there is currently. Tribal Elders will stress that all plants once had a recognized use.

The list in appendix 5 was compiled in consultation with the Tribes, and further refined by Richard Helliwell. Helliwell is currently the Forest Botanist on the Umpqua National Forest and was formally employed by the Confederated Tribes of Warm Springs. He is a recognized and respected authority on culturally significant plants.

Research, Development and Applications

The lack of knowledge concerning certain areas of species biology and ecology interfere with the land manager's ability to effectively mange and conserve rare vascular plant taxa. Broad, one size fits all, directions for rare plant management have proven to be problematic. Vague guidelines are often difficult to interpret or implement. To rectify this situation, the vascular plant task group identified research, application, and application needs that would specifically improve our ability to manage or protect species of conservation concern. This included identification of inventory, monitoring, taxonomic, and ecological studies needed in addition to studies needed to determine the impacts of management activities for the species of rangewide viability concern. The Research, Development, and Applications (RDA) database was compiled with input from expert panels conducted throughout the ICBEMP assessment area and contract reports concerning taxonomically diverse genera.

The database itself is available in a Paradox 4.0 runtime application that can be queried by species, level of endemism, key words (a list of functional key words is provided with the software), or geographic area. The RDA is summarized in tabular form in appendix 6. Copies of the database are available through the database manager for the Interior Columbia Basin Ecosystem Management Project in Walla Walla, Washington.

Flora of the Columbia River Basin

CRBFLORA is a checklist of vascular plant species found in the Interior Columbia Basin assessment area. The data was compiled by Peter Rice at the University of Montana,, the Soil Conservation Service "PLANTS" database, and several other existing sources. Much of the compilation of the CRBFLORA was completed by Karl Urban from 1994-1995. Nomenclature follows Hitchcock and Cronquist (1973). The CRBFLORA checklist is presented in appendix 7.

The CRBFLORA checklist has tremendous potential for use in additional analyses. The Floristic Biodiversity of the Camas Ecosystem Analysis Area (Urban 1995) is an excellent example. Using a matrix database of 1,234 vascular plant species for seven plant association groups, Urban as able to provide the following results:

- the number of vascular plant species presently occurring in the analysis area,
- a comparison of the floristic richness of the analysis area with other areas on the Umatilla National Forest,
- delimit ecological distributions and habitat affinities or the species within plant association groups,
- a historic listing or former or present sensitive plant species,
- a determination of other plant species that are "at risk" in the analysis area,
- a ration of introduced to native species,
- a list of noxious weeds in the analysis area,
- and a list of culturally significant plants to assure their continued harvestability.

This level of analysis is appropriate for many scales and may prove to be an invaluable tool in future ecosystem based planning efforts.

Electronic copies of the checklist are available from the database manager for the Interior Columbia Basin Ecosystem Management Project in Walla Walla, Washington.

Conservation

Appendix 2 contains a list of the species conservation reports that are completed for species of conservation concern within the ICBEMP assessment area. This information was compiled by Leah King in 1995. Again, it is important to note that this information is not current, though it does represent the first comprehensive summary for the assessment area. The following terms are used extensively in that appendix and further defined here.

Conservation strategies: Conservation strategies (also known as species management guides or plans) are typically developed for candidate and sensitive species, as a means of preventing the need to federally list them as threatened or endangered. The strategies are species-specific documents that outline the biological and ecological limiting factors that most influence the species' viability and distribution. They are compiled from the best scientific information available for the species. They provide recommended conservation measures, usually with reference to specific populations, on how to best manage or protect the species. Conservation strategies also usually include action and monitoring plans. Conservation strategies are typically internal documents prepared by a federal agency, and are usually implemented by line officer approval and/or amendment of a planning document (e.g., a Forest Plan).

Conservation agreements are formal written documents agreed to by the U.S. Fish and Wildlife Service and another federal agency; they may also involve tribes, state agencies, local governments, and/or the private sector. The objective of a conservation agreement is to reduce the threats to a candidate species and/or its habitat through voluntary cooperation, by documenting the specific actions and responsibilities for which each party agrees to be accountable. If effective, these agreements may lower the listing priority or eliminate the need to list a species.

Listing packages are compiled by the U.S. Fish and Wildlife Service, and present the information that supports a proposal to federally list a species.

Recovery plans are prepared after a species is federally listed, and present the objectives for recovering a species to the point where it can be delisted.

Status reports (also occasionally referred to as biological investigations) summarize the current biological, ecological and geographic data available for a species. These reports typically precede the development of conservation strategies or agreements, and usually are prepared as a result of focused field surveys aimed at assessing the species' status.

Ex situ conservation

The following discussion on the role of ex-situ conservation in the management of rare plants in the ICBEMP comes from a report prepared under contract by Linda McMahon and Ed Guerrant (1995) of the Berry Botanic Garden, Portland, Oregon, for this project.

Ex situ or "off-site" conservation describes a range of activities more or less separated from "on-site" or *in situ* activities. Many interactions and overlaps exist between off-site and on-site activities; however, *ex situ* activities are usually considered to be such activities as seed storage, maintaining living collections at botanical gardens, or various research activities. *Ex situ* is not an alternative to *in situ*, but both are part of a larger, comprehensive conservation effort.

The Botanic Gardens Conservation Strategy (World Conservation Union, 1989), jointly produced by the World Conservation Union (IUCN), Botanic Garden Conservation International (BGCI: formerly Botanic Garden Conservation Secretariat, or BGCS), and the Worldwide Fund for Nature (WWF), states: "*In situ* and *ex situ* are the opposite ends of a spectrum and there is no absolute distinction between them." That document goes on to call for a "seamless blend" of *in situ* and *ex situ* conservation as the most effective way to conserve species and ecosystems.

Several methods of off-site conservation exist that can be considered for use as part of a conservation and recovery program for rare plants within the ICBEMP assessment area.

Ex situ or off-site conservation is generally considered to consist of germplasm storage methods such as seed banks, maintaining living collections, and tissue storage (such as in tissue culture, or pollen). Also relevant are many activities that take place, at least in part, away from wild sites and habitats, but that rely heavily on material from these sites, including efforts at replanting, restoration, and transplantation, studies of soil seed banks, and laboratory research (e.g. taxonomic, life history). Off-site storage of seeds is not an end in itself, but one means among many that contribute to the end of conservation. "New populations can arise phoenix-like out of the ashes of extinction only if collections exist off-site. It is also critical to note that *ex situ* collections are not an end in themselves. Their ultimate value will be derived from how they are used and their effect, if any, on the long-term prospects for survival of rare plant species" (Guerrant, 1992).

Relevance of Ex Situ Conservation: Why Have Off-site Collections at All?

Off-site conservation must be considered in context with other conservation activities, including outplantings to enhance existing wild populations, reintroduction to a historical site, introduction of species within an existing range to enhance species survival, and experiments with introduction or reintroduction. Reintroductions and other similar activities are far from an exact science.

In some ways, are all experimental, since the experience of the conservation community with these strategies is relatively recent, and long-term monitoring studies are just beginning. Few examples of these activities have been ongoing for over 20 years.

Mitigation activities often specify certain types of *ex situ* conservation, such as seed storage or transplantations of individual plants to new sites. Experience with these shows that transplantations of existing plants in the wild to new sites are rarely successful, even in the short run (Fahselt, 1988; Fiedler, 1991; Hall, 1987). Indeed, translocation is a controversial technique, possibly with limited conservation value. The above mentioned references note that most failed because of lack of site preparation and post-establishment care. Many sites of transplantation require continued watering, mulching, shade protection, grazing protections, insecticides, pest and weed control. The more successful projects tended to be those with more planning and care invested in the project. Gordon (1994) presents a 'decision tree', in the form of a dichotomous key, that aims to inform land managers when and where translocation might be considered appropriate.

Revegetation or restoration seems to be somewhat more successful, particularly when plants are propagated specifically for this purpose. Evans and Bohn (1987) report success in cultivating many California species, particularly woody plants, for restoration projects.

Genetic Consideration

Many biologists refer to genetic considerations in the published literature when undertaking any conservation activity and stress the following of guidelines to protect and enhance genetic integrity. In the context of mitigation, this loud and repetitive voice is certainly appropriate. In the context of species recovery, *ex situ* conservation, restoration, and management, it is equally important. Ferreira and Hillyard (1978) discuss the following needs: to define "local" population, to be very careful with the genetics of plant species, to know genotype and location of all material used in any vegetation enhancement, and to tighten up contracts to account for genetic credibility.

For seed banks, protocols are becoming firmly established. Brown and Briggs (1991) advocate collecting a high amount of genetic material for seed banks--material kept separate for each maternal parent plant, collected at different times and from different plants, and from varying numbers of populations. The Center for Plant Conservation (CPC, 1991) has compiled guidelines for this purpose.

Fenster and Dudash (1994) advocate the need to incorporate genetic considerations in any restoration project. They cite factors such as inbreeding and outbreeding depression and genetic diversity of stock material. In the same book on restoration, Pavlik (1994) cites the need to monitor projects adequately. He considers monitoring "crucial" to the success, and points out that monitoring is a highly developed science involving statistical trends analysis--census data alone are not enough.

The question of limited resources is always with us. Certainly, we must make priorities whenever possible and make sure that any overall conservation plan for a species or habitat is appropriate for that site or species. In some ways, off-site conservation brings new resources by enlisting the aid of seed storage laboratories, botanic gardens, and the research community.

Indeed, off-site conservation can lead to false security if it is not part of an integrated conservation plan. At best, by itself it does little more than conserve genetic material , an activity that has little significance without the context of its habitat. At worst, it can lure us into thinking that we have actually done something for conservation, only to later learn that we cannot germinate seeds in storage or that all suitable habitat has disappeared. The conservation strategy involving *ex situ* methods must be part of an overall plan and not act in a vacuum.

Living collections and other off-site storage methods have their risks. Living collections are far from secure in cultivation (Elias, 1978). Natural mortality and difficulty in maintaining propagated stock make the maintenance of living collections highly challenging if not impossible in the long run. For shorter durations, they may be useful if the context is right. Even more secure methods such as seed storage and tissue culture have their risks, including mutations, mechanical failure, and natural disasters. All methods need to be approached with sound science and humility.

The Role of Botanic Gardens

Botanic Gardens are relatively new partners for certain aspects of plants conservation. For many years, botanic gardens, particularly the larger gardens with research staff, have participated in research on plant taxonomy and distribution.

The role of botanic gardens does not stop with off-site germplasm storage, however. Specific projects include The Berry Botanic Garden's role is reintroduction of *Stephanomeria malheurensis* (Parenti and Guerrant, 1990) and transplantation of *Penstemon barrettiae* by The Berry Botanic Garden (Guerrant, 1990).

A census of the botanic gardens in the Center for Plant Conservation network working within the region to learn of their off-site collections for the taxa on the list is summarized in Table 5. The botanic gardens referred to are The Berry Botanic Garden in Portland, Oregon, Red Butte Gardens and Arboretum in Salt Lake City, and the Denver Botanical Garden in Denver Colorado.

Of the 173 taxa analyzed in this assessment, 63 are kept in off-site seed storage at these institutions.

The table below gives the number of accessions (seeds or living plants) of rare plant taxa from the Interior Columbia River Basin that are maintained at the Berry, Denver, and Red Butte botanic gardens.

TABLE 5. Number of accessions of rare plant taxa maintained at botanic gardens.

Species	**Berry***	**Denver**	**Red Butte**
Allium aaseae	1		
Amsinckia carinata	5		
Antennaria arcuata	1		
Arabis fecunda		1#	
Artemisia campestris var. wormskioldii	4		
Astragalus applegatei	4		
Astragalus diaphanus var. diurnis	1		
Astragalus mulfordiae	10		
Astragalus peckii	2		
Astragalus sinuatus	6		
Astragalus solitarius	3		
Astragalus sterilis	3		
Astragalus tegetarioides	3		
Astragalus tyghensis	3		
Calochortus longebarbatus var. longebarbatus	3		
Castilleja chlorotica	3		
Castilleja christii		1#	
Chaenactis cusickii	1		
Colloma mazama	2		
Cypripedium fasciculatum	1		

Delphinium viridescens	4		
Erigeron basalticus	1		
Eriogonum argophyllum			1
Eriogonum crosbyae	3		
Eriogonum cusickii	4		
Eriogonum prociduum	5		
Hackelia cronquistii	12		
Hackelia venusta	22		
Haplopappus radiatus	10		
Howellia aquatilis	live plants		
Ivesia rhypara var. rhypara	21		
Lepidium davisii	5		
Limnanthes floccosa ssp. bellingeriana	2		
Lomatium erythrocarpum	1		
Lomatium suksdorfii	5		
Luina serpentina	4		
Lupinus biddlei	8		
Mentzelia mollis	5		
Menzelia packardiae	8		
Mimulus hymenophyllus	1		
Mimulus jungermannioides	3		
Mimulus pygmaeus	1		
Mirabilis macfarlanei	39		
Penstemon barrettiae	33		
Penstemon peckii	201		
Perideridia erythrorhiza	7		
Phacelia lenta	3		

Pleuropogon oregonus	4		
Polemonium pectinatum	3		
Primula nevadensis	1		
Ranunculus reconditus	4		
Rorippa columbiae	1		
Senecio ertterae	9		
Sidalcea oregana var. calva	3		
Silene seelyi	4		
Silene spaldingii	23		
Stephanomeria malheurensis	127		1
Tauschia hooveri	1		
Thelypodium eucosmum	2		
Thelypodium howellii ssp. spectabilis		2	
Trifolium leibergii		2	
Trifolium owyheense	5		
Trifolium thompsonii	2		

* The number of accessions can indicate many things. In earlier years, some accessions from different plants in a population were accessioned together. Later, each plant from a population received a separate accession number.

Accession is split between the garden and the National Seed Storage Laboratory. May be more than one accession.

This summary information provides a rough estimate at best of off-site activities. Accessions may or not be adequate to represent the genetics of the wild populations. Germination testing has most likely been completed for only a few of the taxa. Although the number of taxa in off-site seed storage is surprisingly high, the "quality" of these collections has not been assessed for most and should not provide a sense of security that these taxa are well-represented off-site.

It would be interesting and desirable to provide a more in-depth assessment of these collections. Appropriate areas of inquiry would be how the off-site collections compare to natural population and their genetic representation, which additional species might be added to off-site storage and in which priority, which species provide challenges for germination and growth, what outstanding taxonomic questions might lead to better conservation action, and what kinds of research are being carried out in general for life history parameters or restoration/enhancement. We know for example that re-establishment projects are underway for *Penstemon barrettiae* (Guerrant, 1990) and *Stephanomeria malheurensis* (Parenti and Guerrant, 1990) because we are involved directly, however, others may exist that we could learn of with time to inquire. Research on germination and growth of *Hackelia venusta* is being undertaken by the Cincinnati Zoo and Botanical Garden with seeds to be provided by the Berry Garden. Likewise, the Berry Garden is undertaking a long-term soil seed bank study of *Penstemon peckii.*

Centers of Endemism and Hotspots of Biodiversity

Panelists were also asked to generate a map of areas with high concentrations of endemic species and areas that they felt to be "hot spots" of biodiversity. This exercise was meant to be part of a larger effort undertaken by the Terrestrial group of the Science Integration Team. It was a very **subjective** effort, with little definition given as to what constituted a hot spot or how to define a center of endemism. Each panel came up with very different results and areas were drawn on several different scales. As such, none of this information has been included in this report and it is strongly recommended that this information from other reports from the ICBEMP project showing hot spots or centers of endemism for plants **NOT** be used for any type of planning effort.

If this information is desired, the following objective method could be used as a starting point for gathering this type of information. Using State Heritage Program data, and defining endemism to mean areas of high concentrations of globally rare elements, occurrence density maps could be generated for elements of G ranks of G1-3. To get an idea of biodiversity, defined as areas of high concentrations of global and state rare elements, or even state rare elements only, a map of state S1-3 and global G1-3 could be generated. Recent large scale planning efforts have used this method to produce maps that show number of species by county, with a shading to illustrate high density areas. Figures 2 and 3 in this report show this kind of information for the ICBEMP.

MANAGEMENT IMPLICATIONS

Summary of threats (natural and management-induced)

Panelists also provided data on the threats to the taxa of rangewide conservation concern within the ICRB. Several species had more than one factor threatening their habitat or viability. This list did not include natural disturbances such as normal fire regimes, climate change or pathogens and pests. Major threats included exotic plant invasion, road construction and recreation. Several threats represent a complex combination of factors such as the invasion of exotic species due to livestock overgrazing, road construction, or increased fire frequency. The table below summarizes the number of vascular plant taxa of rangewide conservation concern that are judged to be at risk from the indicated threat factors.

TABLE 6. Summary of threats and number of taxa affected.

Threat	Number of taxa affected	bryophytes	fungi	lichens
agricultural conversion	16	X	X	X
development	21			
exotic plant species	89			
fire, change in native regime	12	X	X	X
fire suppression activities	24			
fire, increased frequency	4	X	X	X
fire, stand-replacing	1			
fire exclusion	1		X	X
livestock grazing, indirect effects	16	X	X	X
livestock grazing, direct effects	23	X	X	X
hydrological regime changes	18	X		
mining	9			
off highway vehicles	28	X		X
pipelines, power lines	2			

recreation	32	X		X
road construction	37			X
road maintenance	13			X
riparian disturbances	9	X	X	
timber harvest	12	X	X	X
herbicide spray and drift	15			

Mitigation measures (standards and guides) to reduce risk to species of concern

The majority of the vascular plants analyzed as part of the Science Assessment are either locally endemic in their distribution pattern, or have broader distributions but are associated with highly specialized habitats. As discussed in the previous section, determining the effects of management actions on such rare plants is difficult at the broad scale of analysis for the ICBEMP. The viability and conservation of all of these highly restricted taxa, as well as determinations of the effects of management actions on them, is best undertaken at the local, regional or provincial level. Therefore, we have suggested the following mitigation measures (standards and guides) for both the broad scale and project level that may be used in the planning, analysis, implementation and monitoring of projects to insure viability of native vascular plants and bryophytes, lichens, and fungi at all scales of planning. A further management objective is to maintain the distribution of native plant communities throughout the local planning areas, and to maintain, protect, or restore special habitat features (e.g., peatlands, bogs, fens, azonal lithologies, mineralized areas, geothermal areas).

We also recognize the need to develop a process for the conservation of local and regional endemics and disjunct and peripheral species at finer planning scales that will build on the information provided in this document and provide for continued viability of these taxa across administrative boundaries. This may be potentially accomplished at the sub-watershed or watershed level and involve a diverse group of partners such as: USFS, BLM, State Natural Heritage Programs, U.S. Fish and Wildlife Service and Native Plant Societies.

1. Broad-scale inventory needs to assure species viability:

- Develop monitoring programs and conservation strategies for local endemic, regional endemic, scattered, disjunct, and peripheral plant species across their geographic ranges. When necessary, collect basic life history and demographic information to assess viability, and make this information available to all project planners.

- Conduct floristic surveys of azonal habitat inclusions (e.g., rock outcrops, cindercones, roof pendants, serpentine soils). Surveys should focus on both vascular plants and bryophytes, lichens and fungi. Assure that qualified specialists conduct the surveys for each separate plant group.

- For each Ecological Reporting Unit (ERU) or physiographic province, conduct inventories for rare lichens, bryophytes and fungi. These surveys shall be conducted by individuals with appropriate taxonomic expertise.

- Coordinate all inventories and monitoring for bryophytes, lichens, and fungi at a regional level to assure consistency and expertise at the Forest level, where skills in lichen, bryophyte and fungal taxonomy may be lacking.

- Identify and protect high-quality examples of intact cryptogamic soil crusts and vascular plant communities across the ICBEMP, especially in arid areas at low to mid elevations. Representative stands must be designated in each section of each province in the assessment area. Livestock must be excluded from protected areas. These areas may be designated as Botanical Special Interest Areas or Areas of Critical Environmental Concern.

- Identify and protect type localities for rare lichens, bryophytes and fungi that occur within the ICBEMP as Botanical Special Interest Areas or Areas of Critical Environmental Concern. These areas can serve as reference sites to aid in identification of potential habitat and positive species identification.

- Conduct systematic surveys by taxonomic experts to determine the composition and distribution of microbiotic crusts within the ICBEMP assessment area, as such crusts are critical to the ecological integrity of arid plant communities.

- Encourage systematic surveys by taxonomic experts in peatlands, fens and bogs. Peatlands (including bogs, fens, and shrub swamps) need protection from grazing, commercial collecting, and structural and hydrologic alteration. Basic inventories are needed throughout the assessment area to locate, identify and map peatlands.

- Conduct systematic surveys of calcareous rock habitats. Representative areas of wet and dry calcareous rock need inventory and protection from mining activities because of their habitat importance to bryophytes and lichens.

- Assess the conservation status of rare plant species at the margins of their geographic ranges (e.g., species with state ranks of S1 or S2, as determined by the state Natural Heritage Programs). Provide habitat protection measures necessary to assure the continued viability of these peripheral populations.

- Identify and protect high-quality stands of Garry oak (*Quercus garryana*) woodland occurring in the assessment area. These stands are extremely important habitat for bryophytes and lichens, and harbor the only occurrences of some taxa.

- Within proposed project areas, survey and map all rare (G1-2) plant communities, if present, and provide for their continued compositional and functional integrity.

- Continue to conduct species-specific surveys for rare species of vascular plants and bryophytes, lichens, and fungi with poorly known ranges to determine distributions and abundances and, if necessary, appropriate levels of protection. Assure that qualified specialists conduct the surveys. Incorporate newly acquired information into management decisions such that those taxa in need of protection are provided for.

2. Broad-scale mitigation suggestions for maintaining genetic integrity of native communities:

- To the extent practicable, seeds and plants used in erosion control, fire rehabilitation, riparian restoration, forage enhancement, and other revegetation projects shall originate from genetically local sources of native species. Follow the regional policies established for U.S.F.S. Regions 1 and 6. When project objectives justify the use of non-local or non-native plant materials, documentation explaining why non-local and non-native plants are preferred will be a part of the project planning process.

- If genetically local stock of native tree, shrub, forb, or grass species is not available for rehabilitation or revegetation projects, consider not doing, or delaying the project, or using exotic species that will not persist in the ecosystem. Sterile varieties or short-lived annuals should be specifically considered.

3. Broad-scale planning suggestions:

- Define existing and suitable unoccupied habitat for TES plant species by mapping locations and describing the habitat requirements necessary for the maintenance of viable populations.

- Establish conservation agreements and prepare conservation strategies to preserve habitats of sensitive plant species as a means of preventing further federal listings.

- Establish partnerships and cooperate with native plant interest groups, other agencies, and private land owners in programs for assuring the long-term survival of TES plant species.

- To assure the continued harvestability of Native American culturally significant plant species, these taxa must be identified and their biology and protection considered in the planning and implementation of projects.

4. Broad-scale monitoring and research suggestions:

- Determine what species of vascular plants, lichens, bryophytes, and fungi are being harvested commercially within the assessment area, and determine what impacts harvest will have on species viability. Formulate plans to monitor permit and harvest activity to protect species viability and diversity. This should be regionally coordinated to assure viability across the range of these species.

- Establish a program of monitoring and evaluation to determine the direct, indirect, and cumulative effects of management activities on the continued survival of viable populations of TES plant species occurring within the appropriate planning areas.

- Select appropriate vascular plants and bryophytes, lichens, fungi, or groups of plant species that are sensitive to changes in habitat and ecosystem conditions, for use as management indicators.

- Assess the conservation status or needs of rare plant species at the margins of their geographic range. Provide habitat protection measures necessary to assure the continued viability of these peripheral populations.

- Coordinate all inventories and monitoring for bryophytes, lichens, and fungi at a Regional level to assure consistency and expertise at the Forest level, where skills in non-vascular plant and fungal taxonomy may be lacking.

- Encourage partnerships with outside research organizations to address identified information needs, especially basic life-history information, for high-priority species of conservation concern.

- Provide training opportunities to improve knowledge of monitoring and data collection methods necessary to meet monitoring standards.

5. Forest or project-level mitigations to be incorporated in the design, planning and implementation of projects:

- Amend Forest plans to implement existing recovery plans and conservation strategies for Federally listed vascular plants and bryophytes, lichens, and fungi and species of conservation concern.

- Conduct species-specific and/or floristic surveys for rare species of vascular plants and bryophytes and fungi for all agency-sponsored activities. Assure that qualified specialists conduct the surveys.

- Assess the conservation status or needs of rare plant species at the margins of their geographic range. Provide habitat protection measures necessary to assure the continued viability of these peripheral populations.

- Prescribed fire plans should consider the phenology and condition of native plant communities, and occurrences and phenology of TES plant species, in determining suitable timing and intensities of burn treatments.

- Recreational planning should include adequate consideration of biological impacts to native plant communities, including associated long-term effects. Evaluate and reduce, where necessary, the impact of dispersed recreation on rare plant sites through a program of public education and interpretive displays, and relocation of recreational sites where appropriate.

- To assure the sustainable harvestability of Native American culturally significant plants, these taxa must be identified and their biology and protection considered in the planning and implementation of projects.

6. **Recommendations specific to bryophytes, lichens, and fungi, including: those occurring on specialized substrates that are identified within the planning area and inventory and research needs.**

Bryophytes

Appendices in Christy and Harpel (1995) list specific localities, habitats and research needs for bryophytes in the study area. The data for Nevada and Utah are scanty. Despite the fact that thousands of collections of bryophytes and lichens have been made in the Columbia River Basin over the last 150 years, vast areas have not been collected systematically or at all. In particular, liverworts have been undercollected and chronically misidentified, and need careful attention in future work.

- **Surveys for rare species**. Obviously, the rare taxa listed in the reports need to be sought throughout the study area, to better determine distributions and abundance. The localities of the taxa listed as occurring at the edge of their range (e.g., species primarily of eastern North America) are important for study for their role in migration or as relictual areas. Habitat needs for specific species are beyond the scope of this report.

- **Arid habitats and soil crusts**. Arid habitats of all types are undercollected and need further attention throughout the region. These include desert, shrub-steppe, pinyon-juniper woodland, oak woodland, and ponderosa pine forest. The composition and function of soil crusts, while relatively well studied in the Great Basin, particularly in Utah, is virtually unknown in the Columbia River basin. Some general collecting has been done in a few areas, but the problem needs to be approached on a regional basis, studying crusts in different plant associations and on different soil types. The effects of livestock trampling should be included in any such studies.

- **Old-growth and late-successional forests**. Most of the issues identified in Thomas et al. (1993) also apply to forested areas of the Columbia River Basin and need not be repeated here. The greatest similarities in the bryophytes flora and relative biomass in these forests occur in the mesic forests of the so-called "maritime extension" area in Idaho and Montana. Commercial harvest of moss in these forests is a growing concern, and needs regulation and monitoring to ensure that rare or disjunct species are not being depleted, and that recruitment is adequate to sustain harvest levels. Ponderosa pine forests have few bryophytes as epiphytes or in the understory, but representative stands need to be protected and managed correctly to maintain floristic composition.

- **Calcareous rocks.** Calcareous substrates provide habitat for a distinctive group of bryophyte species. A few calcium-rich areas have been collected, particularly in the northern Rocky Mountains and elsewhere in Idaho, but those of Oregon and Washington are poorly known and need further work.

- **Mineralized areas.** Mineral deposits, usually occurring in areas previously mined for gold, silver, copper, mercury and other materials, often provide substrate for a distinctive group of bryophytes. While these areas have received some attention in the Rocky Mountains, other sites within the study area have not been surveyed adequately for these species. It is the same sulfides, especially in mine runoff, that pollute streams and groundwater. Mine tailings and debris undoubtedly have increased suitable habitat for some of these species, which often favor disturbed or barren soils.

- **Peatlands.** Until recently, wetlands were much ignored by land managers, and there is not a good history of collecting in these sites except by a few individuals. With the advent of wetland fill regulations and community classifications, they are receiving more attention and some records now thought rare should become more common. Included in this category are bogs and fens, the latter occurring on calcium-rich sites, which have been poorly-collected outside of the Rocky Mountain region. Impacts from grazing in peatlands have received little attention in the Pacific Northwest, but observations suggest that bryophytes are severely impacted by trampling, as noted in the wet soil group.

- **Floodplains.** These habitats have received recent attention because of wetland and riparian protection. Thomas et al. (1993) identified how important floodplains were for bryophyte species diversity, and how many species, particularly liverworts, were concentrated in old-growth forests occurring there. A similar situation exists in the Columbia River basin, especially in the "maritime extension" areas of Idaho and Montana, where species depend on shade, wet soils, logs and other organic debris, and humid microclimate. As with the aquatic and splash zone species in streams, this group of species can be affected to some degree by land ownership patterns and adverse conditions originating upstream on non-federal lands, although impacts would be less pernicious because few of these species are in the stream channel. The effects of livestock trampling should be included in any such studies.

- **Geothermal areas.** Geothermal areas are sometimes known for unusual assemblages of plants that survive outside of their normal distributional limits, because heated ground provides snow-free conditions and a longer growing season (Lange 1973, Given 1980). Although many bryophyte specimens were collected from hot springs in Idaho and Montana, none appear to be restricted to this habitat on a regional basis, or to exhibit an unusual distributional pattern. Eversman (1990) found lichens to be absent from geyser areas, presumably because of particulate matter and sulfurous fumes from geysers, but the flora was more normal near thermal springs. More work needs to be done in these areas to better describe their effects on bryophytes.

- **Isolated gorges and narrow canyons**. Steep, narrow canyons provide ideal conditions for bryophytes to persist in areas outside their normal distributional limits. Shade, moisture and cold air drainage all contribute to unusual species being found in these areas, sometimes as relics from cooler periglacial climates. Impacts from livestock and humans are often limited here because of restricted access. More work needs to be done to inventory such sites, particularly those with historical bryological collecting that can be used for comparative purposes to monitor changes in the flora.

- **Rivers and streams**. Aquatic and splash zone bryophytes are subject to the same impacts described in Thomas et al. (1993), and need not be repeated here. Galvanized culverts, like roof flashing, may be toxic to aquatic bryophytes and may diminish species diversity on some streams.

Program needs:

- **Training for identification and management**. Agencies need to implement programs for training of field personnel to survey and manage for bryophyte, lichen, and fungal species. The limitations are essentially the same as those identified in Thomas et al. (1993). There are few bryophyte, lichen, and fungal taxonomists in the region and very few individuals are now being trained in universities.

- **Typification of flora by plant association**. Despite the great strides taken by regional U.S.F.S. ecology programs over the last twenty years to classify vegetation by plant association, no effort has been made to include bryophytes or lichens in plot data. A vast amount of habitat-specific information, with implications for management and distributional studies, could be obtained by including these plants in the classification scheme. Again, a lack of bryological and lichenological training for ecologists is the principal reason for this shortcoming.

- **Inventory of protected areas**. Research Natural Areas, ACEC's, wilderness areas, riparian zones and other administratively protected areas should be inventoried for bryophytes, lichens and fungi. Crater Lake National Park has been poorly collected, in contrast to Glacier, Yellowstone and Grand Teton National Parks, which have been collected heavily since the 1870's. Baseline data should include bryophytes to identify distributional and management issues, and to provide a historical basis to monitor future trends of the bryoflora.

Lichens

Lichens are an important component of forests and rangelands of the Columbia Basin. Yet basic knowledge about these species and their interacts are limited. Therefore, baseline inventories to document lichen species presence, abundance, biomass, habitat requirements, and geographic distribution is needed. Inventory data needs to be incorporated into the general biological inventory efforts, computerized and mapped. Standardized methods for the sampling of forest

epiphytes needs to be developed. This data should be verified with voucher specimens deposited in recognized regional herbaria. From this information identification guides and annotated catalogs for lichens in each physiographic region should be developed.

Status survey reviews should be conducted for the rare lichen species. This information needs to be shared with the State Heritage Programs in each State to compliment information from private and State lands. Conservation strategy plans should be developed for these rare species to conserve and enhance their populations.

Successional studies should be conducted of lichens, including their establishment, diversity and abundance in stands of different ages and different plant associations, substrates, and vertical succession. Conduct basic and applied research to determine lichens dispersal patterns by species, groups of species, by forest types, and recovery after fires.

Develop monitoring and research plans to evaluate the effects of forest and rangeland management practices on lichens. Monitor the impacts from management activities including timber harvesting, silvicultural practices, grazing, and recreation. For example, what species of lichens are retained in retention trees by topographic position, tree symmetry, crown type, or aggregation of the retention trees? What is the advantage of selecting leave trees that contain a diversity of lichen species and do these lichens on retention trees act as centers of dispersal for those species?

Determine nitrogen fixation rates of the lichens in the microbiotic crusts in different rangeland cover types. Determine the quantity and nutrient content of lichen litter-fall in the forest cover types. Develop a research project to address the role of lichen, through-fall and litter-fall in the nutrient cycling and biomass production of the various types and ages of forests. Conduct research into the role of small mammals (flying squirrels, and boreal red-backed voles) eating lichen litter-fall and its role in the trophic dynamics of small mammals and their predators such as, the boreal owls. Conduct research into the species preferences of lichens for nest building by flying squirrels. Conduct research on the role of lichens as habitat and food for forest invertebrates.

Develop an integrated, regional air quality monitoring program using lichens as biological indicators of forest health, including impacts on lichen species and trends in lichen populations.

Alectorioid and cyanolichens are especially sensitive to air pollution, and should be monitored to detect impacts to viability from a decline in air quality.

Fungi

The following are presented as ideas in need of further discussion and elaboration but all have a bearing on the quality of this report and the resulting assessment.

The foundation of data on which this report is written is limited because only a few herbaria were contacted for information and of the information contributed much was lacking by way of specific ecological and locational information. The distinct lack of computerization of collections in herbaria was a significant impediment to this work. The mycological community is in a transition stage of accomplishing this work but it will be a few more years before herbarium holdings are readily accessible. As more and more data on extant collections become available these data will need to be incorporated to update this report.

The data gathered for this study were from collections that were the result of systematic research, not ecological research. Taxonomic studies such as these have an emphasis on sporocarp morphology. As such much data on habitat structure is lacking and locations are often vague, i.e., from Priest River. None the less the data shows trends and offers direction for areas of special concern as emphasized in the endemism section. Additional education of members of mycological societies and clubs to include more comprehensive locational and habitat information will facilitate more accurate assessment of fungal organisms for a variety of purposes.

Numerous fungal species have significant nomenclatural difficulties and some contain species complexes. Specific taxonomic effort on these groups or individuals will reduce uncertainties concerning CRB populations and extralimital populations.

Certain fungal species, especially some *Boletus*, *Morchella* and *Cantharellus* species, are important to recreational and commercial gatherers. Some effort to elucidate the ecological parameters and specific biology and life history of these species is critical for long term management of this resource in the region.

Extensive fungal surveys are critically needed because the fungal flora of North America is poorly known or understood. It has been common in the past to rely on published descriptions , often poor ones, from the literature on fungi found in Europe and then to identify specimens in North America with keys and descriptions developed for Europe. It is now more readily apparent that overlap between species from Europe and North America is much more minimal then traditionally thought for mycorrhizal species and for saprophytic species. A modern reassessment of all fungal species from North America that carry "European" names is called for, particularly the those mycorrhizal species associated with specific hosts.

Many collections were made prior to major changes in vegetation due to forest timber harvesting over the last thirty years. Retrospective analysis is needed for vegetation associations at time of collection.

Identification of extant specimens are not always correct due to non-expert identification prior to placement in the herbarium. Non-expert identification is a product of lack of trained professional mycologists. The last decade has seen many classical (alpha-taxonomy) mycologist positions in universities across North America became positions with a strong if not sole focus on molecular biology. This has led to a severe backlog in accession and curation of fungal specimens. This is compounded by the lack of modern species concepts and critical assessment of species complexes.

The CRB is an extremely large geographic area with an extreme diversity of habitats from alpine to desert. The complexity of the landscape makes assessment for rare fungal species extremely difficult. Of special consideration are riparian areas because of the high diversity of ectomycorrhizal hosts found in these habitats. In addition the CRB has vast areas of habitat (soil types) that are restricted in distribution that have not been explored to any degree.

Lack of specific knowledge on the function or role that each fungal species plays in the ecosystem besides that of a general saprophyte or mycorrhizal symbiont. The specific physiological functions of different fungal species even within the same genus can be marked. Effects of management activities on all species are unknown.

Information on population viability of listed fungal species does not exist. We therefore cannot make inferences on the effects of management activities on population trends except in the general category of mycorrhizal fungi which depend upon a host plant for survival. Removal of the host will negatively impact the mycorrhizal fungus or the saprophyte that is host specific. Effects of landscape fragmentation of dispersal is also unknown.

Due to the ephemeral nature of the sporocarps and the strong dependence on abiotic factors for sporulation, such as precipitation, fungal species community analysis requires five to ten years of collecting to adequately and comprehensively assess any one area. We also have no data on shifting or movement through the soil matrix of fungal populations. A particular fungal colony may or may not migrate through hyphal growth over time, i.e. decades.

A number of species are phoenicoid, fruiting after fire, these species need specific study on the effects of fire intensity on sporocarp phenology.

Species that fruit on or in dung are transitory by nature. Spores are either deposited on vegetation which is then consumed by animals or deposited on dung after deposition. In either case the dung is necessary for completion of the fungal life cycle.

Many of these fungi, both mycorrhizal and saprophytic, are somewhat to extremely dependent on plant host species, effort is needed to protect the site as well as the plant association occupying the site.

Some form of protection of type localities of fungal species should be incorporated into the plan. Type localities are specific locations for specimens that were used to describe this species for science, as such they are important historically. Protection should more often than not be in the form of a mycological preserve of varying size depending on habitat and life history of the species.

Biological and ecological information on macrofungal species is generally lacking. A more useful but not fully satisfying alternative is to manage the habitats where fungi of special concern occur or are likely to occur, particularly habitats that are threatened

7. **Recommendations specific to bryophytes, lichens, and fungi, including: those occurring on specialized substrates that are identified within the planning area.**

- Aquatic. Protect high quality, intact riparian zones and wetlands from siltation and in-stream disturbance. Provide tall tree retention and connectivity to uplands habitat.

- Decayed wood. Retain decaying wood in riparian areas and associated stream terraces for bryophytes, especially liverworts. Bryophytes in this group have the best recovery prospects in riparian and associated stream terraces, where decaying wood is best developed.

- Epiphytic. Epiphytic lichens, bryophytes, and fungi are best expressed in moist to cool forest types, especially along streams. Riparian zone buffers will provide adequate protection in all alternatives for this group.

- Humus and duff. Practices minimizing disturbance to the ground layer will benefit bryophytes in this group. Curtailment and monitoring of commercial moss collecting is recommended.

- Dry soil. Microbiotic crusts need protection in representative stands on all soil types to provide reserves for study of floristics, biology and management alternatives.

- Wet soil. Lichens, bryophytes, and fungi that occur on wet soils can be protected by riparian buffers and other wetlands protections.

- Snags. As snags are critical for the continuation of epiphytic lichens, and once fallen provide habitat as decaying large logs for bryophytes, set a limit on the upper size of fire wood at 18" diameter at the base.

- For continuation of lichen habitat, "leave trees" and snags should have a diversity of form, composition and substrates for lichens to colonize. In the moist provinces with a maritime influence, these trees should also be clustered to create a better microclimate.

ADDITIONAL ANALYSIS NEEDS FOR THE ICBEMP

1. Species that need additional broad-scale analysis prior to broad-scale decision implementation.

Based on the draft alternatives that were available during March, 1996, the final vascular plant expert panel determined that 28 of the 173 plant taxa of rangewide conservation concern could be analyzed as to the effects of the alternatives on these taxa at the broad scale. The panel further determined that, given the current information content and level of specificity of the alternatives, effects of management activities on the remaining 144 taxa could be reasonably addressed only at finer planning scales (e.g., Forest Plans, BLM LMPs, sub-basin analysis or ecosystem analysis at the watershed scale). Though it was crucial that the effects of management actions be considered across the range of these species.

As stated in the Introduction to this document, most of the analysis presented here applies to terrestrial vascular and non-vascular plants. The level of analyses for the terrestrial taxa greatly exceeds that for the aquatic plants. This is due in part to the amount of data available. At this time there is no list of algae for which there may be conservation concerns and information on aquatic macrophytes is incomplete. It is recommended that additional aquatic plant work include: analysis of the effects of aquatics as noxious weeds, development of mitigation measures for protection of aquatic plant habitat, completion of a full list of aquatic vascular and non-vascular plant species of conservation concern in the ICBEMP and identification of locations, habitat and threats.

2. Proposed processes for gathering additional data.

Should the alternatives in the DEISs be changed, a revised effects analysis may be necessary for the plant taxa of rangewide conservation concern, depending on the nature of such alternatives. If they are specific enough as to proposed implementation, a larger percentage of the 173 taxa of concern could possibly be addressed at the broad scale of the assessment. Several proposed processes have been suggested within the previous mitigation section for vascular plants and bryophytes, lichens and fungi. It is critical to remember that the data used for these analyses are based predominately on field data that was collected prior to the scientific panels conducted in Fall 1994. We have limited our consideration of new data to federally listed taxa because of the scope of the project. This list of taxa of rangewide concern may not reflect the most recent range extensions and discovery of new occurrences and threats.

SUMMARY

Of the 173 vascular plant taxa found to be of conservation concern on a rangewide scale, and whose ranges lie wholly or partially within the ICBEMP assessment area, the analyses discussed above revealed that 25 of these occur broadly enough within the CRB, or are associated with common vegetation types, such that the effects of the Draft EIS alternatives on the viability of these taxa could be estimated. Three taxa that are federally listed were also evaluated with respect to the alternatives even thought heir distribution does not otherwise lend them to a broad scale analyses. One additional federally listed threatened species, *Spiranthes diluvialis*, Ute ladies'-tresses, was discovered within the ICBEMP analysis area in August, 1996 in Idaho and the potential effects of the alternatives on this newly discovered species have not been determined with respect to the Draft EIS alternatives. If no further information is available from the alternatives regarding specific management activities, then the potential effects of management activities on the remaining 144 taxa of rangewide conservation concern would be best addressed at a finer planning scale that is commensurate with the distribution of the taxa concerned (Forest, Provincial, Regional or state level) by resource experts most familiar with these taxa.

During the implementation of management activities, specific mitigation measures for restricted plant occurrences are best designed on a project-level basis. Site-specific mitigation is typically accomplished by changing the temporal or spacial characteristics, level of intensity, or methodology of the project. For example, the effects of livestock grazing or prescribed fire can be minimized or eliminated by timing the activity to fall outside critical periods of the species' life history (e.g., to avoid blooming or fruiting periods). Using the lists provided in the bryophyte, lichen and fungi reports and in Appendix 2 and 3 of this report, begin to consider the effect of activities on these taxa identified as having conservation concerns.

For those species whose viability may be at risk, the key considerations, when detailed demographic monitoring data are not available, include, but are not limited to:

1. the relationship of the species to vegetation succession under various disturbance regimes
2. the sensitivity of the habitat relationship; is the species highly restricted to one habitat type or is it less specific in its requirements.

Important geographic considerations are aimed primarily at the retention of the distribution of the species (i.e., whole populations or subpopulations where the species has a patchy distribution in the analysis area). This approach should be able to maintain underlying population and metapopulation structure , genetic variation patterns, demographic processes, and other less-easily analyzed aspects of population viability.

Given the broad goals of the ICBEMP scientific assessment, the Vascular Plant Task Group analysis represented a pioneering effort to integrate management and conservation of vascular plants into a basin-wide, biologically comprehensive approach to ecosystem management. This analysis uniquely spans government jurisdictional boundaries, and involved numerous federal, state, and local agencies and private organizations having an interest in plant conservation. Though it is tempting to state that the scale of the ICBEMP is not an appropriate level to consider management and conservation of many rare plants, this analysis and the contributions of those across the interior Columbia Basin to this synthesis prove otherwise.

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APPENDIX 1

Range Maps for Species of Conservation Concern

APPENDIX 1
Range Maps for Species of Concern

APPENDIX 2
List of Species Conservation Reports

APPENDIX 3
Rare Species Habitat Group Analysis

APPENDIX 4
Rare Plant Communities

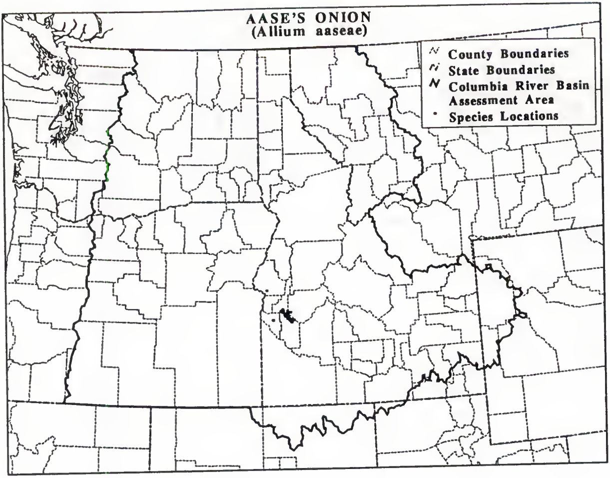
APPENDIX 5
Plants of Cultural Importance

APPENDIX 6
Research, Development, and Applications Database

APPENDIX 7
Checklist of the Vascular Flora of the Interior Columbia River Basin

These range maps were compiled from data from State Heritage Programs in Oregon, Washington, Idaho, Montana, Wyoming, Utah, and Nevada. This information represents what was known at the end of the 1994 field season. These maps may not represent the most recent information on distribution and range for these taxa but it does illustrate geographic distribution across the assessment area. For many of these species, this is the first time information has been compiled on this scale. For the continued viability of many of these taxa, it is imperative that we begin to manage for them across their range and across administrative boundaries.

Of the 173 taxa analyzed, there are maps for 153 taxa. For those taxa that were not tracked by heritage programs, we were not able to generate range maps.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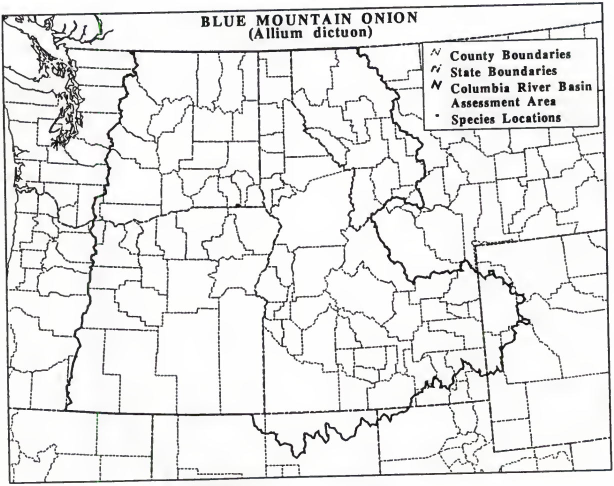
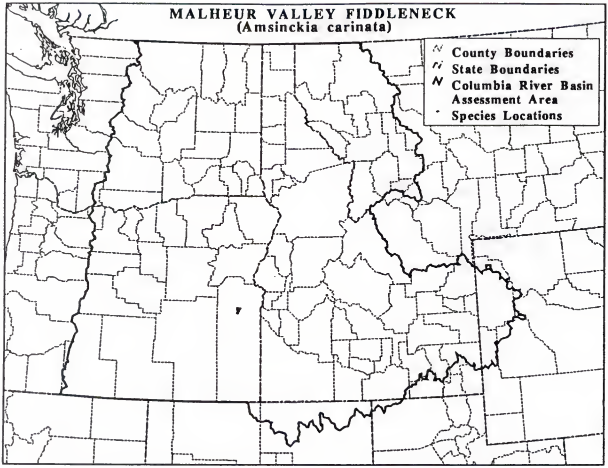
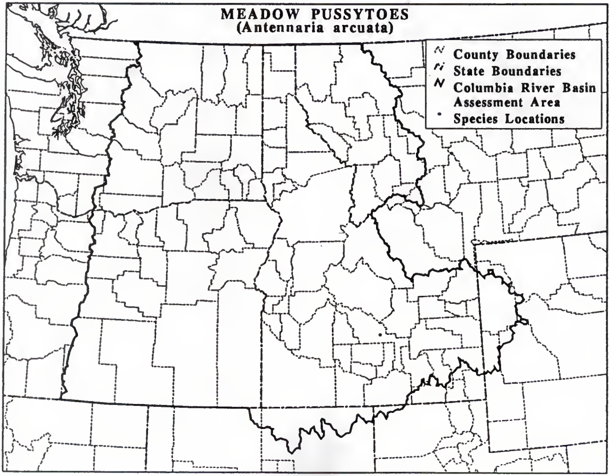
(Allium aaseae)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

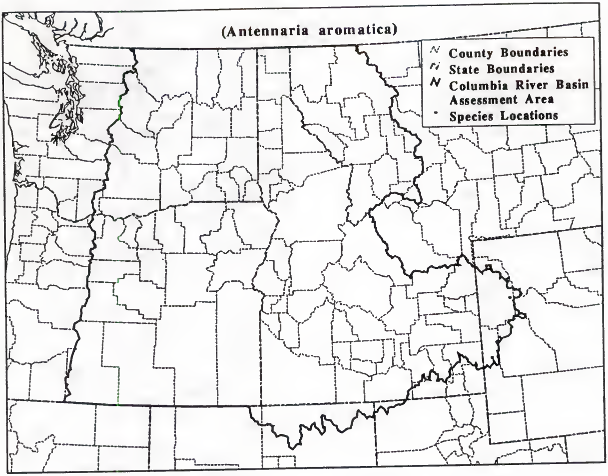

BLUE MOUNTAIN ONION
(Allium dictuon)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

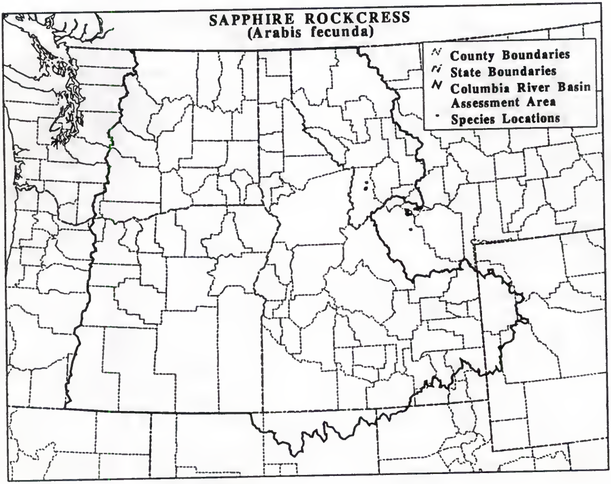


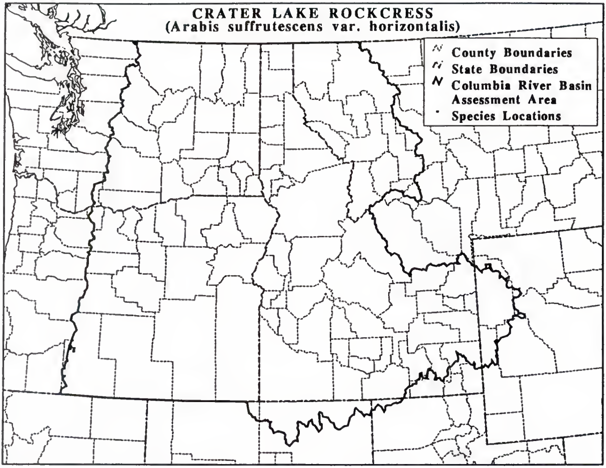
MALHEUR VALLEY FIDDLENECK
(Amsinckia carinata)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

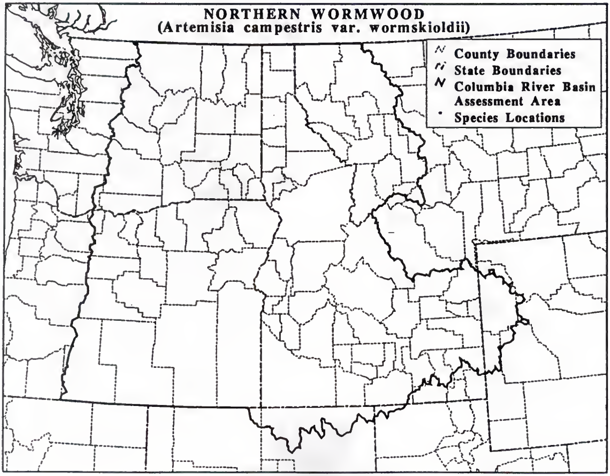


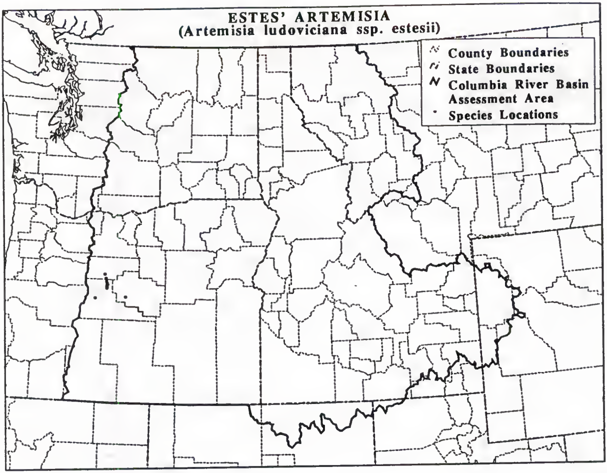
MEADOW PUSSYTOES
(Antennaria arcuata)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

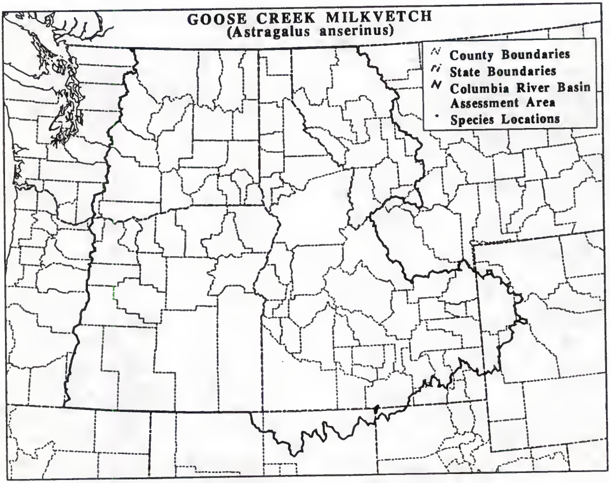

(Antennaria aromatica)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

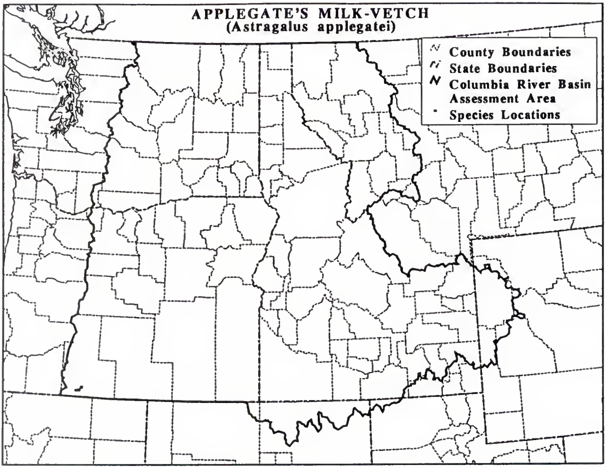

SAPPHIRE ROCKCRESS
(Arabis fecunda)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

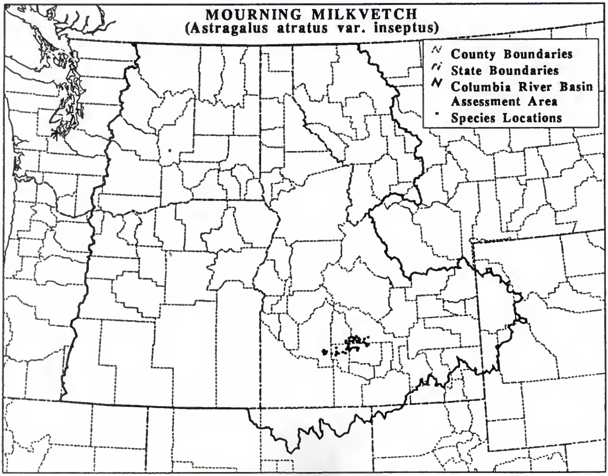

CRATER LAKE ROCKCRESS
(Arabis suffrutescens var. horizontalis)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

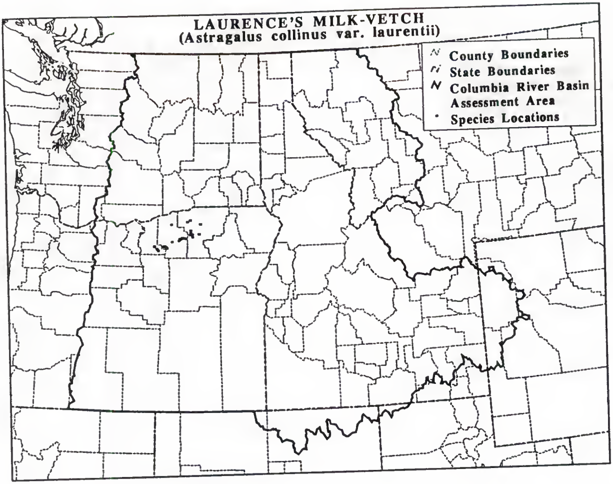

NORTHERN WORMWOOD
(Artemisia campestris var. wormskioldii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

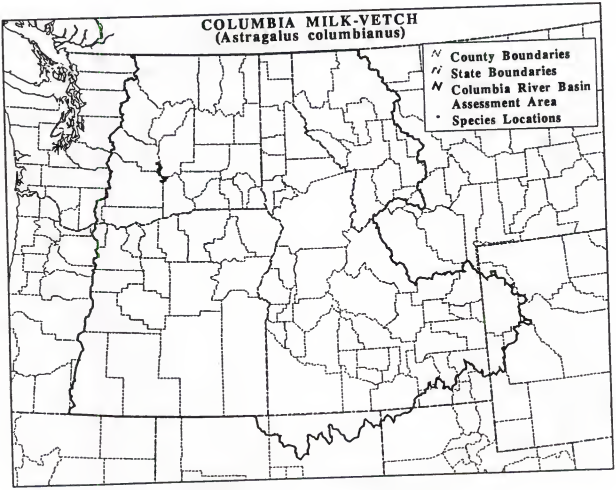

ESTES' ARTEMISIA
(Artemisia ludoviciana ssp. estesii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

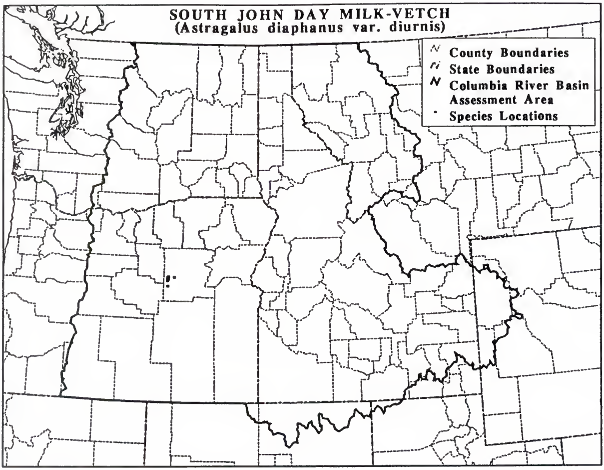

GOOSE CREEK MILKVETCH
(Astragalus anserinus)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

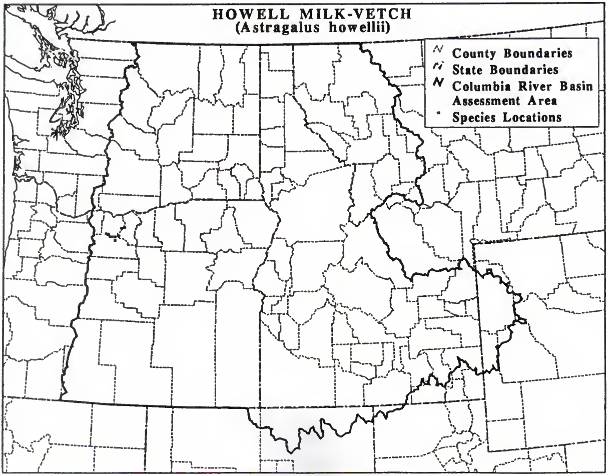

APPLEGATE'S MILK-VETCH
(Astragalus applegatei)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

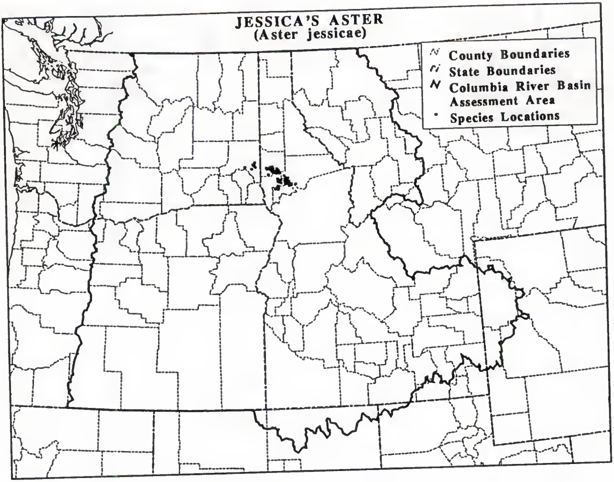

MOURNING MILKVETCH
(Astragalus atratus var. inseptus)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

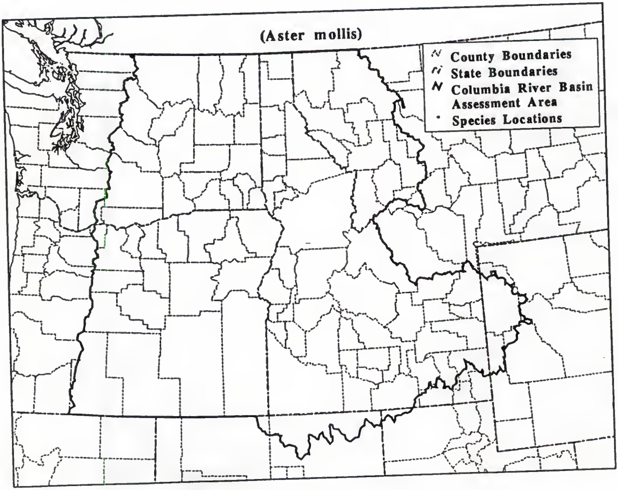

LAURENCE'S MILK-VETCH
(Astragalus collinus var. laurentii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

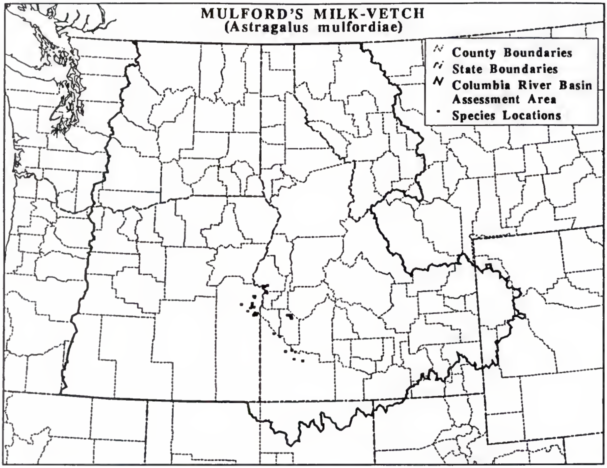

COLUMBIA MILK-VETCH
(Astragalus columbianus)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


SOUTH JOHN DAY MILK-VETCH
(Astragalus diaphanus var. diurnis)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

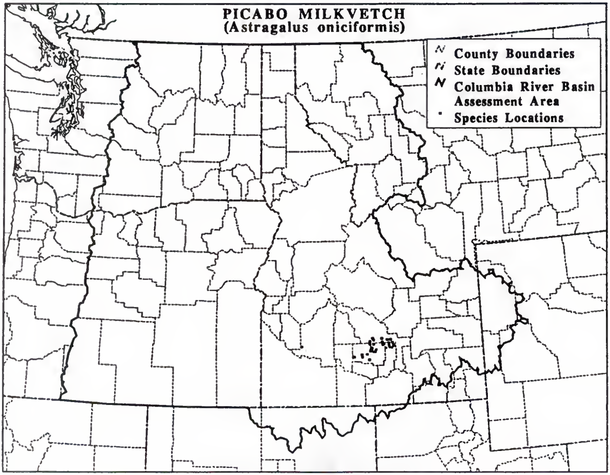

HOWELL MILK-VETCH
(Astragalus howellii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


JESSICA'S ASTER
(Aster jessicae)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


(Aster mollis)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

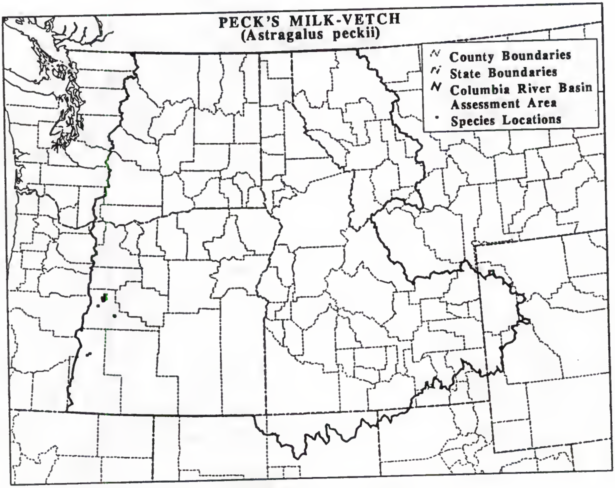


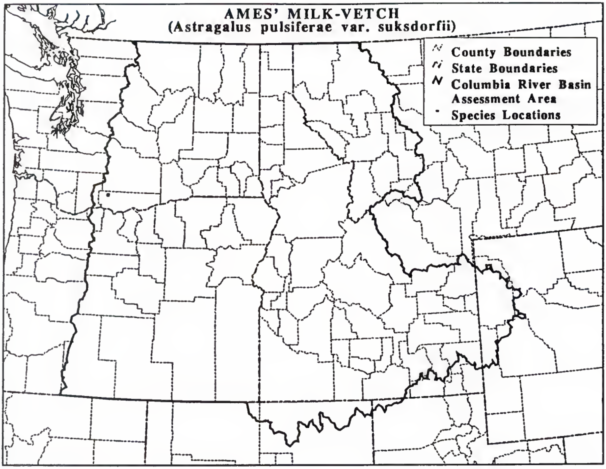
MULFORD'S MILK-VETCH
(Astragalus mulfordiae)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

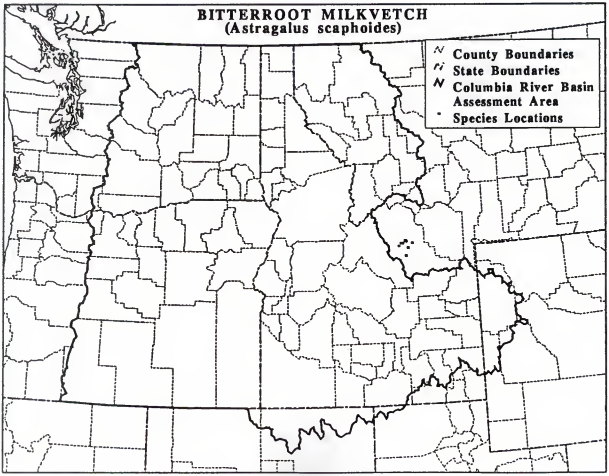


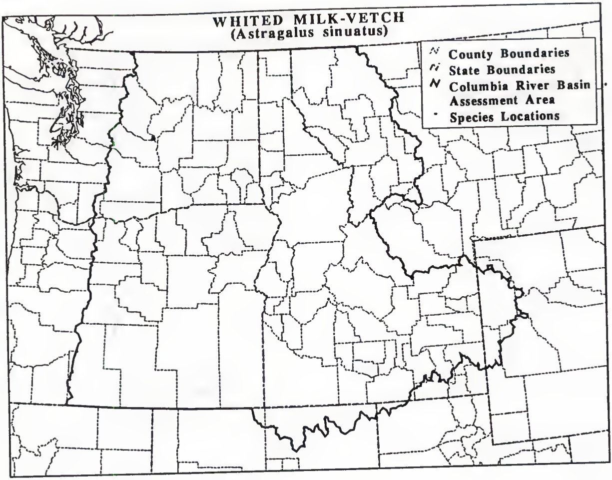
PICABO MILKVETCH
(Astragalus oniciformis)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

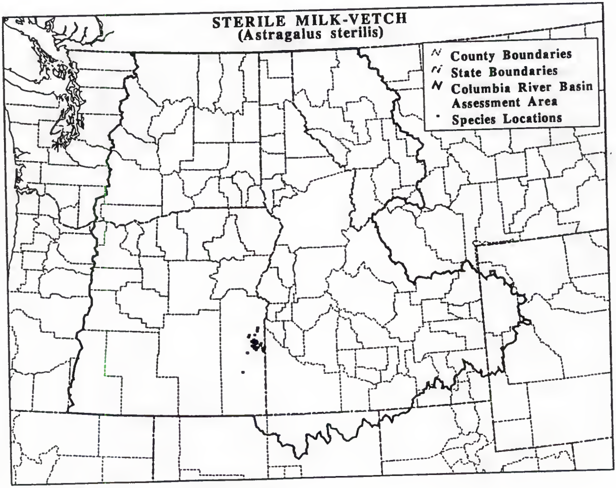

PAYSON'S MILKVETCH
(Astragalus paysonii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

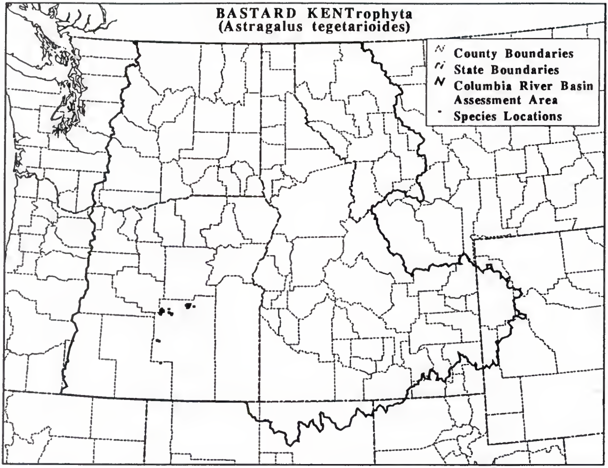

PECK'S MILK-VETCH
(Astragalus peckii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


AMES' MILK-VETCH
(Astragalus pulsiferae var. suksdorfii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

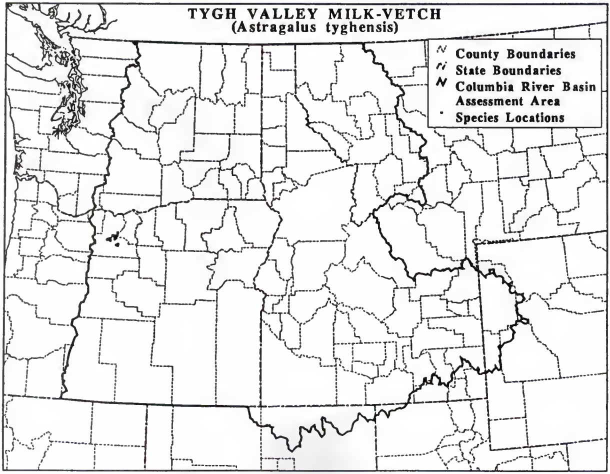

BITTERROOT MILKVETCH
(Astragalus scaphoides)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


WHITED MILK-VETCH
(Astragalus sinuatus)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

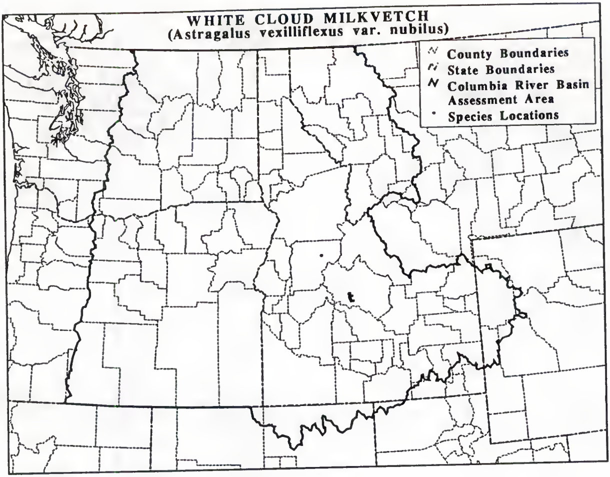

STERILE MILK-VETCH
(Astragalus sterilis)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

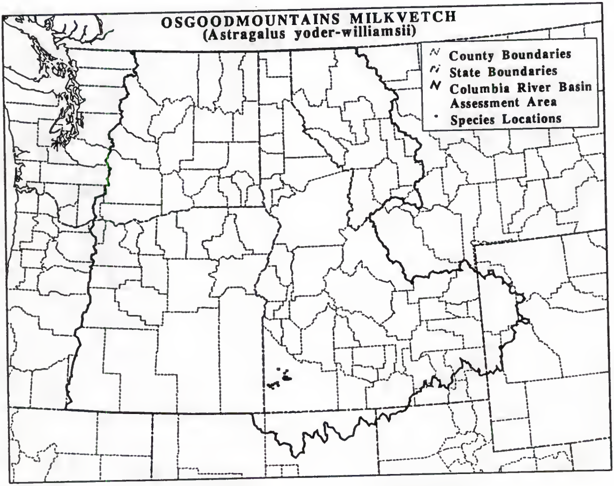


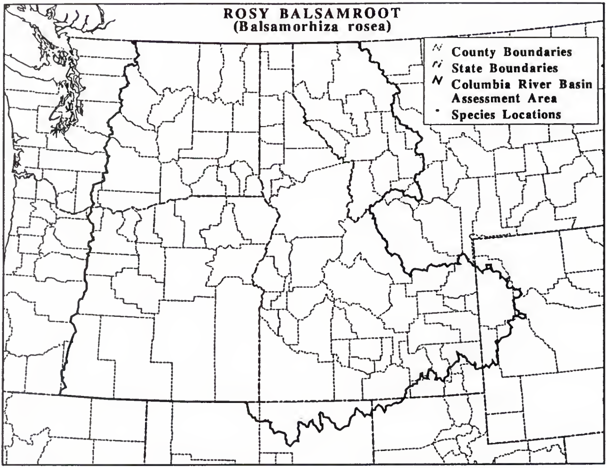
BASTARD KENTrophyta
(Astragalus tegetarioides)

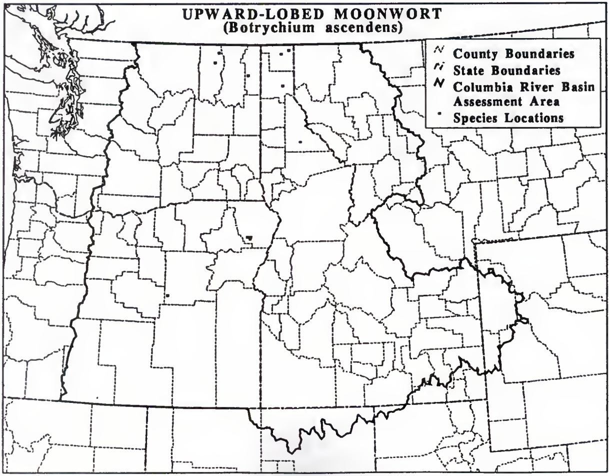


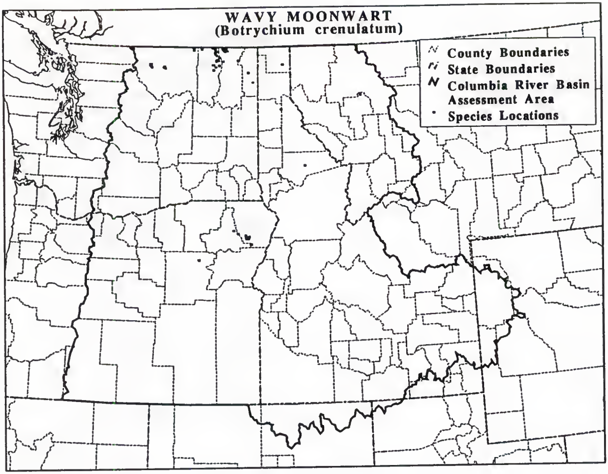
TYGH VALLEY MILK-VETCH
(Astragalus tyghensis)

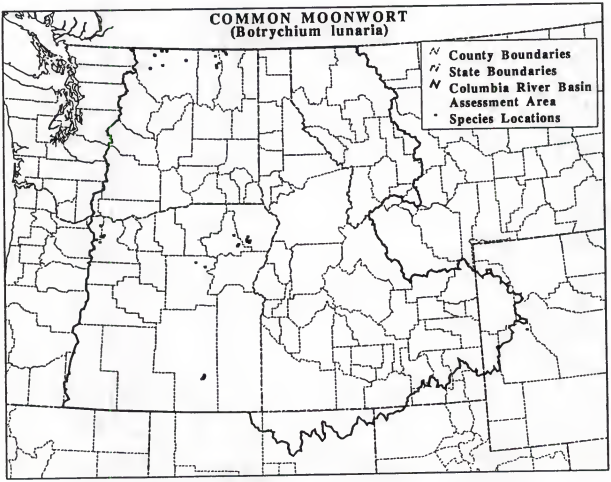

WHITE CLOUD MILKVETCH
(Astragalus vexilliflexus var. nubilus)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

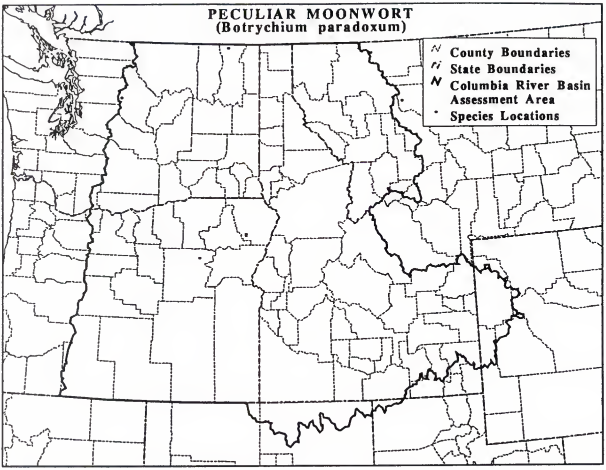

OSGOODMOUNTAINS MILKVETCH
(Astragalus yoder-williamsii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

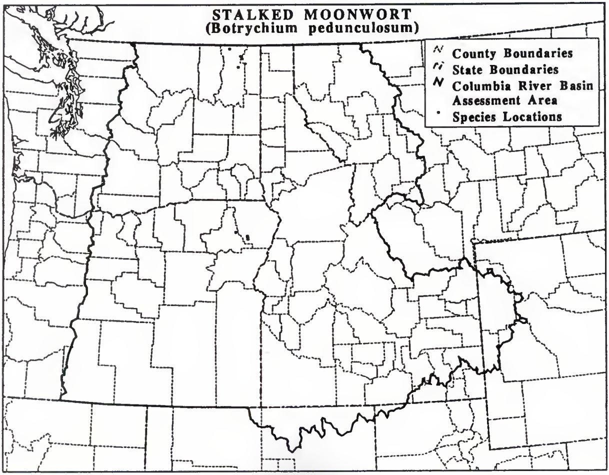

ROSY BALSAMROOT
(Balsamorhiza rosea)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

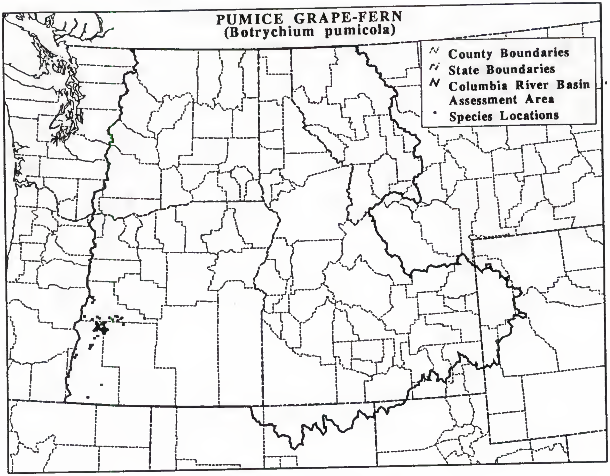

UPWARD-LOBED MOONWORT
(Botrychium ascendens)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

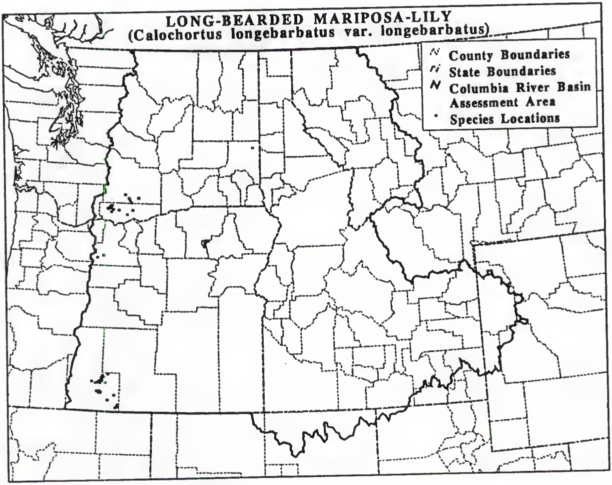

WAVY MOONWART
(Botrychium crenulatum)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

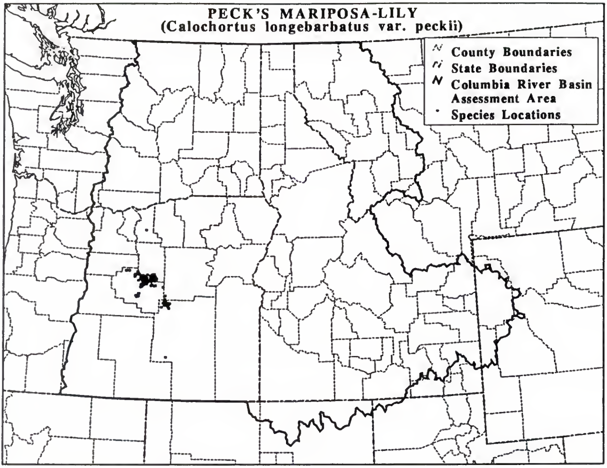

COMMON MOONWORT
(Botrychium lunaria)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

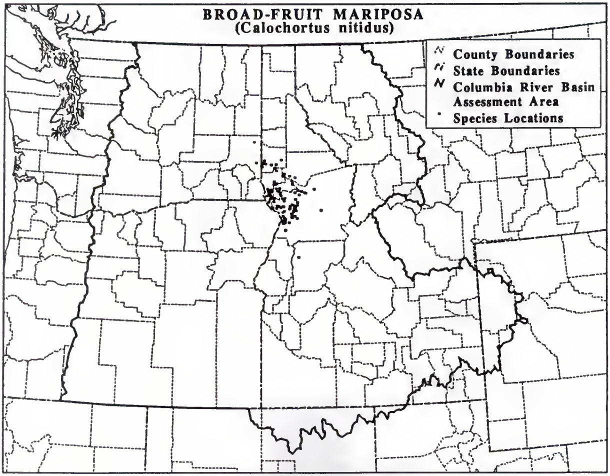

PECULIAR MOONWORT
(Botrychium paradoxum)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


STALKED MOONWORT
(Botrychium pedunculosum)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


PUMICE GRAPE-FERN
(Botrychium pumicola)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


LONG-BEARDED MARIPOSA-LILY
(Calochortus longebarbatus var. longebarbatus)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


PECK'S MARIPOSA-LILY
(Calochortus longebarbatus var. peckii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


BROAD-FRUIT MARIPOSA
(Calochortus nitidus)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

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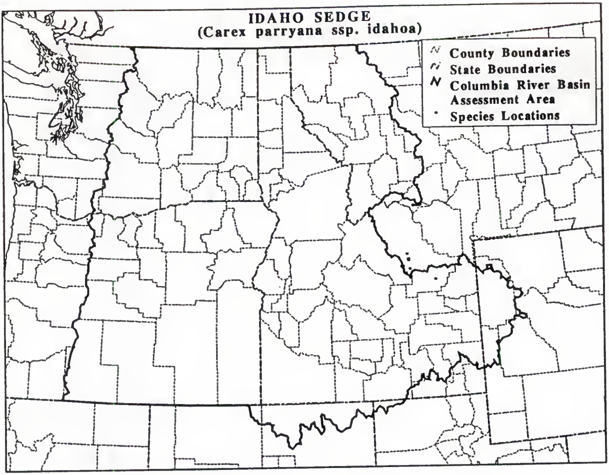
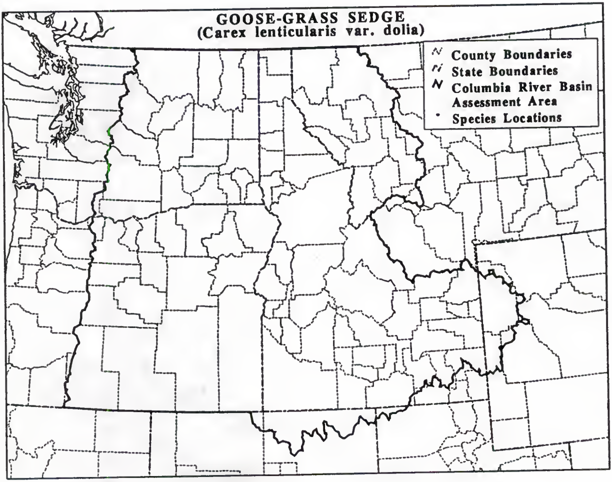
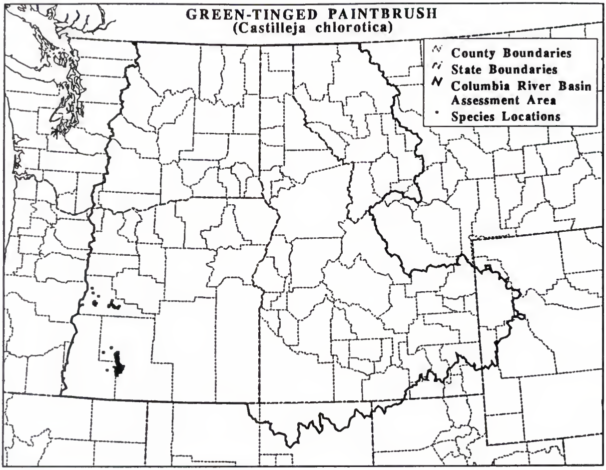
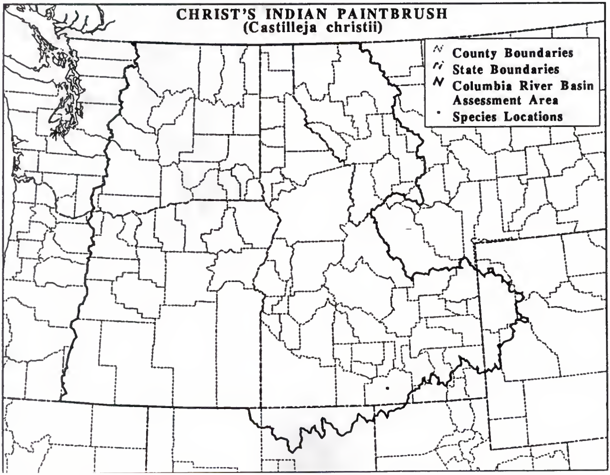
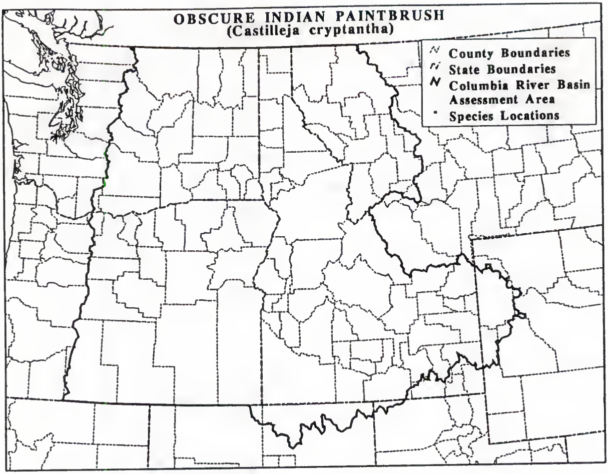
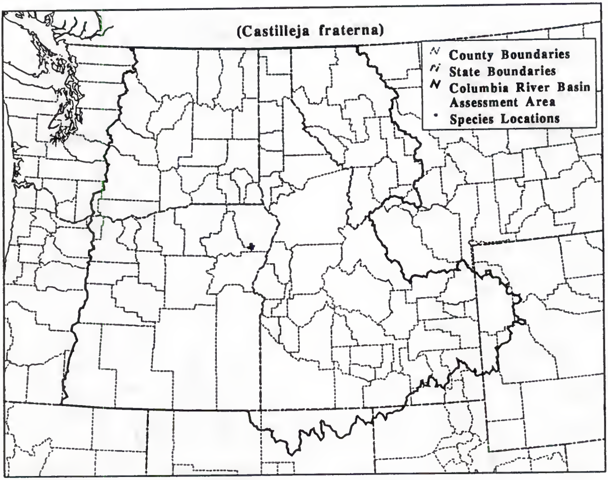

IDAHO SEDGE
(Carex parryana ssp. idahoa)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

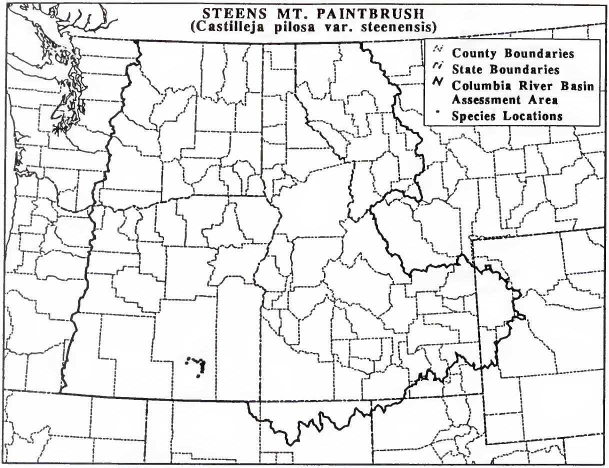

GOOSE-GRASS SEDGE
(Carex lenticularis var. dolia)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

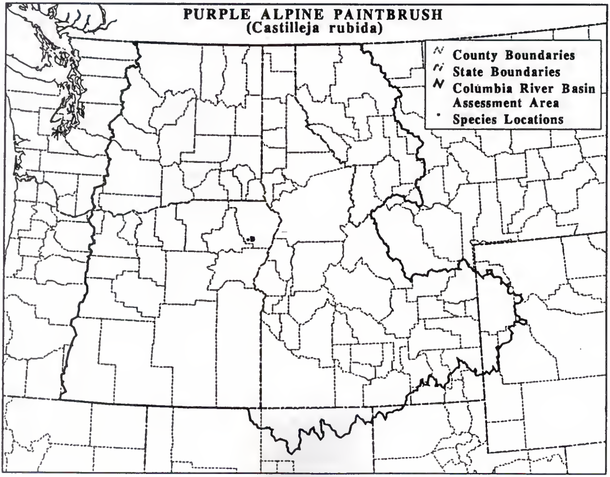

GREEN-TINGED PAINTBRUSH
(Castilleja chlorotica)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

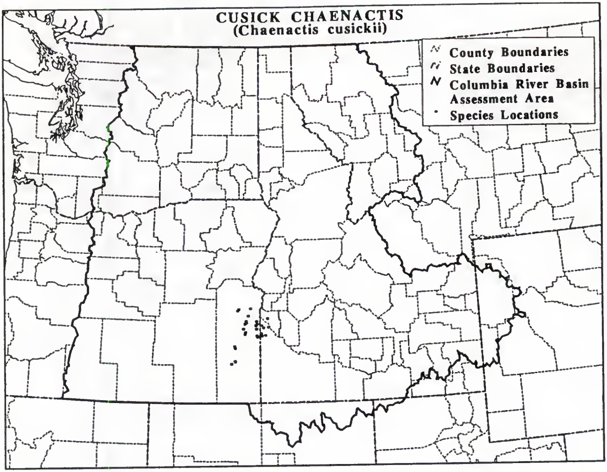

CHRIST'S INDIAN PAINTBRUSH
(Castilleja christii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

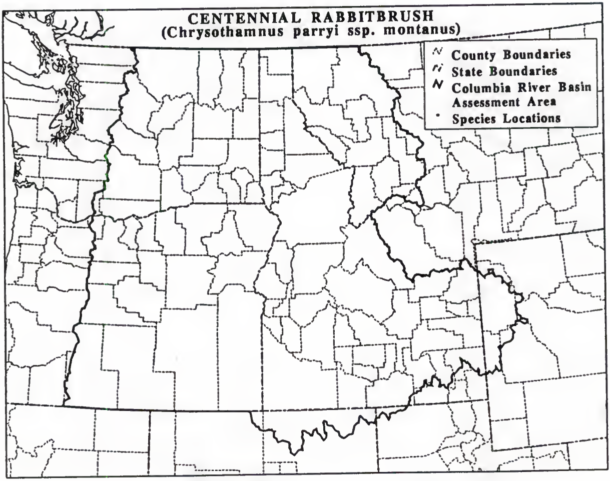

OBSCURE INDIAN PAINTBRUSH
(Castilleja cryptantha)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

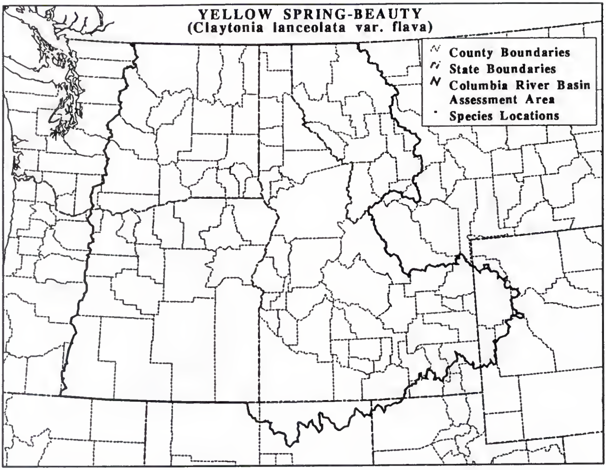

(Castilleja fraterna)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

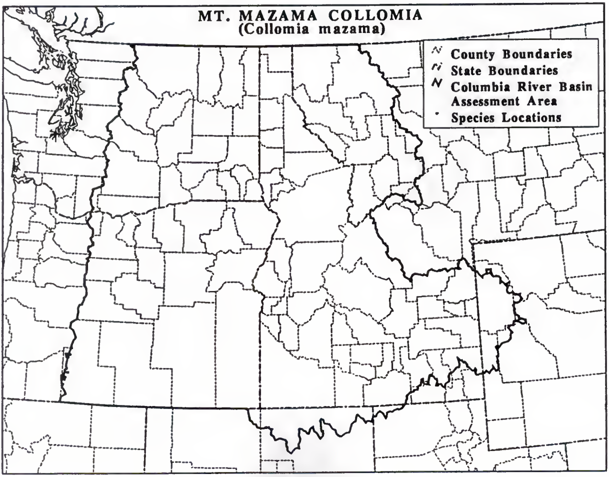

STEENS MT. PAINTBRUSH
(Castilleja pilosa var. steenensis)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

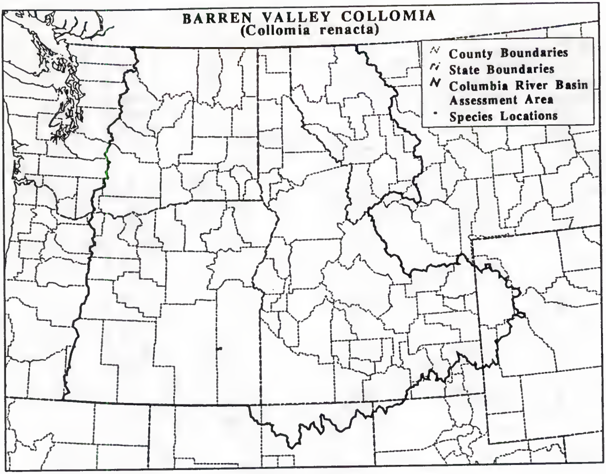

PURPLE ALPINE PAINTBRUSH
(Castilleja rubida)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

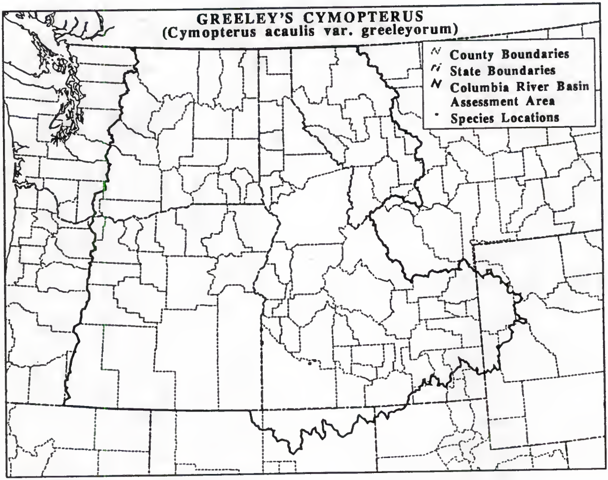

CUSICK CHAENACTIS
(Chaenactis cusickii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

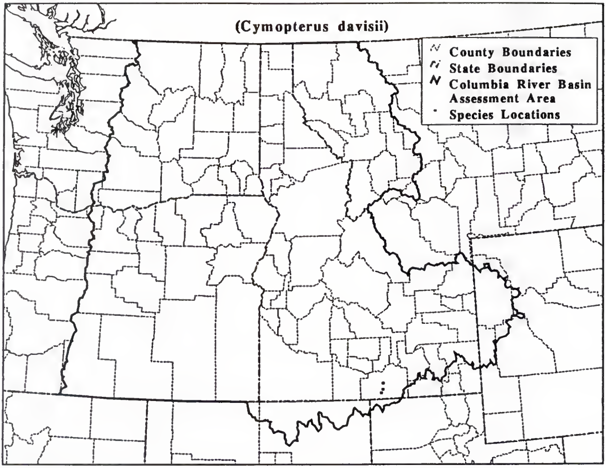

CENTENNIAL RABBITBRUSH
(Chrysothamnus parryi ssp. montanus)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

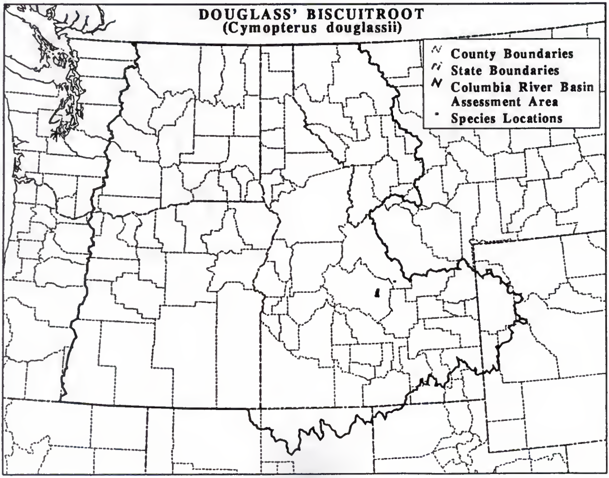

YELLOW SPRING-BEAUTY
(Claytonia lanceolata var. flava)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


MT. MAZAMA COLLOMIA
(Collomia mazama)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


BARREN VALLEY COLLOMIA
(Collomia renacta)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


GREELEY'S CYMOPTERUS
(Cymopterus acaulis var. greeleyorum)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


(Cymopterus davisii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


DOUGLASS' BISCUITROOT
(Cymopterus douglassii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

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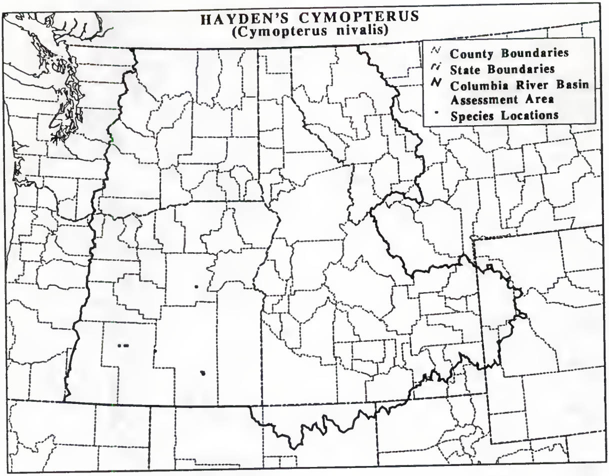
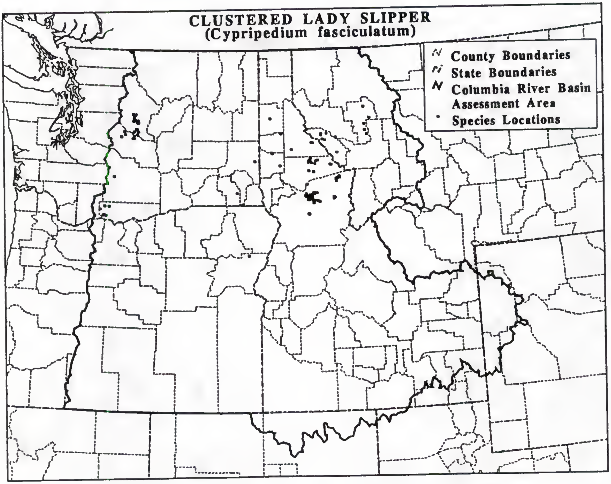
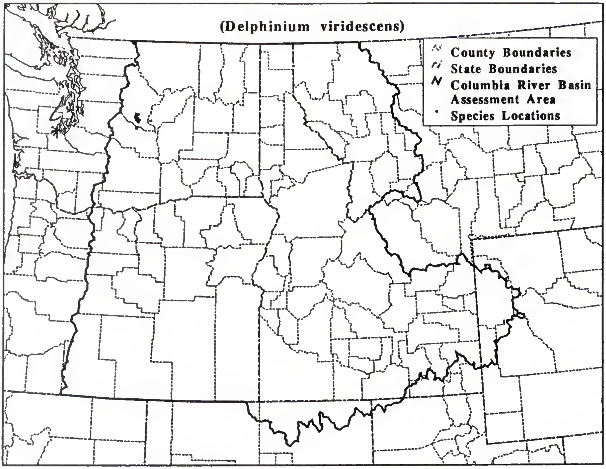
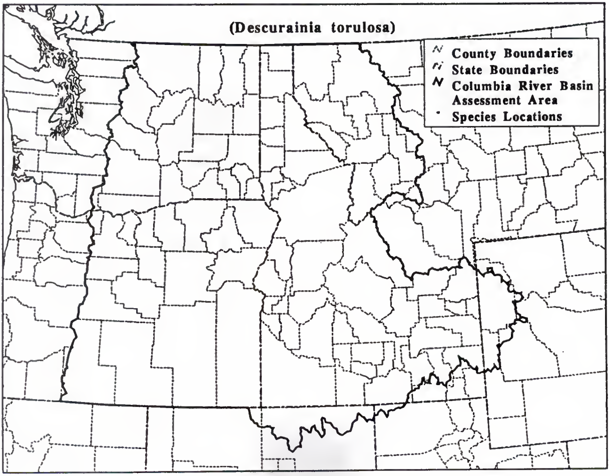
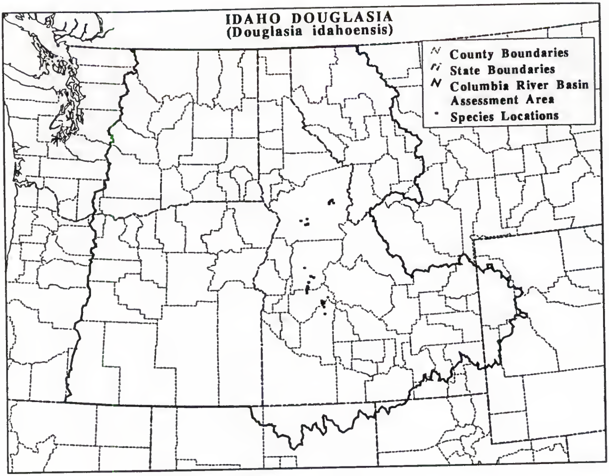
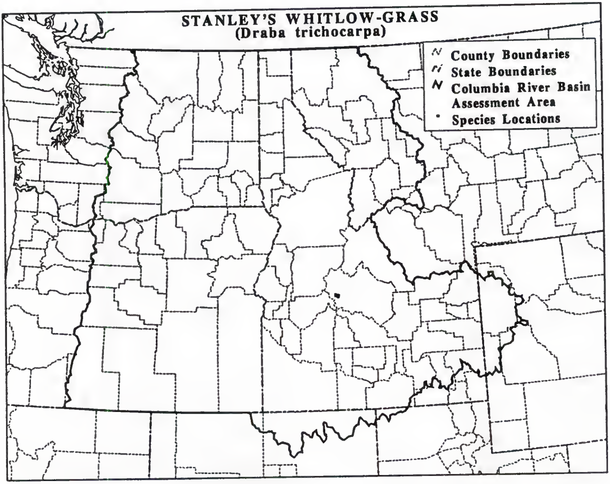

HAYDEN'S CYMOPTERUS
(Cymopterus nivalis)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

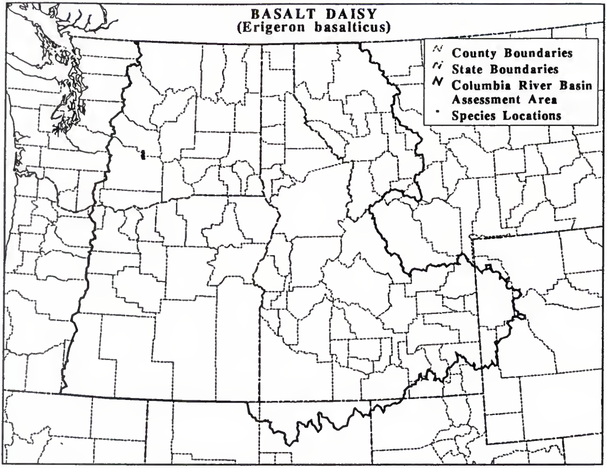

CLUSTERED LADY SLIPPER
(Cypripedium fasciculatum)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

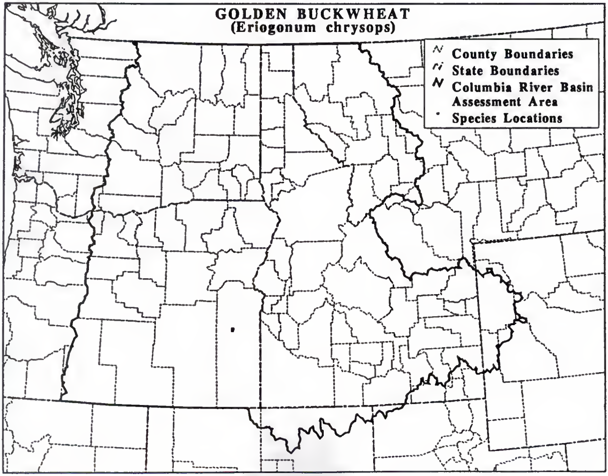

(Delphinium viridescens)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


(Descurainia torulosa)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


IDAHO DOUGLASIA
(Douglasia idahoensis)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


STANLEY'S WHITLOW-GRASS
(Draba trichocarpa)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


BASALT DAISY
(Erigeron basalticus)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


GOLDEN BUCKWHEAT
(Eriogonum chrysops)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

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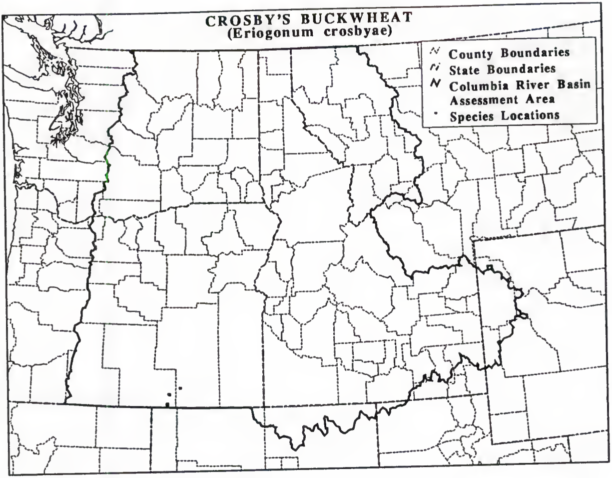
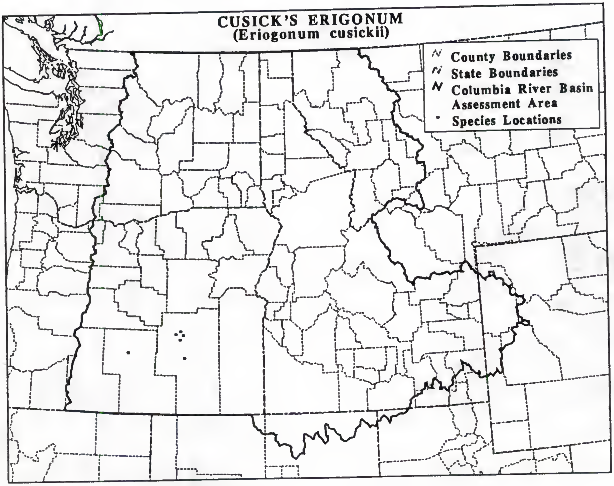

CROSBY'S BUCKWHEAT
(Eriogonum crosbyae)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


CUSICK'S ERIGONUM
(Eriogonum cusickii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

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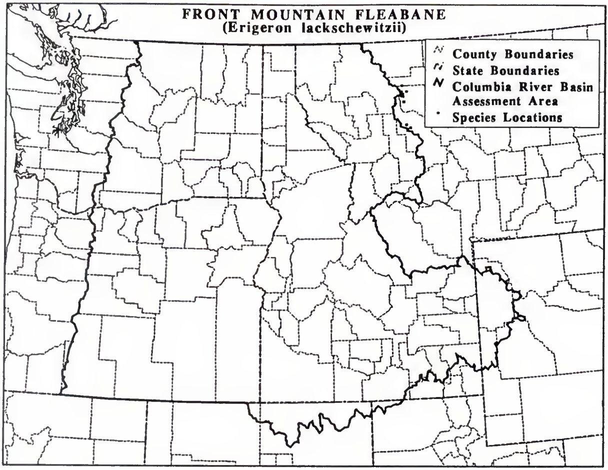
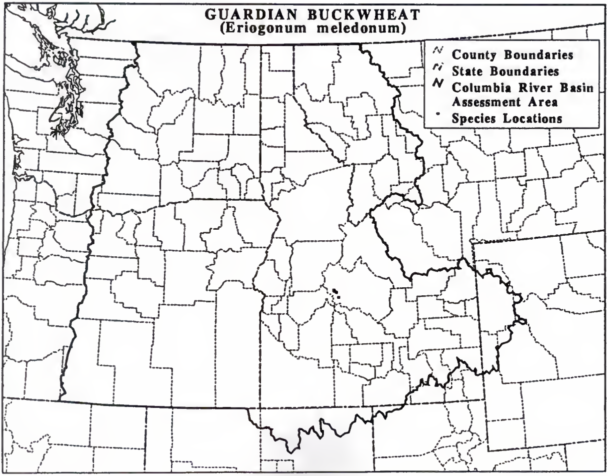
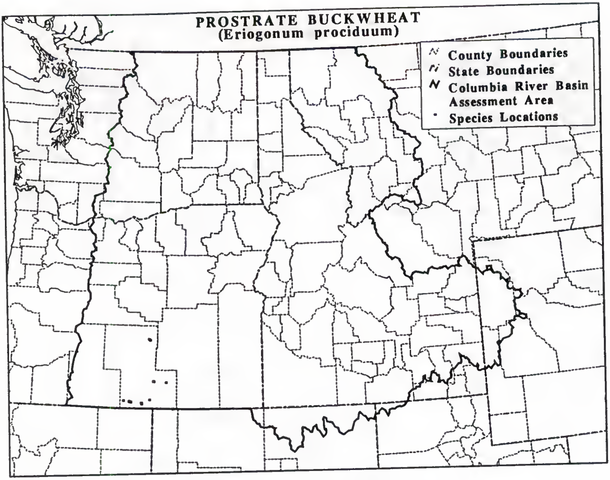
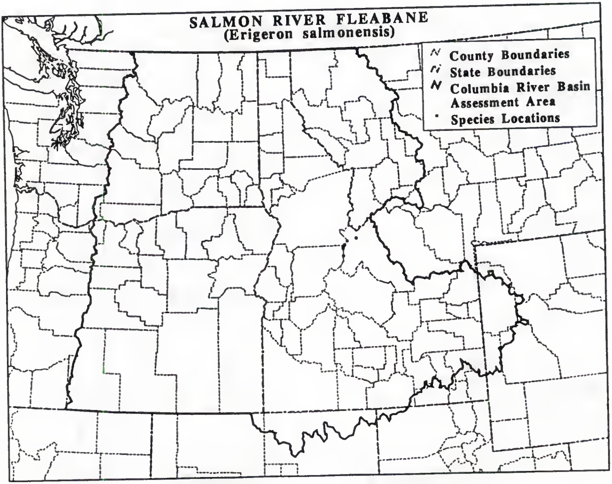
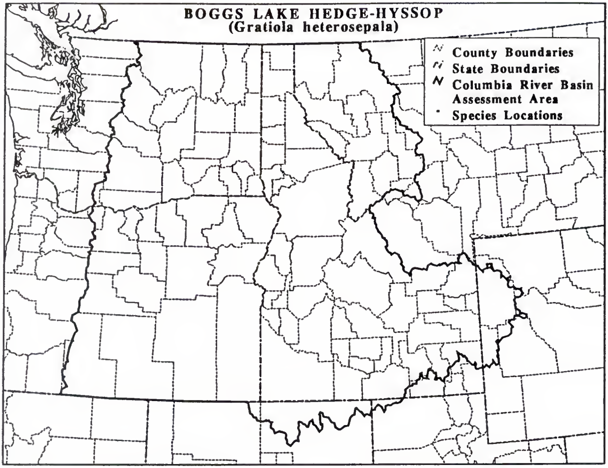
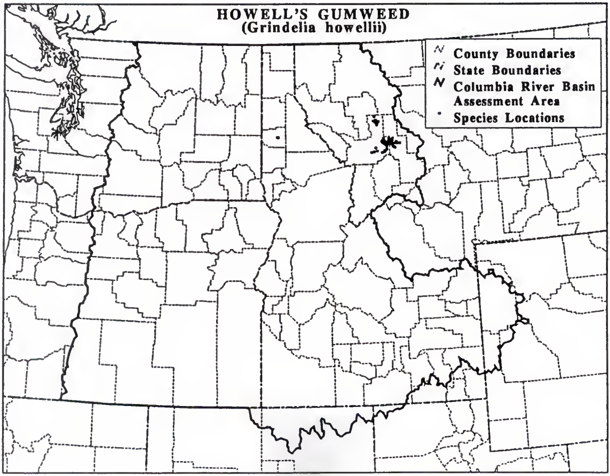

FRONT MOUNTAIN FLEABANE
(Erigeron lackschewitzii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

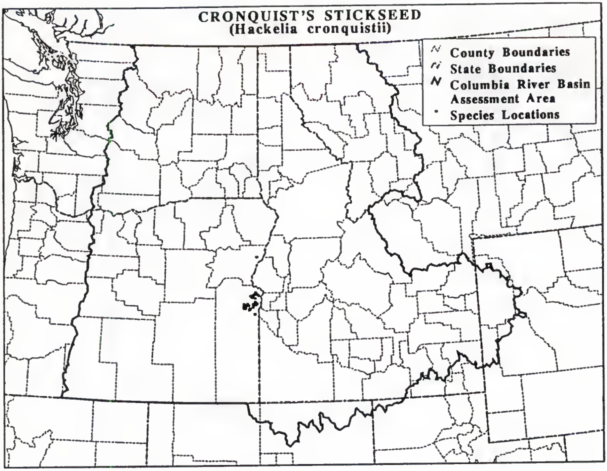

GUARDIAN BUCKWHEAT
(Eriogonum meledonum)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

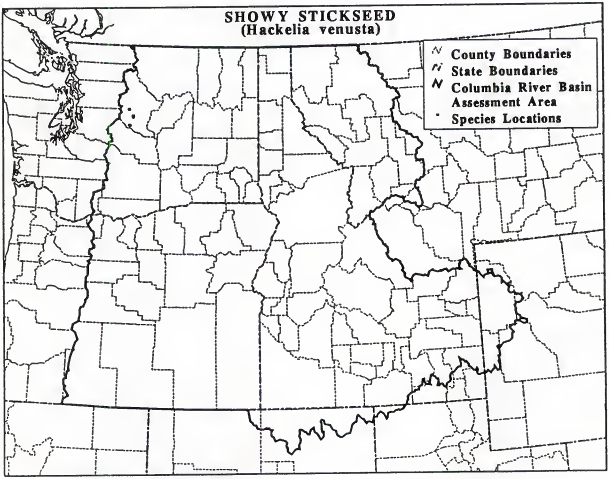

PROSTRATE BUCKWHEAT
(Eriogonum prociduum)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

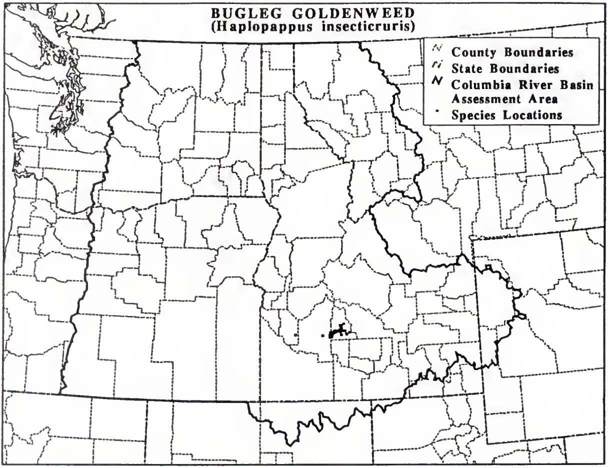

SALMON RIVER FLEABANE
(Erigeron salmonensis)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

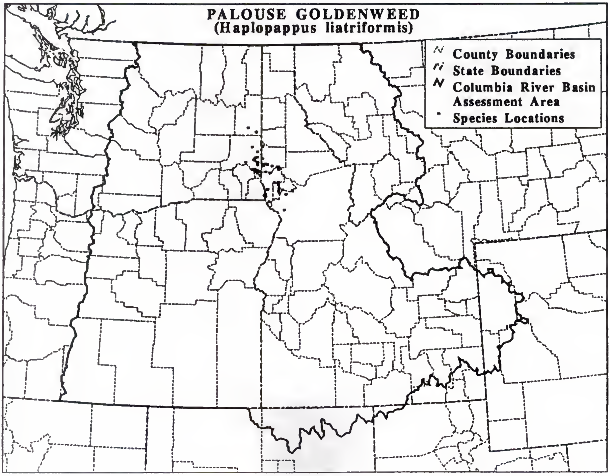

BOGGS LAKE HEDGE-HYSSOP
(Gratiola heterosepala)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

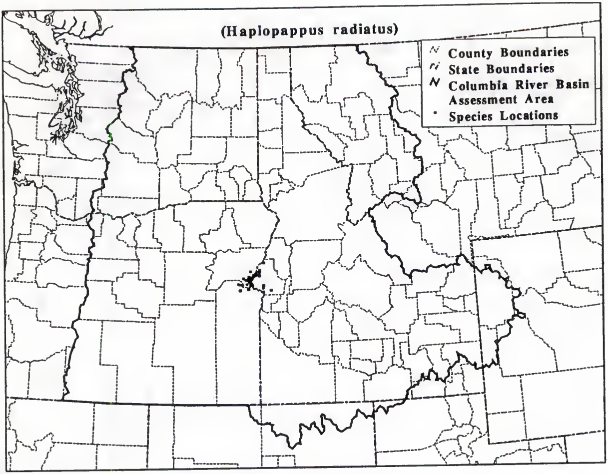

HOWELL'S GUMWEED
(Grindelia howellii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

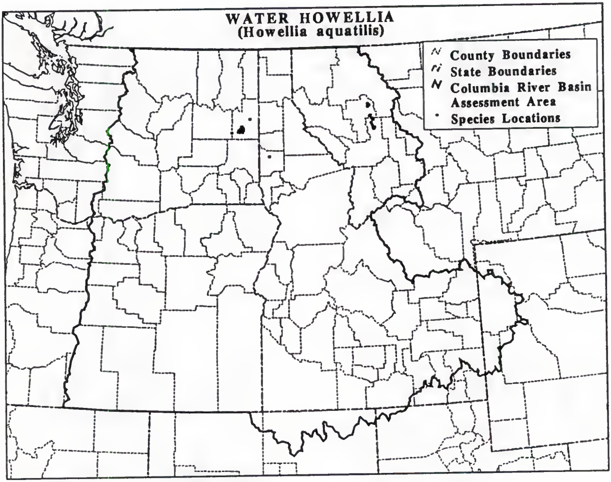

CRONQUIST'S STICKSEED
(Hackelia cronquistii)
County Boundaries
State Boundaries
Columbia River Basin
Assessment Area
Species Locations

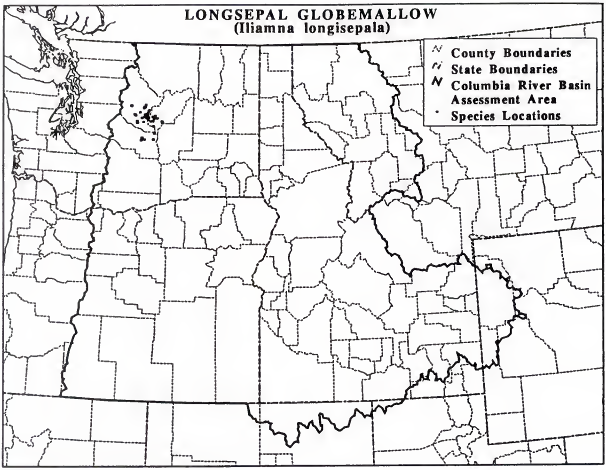

SHOWY STICKSEED
(Hackelia venusta)
County Boundaries
State Boundaries
Columbia River Basin
Assessment Area
Species Locations

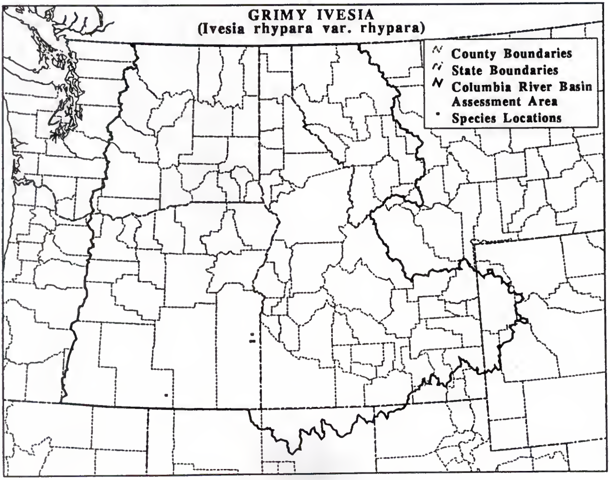

BUGLEG GOLDENWEED
(Haplopappus insecticruris)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


PALOUSE GOLDENWEED
(Haplopappus liatriformis)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


(Haplopappus radiatus)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


WATER HOWELLIA
(Howellia aquatilis)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


LONGSEPAL GLOBEMALLOW
(Iliamna longisepala)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


GRIMY IVESIA
(Ivesia rhypara var. rhypara)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

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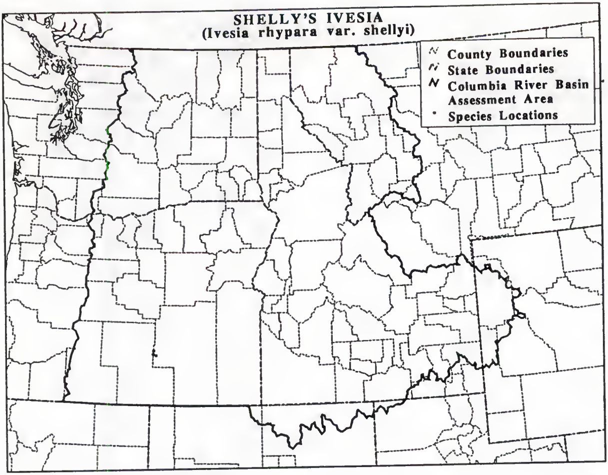
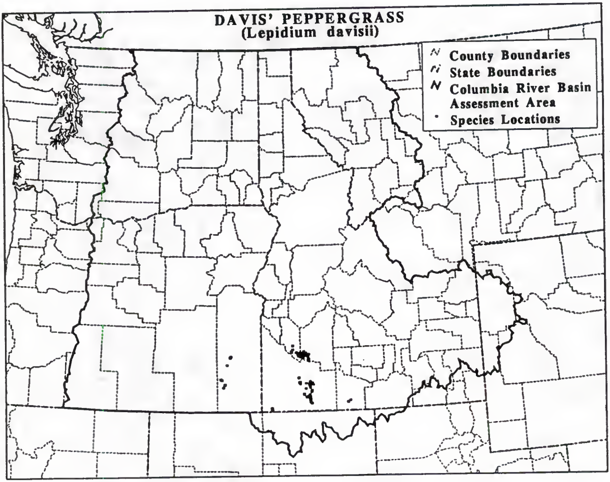
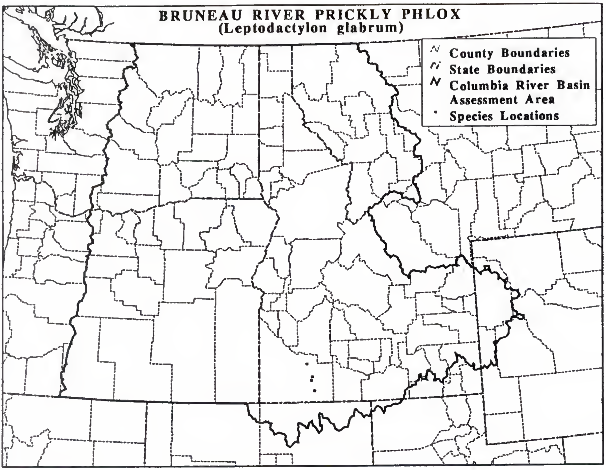
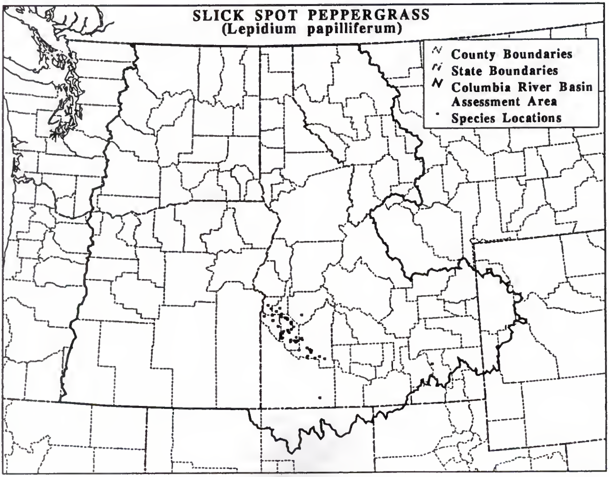
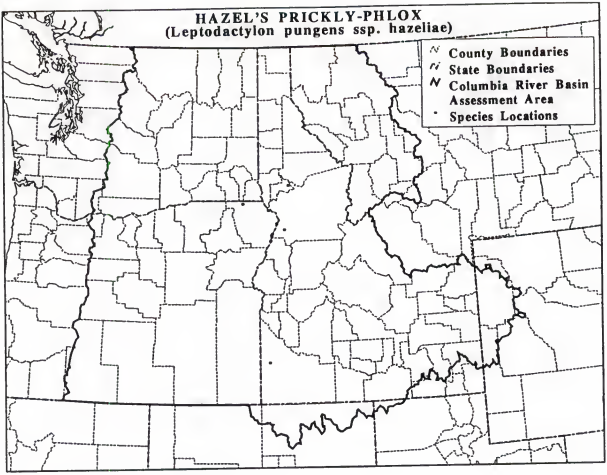
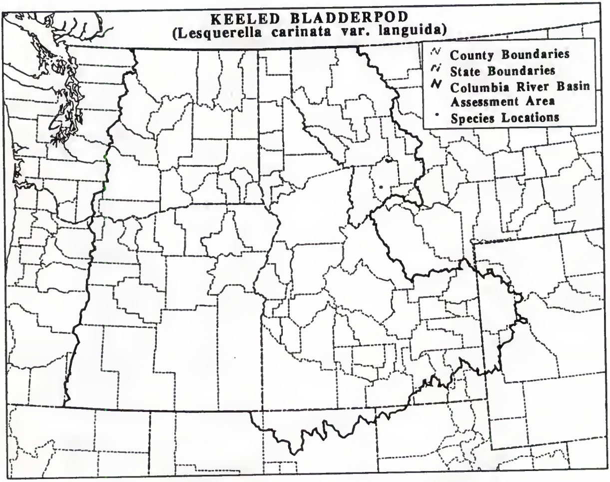

SHELLY'S IVESIA
(Ivesia rhypara var. shellyi)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

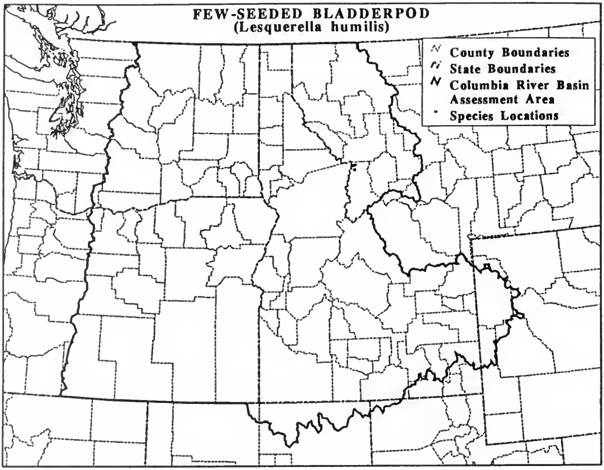

DAVIS' PEPPERGRASS
(Lepidium davisii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

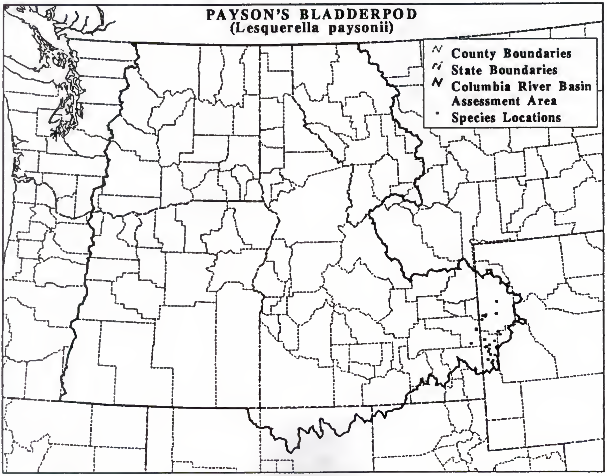

BRUNEAU RIVER PRICKLY PHLOX
(Leptodactylon glabrum)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


SLICK SPOT PEPPERGRASS
(Lepidium papilliferum)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


HAZEL'S PRICKLY-PHLOX
(Leptodactylon pungens ssp. hazeliae)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


KEELED BLADDERPOD
(Lesquerella carinata var. languida)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


FEW-SEEDED BLADDERPOD
(Lesquerella humilis)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


PAYSON'S BLADDERPOD
(Lesquerella paysonii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

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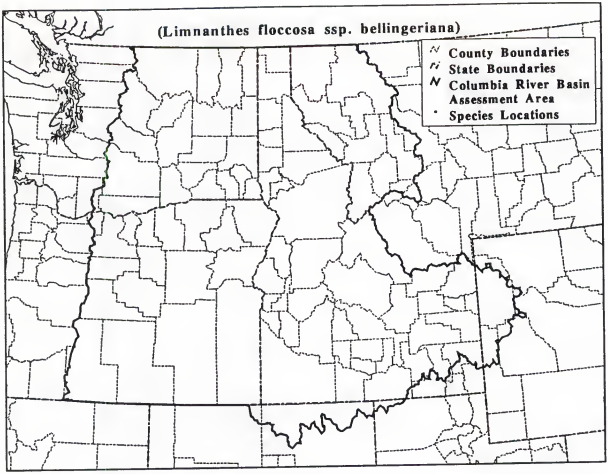
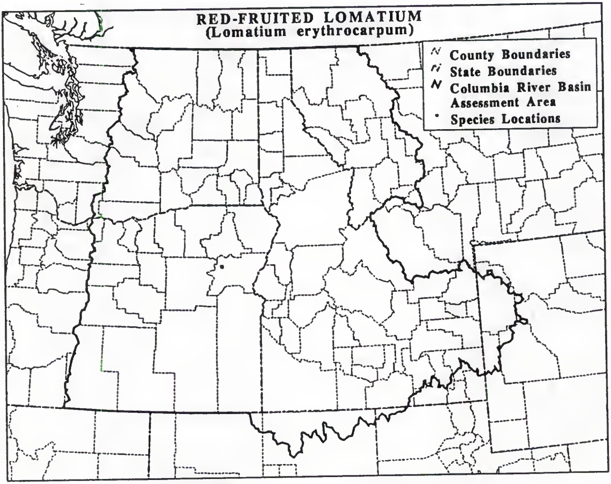
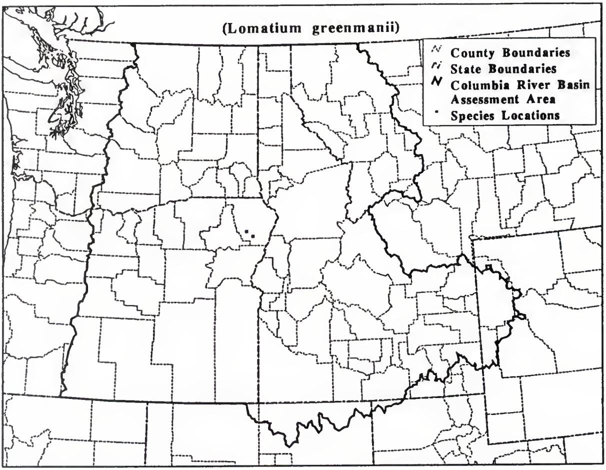
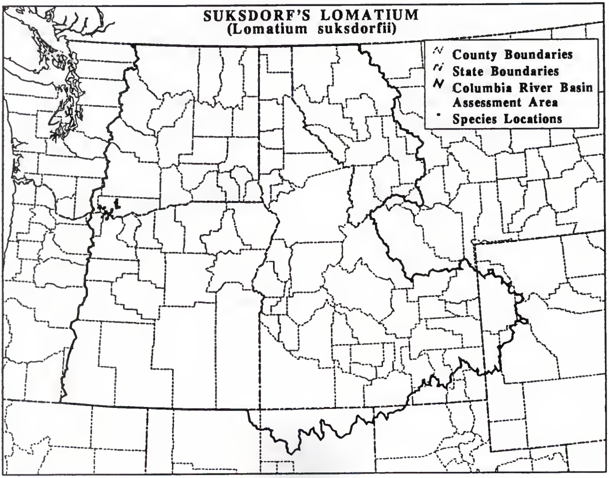
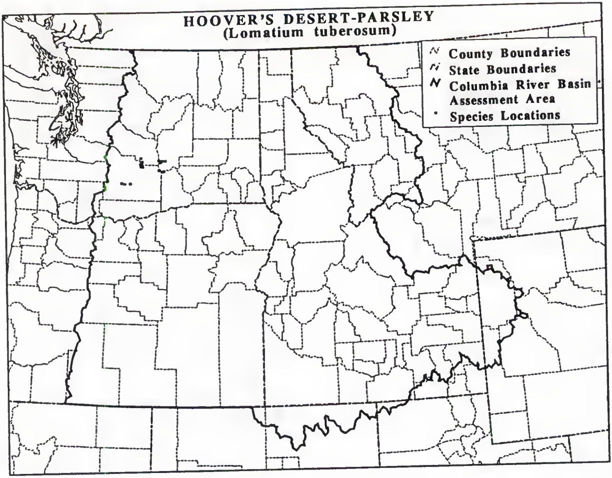
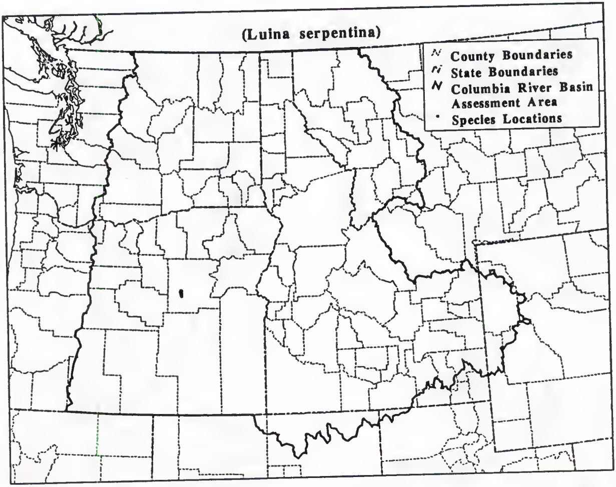

(Limnanthes floccosa ssp. bellingeriana)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

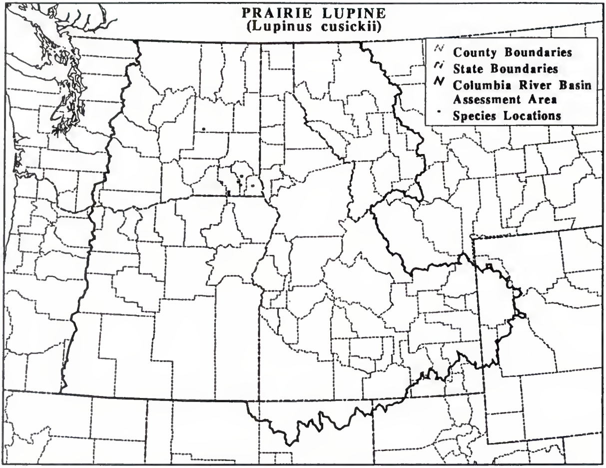

RED-FRUITED LOMATIUM
(Lomatium erythrocarpum)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

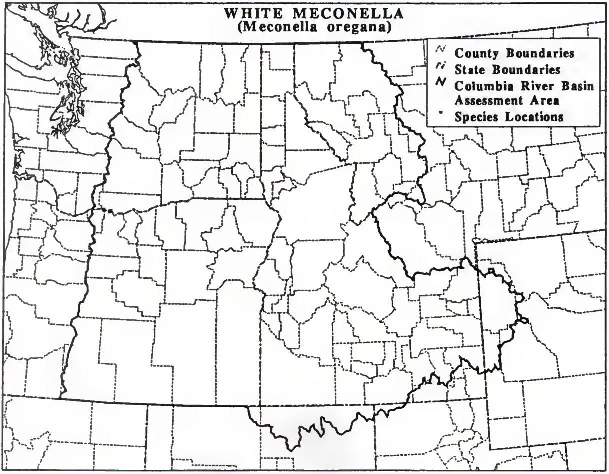

(Lomatium greenmanii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


SUKSDORF'S LOMATIUM
(Lomatium suksdorfii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


HOOVER'S DESERT-PARSLEY
(Lomatium tuberosum)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


(Luina serpentina)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


PRAIRIE LUPINE
(Lupinus cusickii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


WHITE MECONELLA
(Meconella oregana)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

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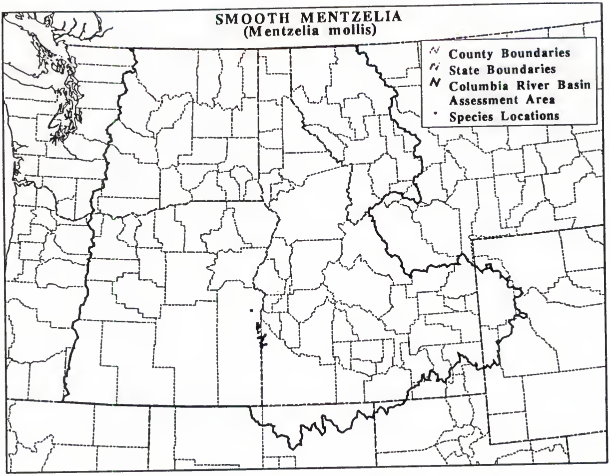
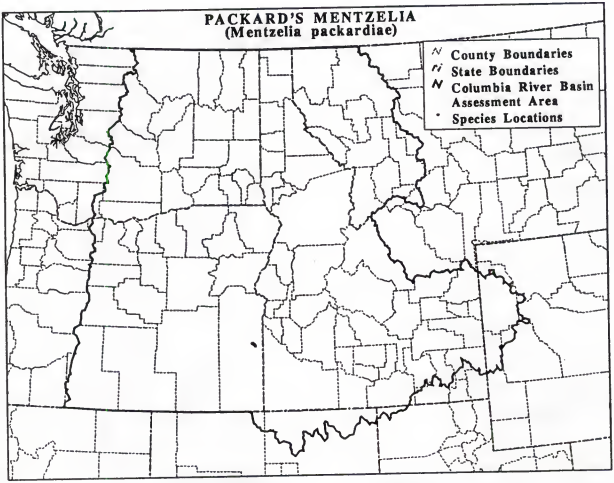

SMOOTH MENTZELIA
(Mentzelia mollis)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


PACKARD'S MENTZELIA
(Mentzelia packardiae)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

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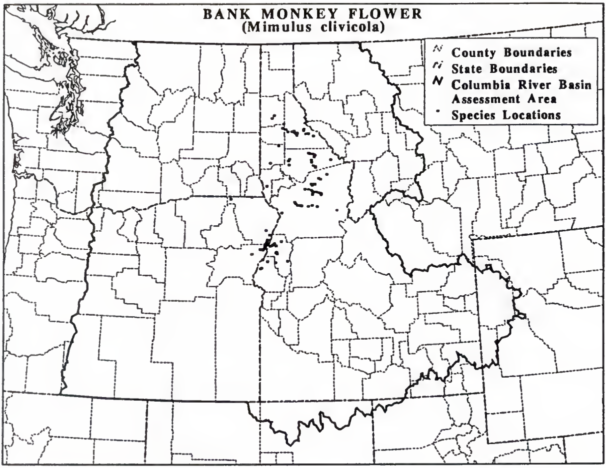
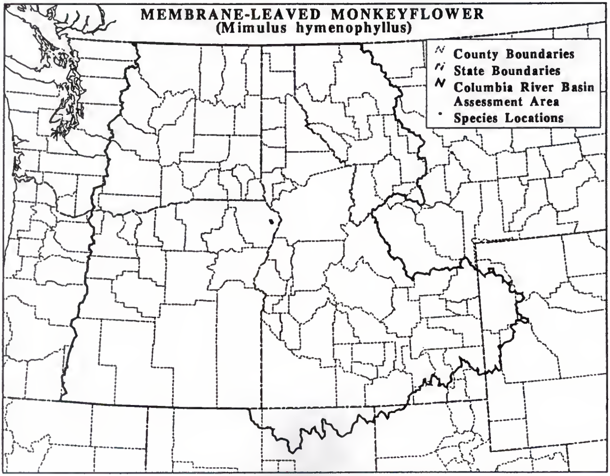
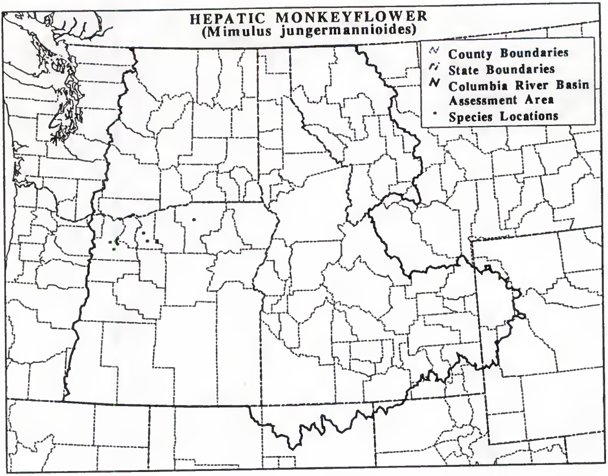
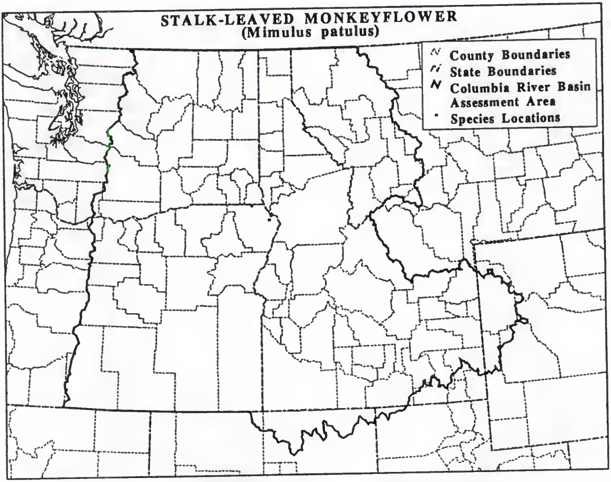
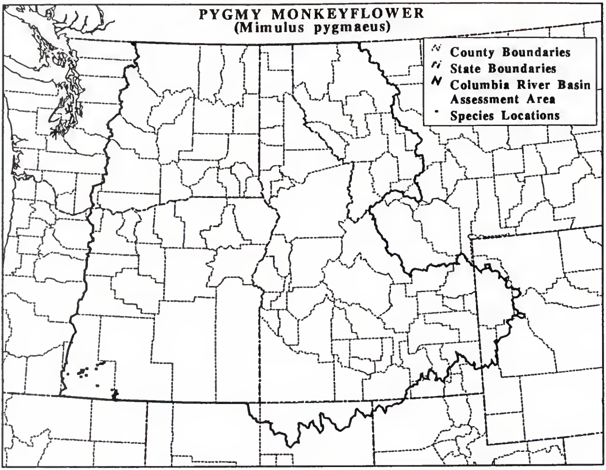
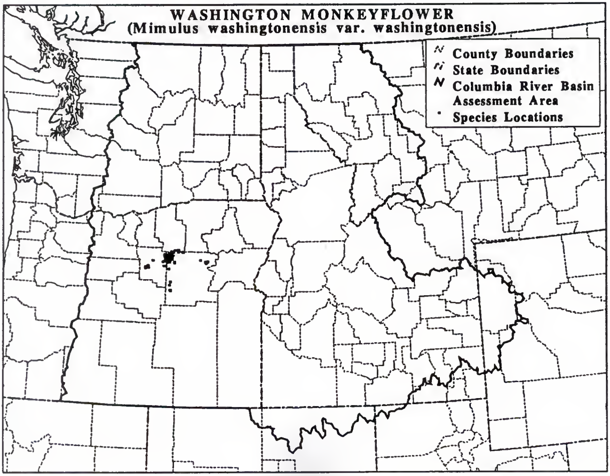

BANK MONKEY FLOWER
(Mimulus clivicola)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

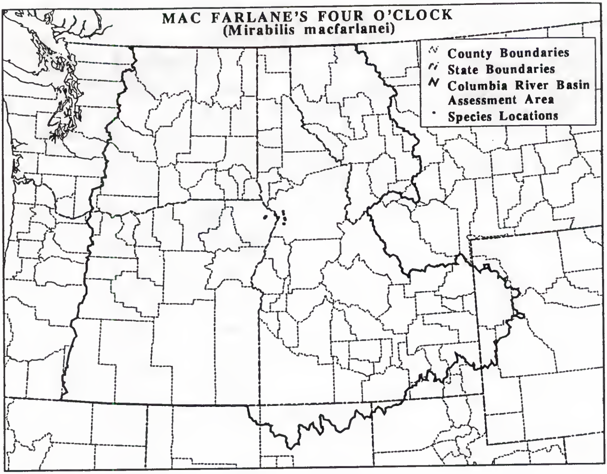

MEMBRANE-LEAVED MONKEYFLOWER
(Mimulus hymenophyllus)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

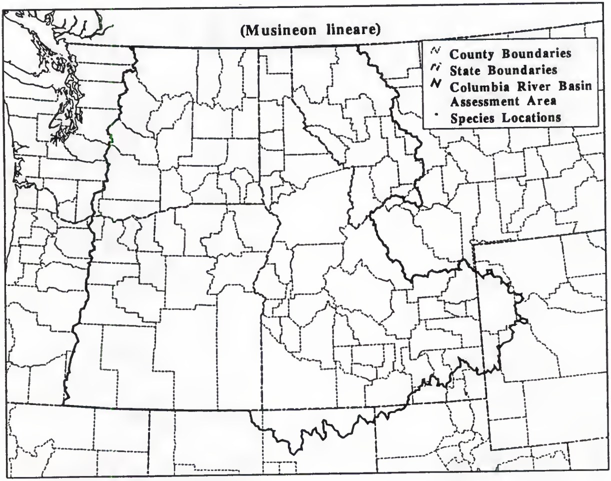

HEPATIC MONKEYFLOWER
(Mimulus jungermannioides)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

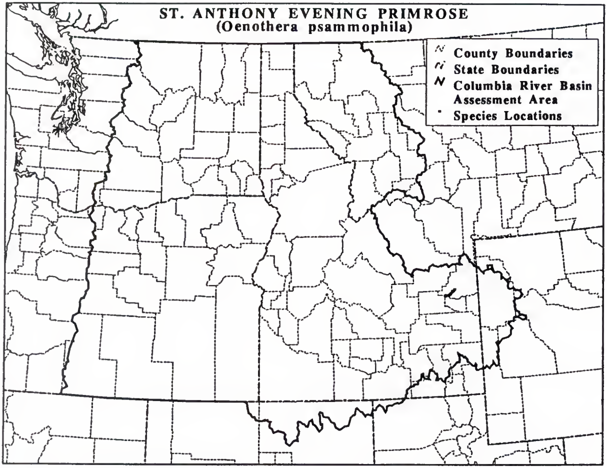

STALK-LEAVED MONKEYFLOWER
(Mimulus patulus)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

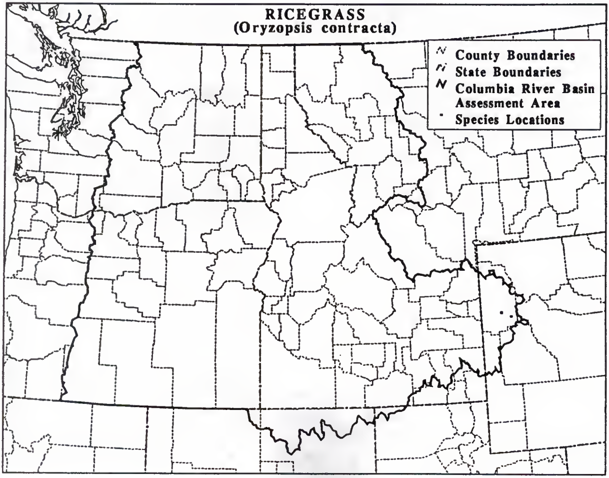

PYGMY MONKEYFLOWER
(Mimulus pygmaeus)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

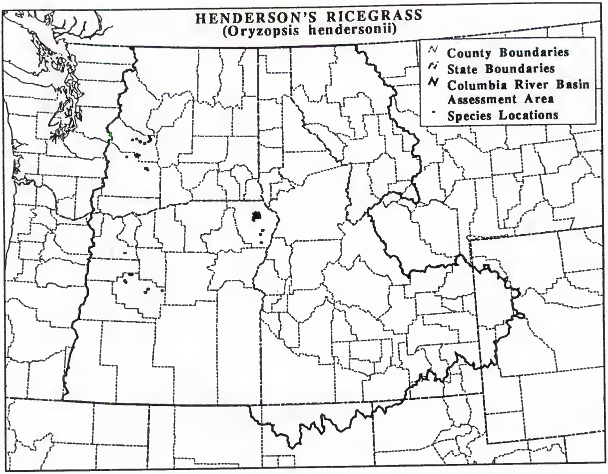

WASHINGTON MONKEYFLOWER
(Mimulus washingtonensis var. washingtonensis)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

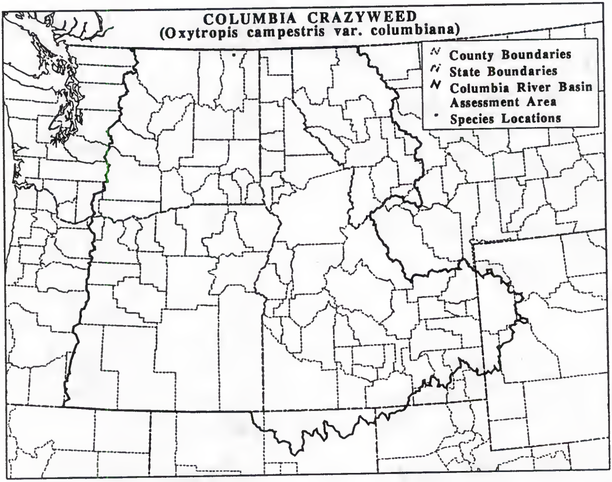

MAC FARLANE'S FOUR O'CLOCK
(Mirabilis macfarlanei)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

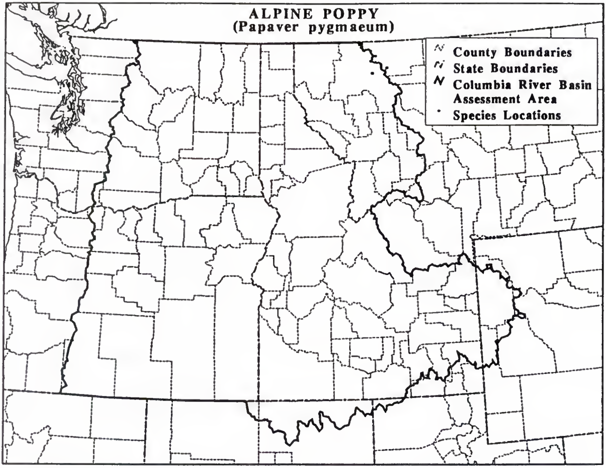

(Musineon lineare)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

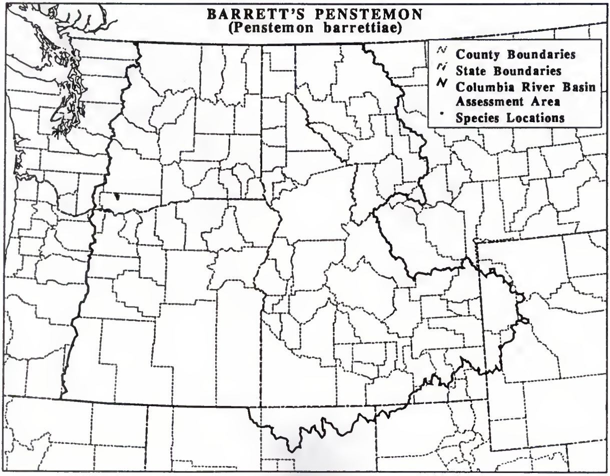

ST. ANTHONY EVENING PRIMROSE
(Oenothera psammophila)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

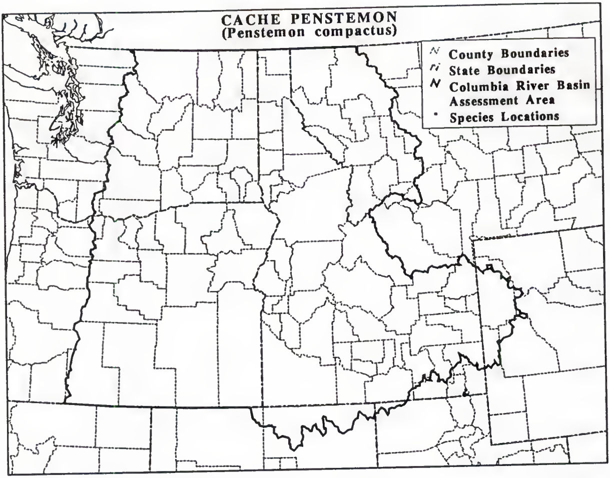

RICEGRASS
(Oryzopsis contracta)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

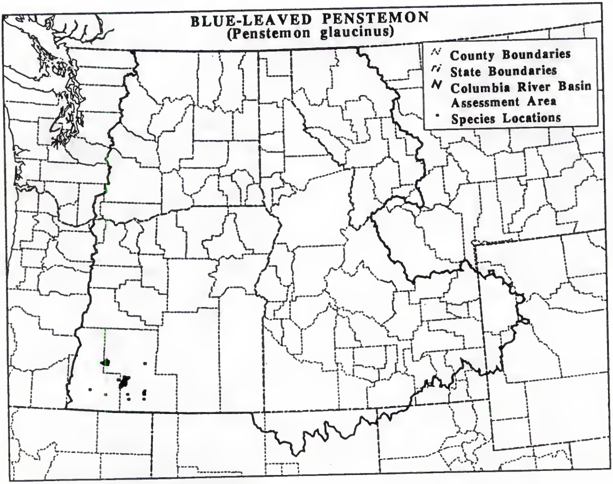

HENDERSON'S RICEGRASS
(Oryzopsis hendersonii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

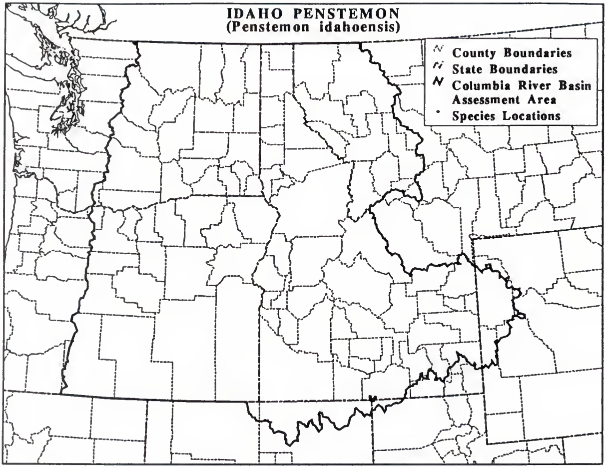

COLUMBIA CRAZYWEED
(Oxytropis campestris var. columbiana)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

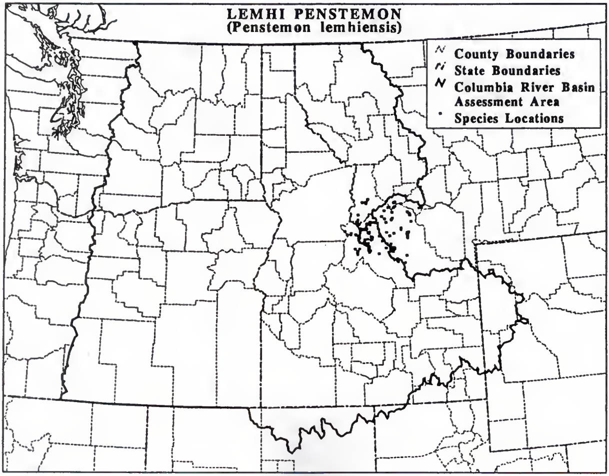

ALPINE POPPY
(Papaver pygmaeum)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

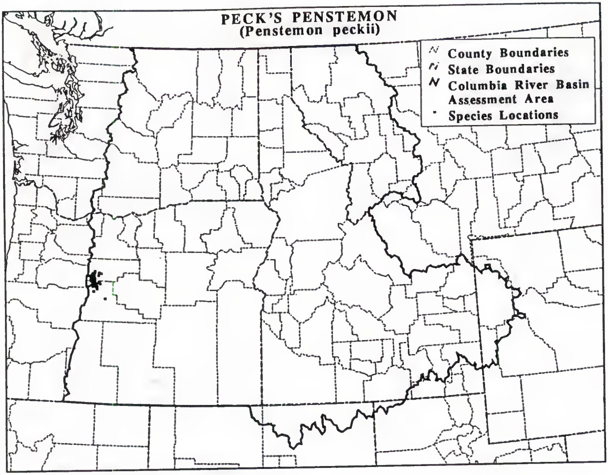

BARRETT'S PENSTEMON
(Penstemon barrettiae)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

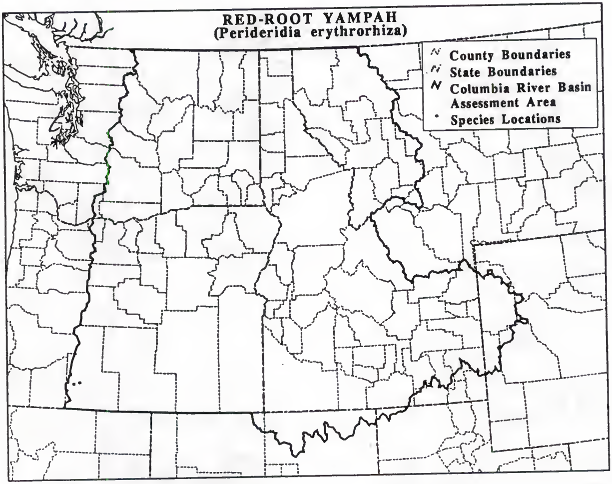

CACHE PENSTEMON
(Penstemon compactus)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

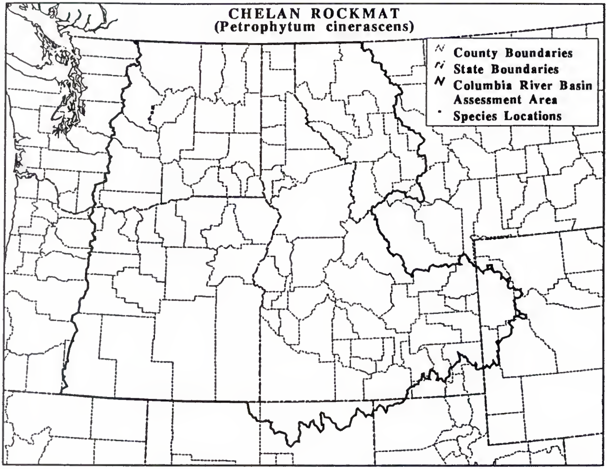

BLUE-LEAVED PENSTEMON
(Penstemon glaucinus)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

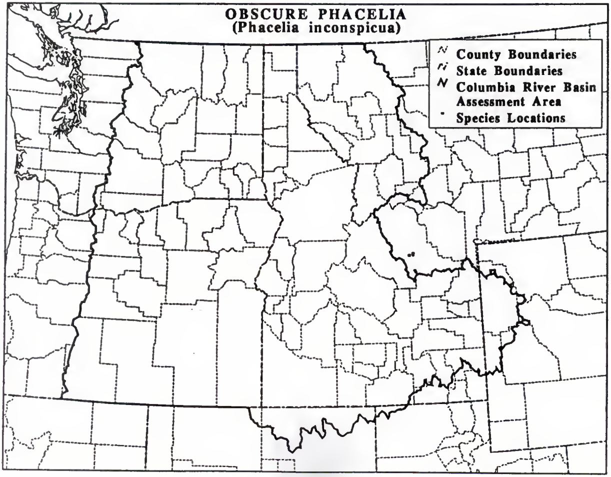

IDAHO PENSTEMON
(Penstemon idahoensis)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

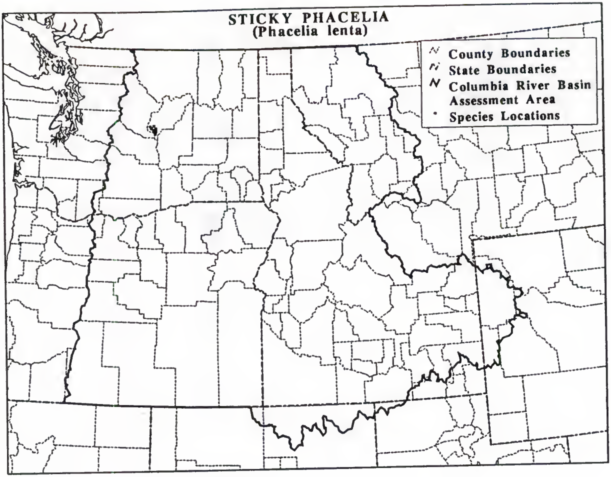

LEMHI PENSTEMON
(Penstemon lemhiensis)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

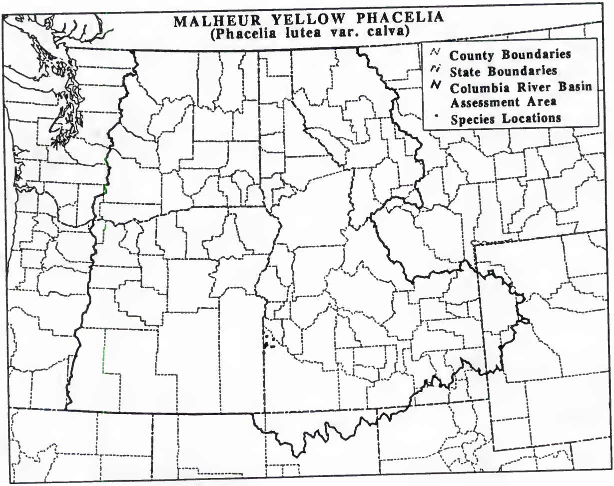

PECK'S PENSTEMON
(Penstemon peckii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

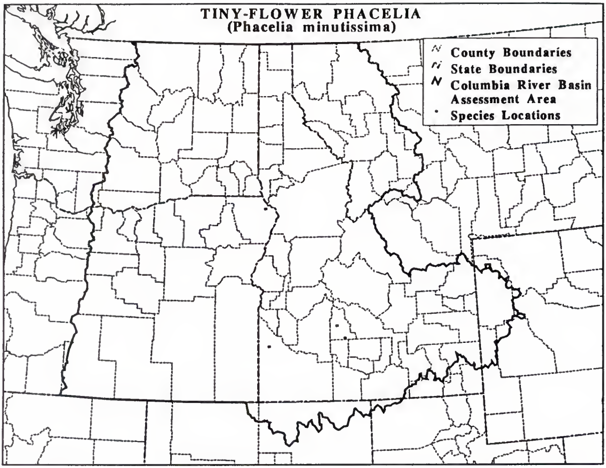

RED-ROOT YAMPAH
(Perideridia erythrorhiza)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

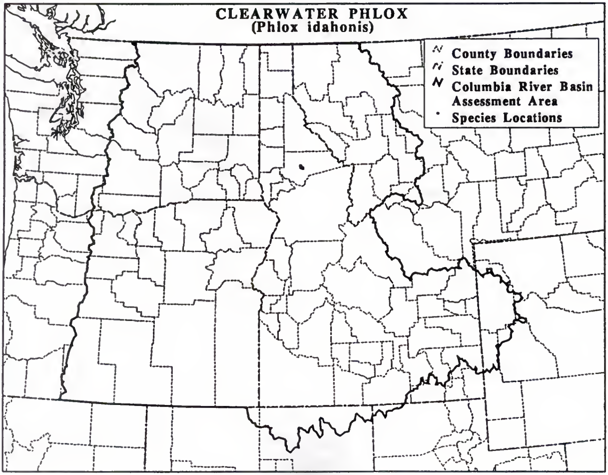

CHELAN ROCKMAT
(Petrophytum cinerascens)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


OBSCURE PHACELIA
(Phacelia inconspicua)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


STICKY PHACELIA
(Phacelia lenta)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


MALHEUR YELLOW PHACELIA
(Phacelia lutea var. calva)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


TINY-FLOWER PHACELIA
(Phacelia minutissima)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


CLEARWATER PHLOX
(Phlox idahonis)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

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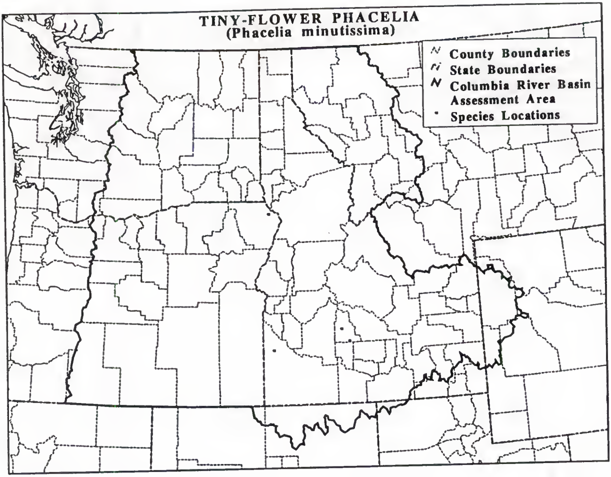
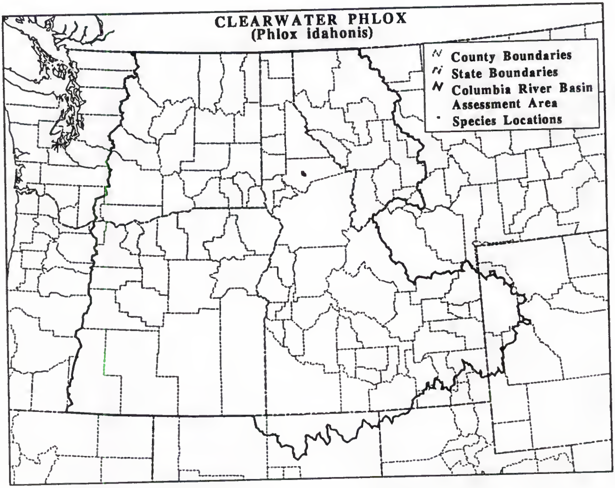
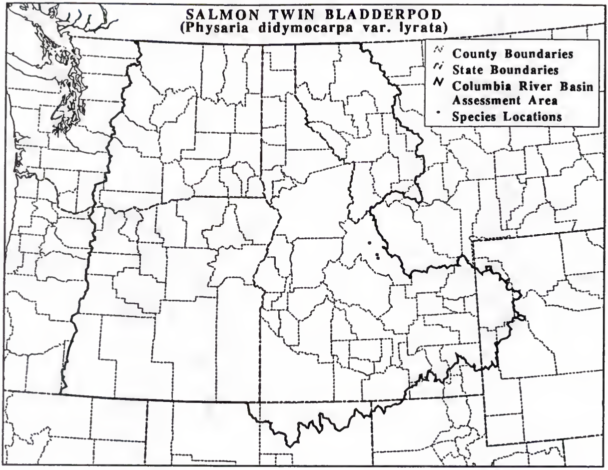
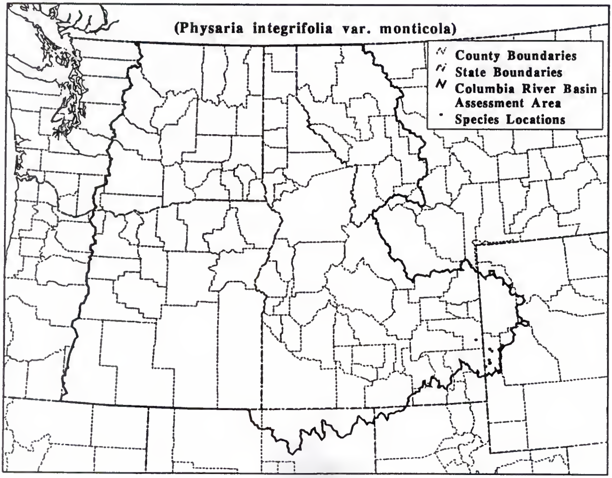
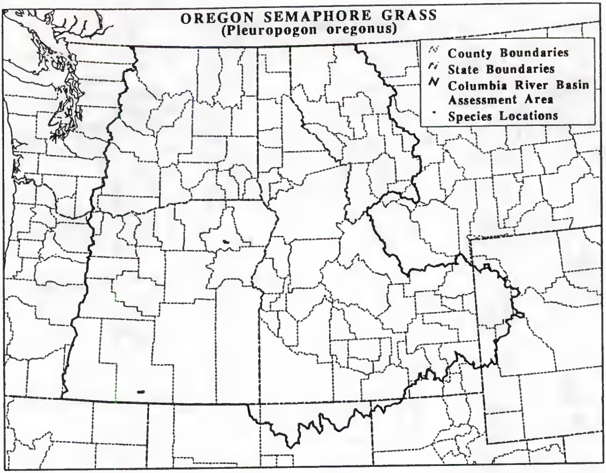

TINY-FLOWER PHACELIA
(Phacelia minutissima)
County Boundaries
State Boundaries
Columbia River Basin
Assessment Area
Species Locations

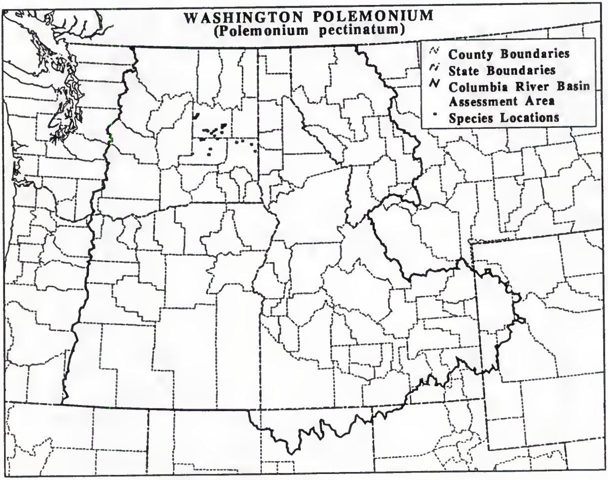

CLEARWATER PHLOX
(Phlox idahonis)
County Boundaries
State Boundaries
Columbia River Basin
Assessment Area
Species Locations

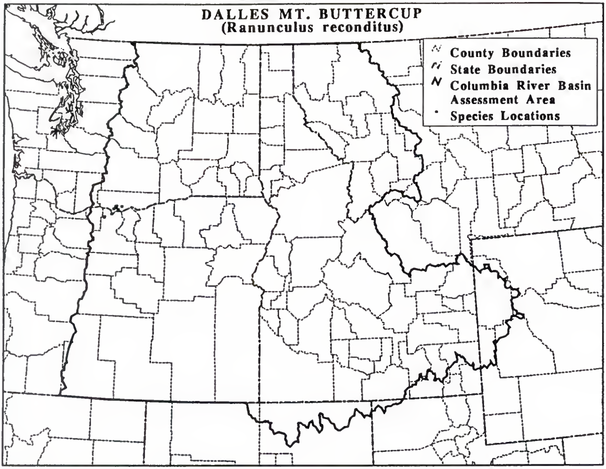
156

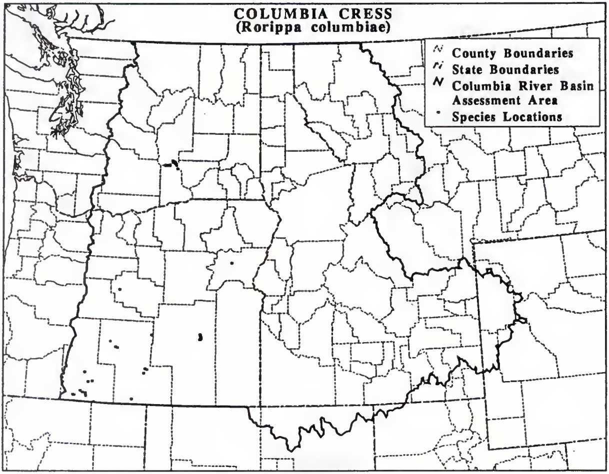

SALMON TWIN BLADDERPOD
(Physaria didymocarpa var. lyrata)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

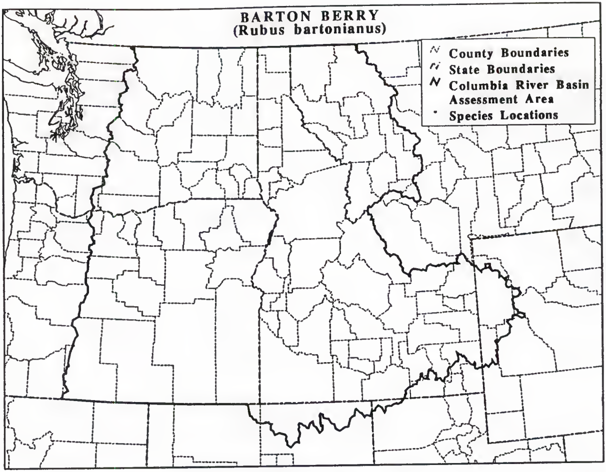

(Physaria integrifolia var. monticola)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

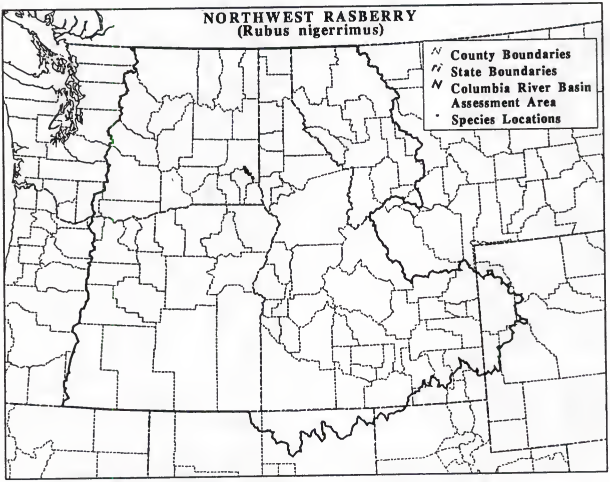

OREGON SEMAPHORE GRASS
(Pleuropogon oregonus)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

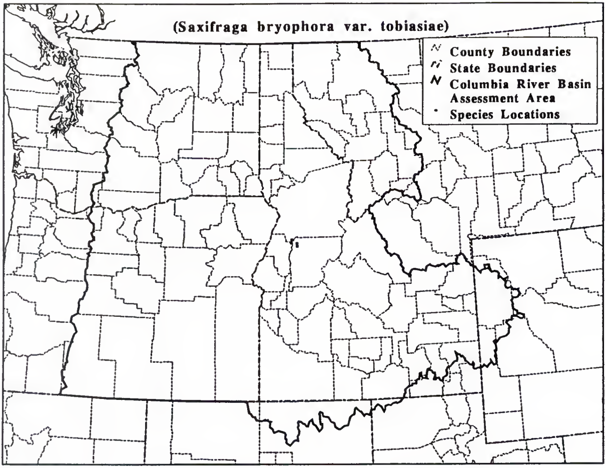

WASHINGTON POLEMONIUM
(Polemonium pectinatum)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

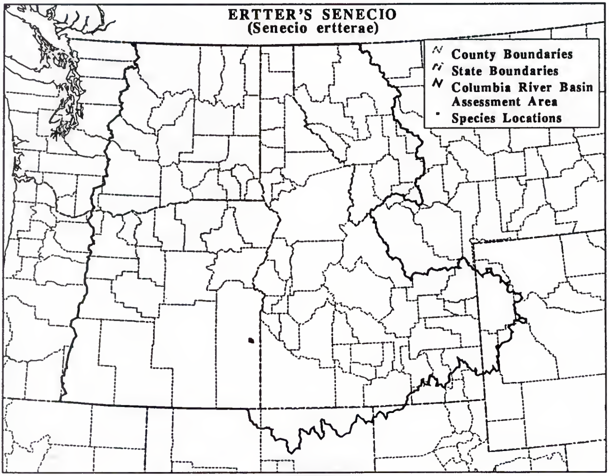

DALLES MT. BUTTERCUP
(Ranunculus reconditus)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

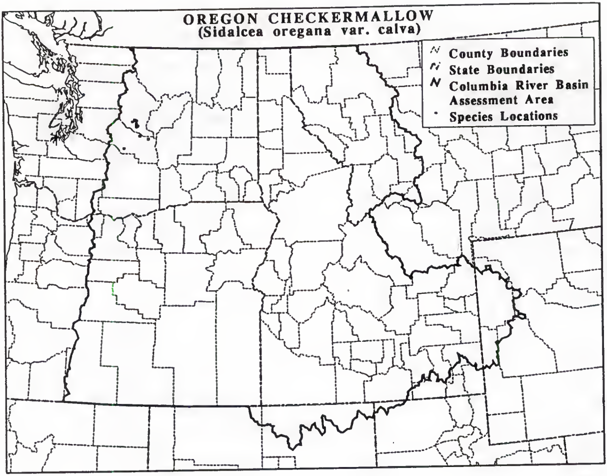

COLUMBIA CRESS
(Rorippa columbiae)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

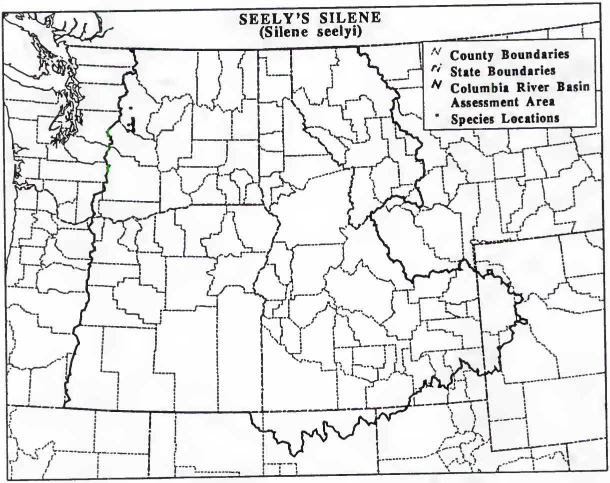

BARTON BERRY
(Rubus bartonianus)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

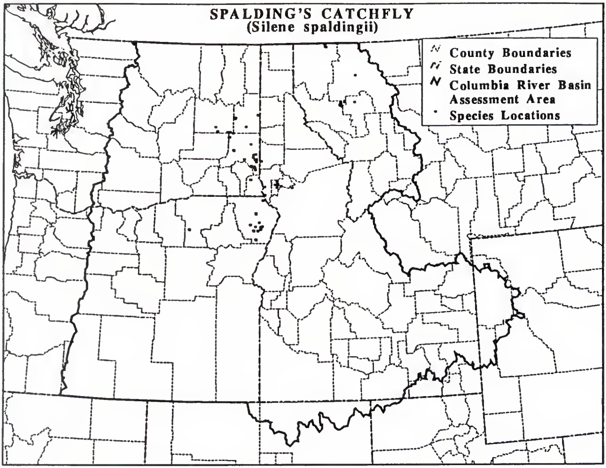

NORTHWEST RASBERRY
(Rubus nigerrimus)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

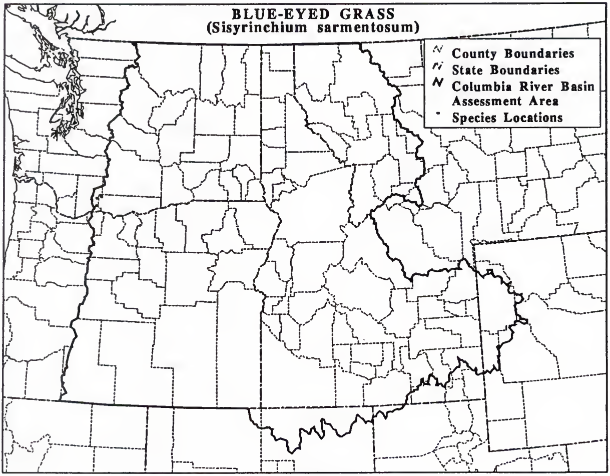

(Saxifraga bryophora var. tobiasiae)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

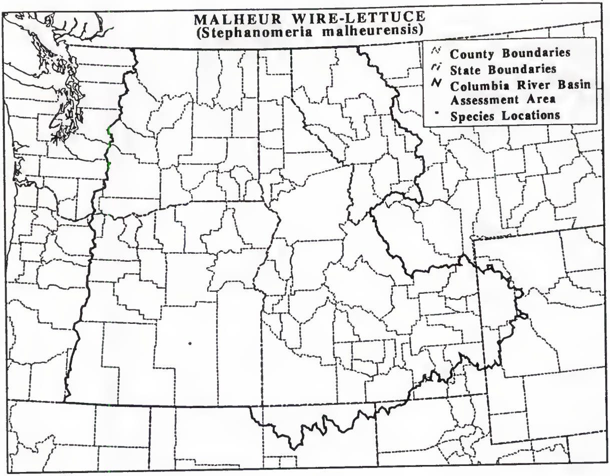

ERTTER'S SENECIO
(Senecio ertterae)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

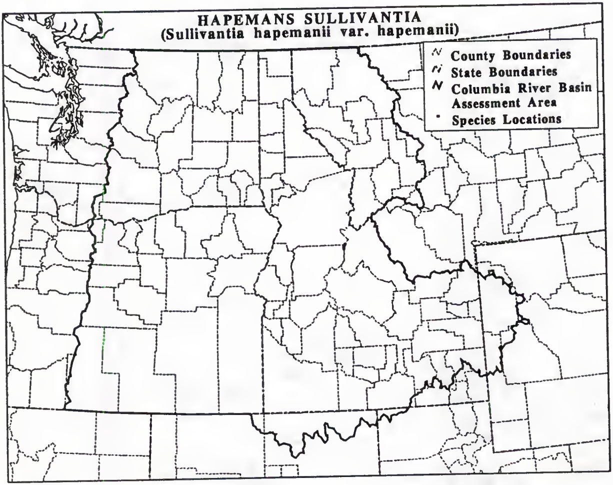

OREGON CHECKERMALLOW
(Sidalcea oregana var. calva)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

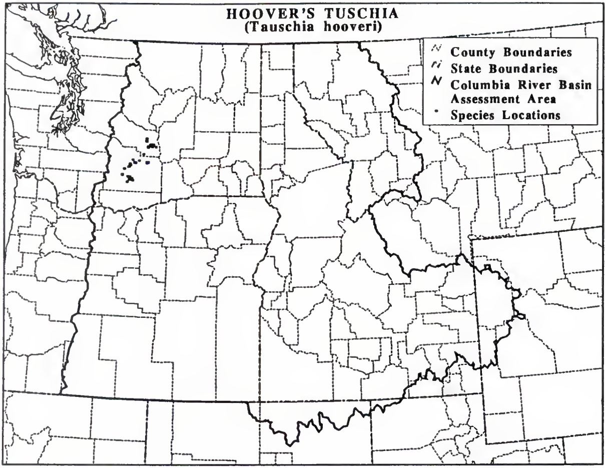

SEELY'S SILENE
(Silene seelyi)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

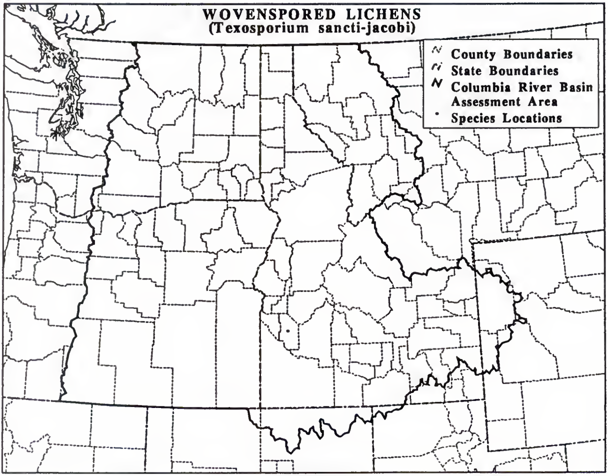

SPALDING'S CATCHFLY
(Silene spaldingii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

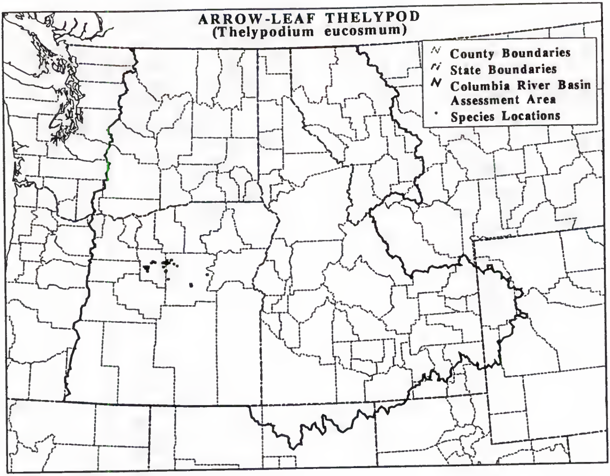

BLUE-EYED GRASS
(Sisyrinchium sarmentosum)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

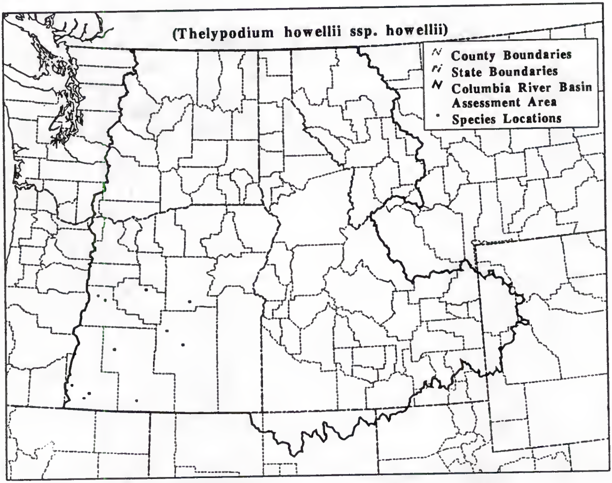

MALHEUR WIRE-LETTUCE
(Stephanomeria malheurensis)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

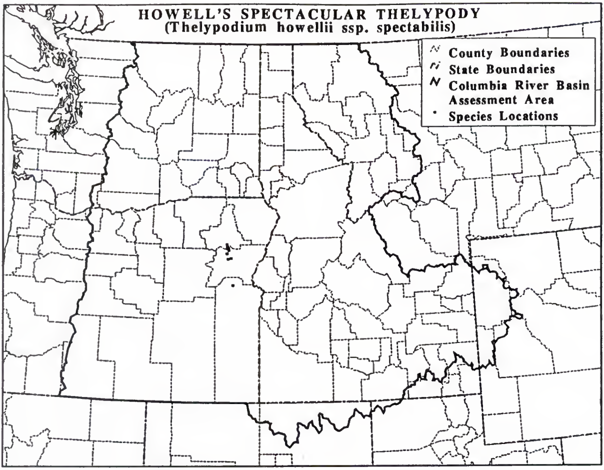

HAPEMANS SULLIVANTIA
(Sullivantia hapemanii var. hapemanii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

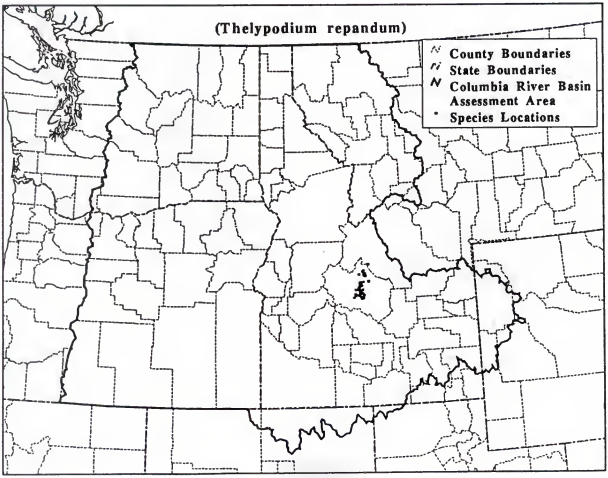

HOOVER'S TUSCHIA
(Tauschia hooveri)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

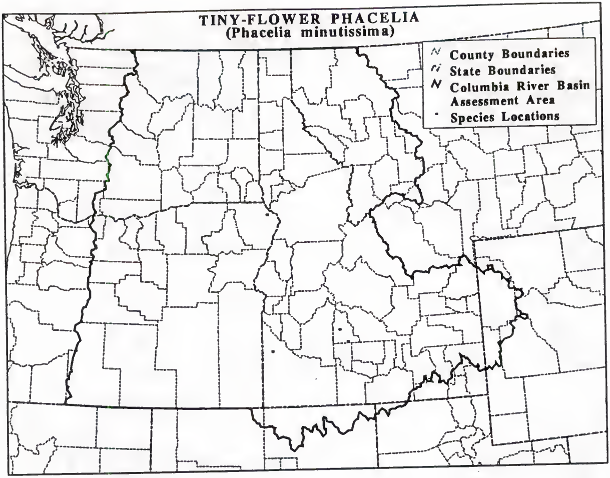

WOVENSPORED LICHENS
(Texosporium sancti-jacobi)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

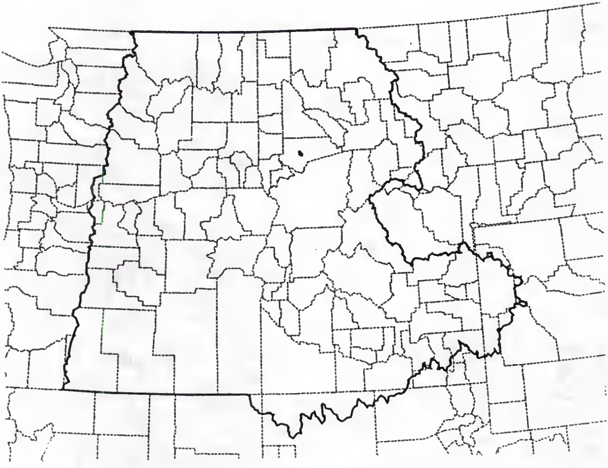

ARROW-LEAF THELYPOD
(Thelypodium eucosmum)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


(Thelypodium howellii ssp. howellii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


HOWELL'S SPECTACULAR THELYPODY
(Thelypodium howellii ssp. spectabilis)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


(Thelypodium repandum)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


TINY-FLOWER PHACELIA
(Phacelia minutissima)
County Boundaries
State Boundaries
Columbia River Basin
Assessment Area
Species Locations



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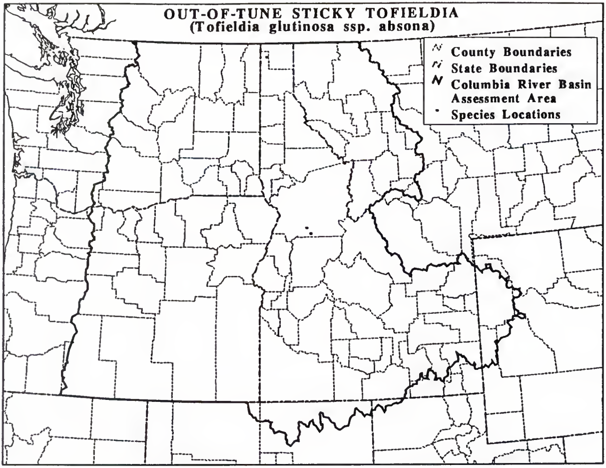
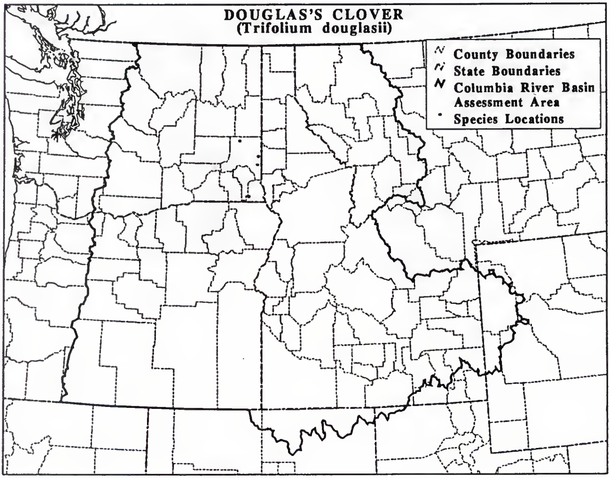
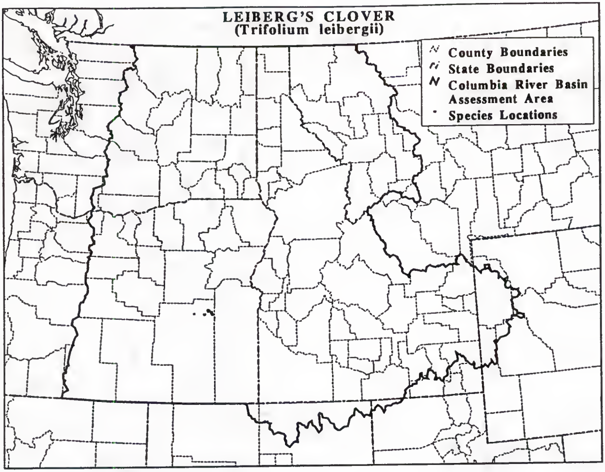
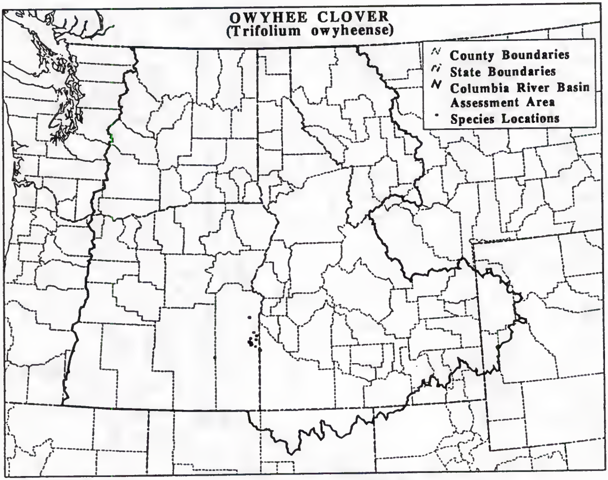
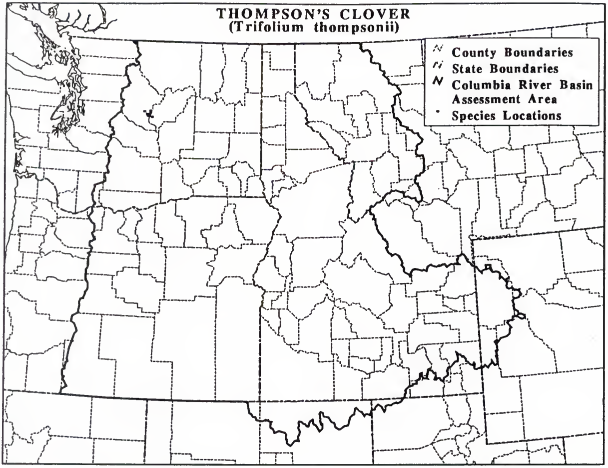

OUT-OF-TUNE STICKY TOFIELDIA
(Tofieldia glutinosa ssp. absona)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


DOUGLAS'S CLOVER
(Trifolium douglasii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


LEIBERG'S CLOVER
(Trifolium leibergii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


OWYHEE CLOVER
(Trifolium owyheense)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations


THOMPSON'S CLOVER
(Trifolium thompsonii)
County Boundaries
State Boundaries
Columbia River Basin Assessment Area
Species Locations

APPENDIX 2

List of Species Conservation Reports

Conservation strategies
Conservation agreements

Taxon	Title	Author	Area	Status/Approval
Amsinckia carinata	Conservation agreement	Vale BLM	VAL	Signed, 1992
Astragalus mulfordiae	Conservation agreement	Vale BLM	VAL	Signed, 1992
Astragalus sinuatus	Conservation agreement	Camp, P.	Wash.	Draft
Eriogonum cusickii	Conservation agreement	Taylor, Housely	LKV, BRN	In preparation
Howelia aquatilis	Conservation agreement	Benner, B.	Wash.	Draft
Ivesia rhypara, Eriogonum crosbyae	Conservation agreement	Housely	LKV	In preparation
Lepidium davisii	Conservation agreement	Vale, Burns BLM	VAL, BRN	Final, waiting for signature
Polemonium pectinatum	Conservation agreement	Benner, B.	Wash.	Draft
Rorripa columbiae	Conservation agreement	Kaye, T.	Rangewide - OR, WA	In preparation
Senecio ertterae, Mentzelia packardiae, Ivesia rhypara var. rhypara	Conservation agreement	Vale BLM	VAL	Signed, 1992
Silene spaldingii	Conservation agreement	Benner, B.	Wash.	Draft
Stephanomeria malheurensis	Conservation agreement	Carlson, J.	BRN	Signed, 1990
Allotropa virgata	Conservation strategy	Lichthardt, J.	BVR, BIT, DRL, LOL, NEZ, PAY	Draft
Asarum wagnerii	Conservation strategy	Baldwin	WIN	Draft
Blechnum spicant	Conservation strategy	Blake, J., C. Ebrahimi	PAN	Signed, 1992
Botrychium minganense, B. montanum, B. pinnatum	Conservation strategy	Zika, P.	MTH	Draft
Botrychium pumicola	Conservation strategy	O'neil, Hopkins	DES	Draft
Botrychium pumicola	Conservation strategy	Vrilakas, S.	EC	Draft, ONHP, 1987
Calochortus langebarbatus var. longebarbatus	Conservation strategy	Kaye, T., rvsd; R. Wooley	FRE	Signed 1995
Calochortus nitidus	Conservation strategy	Caicco, S.L.	NEZ	Implemented / Not signed, 1992
Castilleja chlorotica	Conservation strategy	Kaye, T., W. Messinger	ODA & FRE	Draft, 1991
Castilleja chlorotica	Conservation strategy	Wooley, R., S. Phillips	FRE	Signed 1994
Castilleja fraterna	Conservation strategy	Kagan, J.	OBM, CGF - USFS & ONHP	Draft, 1987
Castilleja rubida	Conservation strategy	Kagan, J.	OBM, CGF - USFS & ONHP	Draft, 1987
Collomia mazama	Conservation strategy	Jean, C.	WIN	In preparation
Cornus nutallii	Conservation strategy	Loraine, C.C.	CLW, NEZ	Implemented / Not signed
Cypripedium fasciculatum	Conservation strategy	Harrod, R., D. Knecht	WEN	In preparation
Cypripedium fasciculatum	Conservation strategy	Kagan, J.	KLA	Draft, 1990
Delphinium viridescens	Conservation strategy	Lillybridge, T.	WEN	Signed, 1989
Dryopteris filix-mas	Conservation strategy	Zika, P.	UMA	Draft
Grindelia howellii	Conservation strategy	Loraine, C.C.	PAN	Implemented / Not signed
Grindelia howellii	Conservation strategy	Loraine, C.C.	St. Joe N.F., ID	Draft, IDNHP, IDF&G, 1991
Hackelia venusta	Conservation strategy	Lillybridge, T.	WEN	In preparation
Haplopappus radiatus	Conservation strategy	Taylor-Grant, Debolt, Hanson	PAY	In preparation
Howellia aquatilis	Conservation strategy	Shelly, J.S.	FLT	Signed, 1994
Listeria borealis	Conservation strategy	Ahlenslager, K.	COL	Draft
Lomatium greenmanii	Conservation strategy	Kagan, J.	CCS, TNC & USFS, WAW	Draft, 1987
Luina serpentina	Conservation strategy	Vander Schaaf, D.	CGF, TNC & USFS, MAL	Draft, 1987
Luina serpentina	Conservation strategy	Yates, G.	MAL	Draft
Mimulus clivicola	Conservation strategy	Loraine, C.C.	CLW, NEZ	Implemented / Not signed
Mimulus clivicola	Conservation strategy	Loraine, C.C.	Rangewide R1 - CLW, PAN, NEZ / R4, R6	Implemented / Not signed
Mimulus pygmaeus, M. tricolor	Conservation strategy	Meinke, R.	WIN, FRE	Signed 1994
Mimulus washingtonensis	Conservation strategy	Meinke, R.	UMA	Draft
Penstemon glaucinus	Conservation strategy	Wooley, R.	FRE	Signed 1993
Penstemon lemhiensis	Conservation strategy	Elzinga, C.	Rangewide R1-BVR,BIT,DRL / R4 -SAL /BLM - ID,MT	In Preparation
Penstemon peckii	Conservation strategy	O'neil	DES	Implemented / Signed 1992
Petrophyton cinerascens	Conservation strategy	Lillybridge, T.	WEN	Draft
Platanthera obtusata	Conservation strategy	Beck, K.	OKA	Draft
Rorripa columbiae	Conservation strategy	Kaye, T.	WIN, SPO, BRN, LKV	In preparation

Conservation strategies
Conservation agreements

Silene spaldingii	Conservation strategy	Kagan, J.	WAW	Draft, 1989
Thelypteris phegopteris	Conservation strategy	KOO	KOO	Signed, 1993
Trifolium thompsonii	Conservation strategy	Lillybridge, T.	WEN	Draft
Calochortus longebarbatus var. longebarbatus	Conservation strategy(interim)	Goldenberg, C. Jean	WIN	Draft
Limnanthes floccosa ssp. bellingeriana	Conservation strategy/agreement	Maslntonn, Severs	KLA	Final draft
Oryzopsis hendersonii	Conservation strategy	Vrilakas, S.	?????	Draft

Status reports

Taxon	Title	Author	Area	On File at...,Date
Agoseris lackschewitzii	Status report	Atwood, D., N. Charlesworth	ID	IDCDC, 1987
Agoseris lackschewitzii	Status review	D. Pavek, L.A. Schassberger	Gallatin NF	MTNHP, 1990
Allium dictuon	Status report	Gamon, J.	USFWS, WA	WANHP, 1986
Allium madidum	Status report	Atwood, D.	ID	IDCDC, 1987
Allium madidum	Status report	Bernatas, S.	WAW	IDCDC, 1988
Allium tolmiei var. persimile	Status report	Atwood, D., N. Charlesworth	ID	IDCDC, 1987
Allium tolmiei var. persimile	Status report	Bernatas, S.	Rocky Comfort Flat RNA, ID	NPS, IDCDC, 1989
Allotropa vergata	Status report	Atwood, D., N. Charlesworth	ID	IDCDC, 1987
Allotropa virgata	Status review	Roe, L.S.	BIT, DRL	MTNHP, 1992
Amsinckia caranata	Status survey	Meinke, R.	OU, Malh	ODA, for BLM, 1990
Antennaria arcuata	Status report	Atwood, D.	ID	IDCDC, 1980
Arabis fecunda	Status report	Lesica, P.	MT	MTNHP, 1985
Arabis fecunda	Status report	Lesica, P.	MT	USFWS, MTNHP, 1993
Arabis fecunda	Status report	Schassberger, L.A.	MT	USFWS, MTNHP, 1988
Arabis fecunda	Status report	Schassberger, L.A.	BVR	MTNHP, 1990
Arabis fecunda	Status report update	Schassberger, L.A.	MT	MTNHP, 1990
Artemesia campestris var. wormskjoldii	Status report	Gamon, J.	USFWS, WA	WANHP, 1989
Asplenium trichomanes	Status report	Caicco, S.L.	CLW	IDCDC, 1987
Astragalus amblytropis	Status report	Atwood, D., N. Charlesworth	ID	IDCDC, 1987
Astragalus amnis-amissi	Status report	Atwood, D., N. Charlesworth	ID	IDCDC, 1987
Astragalus anserinus	Status report	Baird, G.I., J. Tuhy, M.A. Franklin	UT, ID	UTNHP, BLM, 1990
Astragalus anserinus	Status report	Mancuso, M., R.K. Moseley	ID, UT	IDCDC, 1991
Astragalus applegatei	Status report	Yamamoto, S.	EC, Klam	ONHP, 1985
Astragalus aquilonius	Status report	Atwood, D., N. Charlesworth	ID	IDCDC, 1987
Astragalus columbianus	Status report	Gamon, J.	USFWS, WA	WANHP, 1990
Astragalus gilviflorus	Status report	Cholewa A.F.	ID Ntl. Engineering Lab. site, ID	U of ID Herbarium, 1982
Astragalus paysonii	Status report	Caicco, S.L.	NEZ	IDCDC, 1989
Astragalus vexilliflexus var. nubilus	Status report	Moseley, R.K.	ID	IDCDC, 1994
Astragalus yoder-williamsii	Status report	Mancuso, M., R.K. Moseley	ID	IDCDC, IDP&R, 1993
Botrychium crenulatum	Status report	Bernatas, S.	WAW	IDCDC, 1988
Botrychium lanceolatum var. lanceolatum	Status report	Bernatas, S.	WAW	IDCDC, 1988
Botrychium minganense	Status report	Bernatas, S.	WAW	IDCDC, 1988
Botrychium pumicloa	Status report	D. Wagner, S. Vrilakas	EC	ONHP, 1988
Calamagrostis tweedyi	Status report	Atwood, D., N. Charlesworth	ID	IDCDC, 1987
Calochortus longebarbatus var. longebarbatus	Status report	Gamon, J.	USFWS, WA	WANHP, 1990
Calochortus nitidus	Status report	Caicco, S.L.	NEZ	IDCDC, 1987
Calochortus nitidus	Status report	Caicco, S.L.	CLW	IDCDC, 1988
Calochortus nitidus	Status report	Caicco, S.L.	ID	IDP&R, IDCDC, 1988
Cardamine constancei	Status report	Caicco, S.L.	NEZ	IDCDC, 1987
Cardamine constancei	Status report	Caicco, S.L.	Aqaurius NRA, ID	NPS, IDCDC, 1987
Carex aenea	Status report	Caicco, S.L.	PAN	IDCDC, 1988
Carex buxbaumii	Status report	Caicco, S.L.	PAN	IDCDC, 1988
Carex californica	Status report	Caicco, S.L.	PAN	IDCDC, 1988
Carex californica	Status report	Caicco, S.L.	NEZ	IDCDC, 1989
Carex flava	Status report	Caicco, S.L.	PAN	IDCDC, 1988
Carex hendersonii	Status report	Caicco, S.L.	Aqaurius NRA, ID	NPS, IDCDC, 1987
Carex hendersonii	Status report	Caicco, S.L.	PAN	IDCDC, 1988
Carex lenticularis	Status report	Lesica, P.	MT	Glacier N.P., 1988
Carex livida	Status report	Caicco, S.L.	PAN	IDCDC, 1988
Carex paupercula	Status report	Caicco, S.L.	PAN	IDCDC, 1988
Carex tumulicola	Status report	Caicco, S.L.	PAN	IDCDC, 1988
Castilleja chlorotica	Status report	Popovich, S.J.	FRE	1990
Castilleja christii	Status report	Atwood, D.	ID	IDCDC, 1984
Castilleja cryptantha	Status report	Gamon, J.	USFWS, WA	WANHP, 1990

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Taxon	Title	Author	Area	On File at...,Date
Castilleja christii	Status report	Moseley, R.K.	Albion Mtns, SAW, City of Rocks Ntl. Preserve,ID	SAW, IDCDC, 1991
Chaenactis cusickii	Status report	Moseley, R.K.	ID	BSE, IDCDC, 1994
Cymopteris douglassii	Status report	Atwood, D.	ID	IDCDC, 1983
Cymopterus davisii	Status report	Moseley, R.K.	Albion Mtns, SAW, City of Rocks Ntl. Preserve,ID	SAW, IDCDC, 1991
Cypripedium calceolus var. parviflorum	Status report	Chadde, S.	KOO	IDCDC, 1989
Cypripedium fasciculatum	Status report	Caicco, S.L.	Aqaurius NRA, ID	NPS, IDCDC, 1987
Cypripedium fasciculatum	Status report	Caicco, S.L.	CLW	IDCDC, 1988
Cypripedium passerinum	Status review	Shelly, J.S.	FLT, Lewis & Clark NF	MTNHP, 1988
Dasynotus daubenmirei	Status report	Caicco, S.L.	NEZ	IDCDC, 1989
Delphinium viridescens	Status report(revision)	Gamon, J.	USFWS, WA	WANHP, 1987
Douglasia idahoensis	Status report	Atwood, D., N. Charlesworth	ID	IDCDC, 1987
Draba trichocarpa	Status report	Caicco, S.L.	ID	IDCDC, 1988
Epipactis gigantea	Status review	Schassberger, L.A.	FLT	MTNHP, 1988
Erigeron basalticus	Status report	Gamon, J.	USFWS, WA	WANHP, 1988
Erigeron lackschewitzii	Status review	D. Pavek, L.A. Schassberger	MT	Gallatin N.F., MT, 1990
Erigeron lackschewitzii	Status report	Heidel, B.L.	MT	USFWS, MTNHP, 1993
Erigeron lackschewitzii	Status report	Heidel, B.L.	USFWS	MTNHP, 1993
Erigeron salmonensis	Status report	Mancuso, M., R.K. Moseley	ID	IDCDC, 1992
Eriogonum chrysops	Status report	Wright, C.	OU	OHNP, 1989
Goodyera repens	Status report update	Achuff, P.L.	Lewis & Clark NF	MTNHP, 1992
Goodyera repens	Status review	Schassberger, L.A., P. Achuff	Lewis & Clark NF	MTNHP, 1991
Grindelia howellii	Status report update	D.S. Pavek	MT	USFWS, MTNHP, 1991
Grindelia howellii	Status report	Shelly, J.S.	MT	MTNHP, 1986
Grindelia howellii	Status review	USFWS	MT	USFWS, 1980
Grindelia howellii	Status report	Watson, T.J.,C20 Jr.	MT	MTNHP
Hackelia cronquistii	Status report	Yamamoto, S., J. Kagan	OU, Malh	ONHP, 1985
Hackelia venusta	Status report(revision)	Gamon, J.	USFWS, WA	WANHP, 1988
Halimolobos perplexa var. perplexa	Status report	Atwood, D., N. Charlesworth	ID	IDCDC, 1987
Haplopappus insecticruris	Status report	Atwood, D.	ID	IDCDC, 1983
Haplopappus liatriformis	Status report	Gamon, J.	USFWS, WA	WANHP, 1991
Haplopappus radiatus	Status report	Atwood, D., N. Charlesworth	ID	IDCDC, 1987
Haplopappus radiatus	Status report	Kaye, T., S. Massey, W. Messinger, R. Meinke, T. Magee	BM, OU, Bake, Malh	ODA, BLM, 1990
Howelia aquatilis	Status report	Gamon, J.	USFWS, WA	WANHP, 1992
Howellia aquatilis	Status report update	Roe, L.S.C95, J.S. Shelley	MT	FLT, MTNHP, 1992
Howellia aquatilis	Status report	Shelly, J.S.	MT	USFWS, MTNHP, 1988
Howellia aquatilis	Status review	Shelly, J.S.	FLT	MTNHP, 1988
Howellia aquatilis	Status review addendum	Shelly, J.S.	FLT	USFS, MTNHP, 1989
Howellia aquatilis	Status report update	Shelly, J.S., L.A. Schassberger	MT	FLT, MTNHP, 1990
Howellia aquatilis	Status report update	Shelly, J.S., L.A. Schassberger	MT	FLT, MTNHP, 1991
Howellia aquatilis	Status report	Shelly, J.S., R. Mosley	OR, WA, MT, ID	ONHP, 1988
Lepidium davisii	Status report	DeBolt, A., J. Doremus	BOI	IDCDC, 1989
Lepidium papilliferum	Status report	Moseley, R.K.	ID	IDP&R, USFWS, IDCDC, 1994
Lesquerella carinata	Status report	Vanderhorst, J.	BLM, USFWS	MTNHP, 1995
Lesquerella carinata, L. paysonii	Status review	Schassberger, L.A.	MT	DRL, MTNHP, 1991
Lesquerella carinata, L. paysonii	Status review	Schassberger, L.A.	DRL	MTNHP, 1991
Lesquerella humilis	Status review	Shelly, J.S.	BIT	MTNHP, 1988
Lesquerella humilis	Status report	Shelly, J.S., P.L. Achuff	MT	USFWS, MTNHP, 1990
Lomatium erythrocarpum	Status report	Meinke, R.	BM, Bake	1987, ONHP
Lomatium greenmanii	Status report	Meinke, R., T. Kaye	BM, Wall	Unpublished at ONHP
Mentzelia mollis	Status report	Greenleaf, J.	ID	IDCDC, 1980
Mertensia bella	Status report	Lichthardt, J.J.	IDF&O	IDF&O, 1992
Mertensia bella	Status review	Roe, L.S.	LOL	MTNHP, 1991
Mimulus clivicola	Status report	Caicco, S.L.	CLW	IDCDC, 1987
Mimulus [illegible]	Status report	Caicco, S.L.	NEZ	IDCDC, 1987

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Taxon	Title	Author	Area	On File at...,Date
Mimulus clivicola	Status report	Caicco, S.L.	Aqaurius NRA, ID	NPS, IDCDC, 1987
Mimulus clivicola	Status report	Caicco, S.L.	CLW	IDCDC, 1988
Mimulus clivicola	Status report	Gamon, J.	USFWS, WA	WANHP, 1993
Oxytheca dendroidea	Status report	Cholewa A.F.	ID Ntl. Engioeering Lab. site, ID	U of ID Herbarium, 1982
Penstemon compactus	Status report	Atwood, D.	ID	IDCDC, 1988
Penstemon glaucinus	Status report	Popovich, S.J.	FRE	on file @ ONHP, 1990
Penstemon idahoensis	Status report	Baird, G.I., J. Tuhy, M.A. Franklin	UT, ID	UTNHP, BLM, 1990
Penstemon idahoensis	Status report	Mancuso, M., R.K. Moseley	ID, UT	IDCDC, 1991
Penstemon lemhiensis	Status report	ACZ, Inc.	SAL,	SAL, 1990
Penstemon lemhiensis	Status report	Atwood, D., N. Charlesworth	ID	IDCDC, 1987
Penstemon lemhiensis	Status survey	Moseley, R.K.C154, M. Mancuso, J. Hilty	ID	IDNHP, IDF&G
Penstemon lemhiensis	Status report	Shelly, J.S.	MT	USFWS, MTNHP, 1990
Penstemon lemhiensis	Status review	Shelly, J.S.	MT	USFS, MTNHP, 1990
Penstemon lemhiensis	Status survey	Shelly, J.S.	BVR, BIT	MTNHP, 1987
Petrophytum cinerascens	Status report	Gamon, J.	USFWS, WA	WANHP, 1989
Phacelia lenta	Status report	Gamon, J.	USFWS, WA	WANHP, 1986
Phlox kelseyi var. missoulensis	Status review	Schassberger, L.A., P. Achuff	Lewis & Clark NF	MTNHP, 1991
Polemonium pectinatum	Status report	Gamon, J.	USFWS, WA	WANHP, 1985
Polypodium glycyrrhiza	Status report	Caicco, S.L.	Aqaurius NRA, ID	NPS, IDCDC, 1987
Ranunculus reconditus	Status report	Schuller, R., N. Sprague	WA	for USFWS by WNHP, 1985
Rorippa columbiae	Status report	Scherer, N.	Pierce Island, CR	TNC, Wa. 1991
Rubus nigerrimus	Status report	Gamon, J.	USFWS, WA	WANHP, 1989
Salix farriae	Status report	Atwood, D., N. Charlesworth	ID	IDCDC, 1987
Saxifraga bryophora var. tobiasiae	Status report	Atwood, D., N. Charlesworth	ID	IDCDC, 1987
Saxifraga cernua	Status report	Atwood, D., N. Charlesworth	ID	IDCDC, 1987
Scirpus subterminalis	Status report	Chadde, S.	KOO	IDCDC, 1989
Senecio ertterae	Status report	Kaye, T , W. Messinger, S. Massy	OU, Malh	for USFWS by ODA, 1991
Sidalcea oregana var. calva	Status report	Gamon, J.	USFWS, WA	WANHP, 1987
Silene seelyi	Status report	Arnett, J., J. Gamon	USFWS, WA	WANHP, 1991
Silene spaldingii	Status report	Gamon, J.	WA	WNHP, 1991
Silene spaldingii	Status report	Gamon, J.	USFWS, WA	WANHP, 1991
Silene spaldingii	Status report	Lorain, C.	ID	IDFG, 1991
Silene spaldingii	Status report	Schassberger, L.A.	BM, Wall	ONHP, 1988
Sisyrinchium sarmentosum	Status report	Gamon, J., N. Sprague	WA	WNHP, 1986
Sisyrinchium sarmentosum	Status report	Gamon, J., N. Sprague	USFWS, WA	WANHP, 1986
Synthyris platycarpa	Status report	Caicco, S.L.	NEZ	IDCDC, 1989
Tauschia hooveri	Status report	Gamon, J., D. Salstrom	USFWS, WA	WANHP, 1993
Thelypodium howellii ssp. spectabilis	Status report	Kagan, J.	BM, OU, Bake, Malh, Unio	for USFWS by ONHP, 1985
Thelypodium repandum	Status report	Caicco, S.L.	ID	IDCDC, 1988
Thelypteris nevadensis	Status report	Caicco, S.L.	Aqaurius NRA, ID	NPS, IDCDC, 1987
Tofieldia glutinosa ssp. absona	Status report	Atwood, D., N. Charlesworth	ID	IDCDC, 1987
Trientalis latifolia	Status report	Caicco, S.L.	Aqaurius NRA, ID	NPS, IDCDC, 1987
Trifolium thompsonii	Status report(revision)	Gamon, J.	USFWS, WA	WANHP, 1988

Misc. reports

Taxon	Report Type	Author	Area/Subject	Area/File/Publication
Adoxa moschatellina	Botanical survey	Poole, J.M., B.L. Heidel	Big Belt & Elkhorn Mtns., Helena NF, MT	Helena NF, MTNHP, 1993
Agoseris lackschewitzii	Botanical survey	Achuff, P.L., L.S. Roe	Goat Flat proposed research natural area, DRL	DRL, MTNHP, No date
Agoseris lackschewitzii	Botanical survey	Heidel, B., J. Vanderhorst	Tobacco Root mtns., BVR, DRL	BVR, DRL, 1994
Agoseris lackschewitzii	Botanical survey	Mathews, S.	Gallatin NF	USFS, MTNHP, 1989
Agoseris lackschewitzii	Botanical survey	Poole, J.M., B.L. Heidel	Big Belt & Elkhorn Mtns., Helena NF, MT	Helena NF, MTNHP, 1993
Agoseris lackschewitzii	Botanical survey	Vanderhorst, J., B.L. Heidel	Tobacco Root mtns., Madison Co., MT	BVR, DRL, MTNHP, 1995
Agoseris lackschewitzii	Field survey	Armstron, J., V. Standa	Kings Hill RD, MT.	USFS, 1992
Agoseris lackschewitzii	Field survey	D. Pavek	Gallatin NF	Gallatin NF, 1990
Agoseris lackschewitzii	Resources inventory	Layser, E.F.	Onion Park Research Natural Area, MT	Lewis and Clark NF, 1992
Agoseris lackschewitzii	Unpublished new species report	Fertig, W.	Bridger-Teton NF	WNDD, TNC, 1993
Allium aaseae	Botanical survey	Moseley, R.K., M. Mancuso, J. Hilty	Boise Foothills, Ada county, ID	IDCDC, 1992
Allium aaseae	Technical report	Bolin, R., R. Rosentreter	Biology	IDCDC, 1986
Allotropa virgata	Botanical survey	Poole, J.M.	BVR, DRL	MTNHP, 1992
Allotropa virgata	Field survey	Poole, J.M.	Bitterroot & Pioneer Mtns., MT	1992
Allotropa virgata	Field survey	Poole, J.M.	Sapphire & Anaconda ranges, DRL	DRL, 1992
Allotropa virgata	Masters thesis	Lorain, C.C.	History & distribution of coastal disjunct plants	University of Idaho, 1988
Allotropa virgata	Monitoring report	Kaye, T., N. Fredericks, J. Gamon	OIF	ODA, Plant Conservation, 1991
Allotropa virgata	Population monitoring	Lichthardt, J.J.	NEZ	IDFG, 1992
Antennaria arcuata	Botanical survey	Douglass, R., K. Snyder-Douglass, K. Neilsen	TAR	IDCDC, 1978
Antennaria arcuata	Botanical survey	Eidemiller, B.J.	SHS	IDCDC, 1977
Antennaria arcuata	Botanical survey	Harrison, B.F.	SHS	IDCDC, 1981
Antennaria densifolia	Botanical survey	Achuff, P.L., L.S. Roe	Goat Flat proposed research natural area, DRL	DRL, MTNHP, No date
Arabis fecunda	Botanical survey	Lesica, P.	Big Hole River & Whitehall Valley, MT BLM	MTNHP, 1994
Arabis fecunda	Botanical survey	Lesica, P.	Highland Mtns., DRL	MTNHP, 1992
Arabis fecunda	Demographic report	Lesica, P., J.S. Shelley	MT	MTNHP, 1991
Arabis fecunda	Demographic report	Lesica, P., J.S. Shelley	Ravalli & Beaverhead counties, MT	BVR, MTNHP, 1994
Arabis fecunda	Effects	Lesica, P., J.S. Shelley	MT	MTNHP, 1991
Arabis fecunda	Effects	Lesica, P., J.S. Shelley	MT	MTNHP, 1991
Arabis fecunda	Electrophoretic variation	Mitchell-Olds, T.	MT	MTNHP, 1991
Arabis fecunda	Establishment report	Roe, L.S.	BUT	BLM, MTNHP, 1992
Arabis fecunda	Grazing effects	Lesica, P.	BUT	BLM, MTNHP, 1993
Arabis fecunda	Lecture	Achuff, P.L., L.A. Schassberger Roe	Weeds and Rare Native Plants in MT.	Proc. Weed Symposium, 1992
Arabis fecunda	Masters thesis	Walsh, R.	MT	U of M, Missoula, 1992
Arabis fecunda	Monitoring report	Lesica, P.	BVR	MTNHP, 1991
Arabis fecunda	Monitoring report	Lesica, P., J.S. Shelley	Sapphire range, MT	MTNHP, 1991
Arabis fecunda	Monitoring report	Lesica, P., J.S. Shelley	Sapphire & Beaverhead ranges, MT	MTNHP, 1991
Arabis fecunda	Occurrence report	Lesica, P.	MT BLM	BLM, MTNHP, 1992
Arabis fecunda	Progress report	Lesica, P., J.S. Shelley	MT	MTNHP, 1988
Aster jessicae	Thesis	Dean, M.L.	OSU	Dissertation, OSU, 1966
Astragalus anserinus	Field guide	Atwood, D. J. Holland, R. Bolander	Intermountain region	USDANF, Ogden, Ut., 1991
Astragalus atratus var. inseptus	Botanical survey	Eidemiller, B.J.	SHS	IDCDC, 1977
Astragalus mulfordiae	Botanical survey	Moseley, R.K., M. Mancuso, J. Hilty	Boise Foothills, Ada county, ID	IDCDC, 1992
Astragalus mulfordiae	Recommendation	Moseley, R.K.	Bruneau Resource Area, BSE	BSE, 1987
Astragalus oniciformis	Botanical survey	Harrison, B.F.	SHS	IDCDC, 1981
Astragalus paysonii	Botanical survey	Horton, L.E.	Lower Salmon River, ID	USDA, IDCDC, 1972
Astragalus purshii var. ophiogenes	Botanical survey	Eidemiller, B.J.	SHS	IDCDC, 1977
Astragalus sterilis	Thesis	Grimes, J.W.	Leslie Gulch, Malheur Cty., OR.	Thesis, USU, 1979
Balsamorhiza macrophylla	Botanical survey	Mathews, S.	Gallatin NF	USFS, MTNHP, 1989
Blechnum spicant	Thesis	Cousens, M.I.	WSU	WSU, 1973
Botrychium	Demographic report	Lesica, P., K. Ahlenslager	Waterton N.P., Alta.	Waterton N.P., USFWS, MTNHP, 1995
Botrychium	Monitoring report	Lesica, P., K. Ahlenslager	Waterton Lakes Park, Alberta	MTNHP, 1989

Taxon	Report Type	Author	Area/Subject	Area/File/Publication
Botrychium	Monitoring report	Lesica, P., K. Ahlenslager	Waterton N.P., Alta.	Waterton N.P., USFWS, MTNHP, 1994
Botrychium	Species guide	Wagner, D.H.	OR	USFS, 1992
Botrychium hesperium, B. paradoxum	Draft Manuscript	Ahlenslager, K., P. Lesica	Waterton NP	USFWS, MTNHP, 1995
Botrychium hesperium, B. Paradoxum	Observation report	Ahlenslager, K., P. Lesica	MT	Watertoo N.P., USFWS, MTNHP, 1995
Botrychium minganense	Botanical survey	BioSystems Analysis, Inc.	PGT-PGE&E Pipeline, ID, WA, OR, CA	BioSystems Analysis Inc., 1990
Botrychium minganense	Field iovestigation	Caicco, S.L.	PAN	IDNHP, IDFG, 1987
Botrychium paradosum	Botanical survey	Poole, J.M., B.L. Heidel	Big Belt & Elkhorn Mtns., Helena NF, MT	Helena NF, MTNHP, 1993
Botrychium paradoxum	Field survey	Shelly, J.S.	Lewis & Clark, Pondera, and Meagher Co's., MT	1986
Botrychium paradoxum	Field survey	Vanderhorst, J.	Storm Lake, DRL	USFWS, MTNHP, 1993
Botrychium paradoxum	Field survey	Vanderhorst, J.	DRL	DRL, MTNHP, 1993
Botrychium paradoxum	Survey report	Vanderhorst, J.	Storm iake, DRL	USFWS, MTNHP, 1993
Botrychium simplex	Technical report	Johnson, C.G., S.A. Simon	WAW, Wallowa-Snake province	WAW, R6-ECOL-TP-255A-86, 1987
Botrychium sp.	Field survey	Achuff, P.L.	Ninemile valley, Missoula co., MT.	1991
Calamagrostis tweedyi	Biological evaluation	Caruso, L.B.	WEN	IDCDC, 1988
Calochortus macrocarpus maculosus	Botanical survey	Hill, J.L.	Wapshilla Ridge area/ Craig Mtn., ID	IDCDC, 1991
Calochortus nitidus	Botanical survey	Hill, J.L.	Wapshilla Ridge area/ Craig Mtn., ID	IDCDC, 1991
Calochortus nitidus	Monitoring report	Caicco, S.L.	ID	IDCDC, 1988
Calochortus nitidus	Monitoring report	Caicco, S.L.	ID	IDCDC, 1989
Caltilleja gracillima	Botanical survey	Mathews, S.	Gallatin NF	USFS, MTNHP, 1989
Camassia cusickii	Technical report	Johnson, C.G., S.A. Simon	WAW, Wallowa-Soake province	WAW, R6-ECOL-TP-255A-86, 1987
Camassia cusickii	Thesis	Jewell, J.E.	Taxonomy	U of I, 1978
Camissonia andina	Distribution report	Lesica, P., P.L. Achuff	Pryor Mtn. Desert, Carbon Co., MT	BLM, MTNHP, 1992
Cardamine canstancei	Botanical survey	Johnson, P.S., R.C. Crawford	N. ID	U of ID, 1978
Cardamine constancei	Botanical survey	Johnson, F.	Clearwater Basin, ID	IDCDC, 1978
Cardamine constancei	Monitoring report	Crawford, R.C.	Northern ID	U of ID, 1980
Cardamine rupicola	Field survey	Heidel, B.L.	Crown Mt., MT.	1992
Cardamine rupicola	Field survey	Heidel, B.L.	Steamboat Mt. Lookout, MT.	1992
Carex buxbaumii	Botanical survey	Johnston, B.C.	Swamp Lake Botanical Area, SHS	SHS, 1987
Carex cawei	Botanical survey	Lesica, P.	Pine Butte Reserve, MT	MTNHP, 1991
Carex flava	Botanical survey	BioSystems Analysis, Inc.	PGT-PGE&E Pipeline, ID, WA, OR, CA	BioSystems Analysis Inc., 1990
Carex leptalea	Botanical survey	Johnston, B.C.	Swamp Lake Botanical Area, SHS	SHS, 1987
Carex leptalea	Field guide	Atwood, D. J. Holland, R. Bolander	Intermountaio region	USDANF, Ogden, Ut., 1991
Carex livida	Botanical survey	Lesica, P.	Pine Butte Reserve, MT	MTNHP, 1991
Carex livida	Field investigation	Caicco, S.L.	PAN	IDNHP, IDFG, 1987
Carex livida	Field survey	Shelly, J.S.	Indian meadows, MT	1987
Carex maritima	Botanical survey	Achuff, P.L., L.S. Roe	Goat Flat proposed research natural area, DRL	DRL, MTNHP, No date
Carex neurophora	Botanical survey	Vanderhorst, J., B.L. Heidel	Tobacco Root mtns., Madison Co., MT	BVR, DRL, MTNHP, 1995
Carex paupercula	Botanical survey	Chadde, S., F. Rabe	Hawkins pond, Three rivers RD, KOO	KOO, 1994
Carex paupercula	Thesis	Cousens, M.I.	WSU	WSU, 1973
Carex vallicola	Botanical survey	Lesica, P.	Highland Mtns., DRL	MTNHP, 1992
Carix vallicola	Botanical survey	Poole, J.M., B.L. Heidel	Big Belt & Elkhorn Mtns., Helena NF, MT	Helena NF, MTNHP, 1993
Castilleja gracillima	Botanical survey	Vanderhorst, J., B.L. Heidel	Tobacco Root mtns., Madison Co., MT	BVR, DRL, MTNHP, 1995
Castilleja gracillima	Field survey	Vanderhorst, J.	Gallatin NF	MTNHP, 1993
Castilleja pilosa var. steenensis	Masters thesis	Whalen, L.	BR	Utah State? 1991
Ceanothus prostratus ssp. prostratus	Technical report	Brown, R.W., R.H. Ruf, E.E. Farmer	Revegetaion	USDA, Ogden, UT, 1971
Chrysosplenium tetrandrum	Botanical survey	Kratz, A.	Region 1, USFS	USFS, 1989
Cornus nuttallii	Monitoring report	Johnson, F.D.	N. ID	IDCDC, 1988
Cornus nuttallii	Technical bulletin	Davidson, R.M. Jr., R.S. Byther	WA	EM 4421, WSU, 1979
Cornus nuttallii	Technical bulletin	Davidson, R.M. Jr., R.S. Byther	WA	Extension Bulletio 0972, WSU, 1989
Cornus nuttallii	Technical report	Bertagnolli, C.L., A.D. Partridge	Northern ID	U of ID, 1990
Coryphantha vivipara	Botanical survey	Henderson, D.M.	CHA, Middle fork RD	UofI Herbarium, 1982

Taxon	Report Type	Author	Area/Subject	Area/File/Publication
Crepis bakeri idahoensis	Botanical survey	Hill, J.L.	Wapshilla Ridge area/ Craig Mtn., ID	IDCDC, 1991
Cryptantha caespitosa	Field guide	Atwood, D. J. Holland, R. Bolander	Intermountain region	USDANF, Ogden, Ut., 1991
Cryptantha simulans	Technical report	Johnson, C.G., S.A. Simon	WAW, Wallowa-Snake province	WAW, R6-ECOL-TP-255A-86, 1987
Cypeipedium fasciculatum	Technical report	Brownell, V.R.	Distribution	IDCDC, 1985
Cypripedium calceolus	Botanical survey	Hoitsma, T.	Fortine RD, KOO	KOO, 1992
Cypripedium calceolus	Field survey	Heidel, B.L.	Anderson Hill, MT.	1992
Cypripedium calceolus var. parviflora	Botanical survey	Lesica, P.	Pine Butte Reserve, MT	MTNHP, 1991
Cypripedium calceolus var. parviflorum	Botanical survey	Chadde, S.	Pinkham analysis area, Fortine & Rexford RDs, KOO	KOO, 1991
Cypripedium calceolus var. parviflorum	Botanical survey	Heidel, B.	Garnet Resource area, BUT	MTNHP, 1992
Cypripedium calceolus var. parviflorum	Botanical survey	Poole, J.M., B.L. Heidel	Big Belt & Elkhorn Mtns., Helena NF, MT	Helena NF, MTNHP, 1993
Cypripedium fasciculatum	Botanical survey	Moseley, B.	Aquarius Research Natural Area, ID	TNC, 1988
Cypripedium fasciculatum	Field guide	Atwood, D. J. Holland, R. Bolander	Intermountain region	USDANF, Ogden, Ut., 1991
Cypripedium fasciculatum	Field survey	Moseley, B.	Bronco Beauty analysis area, CDANF	IDCDC, 1992
Cypripedium fasciculatum	Thesis	Crawford, R.C.	North-central ID	U of ID, 1983
Cypripedium passerinum	Botanical survey	Hoitsma, T.	Fortine RD, KOO	KOO, 1992
Cypripedium passerinum	Botanical survey	Horn, F.	Headwaters Resource Area, BUT	BUT, 1980
Cypripedium passerinum	Field survey	Shelly, J.S.	Lewis & Clark, Pondera, and Meagher Co's., MT	1986
Cypripedium passerinum	Field survey	Shelly, J.S.	Bob Marshall Wilderness, MT	1988
Cypripedium passerinum	Field survey	Shelly, J.S.	Rocky Mtn. Front range, MT	1988
Dasynotus daubenmirei	Monitoring report	Crawford, R.C.	Northern ID	U of ID, 1980
Dasynotus dubenmirei	Botanical survey	Johnson, F.S., R.C. Crawford	N. ID	U of ID, 1978
Draba apiculata	Botanical survey	Fox, L., R.K. Moseley	White Cloud Peaks, Boulder Mtns., ID	IDCDC, 1991
Draba densifolia	Botanical survey	Heidel, B., J. Vanderhorst	Tobacco Root mtns., BVR, DRL	BVR, DRL, 1994
Draba densifolia	Botanical survey	Poole, J.M., B.L. Heidel	Big Belt & Elkhorn Mtns., Helena NF, MT	Helena NF, MTNHP, 1993
Draba incerta	Botanical survey	Fox, L., R.K. Moseley	White Cloud Peaks, Boulder Mtns., ID	IDCDC, 1991
Draba trichocarpa	Monitoring report	Moseley, R.K., M. Mancuso	Stanley Basin, ID	IDCDC, 1991
Draba trichocarpa	Monitoring report	Moseley, R.K., M. Mancuso	Stanley Basin, ID	SAW, IDCDC, 1993
Drosera linearis	Field survey	Shelly, J.S.	Indian meadows, MT	1987
Dryopteris cristata	Abstract	Greuter, W., B. Zimmer, H.D. Bdhnke		XIV Internation Botanical Conference, 1987
Dryopteris cristata	Field investigation	Caicco, S.L.	PAN	IDNHP, IDFG, 1987
Eleocharis rostellata	Botanical survey	Heidel, B.	Bluewater Fish Hatchery, MT.	MDFWP, 1994
Eleocharis rostellata	Botanical survey	Lesica, P.	Pine Butte Reserve, MT	MTNHP, 1991
Eleocharis rostellata	Unpublished report	Heidel, B.	Bluewater fish hatchery (MDFWP)	MTNHP, no date
Eleocharis rostellata	Botanical survey	Vanderhorst, J., B.L. Heidel	Tobacco Root mtns., Madison Co., MT	BVR, DRL, MTNHP, 1995
Epilobium palustre	Botanical survey	Johnston, B.C.	Swamp Lake Botanical Area, SHS	SHS, 1987
Epipactis gigantea	Botanical survey	Henderson, D.M.	CHA, Middle fork RD	UofI Herbarium, 1982
Epipactis gigantea	Botanical survey	Poole, J.M., B.L. Heidel	Big Belt & Elkhorn Mtns., Helena NF, MT	Helena NF, MTNHP, 1993
Epipactis gigantea	Botanical survey	Vanderhorst, J., B.L. Heidel	Tobacco Root mtns., Madison Co., MT	BVR, DRL, MTNHP, 1995
Epipactis gigantea	Field survey	Achuff, P.L.	Swan valley peatlands, Lake co., MT.	1991
Epipactis gigantea	Field survey	Schassberger, L.A.	Flathead & Lake co's., MT	1988
Epipactis gigantea	Status Publication	Brunton, C.F.	Canada	Canadian Field Naturalist. 100:414-417
Epipactis gigantea	Thesis	Mantas, M.	Ecology and Reproductive biology	University of Idaho, 1993
Erigeron lackschewitzii	Field survey	Heidel, B.L.	Crown Mt., MT.	1992
Erigeron lackschewitzii	Field survey	Heidel, B.L.	Steamboat Mt. Lookout, MT.	1992
Erigeron lackschewitzii	Field survey	Heidel, B.L.	Swift Reservoir, MT.	1992
Erigeron lackschewitzii	Field survey	Heidel, B.L.	Washboard Reef, MT.	1992
Erigeron lackschewitzii	Field survey	Heidel, B.L., H.W. Phillips	Mt. Wright, MT.	1992
Erigeron lackschewitzii	Field survey	Heidel, B.L., T. & H. Kerstetter	Our Lake, MT.	1992
Erigeron lackschewitzii	Field survey	Schassberger, L.A.	Front range Mtns., MT	1989
Erigeron lackschewitzii	Interim taxonomy report	Kerstetter, T.	MT	MTNHP, 1994
Erigeron lackschewitzii	Interim taxonomy report	Kerstetter, T.	USFWS	MTNHP, 1994

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Erigeron lackschewitzii	Masters thesis	Kerstetter, T.	MT	MSU, Bozeman, MT. 1994
Erigeron lackschewitzii	Masters thesis	Kerstetter, T.	Taxonomic investigation	Montana State University, 1994
Erigeron lackschewitzii	New species report	Fertig, W.	BRT	Wyoming TNC, 1993
Erigeron lackschewitzii	Preliminary taxonomy report	Kerstetter, T.	MT	USFWS, MTNHP, 1993
Erigeron lackschewitzii	Preliminary taxonomy report	Kerstetter, T.	USFWS	MTNHP, 1993
Eriogonum meledonum	Monitoring report	Moseley, R.K., M. Mancuso	Stanley Basin, ID	IDCDC, 1991
Eriophorum viridicarinatum	Botanical survey	Johnston, B.C.	Swamp Lake Botanical Area, SHS	SHS, 1987
Eriophorum viridicarinatum	Botanical survey	Lesica, P.	Pine Butte Reserve, MT	MTNHP, 1991
Eriophorum viridicarinatum	Botanical survey	Moseley, R.K.	Fremont & Teton Co's., ID	IDFG, 1991
Gaultheria ovatifolia	Masters thesis	Lorain, C.C.	History & distribution of coastal disjunct plants	University of Idaho, 1988
Gentiana prostrata	Botanical survey	Achuff, P.L., L.S. Roe	Gost Flat proposed research natural area, DRL	DRL, MTNHP, No date
Gentianopsis simplex	Field survey	Heidel, B.L.	Lima fen, MT.	1992
Gentianopsis simplex	Field survey	Shelly, J.S.	Carbon Co., MT	1989
Goodyera repens	Botanical survey	Poole, J.M., B.L. Heidel	Big Belt & Elkhorn Mtns., Helens NF, MT	Helens NF, MTNHP, 1993
Goodyera repens	Field survey & monitoring	Schassberger, L.A.	Little belt Mtns., MT	1990
Grindelia howellii	Field investigation	Caicco, S.L.	PAN	IDNHP, IDFG, 1987
Grindelia howellii	Lecture	Achuff, P.L., L.A. Schassberger Roe	Weeds and Rare Native Plants in MT.	Proc. Weed Symposium, 1992
Grindelia howellii	Population monitoring	Kratz, A.	LOL	Seeley Lake, MT, 1989
Halimolobos perplexa var. perplexa	Technical report	Johnson, C.G., S.A. Simon	WAW, Wallowa-Snake province	WAW, R6-ECOL-TP-255A-86, 1987
Haplopappus insecticruris	Botanical survey	Eidemiller, B.J.	SHS	IDCDC, 1977
Haplopappus macfarlanei	Inventory	Moseley, R.K.	Lower Salmon River, CDA	CDA, IDCDC, 1993
Haplopappus macronema var. macronema	Botanical survey	Schassberger, L.A.	East Pioneer Mtns., BVR	MTNHP, 1991
Haplopappus macronema var. macronema	Field survey	D. Pavek	Pioneer Mtns., MT	1990
Haplopappus radiatus	Field investigation	Mancuso, M.	PAY	IDCDC, 1991
Heterocodon rariflorum	Botanical survey	Schassberger, L.A.	East Pioneer Mtns., BVR	MTNHP, 1991
Howellia aquatilis	Abstract	Shelly, J.S.	Lack & Missoula counties, Mt.	Proc. Mont. Acad. Sci. 48:12, 1988
Howellia aquatilis	Ecological assessment	Lesica, P.	Swan valley, Mt.	FLT, Conservation biology research, 1990
Howellia aquatilis	Masters thesis	Rice, D.J.	MT	WSU, Pullman, Wa. 1990
Howellia aquatilis	Monitoring progress report	Lesica, P.	Swan river oxbow preserve, MT.	MTNC, 1991
Howellia aquatilis	Monitoring progress report	Lesica, P.	Swan river oxbow preserve	MTNC, 1994
Howellia aquatilis	Population report	Lesica, P., R.F. Leary, F.W. Allendorf	MT	MTNC, 1987
Hutchinsia procumbens	Botanical survey	Vanderhorst, J.P.	Tendoy mtns., Beaverhead Co., MT	BUT, MTNHP, 1994
Juncus covillei	Ecological assessment	Vanderhorst, J.P.	Southcentral MT	MDFWP, MTNHP, 1993
Juncus hallii	Botanical survey	Lesica, P.	Highland Mtns., DRL	MTNHP, 1992
Juncus hallii	Botanical survey	Poole, J.M., B.L. Heidel	Big Belt & Elkhorn Mtns., Helens NF, MT	Helena NF, MTNHP, 1993
Juncus hallii	Environmental analysis	OEA research	Beal Mining Co., German Gulch, MT	OEA, 1981
Juncus hallii	Field survey	Poole, J.M.	Elkhorn & Big Belt Mtns., Helena NF, MT	Helena NF, 1992
Juncus hallii	Plant survey	Dieffenbach, T.	Caribou Mountains, ID	IDCDC, 1977
Kobresia simpliciuscula	Botanical survey	Johnston, B.C.	Swamp Lake Botanical Area, SHS	SHS, 1987
Lepidium davisii	Botanical survey	Eidemiller, B.J.	SHS	IDCDC, 1977
Lepidium davisii	Monitoring report	Bernatas, S., R.K. Moseley	Mountain Home AFB, ID	IDCDC, 1991
Lepidium davisii	Monitoring report	DeBolt, A., J. Doremus	BOI	IDCDC, 1990
Lepidium davisii	Monitoring report	Doremus, J., A. DeBolt	Kuna Planning area, BOI	BOI, 1987
Lepidium papilliferum	Botanical survey	Moseley, R.K., M. Mancuso, J. Hilty	Boise Foothills, Ada county, ID	IDCDC, 1992
Leptodactylon pungens ssp. hazeliae	Field survey	Moseley, R.K.	Hells Canyon Ntnl. Recreation Area, CDANF	IDCDC, 1992
Lesquerella carinata	Field survey	D. Pavek	MT	1190
Lesquerella carinata	Field survey	Heidel, B.L.	Rattler Gulch, MT.	1992
Lesquerella carinata	Field survey	Schassberger, L.A.	Granite Co., MT	1989
Lesquerella carinata	Field survey	Schassberger, L.A.	Granite Co., MT	1990
Lesquerella carinata	Lecture	Achuff, P.L., L.A. Schassberger Roe	Weeds and Rare Native Plants in MT.	Proc. Weed Symposium, 1992
Lesquerella carinata var. languida	Unpublished report	Greenlee, J.	Conservation Biology	TNC, 1994

Misc. reports

Taxon	Report Type	Author	Area/Subject	Area/File/Publication
Lesquerella klausii	Botanical survey	Poole, J.M., B.L. Heidel	Big Belt & Elkhorn Mtns., Helena NF, MT	Helena NF, MTNHP, 1993
Lomatium laevigatum	John Day Dam Survey	Kagan, J.	John Day Dam	Final report, 1988 - ONHP
Lomatium laevigatum	Survey report	Vrilakas, S.C185, J. Kagan	The Dalles, Foster Lake, Detroit Dam	Final report, Army Corps, ONHP, no date
Lycopodium inundatum	Botanical survey	Moseley, R.K.	Fremont & Teton Co's., ID	IDFG, 1991
Lycopodium inundatum	Field investigation	Caicco, S.L.	PAN	IDNHP, IDFG, 1987
Madia minima	Botanical survey	Schassberger, L.A.	East Pioneer Mtns., BVR	MTNHP, 1991
Mentzelia mollis	Distribution and Occurrence report	Smithman, L.C.	VAL	Vale BLM, 1989
Mentzelia mollis	Thesis	Glad, J.B.	OSU	Thesis, OSU, 1975
Mentzelia packardiae	Masters thesis	Glad, J.B.	OU	OSU, 1975
Mertensia bella	Masters thesis	Lorain, C.C.	History & distribution of coastal disjunct plants	University of Idaho, 1988
Mimulus primuloides	Botanical survey	Schassberger, L.A.	East Pioneer Mtns., BVR	MTNHP, 1991
Mimulus primuloides	Field survey	D. Pavek	Pioneer Mtns., MT	1990
Mirabilis macfarlanei	Botanical survey	Johnson, C.A	Lower Salmon River, CDA	CDA, IDCDC, 1983
Mirabilis macfarlanei	Botanical survey	Moseley, R.K., S. Bernatas	Lucile Caves Area, CDA	IDCDC, 1991
Mirabilis macfarlanei	Monitoring report	Johnson, C.A	Mgmt. techniques	IDCDC
Mirabilis macfarlanei	Technical report	Johnson, C.G., S.A. Simon	WAW, Wallowa-Snake province	WAW, R6-ECOL-TP-255A-86, 1987
Muhlenbergia racemosa	Botanical survey	Johnston, B.C.	Swamp Lake Botanical Area, SHS	SHS, 1987
Orchis rotundifolia	Botanical survey	Chadde, S.	Pinkham analysis area, Fortine & Rexford RDs, KOO	KOO, 1991
Orchis rotundifolia	Botanical survey	Hoitsma, T.	Fortine RD, KOO	KOO, 1992
Orchis rotundifolia	Botanical survey	Horn, F.	Headwaters Resource Area, BUT	BUT, 1980
Orchis rotundifolia	Field survey	Shelly, J.S.	Bob Marshall Wilderness, MT	1988
Orchis rotundifolia	Field survey	Shelly, J.S.	Rocky Mtn. Front range, MT	1988
Orobanche corymbosa	Botanical survey	Heidel, B.	south of Elkhorn mtns., MT.	MTBLM, 1994
Orobanche corymbosa	Botanical survey	Lesica, P.	Highland Mtns., DRL	MTNHP, 1992
Oxytheca dendroidea	Science bulletin	Atwood, D.	Ditribution, Taxonomy	BYU, Vol. XI(4), 1970
Oxytropis lagopus var. conjugens	Botanical survey	Lesica, P.	Pine Butte Reserve, MT	MTNHP, 1991
Oxytropis lagopus var. conjugens	Botanical survey	Poole, J.M., B.L. Heidel	Big Belt & Elkhorn Mtns., Helena NF, MT	Helena NF, MTNHP, 1993
Oxytropis podocarpa	Field survey	Schassberger, L.A.	Front range Mtns., MT	1989
Pediocactus simpsonii var. robustior	Botanical survey	Hill, J.L.	Wapshilla Ridge area/ Craig Mtn., ID	IDCDC, 1991
Pediocactus simpsonii var. robustior	Technical bulletin	Daubenmire, R.	WA	Tech. Bull. 62, WSU, 1970
Penstemon compactus	Botanical survey	Franklin, M.A.	CCS, Wasatch-Cache NF, UT	UNHP, IDCDC, 1990
Penstemon compactus	Field guide	Atwood, D. J. Holland, R. Bolander	Intermountain region	USDANF, Ogden, Ut., 1991
Penstemon idahoensis	Field guide	Atwood, D. J. Holland, R. Bolander	Intermountain region	USDANF, Ogden, Ut., 1991
Penstemon lemhiensis	Botanical survey	Lesica, P.	Highland Mtns., DRL	MTNHP, 1992
Penstemon lemhiensis	Botanical survey	Mathews, S.	Gallatin NF	USFS, MTNHP, 1989
Penstemon lemhiensis	Masters thesis	Ramstetter, J.	MT	U of M, Missoula, MT, 1983
Penstemon lemhiensis	Monitoring progress report	Achuff, P.L., J.S. Shelly	BVR	MTNHP, 1991
Penstemon lemhiensis	Monitoring progress report	Shelly, J.S., B.L. Heidel	BVR	MTNHP, 1992
Penstemon lemhiensis	Monitoring report	Achuff, P.L.	MT	BLM, MTNHP, 1992
Penstemon lemhiensis	Monitoring report	Heidel, B.L., J.S. Shelly	Dillon Resource Area, Mt.	BLM, MTNHP, 1992
Penstemon lemhiensis	Monitoring report	Shelly, J.S., P.L. Aehuff	BVR	MTNHP, 1992
Penstemon peckii	PhD Dissertation	Field, K.G.	EC	U of O, 1985
Peraphyllum ramosissimum	Technical report	Johnson, C.G., S.A. Simon	WAW, Wallowa-Snake province	WAW, R6-ECOL-TP-255A-86, 1987
Phacelia inconspicua	Science bulletin	Atwood, D.	Ditribution, Taxonomy	BYU, Vol. XI(4), 1970
Phlox kelseyi var. missoulensis	Botanical survey	Poole, J.M., B.L. Heidel	Big Belt & Elkhorn Mtns., Helena NF, MT	Helena NF, MTNHP, 1993
Phlox kelseyi var. missoulensis	Field survey	D. Pavek	MT	1990
Phlox kelseyi var. missoulensis	Field survey	Schassberger, L.A.	Granite Co., MT	1990
Phlox kelsyi var. missoulensis	Field survey	Schassberger, L.A., D.L. Pavek	Mcdonald pass & Little belt Mtns., MT	1990
Phlox kelsyi var. missoulensis	Thesis	Campbell, L.M.	Biosystematics	University of Montana, 1992
Picea glauca	Botanical survey	Johnston, B.C.	Swamp Lake Botanical Area, SHS	SHS, 1987
Polygonum douglasii ssp. austinae	Botanical survey	Poole, J.M., B.L. Heidel	Big Belt & Elkhorn Mtns., Helena NF, MT	Helena NF, MTNHP, 1993

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Polygonum douglasii ssp. austinae	Botanical survey	Heidel, B., J. Vanderhorst	Tobacco Root mtns., BVR, DRL	BVR, DRL, 1994
Polygonum douglasii ssp. austinae	Botanical survey	Vanderhorst, J., B.L. Heidel	Tobacco Root mtns., Madison Co., MT	BVR, DRL, MTNHP, 1995
Polygonum douglasii ssp. austinae	Field survey	Heidel, B.L.	Hunters Gulch, Helena NF, MT.	Helena NF, 1992
Polygonum douglasii ssp. austinae	Field survey	Heidel, F.L.C291, P. Lesica	Pike Gulch & Burnt Creek, Helena NF, MT	Helena NF, 1992
Polystichum kruckebergii	Botanical survey	Achuff, P.L., L.S. Roe	Goat Flat proposed research natural area, DRL	DRL, MTNHP, No date
Potamogeton obtusifolius	Field survey	Watsoo, L.	near Cygnet Lake, MT	BUT, MTNHP, 1994
Potentilla quinquefolia	Botanical survey	Vanderhorst, J., B.L. Heidel	Tobacco Root mtns., Madison Co., MT	BVR, DRL, MTNHP, 1995
Primula alcalina	Ecological and Floristic inventory	Moseley, R.K.	Birch Creek Fen, Lemhi and Clark Cty's, ID	TAR, SMN, IDCDC, 1992
Ranunculus jovis	Field survey	Heidel, B.L.	Targhee Pass, MT.	1992
Ranunculus verecundus	Botanical survey	Lesica, P.	Highland Mtns., DRL	MTNHP, 1992
Rubus bartonianus	Field survey	Moseley, R.K.	Hells Canyon Ntnl. Recreation Area, CDANF	IDCDC, 1992
Rubus bartonianus	Species guide	Biogham, R.T., D.M. Henderson	Hells Canyon, GR	Hèlls Canyoo NRA, 1980
Salix candida	Botanical survey	Johnston, B.C.	Swamp Lake Botanical Area, SHS	SHS, 1987
Salix candida	Field guide	Brunsfeld, S.J., F.D. Johnson	East-Central Idaho	U of ID, 1985
Salix cascadensis	Botanical survey	Achuff, P.L., L.S. Roe	Goat Flat proposed research natural area, DRL	DRL, MTNHP, No date
Salix cascadensis	Ecological assessment	Vanderhorst, J.P.	Southcentral MT	MDFWP, MTNHP, 1993
Salix cascadensis	Field survey	Vanderhorst, J.	Gallatin NF	MTNHP, 1993
Salix farriae	Field guide	Brunsfeld, S.J., F.D. Johnson	East-Central Idaho	U of ID, 1985
Salix wolfii var wolfii	Ecological assessment	Vanderhorst, J.P.	Southcentral MT	MDFWP, MTNHP, 1993
Salix wolfii var. wolfii	Botanical survey	Achuff, P.L., L.S. Roe	Goat Flat proposed research natural area, DRL	DRL, MTNHP, No date
Salix wolfii var. wolfii	Botanical survey	Mathews, S.	Gallatin NF	USFS, MTNHP, 1989
Salix wolfii var. wolfii	Botanical survey	Poole, J.M., B.L. Heidel	Big Belt & Elkhorn Mtns., Helena NF, MT	Helena NF, MTNHP, 1993
Salix wolfii var. wolfii	Field survey	Vanderhorst, J.	Gallatin NF	MTNHP, 1993
Sanicula marilandica	Botanical survey	BioSystems Analysis, Inc.	PGT-PGE&E Pipeline, ID, WA, OR, CA	BioSystems Analysis Inc., 1990
Saturega douglasii	Field survey	Achuff, P.L.	Ninemile valley, Missoula co., MT.	1991
Saussurea weberi	Botanical survey	Achuff, P.L., L.S. Roe	Goat Flat proposed research natural area, DRL	DRL, MTNHP, No date
Saxifraga tempestiva	Botanical survey	Achuff, P.L., L.S. Roe	Goat Flat proposed research natural area, DRL	DRL, MTNHP, No date
Saxifraga tempestiva	Botanical survey	Lesica, P.	Highland Mtns., DRL	MTNHP, 1992
Saxifraga tempestiva	Botanical survey	Schassberger, L.A.	East Pioneer Mtns., BVR	MTNHP, 1991
Scheuchzeeria palustris ssp. americana	Field investigation	Caicco, S.L.	PAN	IDNHP, IDFG, 1987
Scheuchzeria palustris	Botanical survey	BioSystems Analysis, Inc.	PGT-PGE&E Pipeline, ID, WA, GR, CA	BioSystems Analysis Inc., 1990
Scheuchzeria palustris ssp. americana	Botanical survey	Moseley, R.K.	Fremont & Teton Co's., ID	IDFG, 1991
Scirpus cespitosus	Botanical survey	Lesica, P.	Pine Butte Reserve, MT	MTNHP, 1991
Scirpus nevadensis	Botanical survey	Chadde, S.	Pinkham analysis area, Fortine & Rexford RDs, KOO	KOO, 1991
Scirpus subterminalis	Botanical survey	Holtsma, T.	Fortine RD, KOO	KOO, 1992
Scirpus subterminalis	Botanical survey	Moseley, R.K.	Fremont & Teton Co's., ID	IDFG, 1991
Scirpus subterminalis	Field survey	Shelly, J.S.	Indian meadows, MT	1987
Sidalcea oregana var. calva	Botanical survey	Vanderhorst, J.	Gallatin NF	Gallatin NF, MTNHP, 1994
Sidalcea oregana var. calva	Ecological assessment	Vanderhorst, J.P.	Southcentral MT	MDFWP, MTNHP, 1993
Sidalcea oregana var. calva	Field survey	Vanderhorst, J.	Gallatin NF	MTNHP, 1993
Sphenopholis obtusata var. major	Botanical survey	Poole, J.M., B.L. Heidel	Big Belt & Elkhorn Mtns., Helena NF, MT	Helena NF, MTNHP, 1993
Spiraea X pyramidata	Botanical survey	Schassberger, L.A.	East Pioneer Mtns., BVR	MTNHP, 1991
Synthyris platycarpa	Botanical survey	Johnson, F.S., R.C. Crawford	N. ID	U of ID, 1978
Synthyris platycarpa	Monitoring report	Crawford, R.C.	Northern ID	U of ID, 1980
Synthyris platycarpa	Technical bulletin	Daubenmire, R., J.B. Daubenmire	E. WA, N. ID	Tech. Bull. 60, WSU, 1968
Synthyris platycarpa	Technical report	Cooper, S.V., K.E. Neiman, R. Steele, D.W. Roberts	Northern ID	USDA, Ogden, UT, 1987
Synthyris platycarpa	Thesis	Crawford, R.C.	North-central ID	U of ID, 1983
Thalictrum alpinum var. hebetum	Botanical survey	Vanderhorst, J.P.	Tendoy mtns., Beaverhead Co., MT	BUT, MTNHP, 1994
Thelypodium sagittatum var. sagittatum	Botanical survey	Vanderhorst, J.P.	Tendoy mtns., Beaverhead Co., MT	BUT, MTNHP, 1994
Thlaspi parviflorum	Botanical survey	Lesica, P.	Highland Mtns., DRL	MTNHP, 1992
Thlaspi parviflorum	Botanical survey	Vanderhorst, J.P.	Tendoy mtns., Beaverhead Co., MT	BUT, MTNHP, 1994

Misc. reports

Taxon	Report Type	Author	Area/Subject	Area/File/Publication
Townsendia nuttallii	Botanical survey	Vanderhorst, J.P.	Tendoy mtns., Beaverhead Co., MT	BUT, MTNHP, 1994
Trifolium owyheense	Thesis	Grimes, J.W.	Leslie Gulch, Malheur Cty., OR.	Thesis, USU, 1979
Veratrum californicum	Botanical survey	Poole, J.M., B.L. Heidel	Big Belt & Elkhorn Mtns., Helena NF, MT	Helena NF, MTNHP, 1993
Viola renifolia	Botanical survey	Poole, J.M., B.L. Heidel	Big Belt & Elkhorn Mtns., Helena NF, MT	Helena NF, MTNHP, 1993

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Taxon	Author	Subject	Publication, Date
Agoseris lackschewitzii	Henderson, D.M., R.K. Moseley, A.F. Cholewa	Taxonomy	Systematic Botany. 15(3):462-465, 1990
Allium aaseae	Holsinger, K.E.	Biology	C of I, IDCDC, 1978
Allium fibrillum	Badr, A., T.T. Elkington	Genetics topic	Plant Systematics and Evolution. 144:17-24, 1984
Allotropa vergata	Castellano, M.A., J.M. Trappe	Biology	Mycologia. 77(3):499-502, 1985
Allotropa virgata	Castellano, M.A., J.M. Trappe	Mycorrhizal associations	? 77(3):499-502, 1985
Allotropa virgata	Copeland, H.F.	Genus Structure	Madrono 4:137-168, 1938
Allotropa virgata	Copeland, J.F.	Biology	Madrono. 4:137-153, 1938
Allatropa virgata	Furman, T.E., J.M. Trappe	Biology	Quarterly Review of Biology. 46:219-225, 1971
Allotropa virgata	Furman, T.E., J.M. Trappe	Phylogeny and Ecology	Quarterly Revie of Biology 46: 219-225, 1971
Allotropa virgata	Wallace, G.D.	Pollination ecology	Amer. Journal of Botany 64:199-206, 1977
Antennaria arcuata	Cronquist, A.	Distribution, Taxonomy	Lflts. of Western Botany. 6(2):41-56, 1950
Antennaria densifolia	Bayer, R.J.	A systematic and phytogeographic study.....	Madrono 36:248-259, 1989
Antennaria densifolia	Bayer, R.J.	Patterns of isozyme variation.....	Am. Journal of Botany 76:679-691, 1989
Arabis fecunda	Lesica, P., J.S. Shelley	MT	Am. Midl. Nat. 128:53-60, 1992
Arnica alpina var. tomentosa	Bridgland, F., J.M. Gillet	Distribution	Can. Field-Naturalist. 97(3):279-292, 1983
Arnical alpina var. tomentosa	Douglas, G.W., M.J. Ratcliffe	Distribution	Can. Journal of botany. 56:1710-1711, 1978
Aster jessicae	Bates, V.	Taxonomy	Taxon. 35:170-171, 1986
Aster jessicae	Dean, M.L., K.L. Chambers	Genetics, Taxonomy	Brittonia. 35(3):189-196, 1983
Aster jessicae	Jones, A.G.	Taxonomy	Madrono. 31(2):113-122, 1984
Aster jessicae	Jones, A.G.	Taxonomy	Taxon. 36(1):142, 1987
Astragalus amnis-amissi	Henderson, D.M., S. Brunsfeld, P. Brunsfeld	Distribution	Madrono. 28(2):88-90, 1981
Astragalus anserinus	ATwood, N.D., S. Goodrich, S.L. Welsh	Taxonomy	Great Basin Naturalist. 44(2):263-264, 1984
Astragalus bisulcatus	Clement, S.L., D.H. Miller	Biology	Pan-Pacific Entomologist. 58(1):38-41, 1982
Astragalus gilviflorus	Goodrich, S., D. Henderson, A. Cholewa	Distribution	Madrono. 30:63, 1983
Astragalus leptaleus	Caicco, S.L.	Distribution	Modrono. 30:64, 1983
Astragalus riparius	Barneby, R.C.	Taxonomy	Am. Midland Naturalist. 55(2):477-503, 1956
Astragalus sterilis	Barneby, R.C.	Taxonomy	Lflts of Western Botany. 5(12):193-195, 1949
Astragalus sterilis	Grimes, J.W.	Community ecology, Distribution	Madrono. 31(2):80-85, 1984
Astragalus vexilliflexus var. nubilus	Barneby, R.C.	Taxonomy	Am. Midland Naturalist. 55(2):477-503, 1956
Astragalus yoder-williamsii	Barneby, R.C.	Taxonomy	Brittonia. 32(1):30-32, 1980
Bacapa rotundifolia	Barrett, S.C.H., J.L. Strother	Distribution, Taxonomy	Systematic Botany. 3(4):408-419, 1978
Betula pumial var. glandulifera	Connoly-McCarthy, B.J., D.F. Grigal	Community ecology	Forest Science. 31(4):1011-1017, 1985
Betula pumila var. glandulifera	Brunsfeld, S.J., F.D. Johnson	Distribution, Taxonomy	Madrono. 33:-147-148, 1986
Betula pumila var. glandulifera	Dugle, J.R.	Genetics, Taxonomy	Can. Journal of Botany. 44:929-1007, 1966
Blechnem spicant	Cousens, M.I.	Biology, Community ecology	Diss. Abtracts Int. 34/08-B:3672, 1973
Blechnum spicant	Chambers, K.L.	Distribution	Madrono. 22(3):105-114, 1973
Blechnum spicant	Cousens, M.I.	Biology, Community ecology	Botanical Gazette. 142(2):251-258, 1981
Blepharidachne kingii	Hunziker, A.T., A.M. Anton	Taxonomy	Brittonia. 31(4):446-453, 1979
Botrychium lanceolatum var. lanceolatum	Farrar, D.R., C.L. Johnson-Groh	Biology	Am. Journal of Botany, 77(9):1168-1175, 1990
Botrychium minganense	Alverson, Ed.	Taxonomy	Douglasia. 9(3):2-4
Botrychium minganense	Farrar, D.R., C.L. Johnson-Groh	Biology	Am. Journal of Botany, 77(9):1168-1175, 1990
Botrychium pedunculosum	Wagner, W.H. Jr., F.S. Wagner	OBM	American Fern Journal 76(2):33-47
Botrychium simplex	Alverson, Ed.	Taxonomy	Douglasia. 9(3):2-4
Botrychium simplex	Farrar, D.R., C.L. Johnson-Groh	Biology	Am. Journal of Botany, 77(9):1168-1175, 1990
Botrychium sp.	Paris, C.A., F.S. Wagner, W.H. Wagner	Cryptic species, delimitation, taxonomy	Amer. Fern Journal 79:46-54, 1989
Botrychium sp.	Vij, S.P., G.C. Gupta	New species	Amer. Fern Journal 71:20-30, 1981
Botrychium sp.	Wagner, W.H. Jr., F.S. Wagner	New species	Amer. Fern Journal 76(2):3347, 1986
B[illegible]um sp.	Wagner, W.H. Jr., F.S. Wagner	Notes	Amer. Fern Journal 80:73-81, 1990

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Taxon	Author	Subject	Publication, Date
Botrychium sp.	Wagner, W.H. Jr., F.S. Wagner, C. Haufler, J.K. Emerson	New nothospecies	Can. Journal of Botany 62:629-634, 1984
Botrycium crenulatum	Alverson, Ed.	Taxonomy	Douglasia. 9(3):2-4
Calochartus nitidus	Caicco, S.L.	Biology, Monitoring	Northwest Science. 64(2):108. Abstract # 71, 1990
Calochortus nitidus	Henderson, L.F.	Distribution, Taxanomy	Torrey Botanical Club. 27:342-359, 1900
Carex breweri paddoensis	Howell, J.T.	Taxonomy	Lflts. of Western Botany. 2(2):36-40, 1947
Carex buxbaumii	Bogs, K., P. Hansen, R. Pfister, J. Joy	Community ecology	U of MT, 1990
Carex buxbaumii	Hansen, P., K. Boggs, R. Pfister, J. Joy	Community ecology	UofM, Missoula, MT.,1990
Carex buxbaumii	Hansen, P., S. Chadde, R. Pfister, J. Joy, D. Svoboda, J. Pierce, L. Myers	Community ecology	UofM, Missoula MT., 1988
Carex buxbaumii	Hansen, P.L., S.W. Chadde, R.D. Pfister	Community ecology, Distribution, Mgmt. techniques	Uof M. Publ. 49, Missoula, MT., 1988
Carex chordarrhiza	Bernard, J.M.	Biology	Can. Journal of Botany. 68:1441-1448, 1989
Carex chardorrhiza	Bowles, M.L., M.M. DeMauro, N. Pavlovic, R.D. Hiebert	Community ecology, Management techniques	Natural Areas Journal. 10(4):187-200, 1990
Carex chordorrhiza	Fernald, M.L.	Distribution	Rhodora. 21(243):41-67, 1919
Carex chordorrhiza	Schuyler, A.E.	Glacier NP	Rhodora 82:519, 1980
Carex comosa	Bernard, J.M.	Biology	Can. Journal of Botany. 68:1441-1448, 1989
Carex comosa	Bryson, C.T.	Distribution	Sida. 14(2):311-312, 1990
Carex flava	Bernard, J.M.	Biology	Can. Journal af Botany. 68:1441-1448, 1989
Carex flava	Crins, W.J., P.W. Ball	Taxonomy	Can. Journal af Botany. 67:1048-1065, 1989
Carex flava	Hansen, P.L., S.W. Chadde, R.D. Pfister	Community ecology, Distribution, Mgmt. techniques	Uaf M. Publ. 49, Missoula, MT., 1988
Carex flava	Howell, J.T.	Distribution	Lflts. of Western Botany. 4(8):206-208, 1945
Carex flava	Johnson, F.D., S.J. Brunsfeld	Distribution	Madrono. 30:259, 1983
Carex leptalea	Hansen, P.L., S.W. Chadde, R.D. Pfister	Community ecology, Distribution, Mgmt. techniques	Uof M. Publ. 49, Missoula, MT., 1988
Carex livida	Cooper, D.J.	Community ecology, Distribution	Madrono. 38(2):139-143, 1991
Carex livida	Evert, E.F., R.D. Dorn, R.L. Hartman, R.W. Lichvar	Distribution	Madrona. 33:313-315, 1986
Carex livida	Lesica, P.	Pine Butte Fen, Teton Co., MT.	Great Basin Naturalist 46:22-32, 1986
Carex paupercula	Cranston, D.M., D.H. Valentine	Transplant Experiments	Biological Conservation 26:175-191
Carex paupercula	Fearn, C311G.M.	Genetics	Watsonia 11(3):254, 1977
Carex paupercula	Fernald, M.L.	Taxonomy	Rhodora. 8:73-77, 1906
Castilleja christii	Holmgren, N.H.	Distribution, Taxonomy	Torrey Botanical Club. 100(2):83-93, 1973
Chrysosplenium tetrandrum	Bohm, B.A., William Collins, F. & R. Bose	Flavonoids...	Pytochemistry 16:1205-1209
Chrysosplenium tetrandrum	Leck, M.A.	Germination	Arctic and Alpine Research 12(3):343-349
Chrysothamnus parryi var. montanus	Anderson, Loran C.	Distribution, Taxonomy	Phytologia. 38(4):309-320
Chrysathomnus parryi var. mantanus	Anderson, Loran C.	Distribution, Taxonomy	USDA, Ogden, UT. 1986
Cicuta bulbifera	Berenbaun, M.	Taxonomy	Ecology. 62(5):1254-1266, 1981
Clarkia rhomboidea	Holsinger, K.E.	Nomenclature status	Taxon 34(4):707-708, 1985
Claytonia lanceolata var. flava	Davis, R.J.	Distribution, Taxonomy	Brittonia. 18:285-303, 1966
Callamia debilis var. camporum	Chuang, T., W.C. Hsieh, D.H. Wilken	Taxonomy	Am. Journal of Botany. 65(4):450-458, 1978
Callomia debilis var. camporum	Hitchcock, C.L., J.W. Thompson	Distribution	Lflts. of Western Botany. 4(8):197-206, 1945
Collamia renacta	Joyal, E.	New species report	Brittonia (38)3:243-248, 1986
Cornus nuttalli	Atkinson, R.G.	Biology	Can. Journal of Botany. 43:1471-1475, 1965
Cornus nuttallii	Funk, A., A.K. Parker	Biology	Can. Journal of Botany. 50:1623-1625, 1972
Cornus nuttallii	Guppy, G.A.	Distribution	Davidsonia. 8(2):24-30, 1977
Cornus nuttallii	Halpern, C.B.	Community ecolagy	Ecology. 70(3):704-720, 1989
Cymopterus davisii	Hartman, R.L.	Taxonomy	Brittonia. 37(1):102-105, 1985
Cymopterus douglassii	Hartman, R.L., L. Constance	Distribution, Taxonomy	Brittonia. 37:88-95, 1985
Cypripedium calceolus var. parviflorum	Arditti, J., J.D. Michaud, P.L. Healey	Morphometry af Orchid Seeds	Am. Journal of Botany. 66(10):1128-1137, 1979
Cypripedium calceolus var. parviflorum	Fernald, M.L.	Distribution	Rhodora. 48(565):4, 1946
Cypripedium calceolus var. parviflorum	Harma, V.L.	Distribution	Rhodora. 75(803):491, 1973
Cypripedium calceolus var. parviflorum	Harms, V.L.	New record	Rhodora 75:491, 1973

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Taxon	Author	Subject	Publication, Date
Cypripedium calceolus var. parviflorum	Lesica, P.	Pine Butte Fen, Teton Co., MT.	Great Basin Naturalist 46:22-32, 1986
Cypripedium calceolus var. parviflorum	Linden, B.	Aseptic germination	Ann. Bot. Fennici 17:174-182
Cypripedium calceolus var. parviflorum	Nekola, J.C.	Rare plant notes, R.V. Drexler herbarium	Journal Iowa Academy of Sciences 97:55-73, 1990
Cypripedium fasciculatum	Brownell, V.R.	Distribution, Taxonomy	Lindleyana. 2(1):53-57, 1987
Cypripedium fasciculatum	Brownell, V.R., P.M. Catling	Distribution and Taxonomy	LINDLEYANA 2:53-57
Cypripedium fasciculatum	Brownell, V.R., P.M. Catling	MT	LINDLEYANA 2:53-57, 1987
Cypripedium fasciculatum	Fowlie, J.A.	Community ecology, Distribution	The Orchid Digest, 52(3):137-139, 1988
Cypripedium passerinum	Arditti, J., J.D. Michaud, P.L. Healey	Morphometry of Orchid Seeds	Am. Journal of Botany. 66(10):1128-1137, 1979
Cypripedium passerinum	Catling, P.M.	Autogamy	Naturaliste Canada 110:37-53, 1983
Cypripedium passerinum	Keddy, C228CJ. , P.A. Keddy, R.J. Planck	Ecological study	Can. Field Naturalist 97(3):268-274, 1983
Cypripedium passerinum	Linden, B.	Aseptic germination	Ann. Bot. Fennici 17:174-182
Dasynotus dauenmirei	Johnston, I.M.	Taxonomy	Journal of the Arnold Arboretum. 29:227-241, 1948
Dimeresia howellii	Barneby, R.C.	Distribution	Leaflets of Western Botany. 5(4):61-66, 1947
Douglasia idahoensis	Henderson, D.M.	Taxonomy	Brittonia. 33(1):52-56, 1981
Draba apiculata	Hitchcock, C.L.	Distribution, Taxonomy	UofW Press, 1941
Draba fladnizensis	Bridgland, F., J.M. Gillet	Distribution	Can. Field-Naturalist. 97(3):279-292, 1983
Draba fladnizensis	Hitchcock, C.L.	Distribution, Taxonomy	UofW Press, 1941
Draba incerta	Chambers, J.C., J.A. MacMahon, R.W. Brown	Biology	Ecology. 71(4):1323-1341, 1990
Draba incerta	Hitchcock, C.L.	Distribution, Taxonomy	UofW Press, 1941
Dryoopteris cristata	Carlson, T.M., W.H. Wagner Jr.	Distribution	U of MI Herbarium. 15:141-162, 1982
Dryopteris cristata	Britton, D.M.	The Spores....	Canadian Journal of Botany 50:2027-2029
Dryopteris cristata	Carlson, T.M., W.H. Wagner	Distribution	Contr. Univ. Mich. Herb. 15:141-162, 1982
Dryopteris cristata	Cody, W.J., D.M. Britton	Phytogeography	Can. Field Naturalist 99(1):101-102
Dryopteris filix-mas	Cody, W.J., D.M. Britton	Phytogeography	Can. Field Naturalist 99(1):101-102
Eatonella nivea	Barneby, R.C.	Distribution	Leaflets of Western Botany. 5(4):61-66, 1947
Epipactis gigantea	Allen, Don R.	Distribution	Am. Orchid Society Bulletin. 51(10):1038-1040
Epipactis gigantea	Arditte, F., J.D. Michaud, A.P. Oliva	Biology	Botanical Gazette. 142(4):442-453, 1981
Epipactis gigantea	Arditte, F., J.D. Michaud, A.P. Oliva	Biology	Am. Orchid Society Bulletin. 51(2):162-171, 1982
Epipactis gigantea	Brunton, D.F.	Biolgy, Distribution	Can. Field-Naturalis. 100(3):414-417, 1986
Epipactis gigantea	Burns-Balogh, P., D.L. Szlachetko, A. Dafni	Evolution, Pollination, and Systematics	Pl. Syst. Evol. 156:91-115
Epipactis gigantea	Coleman, R.A.	Distribution	Orchid Digest. 50(2):66-68, 1986
Epipactis gigantea	Coleman, R.A.	Distribution	Orchid Digest. 51(4):203-204, 1987
Epipactis gigantea	Vanderhorst, J.P.	Genetics	Cytologia 40:613-621, 1975
Epipacts gigantea	Burns-Balogh, P., D.L., Szlachetko, A. Dafni	Biology, Taxonomy	Plant Systematics and Evolution. 156:91-115, 1987
Erigeron lackschewitzii	Neson, G.L., W.A. Weber	MT	Madrono 30:245-249, 1983
Erigeron lackschewitzii	Neson, G.L., W.A. Weber	New species	Madrono 30:245-249, 1983
Eriphorum viridicarinatum	Lesica, P.	Pine Butte Fen, Teton Co., MT.	Great Basin Naturalist 46:22-32, 1986
Gentiana glauca	Iltis, H.H.	Transfers and phytogeography	Sida 2:129-153, 1965
Gentiana prostrat	Iltis, H.H.	Transfers and phytogeography	Sida 2:129-153, 1965
Gentianopsis simplex	Iltis, H.H.	Transfers and phytogeography	Sida 2:129-153, 1965
Glytopleura marginata	Barneby, R.C.	Distribution	Leaflets of Western Botany. 5(4):61-66, 1947
Goodyera repens	Alexander, C., G. Hadley	Mycorrhizal effects	New Phytology 97:39-400, 1984
Goodyera repens	Barclay-Estrup, P., P. Duralia, T.E. & A.G. Harris	Flowering sequence of the genus Goodyera...	Rhodora 93(874):141-147, 1991
Goodyera repens	Catling, P.M.	Autogamy	Naturaliste Canada 110:37-53, 1983
Goodyera repens	Phillips, C360H.W.	Noteworthy collection	Madrono 36:174, 1989
Goodyera repens	Vij, S.P., G.C. Gupta	Genetics	Cytologia 40:613-621, 1975
Hackelia ophiobia	Carr, R.L.	Taxonomy	Madrono. 22:390-392, 1974
[illegible] perplexa var. perplexa	Henderson, L.F.	Distribution, Taxonomy	Torrey Botanical Club. 27:342-359, 1900

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Taxon	Author	Subject	Publication, Date
Hoplopappus oberrans	Hall, H.M.	Phylogenetic study of Genus	Carnegie Institution of Wash. pub. #389, 1928
Hoplopappus insecticruris	Henderson, L.F.	Distribution, Taxonomy	Torrey Botanical Club. 27:342-359, 1900
Haplopappus insecticruris	Anderson, Loran C.	Taxonomy	Am. Journal of Botany. 61(6):665-671, 1974
Haplopappus liatriformis	Anderson, Loran C.	Taxonomy	Am. Journal of Botany. 61(6):665-671, 1974
Haplopappus macronemo var. macranemo	Hall, H.M.	Phylogenetic study of Genus	Carnegie Institution of Wash. pub. #389, 1928
Hoplopappus pygmoeus	Hall, H.M.	Phylogenetic study of Genus	Carnegie Institution of Wash. pub. #389, 1928
Hoplopappus radiatus	Anderson, Loran C.	Taxonomy	Am. Journal of Botany. 61(6):665-671, 1974
Howellia oquatilis	Lesica, P.	MT	Ecological applications 2(4):411-421, 1992
Howellio oquatilis	Lesica, P., R.F. Leary, F.W. Allendorf, D.E. Bilderback	MT	Conservation Biology 2:275-282, 1988
Howellia aquatilis	McCune, B.	MT	Madrono 29:123-124, 1982
Kobresio simpliciuscula	Arnold, S.M.	Biology	New Phytologia. 72:583-593, 1973
Kobresia simpliciuscula	Bridgland, F., J.M. Gillet	Distribution	Can. Field-Naturalist. 97(3):279-292, 1983
Kobresia simpliciuscula	Cooper, D.J.	Community ecology, Distribution	Madrono. 38(2):139-143, 1991
Kobresia simpliciuscula	Cranston, D.M., D.H. Valentine	Biology, Mgmt. techniques	Biological Conservation. 26(2):175-191, 1983
Lepidium papilliferum	Henderson, L.F.	Distribution, Taxonomy	Torrey Botanical Club. 27:342-359, 1900
Leptodactylon pungens ssp. hazeliae	Meinke, R.	BM ; ID	Madrono 35(2):105-111, 1988
Lewisia kelloggii	Hitchcock, C.L., J.W. Thompson	Distribution	Lflts. of Western Botany. 4(8):197-206, 1945
Lomatium erythrocarpum	Meinke, R., L. Constance	New species report	1984, Torreya 111: 222-226
Lomatium geyeri	Schlessman, C510M.A.	Systematics	Syst. Bot. Mono. 4:1-55, 1984
Lycopodium inundotum	Andreas, B., G.E. Host	Community ecology	Ohio Journal of Science. 83(5):246-253, 1983
Lycopodium inundatum	Bowles, M.L., M.M. DeMauro, N. Pavlovic, R.D. Hiebert	Community ecology, Management techniques	Natural Areas Journal. 10(4):187-200, 1990
Lycopodium inundotum	Gillespie, J.P.	Taxonomy	Am. Fern Journal. 52:19-26, 1962
Lycopodium sitchense	Beitel, J.M.	Taxonomy	The Michigan Botanist. 18(1):3-13, 1979
Malanthemum dilatatum	Chambers, K.L.	Distribution	Madrono. 22(3):105-114, 1973
Mentzella mollis	Glad, J.B.	Taxonomy	Madrono. 23(5):283-292, 1976
Mentzelia packardiae	Glad, J.B.	Taxonomy	Madrono 23:283-292, 1976
Mentzelio torreyi var. aceroso	Barneby, R.C.	Distribution	Leaflets of Western Botany. 5(4):61-66, 1947
Mertensio bella	Williams, L.O.	Monograph	Annals of Miss. Botanical Garden 14:17-159, 1937
Mimulus clivicolo	Greenleaf, J.	Distribution, Taxonomy	Erythea. 7(11):115-120, 1989
Mimulus hymenophyllus	Meinke, R.	OBM	1983
Mimulus primuloides	Douglas, D.A.	Reproduction	Journal of Ecology 69:295-310, 1981
Mimulus ringens	Cooperrider, T.S.	Distribution	Ohio Journal of Science. 78:15, 1978
Mimulus washingtonensis ssp. ampliatus	Argue, C.L.	Taxonomy	Can. Journal of Botany. 64(7):1331-1337, 1986
Mirabilis macfarlanei	Constance, L., R. Rollins	Taxonomy	Bio. Society of WA. 49:147-150, 1936
Nemacladus rigidus	Barneby, R.C.	Distribution	Leaflets of Western Botany. 5(4):61-66, 1947
Oxytheco dendroidea	Ertter, B.	Distribution, Taxonomy	Brittonia. 32(1):70-102, 1980
Oxytheca dendroidea	Ertter, B.	Taxonomy	Brittonia. 33(1): 37-38, 1981
Pocelia inconspicua	Henderson, L.F.	Distribution, Taxonomy	Torrey Botanical Club. 27:342-359, 1900
Papaver kluanense	Henderson, D.M., S. Brunsfeld, P. Brunsfeld	Distribution	Madrono. 28(2):88-90, 1981
Pediocactus simpsonii var. robustior	Arp, G.	Community ecology	Cactus Succulent Journal. 44(3):108-110, 1972
Pediocactus simpsonii var. robustior	Arp, G.	Taxonomy	Cactus Succulent Journal. 42(1): 40-43, 1970
Penstemon idahoensis	Atwood, D., S.L. Welsh	Distribution, Taxonomy	Great BAsin Naturalist. 48(4):495-498, 1988
Penstemon janishiae	Holmgren, N.H.	Distribution, Taxonomy	Brittonia. 31(2):217-242, 1979
Peraphyllum ramosissimum	Blauer, A.C., A.P. Plummer, E.D. McArthur, R. Stevens, B.C. Guinta	Biology, Distribution	USDA, Ogden, UT, 1975
Peterio thompsoniae	Barneby, R.C.	Distribution	Leaflets of Western Botany. 5(4):61-66, 1947
Phacelia lyallii	Henderson, D.M.	Ditsribution	Madrono. 25:172-174, 1978
Phacelia minutissima	Henderson, L.F.	Distribution, Taxonomy	Torrey Botanical Club. 27:342-359, 1900
Picea glauca	Corns, I.G.W.	Community ecology	Can. Journal of Botany. 13(5):995-1010, 1983

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Taxon	Author	Subject	Publication, Date
Polypodium glycyrrhiza	Berch, S.M.	Community ecology	Can. Journal of Botany. 66(10):1924-1928, 1988
Patamogeton obtusifolius	Aulio, K., M. Salin	Enrichment of Copper, Zinc, Manganese, and Iron, etc.	Bull. Environm. Contam. Toxicol. 29:320-325, 1982
Patamogeton obtusifolius	Danell, K.	Plant succession	Journal of Applied Ecology 14:933-947, 1977
Patamageton abtusifolius	Pip, E.	Ecology	Hydrobialogia 153:203-216, 1987
Patamogeton abtusifolius	Toivonen, H., C. Nybom	Succession	Ann. Bot. Fennici 26:1-14, 1989
Potamogeton abtusifolius	Toivonen, H., S. Back	Eutrophication caused changes	Ann. Bot. Fennici 26:27-38, 1989
Primula alcalina	Cholewa A.F., D.M. Henderson	Distribution, Taxonomy	Brittonia. 36(1):59-62, 1984
Ranunculus gelidus	Benson, L.	Taxonomy	Am. Midland Naturalist. 40(1): 1-261, 1948
Ranunculus pygmaeus	Benson, L.	Taxonomy	Am. Midland Naturalist. 40(1): 1-261, 1948
Rhynchospora alba	Cody, W.J.	Distribution	Can. Field-Naturalist. 92(2):137-143, 1978
Ribes wolfii	Anderson, R. Scott, David S. Shafer	Community ecology	Madrono. 38(4):287-295, 1991
Ribes wolfii	Dye, A.J., W.H. Moir	Community ecology	Am. Midland Naturalist. 97(1):133-146, 1977
Rubus pubescens	Corns, I.G.W.	Community ecolagy	Can. Journal of Botany. 13(5):995-1010, 1983
Salix candida	Argus, G.W.	Taxonomy	U af WY Publications. 21(1):1-63, 1957
Salix candida	Bogs, K., P. Hansen, R. Pfister, J. Jay	Community ecology	U af MT, 1990
Salix candida	Cooper, D.J.	Community ecolagy, Distribution	Madrono. 38(2):139-143, 1991
Salix candida	Hansen, P., K. Baggs, R. Pfister, J. Joy	Community ecalagy	UafM, Missoula, MT.,1990
Salix candida	Johnson, F.D., S.J. Brunsfeld	Distribution	Madrono. 30:259, 1983
Salix farriae	Argus, G.W.	Taxonomy	U of WY Publications. 21(1):1-63, 1957
Salix farriae	Dorn, R.D.	Taxonomy	Can. Journal of Botany. 53(15):1491-1522, 1975
Salix farriae	Hansen, P.L., S.W. Chadde, R.D. Pfister	Community ecology, Distribution, Mgmt. techniques	Uaf M. Publ. 49, Missoula, MT., 1988
Salix farriae	Hitchcock, C.L., J.W. Thompson	Distribution	Lflts. of Western Botany. 4(8):197-206, 1945
Salix glauca	Argus, G.W.	Taxonomy	Gray Herbarium #196, 1965
Saxifraga cernua	Bridgland, F., J.M. Gillet	Distribution	Can. Field-Naturalist. 97(3):279-292, 1983
Saxifraga tempestiva	Elvander, P.E.	Taxonomy	Systematic Botany Monographs 3:1-44, 1984
Saxifraga tempestiva	Elvander, P.E., M.F. Denton	New Species report	Madrona 23:346-354, 1976
Scheuchzeria palustris	Cody, W.J.	Distribution	Can. Field-Naturalist. 89:69-71
Scirpus subterminalis	Beer, S., R.G. Wetzel	Bialagy	Plant Physiology. 70(2):488-492, 1982
Scirpus subterminalis	Brodberg, R., T.R. Fisher	Distribution	Ohio Journal of Science. 76(3):109-110, 1976
Scirpus subterminalis	Catling, P.M., B. Freedman., C. Stewart, J.J. Kerekes, L.P. Lefkovitch	Community ecology, Distribution	Can. Journal of Botany. 64(4):724-729, 1986
Scirpus subterminalis	Hough, R.A.	Biology	Limnolagy & Oceanography. 19(6):912-927, 1974
Sedum rupicolum	Clausen, R.T.	Distribution, Taxonomy	Cornell U. press, 1975
Salidago spectabilis	Bjorkman, O., M. Nobs, H. Mooney	Biolagy	Carnegie Inst. 73:748-757, 1974
Sphaeromeria potentillaides	Holmgren, A.H., L.M. Shultz, T.K. Lowrey	Taxonomy	Brittonia. 28(2):255-262, 1976
Stephanameria malheurensis	Gottlieb, L.	BR, Ham	Kalmiopsis, 1991. NPS
Stipa viridula	Anderson, Howard G., Arhur W. Bailey	Community ecolagy	Can. Journal of Botany. 58(8):985-996
Stipa viridula	Barkworth, M.E., J. Maze	Taxonomy	Taxon. 31(2):290-299, 1982
Stipa viridula	Fulbright, T.E., E.F. Redente, A.M. Wilson	Bialogy	Journal of Range Mgmt. 36(3):390-394, 1985
Stipa viridula	Fulbright, T.E., E.F. Redente, A.M. Wilson	Biology	Journal of Range Mgmt. 37(5):462-464, 1984
Stipa viridula	Fulbright, T.E., E.F. Redente, A.M. Wilson	Biology	Journal of Range Mgmt. 38(3):266-270, 1985
Streptopus streptopoides var. brevipes	Fasset, N.C.	Taxonomy	Rhodora. 37:88-113, 1935
Tellima grandiflora	Chambers, K.L.	Distribution	Madrono. 22(3):105-114, 1973
Thelypodium repandum	Alverson, Ed.	Taxonomy	Douglasia. 9(3):2-4
Thelypteris phegopteris	McLaughin, W.T.	Flora af Glacier NP	Rhodora 37:362-365, 1935
Tofieldia glutinosa ssp. absana	Hitchcock, C.L.	Taxonomy	Am. Midland Naturalist. 31:487-498, 1944
Tofieldia glutinosa ssp. brevistyla	Hitchcock, C.L.	Taxonomy	Am. Midland Naturalist. 31:487-498, 1944
Trientalis latifolia	Anderson, R.C., O.L. Loucks	Biology, Distribution	Ecology. 54(4):798-808, 1973
Trientalis latifolia	Berch, S.M.	Community ecology	Can. Journal of Botany. 66(10):1924-1928, 1988

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Taxon	Author	Subject	Publication, Date
Trientalis latifolia	Chambers, K.L.	Distribution	Madrono. 22(3):105-114, 1973
Trientalis latifolia	Halpern, C.B.	Community ecology	Ecology. 70(3):704-720, 1989
Trifolium owyheense	Gilkey, H.M.	Distribution, Taxonomy	Madrono. 13:167-169, 1956
Trifolium owyheense	Grimes, J.W.	Community ecology, Distribution	Madrono. 31(2):80-85, 1984
Trifolium plumosum var. amplifolium	Gillett, J.M.	Taxonomy	Can. Journal of Botany. 50(10):1975-2007, 1972
Vaccinium oxycoccos	Angelo, R.	Distribution	Rhodora. 81(826):285-286, 1988
Vaccinium oxycoccos	Ballard, N.	Community ecology	Arboretum Bulletin. 39(2):32, 1976
Viola renifolia	Canne, J.M.	Genetics	Can. Journal of Botany 65(4):653-655, 1987
Viola renifolia	Nekola, J.C.	Rare plant notes, R.V. Drexler herbarium	Journal Iowa Academy of Sciences 97:55-73, 1990

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APPENDIX 3

Rare Habitat Group Analysis

Appendix 3

Introduction

The combining of sensitive species into habitat groups was accomplished to provide a habitat based analysis of plant communities that harbor rare plants that was both sufficient to foster protection and doable within the time and resource constraints of the project. In each section below, a list of species by major habitat group is provided with GIS attributes and themes. this information is given to facilitate planning efforts for future ecosystem management projects. Each section is prefaced with a short description of the important general physical attributes of each habitat group and a short discussion of the impacts of current and historic land use practices. In each case, the generalities have been stressed. We recognize that there is and always will be variation within the Basin with respect to the intensity and nature of the threats.

ALPINE

For this analysis, alpine includes true alpine and high subalpine habitats. These areas within the Interior Columbia Basin (ICB) are limited in extent though not infrequent. Our alpine areas are diverse in structure and composition. The more severe alpine areas include barren rocky outcrops, shallow residuum, and talus slopes. Areas with park-like subalpine fir and whitebark pine forests and forb meadows are significantly less arduous. The pattern and quantity of vegetation at high elevations is largely determined by snowpack, wind, and exposure. The economic uses of alpine areas in the ICB are essentially limited to sheep grazing and mining, though recreation-based commerce (e.g., outfitters and guides) is locally important. The most common human use of high elevation areas is recreational activities such as hiking and hunting. Alpine areas are very important to wildlife, especially as sites for reproduction and raising offspring (e.g., mountain goats and nutcrackers). The floristic diversity of high elevation habitats vary from low in harsh sites to high in moist meadows. Alpine areas contribute significantly to the beta-diversity (between site diversity) of local ecosystems because high portions of the species there are endemic to some degree.

Historically, alpine areas throughout the ICB were heavily used by domestic sheep. This use has declined significantly in the past 50 years though scars created between 1880 and 1930 are still readably evident. Today's sheep operations are smaller and better managed. Mining (usually gold or heavy metals such as antimony or uranium) at high elevations is generally devastating on a local scale (discounting the associated heavy road construction through subtending forest) but is scattered and infrequent. The pace of mineral exploration and extraction is highly dependent on the market price of the ore being sought. Beginning around 1920, white pine blister rust began infecting and devastating whitebark pine stands throughout the ICB. Today, this pathogen is still impacting high elevation woodlands. Exotic plant species (mostly grasses) are well represented in high elevation habitats though these areas are rarely as severely altered as low elevation vegetation types. In many cases, exotic plants were purposely introduced either for or by sheep grazers to improve forage production. The recreational use of alpine habitats is usually of little to no consequence; however, popular and frequently uses areas (e.g., the northern Cascades of Washington and the Trinity Lakes region of central Idaho) can suffer greatly from trampling, compaction, and increased rill erosion.

Idaho North

Subgroup: Alpine
Themes and/or Attributes: CRB005, CRB006, SAF206, SAF208

Species
Arnica alpina tomentosa
Artemisia campestris borealis purshii
Carex brewerii paddoensis
Carex incurviformis incurviformis
Carex straminoformis
Diaphasiastrum sitchense
Draba apiculata
Draba fladnizensis
Draba incerta
Erigeron radicatus
Phacelia lyallii
Ranunculus gelidus
Ranunculus pygmaeus
Saxifraga cernua
Silene uralensis montana
Thamnolia vermicularis

Oregon, Blue Mountains

Subgroup: Alpine barrens
Themes and/or Attributes: CRB005, CRB006

Species
Allium campanulatum
Anemone multifida tetonensis
Antennaria aromatica
Arenaria rossii rossii
Asplenium trichomanes
Astragalus robbinsii alpiniformis
Bupleurum americanum
Carex nardina
Castilleja rubida
Cymopteris nivalis
Draba lemmonii cyclomorpha
Dryas drummondii
Epilobium latifolium
Eriogonum scopulorum
Eritrichium nanum
Geum rossii turbinatum
Hulsea algida
Lesquerella kingii diversifolia
Lomatium cusickii
Lomatium erythrocarpum
Lomatium greenmanii
Penstemon spatulatus
Poa suksdorfii
Polemonium viscosum
Polystichum kruckebergii
Ranunculus verecundus
Salix wolfii
Selaginella watsonii
Townsendia montana
Townsendia parryi

Subgroup: Snow Banks
Themes and/or Attributes: CRB005, CRB006

Species
Thalictrum alpinum hebetum
Trollius laxus albiflorus

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Subgroup: Alpine Herbaceous
Themes and/or Attributes: CRB005

Species
Agrostis humilis
Arenaria rossii rossii
Astragalus robbinsii alpiniformis
Bupleurum americanum
Carex nardina
Carex nova
Carex praeceptorum
Castilleja glandulifera
Epilobium latifolium
Hackelia patens patens
Lomatium greenmanii
Penstemon spatulatus
Polemonium viscosum
Saxifraga adscendens oregonensis
Senecio dimorphophyllus
Senecio porteri
Thalictrum alpinum hebetum

Subgroup: Alpine wetlands
Themes and/or Attributes: CRB005, CRB007

Species
Carex nova
Corydalis caseana cusickii
Epilobium latifolium
Kobresia bellardii
Kobresia simpliciuscula
Platanthera obtusata
Salix brachycarpa
Salix drummondiana
Salix farriae
Thalictrum alpinum hebetum
Trollius laxus albiflorus

Oregon, Basin and Range

Subgroup: Alpine
Themes and/or Attributes: CRB005, CRB006, SAF206, SAF208, Steens Mountain

Species
Agrostis humilis
Botrychium lanceolatum
Botrychium lunaria
Botrychium minganense
Botrychium pinnatum
Carex haydeniana
Carex nova
Carex praeceptorum
Castilleja pilosa howellii
Claytonia nevadensis
Claytonia megarhiza
Cryptantha humilis
Gentiana prostrata
Gentiana simplex
Gentianella tenella tenella
Kobresia bellardii
Salix brachycarpa
Salix orestera
Salix wolfii

Oregon, East Cascades South

Subgroup: Alpine Barrens and Fell Fields
Themes and /or Attribute: CRB005, CRB006

Species
Arabis suffrutescens horizontalis
Arnica viscosa

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Botrychium pumicola
Castilleja rupicola
Collomia larsenii
Elmera racemosa puberulenta
Epilobium latifolium
Hieracium bolanderi
Ivesia shockleyi
Poa suksdorfii
Polystichum kruckebergii
Silene suksdorfii
Smelowskia ovalis ovalis

Washington, Columbia Basin

Subgroup: Alpine
Themes and/or Attributes: CRB005

Species
Pellaea breweri
Spiraea densiflores splendens

Washington, East Cascades North

Subgroup: Alpine
Themes and/or Attributes: CRB005, CRBS10, SAF206

Species
Agoseris elata
Agrostis borealis
Anemone nuttalliana
Arabis lemmonii paddoensis
Arnica nevadensis
Arnica rydbergii
Aster glaucescens
Botrychium lunaria
Botrychium pinnatum
Carex atrata atrosquama
Carex atrata erecta
Carex norvegica
Carex proposita
Carex scirpoidea scirpoidea
Carex vallicola
Castilleja suksdorfii
Claytonia megarhiza nivalis
Doulgasia nivalis dentata
Draba aurea
Draba cana
Erigeron humilis
Erigeron leibergii
Erigeron salishii
Eriophorum viridicarinatum
Eritrichium nanum elongatum
Gentiana glauca
Gentianella tenella
Geum rivale
Geum rossii depressum
Lloydia serotina
Loiseleuria procumbens
Parnassia kotzebuei kotzebuei
Pedicularis rainierensis
Penstemon washingtonensis
Polemonium viscosum
Potentilla diversifolia perdissecta
Potentilla quinquefolia
Ranunculus pygmaeus
Salix tweedyi
Salix vestita erecta
Saxifraga apetala
Saxifraga cernua
Saxifraga debilis
Spiranthes porrifolia
Poa arctica arctica
Poa pancispicula
Swertia perennia
Zigadenus elegans

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Washington, Okanogan Highlands

Subgroup: Barrens, tundra, snowbanks
Themes and/or Attributes: CRB005, CRB006

Species
Agrostis borealis
Antennaria corymbosa
Dodecatheon pulchellus watsonii
Draba aurea
Draba cana
Erigeron humilis
Eriophorum viridicarinatum
Gentiana glauca
Gentianella tenella
Poa arctica arctica
Polemonium viscosum
Potentilla nivea
Potentilla quinquefolia
Potentilla diversifolia perdissecta
Saxifraga adscendens oregonensi
Saxifraga cernua
Saxifraga debilis

Subgroup: Subalpine
Themes and/or Attributes: CRB005, SAF206

Species
Botrychium lunaria
Botrychium minganense
Botrychium pinnatum
Botrychium simplex
Carex atrata atrosquama
Carex atrata erecta
Carex paupercula
Carex scopulorum prinophylla
Dodecatheon pulchellum
Draba aurea
Draba cana
Gentiana glauca
Gentianella tenella
Parnassia kotzebuei kotzbuei
Salix tweedyi
Saxifraga integrifolia apetala
Spiranthes porrifolia
Trimorpha elata

Utah

Subgroup: Alpine
Themes and/or Attributes: CRB005, CRB006

Species
Draba incerta
Draba douglasii
Erigeron nanus

Wyoming

Subgroup: Alpine meadows
Themes and/or Attributes: CRB005

Species
Antennaria monocephala
Parrya nudicaulis
Pedicularis pulchella
Sausaura weberi

Subgroup: Alpine semibarrens

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Themes and/or Attributes: CRB005, CRB006

Species
Minuartia macranthera
Townsendia leptotes

Subgroup: Alpine rock outcrops and boulder fields
Themes and/or Attributes: CRB005, CRB006

Species
Draba crassa
Draba globosa

AQUATIC AND RIPARIAN

Aquatic and Riparian areas of the Interior Columbia Basin (ICB) include a broad range of intermittent and ephemeral features, perennial streams of all orders, large and small lakes, human-made water impoundments, and geothermal waters. These water bodies are of critical importance to all forms of life within the ICB. Humans use these resources for recreation, municipal utilities, commerce, and agriculture. Wildlife use them as habitat, breeding and hunting sites, refugia, and most obviously, for drinking. Migratory wildlife from salmon to neotropical birds and waterfowl have suffered irreparable harm and may even be faced with extinction because their water dominated habitats have been significantly altered. Bodies of water are no less important for plants. Vernal pools and ephemeral water courses provide unique sites in which many annuals may dependably complete their life cycles. Lakes, both large and small, provide a spectrum of habitats for plants that require submersion, wave action, low energy water movement, shallow water tables, etc. Open stream courses are the most common water feature in the ICB. The riparian areas and wetlands surrounding streams from the high mountains to the lowest deserts add structural and floristic diversity to the landscape, qualities that benefit plant species, wildlife, and humanity, and are very important in maintaining the overall biological diversity in the ICB. In lowland areas and xeric portions of the analysis area, essentially all of the riparian areas have been heavily and adversely impacted (primarily by domestic livestock grazing) which has lead to documented and significant losses in plant, fish, animal, and arthropod diversity. Other wetlands like peatlands, hotsprings, and seeps are generally very small but provide specialized microhabitats and are commonly occupied by unique plants and animals.

Current and historic patterns of water use within the ICB pose many threats to the health of riparian and aquatic habitats. Sedimentation of streambeds and the accumulation of silts in standing water bodies (both natural and human made) degrade these habitats for many plants, wildlife and people. Domestic livestock grazing has been very destructive to riparian areas, especially in the more arid portions of the ICB where the removal and trampling of vegetation and the degradation of streambanks has reduced many streams that were once perennial and vested with diverse plant and animal communities to open, barren ephemeral gulleys (a condition that benefits no one). Eutrophication from agricultural run-off and untreated or poorly treated sewage from both humans and livestock has and continues to reduce the health and economic value of aquatic and riparian ecosystems throughout the ICB. Water diversions for agriculture, industry, and direct human consumption has also negatively impacted water dominated plant and animal communities. The introduction of exotic plants and animals have exacted permanent alterations to aquatic and riparian communities throughout the ICB. From brook trout to purple loosestrife and reed canarygrass, exotic species have become both ubiquitous, destructive, and firmly incorporated into our biota.

Idaho North

Subgroup: Peatlands
Themes and/or Attributes: CRB007; Channel Type 10,12

Species
Andromeda polifolia
Betula pumila gladulifera
Carex buxbaumii
Carex chordorrhiza
Carex comosa
Carex flava
Carex leptalea
Carex livida
Carex paupercula
Cicuta bulbifera
Cypripedium fasciculatum
Drosera intermedia
Dryopteris cristata
Eriophorum viridicarinatum
Gaultheria hispidula
Helodium blandowii
Hypericum majus
Ludwigia polycarpa
Lycopodiella inundata
Rhynchospora alba
Salix candida
Salix pedicellaris
Scheuchzeria palustris
Sphagnum mendocinum
Trientalis arctica
Vaccinium oxycoccos

Subgroup: Streamside
Themes and/or Attributes: CRB007, CRBS05, SAF235; Channel Type 12

Species
Agrostis oregonensis
Bryum calobryoides
Chrysosplenium tetrandrum
Collema curtisporum
Epipactis gigantea
Lobaria hallii
Ribes howellii
Salix farriae
Tofieldia glutinosa brevistyla

Subgroup: Wet Meadows
Themes and/or Attributes: CRB007; Channel Type 12

Species
Agrostis oregonensis
Allium validum
Haplopappus hirtus sonchifolius
Psilocarphus tenellus
Salix farriae

Subgroup: Aquatic
Themes and/or Attributes: CRBS20

Species
Scirpus subterminalis

Idaho South

Subgroup: Alkaline Wetlands
Themes and/or Attributes: CRB007, CRBS05; Channel Type 12

Species
Astragalus diversifolius
Lomatogonium rotatum
Cleomella plocasperma
Primula incana
Salicornia rubra
Teucrium canadense occidentale

Subgroup: Bogs
Themes and/or Attributes: CRB007, CRBS05; Channel Type 10, 12

Species
Cicuta bulbifera
Epilobium palustre
Salix candida
Picea glauca

Subgroup: Ephemeral Wetlands
Themes and/or Attributes: CRB007, CRBS05; Channel Type 10, 12

Species
Downingia bacigaluppi
Machaerocarpus californicus
Sphaeromeria potentilloides

Subgroup: Other Aquatic and Riparian Habitats
Themes and/or Attributes: CRB007, CRBS05, CRBS20, SAF235; Channel Type 12, 20

Species
Astragalus leptaleus
Bacopa rotundifolia
Epipactis gigantea
Juncus hallii
Limosella acaulis
Salix glauca
Salix pseudomonticola

Montana

Subgroup: Peatlands
Themes and/or Attributes: CRB007; Channel Type 10, 12

Species
Carex chordorrhiza
Carex crawei
Carex livida
Carex paupercula
Carex tenuiflora
Cypripedium calceolus parviflorum
Cypripedium passerinum
Drosera anglica
Drosera linearis
Eleocharis rostellata
Epipactis gigantea
Eriophorum viridicarinatum
Gentianopsis simplex
Kalmia occidentalis
Liparis loeselii
Lycopodium inundatum
Orchis rotundifolia
Scheuchzeria palustris
Scirpus cespitosus
Scirpus hudsonianus
Utricularia intermedia
Viola renifolia

Subgroup: Emergent wetlands
Themes and/or Attributes: CRBS20; Channel Type 12

Species
Carex amplifolia
Carex chordorrhiza
Carex comosa
Howellia aquatilis

Subgroup: Aquatic habitats
Themes and/or Attributes: CRBS20

Species
Bidens beckii
Brasenia schreberi
Heteranthera dubia
Lilaea scilloides
Najas guadalupensis
Nymphaea tetragona
Potamogeton obtusifolius
Scirpus subterminalis
Wolffia columbiana

Subgroup: Riparian habitats
Themes and/or Attributes: CRB007, CRBS20, SAF235; Channel Type 12, 20

Species
Aster frondosus
Carex crawei
Carex neurophora
Carex parryana idahoa
Carex scoparia
Carex sychnocephala
Centunculus minimus
Chrysosplenium tetrandrum
Cyperus acuminatus
Cyperus rivularis
Cypripedium calceolus parviflorum
Cypripedium passerinum
Elatine americana
Elatine californica
Epipactis gigantea
Gentianopsis simplex
Juncus covillei covillei
Mimulus primuloides
Ophioglossum vulgatum
Orchis rotundifolia
Ranunculus orthorhynchus platyphyllus
Ribes triste
Rotala ramosior
Salix wolfii wolfii
Scirpus pallidus
Spiraea x pyramidata
Stellaria crassifolia
Thalictrum alpinum
Thelypodium sagittatum sagittatum
Thelypteris phegopteris
Trifolium cyathiferum
Veratrum californicum
Viola renifolia

Subgroup: Forested wetlands
Themes and/or Attributes: SAF206, SAF210, SAF217, SAF235; Channel Type 12, 20

Species
Carex eburnea
Carex paupercula
Cypripedium calceolus parviflorum
Cypripedium passerinum
Dryopteris cristata
Epipactis gigantea
Halenia deflexa
Kalmia occidentalis
Orchis rotundifolia
Petasites frigidus
Spiraea x pyramidata
Thelypteris phegopteris
Viola renifolia

Oregon Basin and Range and Owyhee Uplands

Subgroup: Alkaline pools, hot springs and adjacent meadows are sites of saline-alkaline affected soils.
Themes and/or Attributes: CRB007, CRBS05; Channel Type 10, 12

Species
Hymenoxys lemmonii
Phacelia inundata
Plagiobothrys salsus
Rorippa columbiae
Sesuvium verrucosum
Thelypodium brachycarpum

Subgroup: Vernal Pool Species
Themes and/or Attributes: CRB007, CRBS05; Channel Type 10, 12

Species
Bergia texana
Downingia insignis
Downingia laeta
Gratiola heterosepala
Mimulus latidens
Nama lobbii
Rotala ramosior
Sesuvium verrucosum
Thelypodium howellii howellii

Subgroup: Mud Flat Species
Themes and/or Attributes: CRB007, CRBS05; Channel Type 10

Species
Allium madidum
Juncus bryoides
Juncus capillaris
Juncus hemiendytus abjectus
Juncus kelloggii
Juncus tiehmii
Mimulus evanescens
Scribneria bolanderi

Subgroup: Playa Species
Themes and/or Attributes: CRB007, CRBS05, SRM401; Channel Type 10

Species
Lepidium davisii
Rorippa columbiae

Subgroup: Riverine communities
Themes and/or Attributes: SAF235; Stream Order 3, 4

Species
Carex backii
Carex hystricina
Carex sheldonii
Juncus torreyi
Penstemon pratensis
Perderidia lemmonii
Pleuropogon oregonus
Populus angustifolia
Rorippa columbiae
Salix drummondiana
Salix orestera
Salix wolfii

Subgroup: Ponds
Themes and/or Attributes: CRBS20; Channel Type 10, 12

Species

Elodea nuttallii
Lilaea scilloides
Myriophyllum sibiricum
Potamogeton diversifolius
Potamogeton filiformis
Potamogeton foliosus fibrillosus
Rotala ramosior

Oregon, Blue Mountains

Subgroup: Herbaceous and shrub wetlands
Themes and/or Attributes: CRB007, CRBS05; Channel Type 12, 20

Species
Allium madidum
Botrychium ascendens
Botrychium crenulatum
Botrychium lanceolatum
Botrychium minganense
Botrychium montanum
Botrychium paradoxum
Botrychium pinnatum
Calochortus longebarbatus peckii
Calochortus longebarbatus longebarbatus
Carex concinna
Carex dioica gynocrates
Carex hystricina
Carex sheldonii
Epipactis gigantea
Phacelia minutissima
Pleuropogon oregonus
Thelepodium howellii spectabilis
Thelupodium howellii howellii
Trifolium douglasii

Subgroup: High gradient streams
Themes and/or Attributes: CRB007, CRBS05; Channel Type 12; Rosgen Type A, B

Species
Allium robbinsii
Astragalus robbinsii alpiniformis
Bolandra oregana
Carex hendersonii
Clematis columbiana
Corydalis caseana cusickii
Dryopteris felix-mas
Lycopodium annotinum
Mimulus patulus
Rubus bartonianus

Subgroup: Low gradient streams
Themes and/or Attributes: CRB007, CRBS05; Channel Type 12, 20; Rosgen Type C

Species
Allium madidum
Botrychium minganense
Botrychium montanum
Calochortus longebarbatus peckii
Calochortus longebarbatus longebarbatus
Carex backii
Carex concinna
Carex hendersonii
Carex hystricina
Carex nova
Carex sheldonii
Corydalis caseana cusickii
Dryopteris felix-mas
Hackelia patens patens
Lycopodium annotinum
Mimulus washingtonensis washingtonensis
Pleuropogon oregonus
Ribes oxyacanthoides cognatum

Subgroup: Open water
Themes and/or Attributes: CRBS20

Species

Myriophyllum sibiricum
Potamogeton filiformis

Oregon, East Cascades South

Subgroup: Vernal Pools and Receeding Shorelines
Themes an/or Attributes:

Species
Juncus kelloggii
Lilaea scilloides
Limnanthes floccosa bellingeriana
Mimulus evanescens
Mimulus tricolor
Parvisedum pumilum
Phacelia inundata
Pilularia americana
Rorippa columbiae

Subgroup: Herbaceous Montane and Subalpine Meadows
Themes an/or Attributes:

Species
Agoseris elata
Botrychium lanceolatum
Botrychium minganense
Botrychium montanum
Botrychium pinnatum
Calamagrostis breweri
Calochortus longebarbatus longebarbatus
Carex buxbaumii
Carex comosa
Epilobium luteum
Gentiana newberryi newberryi
Oxypolis occidentalis
Perideridia erythrorhiza
Perideridia howellii

Subgroup: Herbaceous Aquatic and Subaquatic Bogs
Themes an/or Attributes:

Species
Coptis trifolia
Cypripedium calceolus parviflorum
Lobelia dortmanna
Lophotocarpus californicus
Myriophyllum sibiricum
Potamogeton filiformis
Potamogeton foliosus fibrillosus
Scheuchzeria palustris americana

Subgroup: Riparian and Riverine Shrublands
Themes and/or Attributes:

Species
Artemisia ludoviciana estesii
Juncus torreyi
Salix bonplandiana

Washington, Columbia Basin

Subgroup: Riparian, riverine
Themes and/or Attributes: CRB007, CRBS05; Channel Type 12; Stream Order 2, 3, 4

Species

Astragalus riparius
Carex densa
Carex interrupta
Crassula aquatica
Cyperus bipartitus
Heuchera grossulariifolia tenuifolia
Hypericum majus
Impatiens aurella
Limosella acaulis
Lindernia dubia
Spartina pectinata

Subgroup: Riparian, temporary pond/seep
Themes and/or Attributes: CRB007, CRBS05; Channel Type 10, 12, 20; Stream Order 1

Species

Damasonium cacifornicus
Downingia bacigallupii
Eleocharis atropurpurea
Isoetes nuttallii
Mimulus suksdorfii
Spiranthes porrifolia
Taushia tenuissima
Teucrinum canadense viscidum

Subgroup: Riparian, permanent pond/seep
Themes and/or Attributes: CRB007, CRBS05; Channel Type 10, 12, 20; Stream Order 2, 3

Species

Carex comosa
Carex flava
Carex hendersonii
Carex hystricina
Epipactis gigantea
Eleocharis rostellata
Lobelia kalmii
Muhlenbergia glomerata
Ophioglossum pusillum
Utricularia minor

Washington, East Cascades North

Subgroup: Riparian and Aquatic Wetlands
Themes and/or Attributes: CRB007, CRBS05; Channel Type 3, 10, 12, 20

Species

Carex buxbaumii
Carex chordorrhiza
Carex comosa
Carex densa
Carex hystricina
Carex novegica
Carex paupercula
Carex saxatilis major
Carex sychnocephala
Carex tenuiflora
Castilleja suksdorfii
Chrysosplenium tetrandrum
Cicuta bulbifera
Crassula aquatica
Cypripedium parviflorum
Eleocharis atropurpurea
Eleocharis rostellata
Epipactis gigantea
Eriophorum viridicarinatum
Eryngium petiolaria
Gentiana douglasiana
Gentiana glauca
Geum glauca
Geum rivale
Juncus kelloggii
Listera borealis
Limosella acaulis
Lindernia dubia
Liparis loeselii
Loiseluria procumbens
Oplioglossum pusillum
Platanthera chorisiana
Platanthera sparsiflora
Polypodium hesperium

Potentilla brewcri
Ribes oxyacanthoides cognatum
Rubus acaulis
Salix brachycarpa
Salix glauca
Salix sessilifolia
Salix tweedyi
Salix vcstita erccta
Sanicula marilandica
Spiranthcs porrifolia
Sisyrinchium septentrionale
Teucrinum canadense viscidum
Trimorpha elata
Zigadenus elegans

Washington, Okanogan Highlands

Subgroup: Xero-riparian
Themes and/or Attributes: CRB007, CRBS05; Channel Type 12; Stream Order 1, 2

Species
Botrychium lanceolatum
Botrychium lunaria
Botrychium montanum
Botrychium pinnatum
Corydalis aurea
Epipactis gigantea
Impatiens aurella
Listera borealis
Lycopodium dendroideum
Oxytropsis campestris columbiana
Sisyrinchium septentrionale
Thalictrum dasycarpum

Subgroup: Wetlands
Themes and/or Attributes: CRB007, CRBS05; Channel Type 10, 12

Species
Antennaria corymbosa
Carex atrata atrosquama
Carex atrata erecta
Carex buxbaumii
Carex capillaris
Carex dioica
Carex flava
Carex hystrina
Carex paupercula
Carex rostrata
Carex scopulorum prinophylla
Carex tenuiflora
Cicuta bulbifera
Cypripedium parviflorum
Dryopteris carthusiana
Dryopteris cristata
Eriophorum viridicarinatum
Gaultheria hispidula
Gentiana glauca
Geum rivale
Lycopodium inundatum
Muhlenbergia glomerata
Platanthera obtusata
Rubus acaulis
Salix candida
Salix maccalliana
Salix tweedyi
Sanicula marilandica
Sisyrinchium septentrionale
Spartina pectinata
Spiranthes porrifolia
Trimorpha elata

Subgroup: Riverine, perennial
Themes and/or Attributes: CRBS05; Channel Type 12; Stream Order 2, 3, 4

Species
Chrysoplenium tetrandum
Salix glauca
Salix tweedyi

Subgroup: Riverine, vernal

Themes and/or Attributes: CRB007, CRBS05; Channel Type 12, 20; Stream Order 1

Species
Crassula aquatica
Eleocharis rostellata
Ranunculus longirostris
Teucrinum canadense viscidum

Subgroup: Lacustrine
Themes and/or Attributes: CRB007, CRBS05; Channel Type 3, 12

Species
Carex aenea
Carex sychnocephala
Teucrinum canadense viscidum

Wyoming

Subgroup: Aquatic
Themes and/or Attributes: CRBS20

Species
Eleocharis flavescens
Equisetum fluviatile
Lemna valdiviana
Marsilea oligospora
Najas guadalipensis
Potamogeton friesii
Potamogeton obtusifolius
Potamogeton robbinsii
Potamogeton zosteriformis
Spirodela polyrhiza
Scirpus subterminalis

Subgroup: Riparian
Themes and/or Attributes: CRB007, CRBS05, SAF235; Channel Type 12

Species
Agoseris lackschewitzii
Aster junciformis (=A. borealis)
Astragalus robbinsii
Astragalus terminalis
Carex buxbaumii
Carex cusickii
Carex deweyana bolanderi
Carex diandra
Carex echinata
Carex laeviculmis
Carex leptalea
Carex limosa
Carex livida
Carex sartwellii
Cicuta bulbifera
Drosera angelica
Dulichium arundinaceum
Epipactis gigantea
Eriophorum gracile
Eriophorum viridicarinatum
Gentianopsis simplex
Heterocodon rariflorum
Heterotheca depressa
Juncus filiformis
Juncus tweedyi
Puccinellia fernaldii
Scheuchzeria palustris
Selaginella selaginoides
Veronica scutellata
Viola renifolia

FORESTS

Forested ecosystems occupy a significant portion of the moisture gradient within the Interior Columbia Basin (ICB). From the Juniper woodlands of southwestern Idaho, northern Nevada, and south central Oregon to the wet temperate rain forests of western hemlock and western red cedar in northern Idaho and adjacent Washington, moisture exerts a tremendous influence on forest composition. The majority of forest types in the ICB are based on conifers though hardwoods like cottonwood, aspen, and various oak species can be locally important. Humans make intensive use of forests for recreation, commerce (e.g., outfitters and mining), and agriculture (e.g., livestock grazing and timber harvest). Forests are major and important areas for both large and small wildlife, including many endangered and threatened species such as woodland caribou, large forest owls, grizzly bears, and goshawks. The forests of the ICB are floristically rich, a consequence of widely ranging moisture conditions (which are largely due to geography and topography). Dry, open woodlands at low elevations are typically vested with a rich component of shrubs and ephemeral annuals. With increasing elevation and available moisture shrubs become more prominent only to decline in importance in the highest and wettest forest types. Annuals tend to be most important in dry forests and woodlands whereas herbaceous perennials become more important with increasing elevation and available moisture.

Current and historic patterns of resource use within the forests of the ICB pose a threat to the health of these ecosystems. Fire suppression has dramatically increased the risk of stand replacing fires in forests that evolved with periodic low intensity fires. Clear cutting has, in some cases, left sites incapable of being regenerated. Timber cutting prescriptions that focus on maximum commercial return rather than sustainability have similarly degraded many forest stands. Some types of forest (juniper, pinyon, and oak woodlands) are commonly burned or otherwise destroyed (with herbicides or heavy equipment) in order to make room for increased production of plant biomass that is more palatable to livestock, especially cattle. Forests within the ICB have become increasingly susceptible to a variety of pests, pathogens, and stand replacing fires. Insects such as pine and bark beetles, tussock moth, budworm, and borers and fungi like white pine blister rust and a variety of rots have increased in frequency and economic impact over the last 30 years. In relatively dry forest types, the frequency of localized low intensity fires has declined significantly while the recurrence time of extensive high intensity burns has shortened considerably.

Idaho North

Subgroup: Clearwater Refugium Forests
Themes and/or Attributes: SAF227

Species
Cardamine constancei
Carex hendersonii
Cladonia verruculosa
Cornus nuttallii
Festuca subuliflora
Physcia semipennata
Pilophorus acicularis
Pseudocyphellaria anthraspis
Sphaerophorus tuckermanii
Trientalis latifolia

Subgroup: Dry Forests
Themes and/or Attributes: SAF210, SAF218, SAF237

Species
Allotropa virgata
Ceanothus prostratus
Cryptantha simulans
Halimolobos perplexa perplexa
Lobaria linita
Lobaria scrobiculata
Lycopodium dendroideum
Mertensia bella
Mimulus clivicola
Psoralea physodei
Ramilina thrausta
Ribes sanguineum
Ribes wolfii
Sanicula graveolens
Stipa pinetorum

Subgroup: Moist Forests
Themes and/or Attributes: CRBS09, SAF205, SAF206, SAF210, SAF212, SAF217, SAF218, SAF227

Species
Blechnum spicant
Botrychium lanceolatum lanceolatum
Botrychium minganense
Botrychium montanum
Botrychium pinnatum
Botrychium simplex
Cladonia transcendens
Collema furfuraceum
Hookeria lucens
Hypogymnia apinnata
Hypogymnia enteromorpha
Maianthemum dilatatum
Oxalis trilliifolia
Phegopteris connectilis
Polystichum braunii
Rubus spectabilis
Sanicula marilandica
Streptopus streptopoides brevipes
Tellima grandiflora
Thelypteris nevadensis

Idaho South

Subgroup: Pinyon juniper
Themes and/or Attributes: CRBS01, CRBS03, SAF107

Species
Astragalus newberryi castoreus
Camissonia pterosperma

Montana

Subgroup: Cold/moist forests (ABLA/LUHI, ABLA/MEFE, ABLA/CLUN)
Themes and/or Attributes: SAF206

Species
Mertensia bella
Polystichum kruckebergii

Subgroup: Cold/mesic forests (ABLA/VASC, ABLA/VAGL, ABLA-PIAL/VASC, TSME/XETE)
Themes and/or Attributes: SAF205, SAF206, SAF208

Species
Allotropa virgata
Calamagrostis tweedyi

Lewisia pygmaea nevadensis
Pedicularis contorta rubicunda
Synthyris missurica

Subgroup: Cold/dry forests (PIAL-ABLA, ABLA-PIAL/VASC, PIAL/VASC, ABLA/CAGE, PSME/CARU)
Themes and/or Attributes: SAF208, SAF210

Species
Orogenia fusiformis
Penstemon attenuatus militaris
Ranunculus jovis

Subgroup: Moderate/moist forests (ABLA/CLUN, PIEN/EQAR, ABLA/LIBO, ABGR/CLUN, PIEN/CLUN, THPL/CLUN)
Themes and/or Attributes: CRBS09, SAF206

Species
Cypripedium calceolus
Cypripedium fasciculatum
Cypripedium passerinum
Goodyera repens
Orchis rotundifolia
Petasites frigidus
Ribes triste
Satureja douglasii
Viola renifolia

Subgroup: Moderate/mesic forests (THPL/CLUN, ABGR/CLUN, ABGR/LIBO, PSME/PHMA, PSME/LIBO, ABLA/CLUN, ABLA/LIBO, ABLA/VACA, ABLA/VAGL, ABLA/XETE)
Themes and/or Attributes: CRBS09, SAF206, SAF210, SAF227

Species
Adoxa moschatellina
Calamagrostis tweedyi
Castilleja covilleana
Cirsium brevistylum
Cypripedium fasciculatum
Gaultheria ovatifolia
Goodyera repens
Lewisia pygmaea nevadensis
Trifolium eriocephalum piperi

Subgroup: Moderate/dry forests (PSME/CARU, PSME/SPBE, PSME/SYAL, PSME/VAGL, PSME/CAGE)
Themes and/or Attributes: SAF210

Species
Castilleja covilleana
Clarkia rhomboidea
Orogenia fusiformis
Penstemon lemhiensis
Trifolium gymnocarpon

Subgroup: Warm/moist forests (THPL/OPHO, THPL/ATFI, THPL/GYDR, THPL/CLUN, TSHE/GYDR, TSHE/CLUN)
Themes and/or Attributes: SAF227

Species
Botrychium crenulatum
Botrychium minganense
Botrychium montanum
Lilium columbianum
Thelypteris phegopteris

Subgroup: Warm/mesic forests (PSME/SYAL, PSME/CARU)
Themes and/or Attributes: SAF210

Species
Botrychium montanum
Botrychium spathulatum
Castilleja cervina
Cirsium brevistylum

Subgroup: Warm/dry forests (PIPO/AGSP, PIPO/FEID, PSME/FEID)
Themes and/or Attributes: SAF237

Species
Arctostaphylos patula
Castilleja cervina
Kelloggia galioides
Lomatium geyeri
Madia minima

Oregon, Blue Mountains

Subgroup: Juniper forests
Themes and/or Attributes: CRBS03, SRM107

Species
Allium campanulatum
Pediocactus simpsonii robustior
Silene scaposa scaposa
Thelypodium eucosmum

Subgroup: Ponderosan pine/Doug-fir forests
Themes and/or Attributes: SAF210, SAF237

Species
Allium bisceptrum
Allium campanulatum
Astragalus tegetarioides
Calochortus longebarbatus peckii
Calochortus longebarbatus longebarbatus
Clematis columbiana
Cypripedium fasciculatum
Cypripedium montanum
Frasera albicaulis idahoensis
Lupinus sabinii
Mimulus evanescens
Mimulus hymenophyllus
Mimulus patulus
Mimulus washingtonensis washingtonensis
Orobanche pinorum
Ribes oxyacanthoides cognatum
Ribes oxycanthoides irriguum
Silene scaposa scaposa

Subgroup: Grand fir forests
Themes and/or Attributes: CRBS09

Species
Clematis columbiana
Cypripedium fasciculatum
Cypripedium montanum
Dryopteris felix-mas
Listera borealis
Lupinus sabinii
Lycopodium annotinum
Lycopodium complanatum
Orobanche pinorum
Ribes oxycanthoides irriguum

Subgroup: Subalpine fir forests
Themes and/or Attributes: SAF206

Species
Allium campanulatum
Castilleja glandulifera

Cypripedium montanum
Orobanche pinorum

Subgroup: Lodgepole pine forests
Themes and/or Attributes: SAF218

Species
Allium campanulatum
Botrychium crenulatum
Botrychium lanceolatum
Botrychium minganense
Botrychium montanum
Botrychium pinnatum
Listera borealis
Lycopodium annotinum
Platanthera obtusata

Subgroup: Whitebark pine/limber pine forests
Themes and/or Attributes: SAF208, SAF219

Species
Allium campanulatum

Oregon, East Cascades South

Subgroup: Red fir and whitefir
Themes and/or Attributes:

Species
Asarum wagneri
Carex whitney
Collomia mazama
Nama lobbii
Synthyris stellata

Subgroup: Lodgepole pine
Themes and/or Attributes:

Species
Astragalus peckii
Botrychium pumicola
Castilleja chlorotica
Mimulus jepsonii

Subgroup: Western red cedar and western hemlock
Themes and/or Attributes:

Species
Botrychium montanum
Botrychium pinnatum
Huperzia occidentalis
Lycopodium annotinum

Subgroup: Juniper/sagebrush
Themes and/or Attributes:

Species
Astragalus peckii
Silene scaposa scaposa

Subgroup: Oregon white oak woodlands

Themcs and/or Attributcs:

Species

Lomatium suksdorfii

Meconella oreganaì

Subgroup: Low elevation Ponderosa pine
Themes and/or Attributes:

Species

Allium campanulatum
Carex eleocharis
Castilleja chlorotica
Cypripedium montanum
Mimulus pulsiferae
Penstemon peckii

Subgroup: Ponderosa pine/mixed conifer woodlands
Themes and/or Attributes:

Species

Castilleja chlorotica
Cypripedium montanum
Hieracium greenei
Lithophragma campanulata
Mimulus jepsonii
Nama lobbii
Penstemon glaucinus

Utah

Subgroup: Forest
Themes and/or Attributes: CRBS01, SAF206, SAF210, SAF219

Species

Astragalus alpinus
Astragalus filipes
Astragalus iodanthus
Cryptantha spiculifera

Washington, Columbia Basin

Subgroup: Forest
Themes and/or Attributes: SAF210, SAF218, SAF237

Species

Antennaria parviflorum
Corydalis aurea
Lupinus sabinii
Mimulus pulsiferae
Orobanche pinorum
Ribes oxyacanthoides cognatum
Ribes oxyacanthoides irriguum

Subgroup: Grand fir forest
Themes and/or Attributes: CRBS09

Species

Corydalis aurea
Lupinus sabinii
Orobanche pinorum
Ribes oxyacanthoides cognatum
Ribes oxyacanthoides irriguum

Subgroup: Aspen forest
Themes and/or Attributes: SAF217

Species
Corydalis aurea
Cypripedium parviflorum

Subgroup: Ponderosa pine forests
Themes and/or Attributes: SAF237

Species
Antennaria parviflorum
Corydalis aurea
Lupinus sabinii
Mimulus pulsiferae
Ribes oxyacanthoides cognatum
Ribes oxyacanthoides irriguum

Washington, East Cascades North

Subgroup: Oak forests
Themes and/or Attributes: SAF233

Species
Antennaria parvifolia
Astragalus hoodianus
Carex vallicola
Cypripedium montanum
Cypripedium parviflorum
Epipactis gigantea
Hackelia diffusa diffusa
Mimulus pulsiferae
Oxalis suksdorfii

Subgroup: Douglas-fir forests
Themes and/or Attributes: SAF210

Species
Botrychium lanceolatum
Botrychium lunaria
Botrychium montanum
Carex buxbaumii
Carex vallicola
Corallorhiza trifida
Epipactis gigantea
Hemitome congestum
Lewisia tweedyi
Listera borealis
Montia diffusa
Orobanche pinorum
Oxalis suksdorfii
Platanthera obtusata
Pleuricospora fimbriolata
Sanicula marilandica
Veratrum insolitum

Subgroup: Subalpine fir forests
Themes and/or Attributes: SAF206

Species
Botrychium lanceolatum
Botrychium lunaria
Botrychium montanum
Carex atrata erecta
Chrysosplenium tetrandrum
Corallorhiza trifida
Hemitomes congestum
Lewisia tweedyi
Listera borealis
Platanthera obtusata

Subgroup: Subalpine larch forests
Themes and/or Attributes: CRBS10, SAF206

Species
Carex atrata erecta
Carex vallicola

Washington, Okanogan Highlands

Subgroup: Forest
Themes and/or Attributes: SAF206, SAF210, SAF218, SAF227

Species
Astragalus microcystis
Botrychium lanceolatum
Botrychium lunaria
Botrychium minganense
Botrychium montanum
Botrychium pinnatum
Carex xerantica
Dodecatheon pullchellum watsonii
Orobanche pinorum
Phacelia franklinii
Ribes oxyacanthoides cognatum
Ribes oxyacanthoides irriguum
Vaccinium myrtilloides
Zigadenus elegans

Wyoming

Subgroup: Dry Forests
Themes and/or Attributes: SAF218, SAF237

Species
Arceuthobium douglasii
Calamagrostis scopulorum
Carex preslii
Hieracium scouleri

Subgroup: Moist Forests
Themes and/or Attributes: CRBS09, SAF210, SAF217, SAF218

Species
Botrychium virginianum
Calamagrostis scopulorum
Dryopteris expansa
Festuca occidentalis
Gymnocarpium dryopteris
Listera caurina
Listera convallarioides
Melica smithii
Ophioglossum vulgatum
Rubus acaulis
Trautvettaria caroliniensis
Viola orbiculata
Xerophyllum tenax

GRASSLANDS AND SHRUBLANDS

Grasslands and shrublands occur throughout the entire elevational range of the Interior Columbia Basin (ICB). Shrublands tend to occupy relatively xeric sites that can be as large as a landscape or as small as several meters square. Grasslands on the other hand may occur in dry or wet areas. Bunchgrasses and annual species are favored where conditions are dry (chronically or seasonally) whereas rhizomatous grasses tend to occur where soil moisture is more abundant or consistent. Grasslands and shrublands ar important habitats for many small animals. Large animals often use these areas to browse or graze but few live there exclusively (due largely to the lack of adequate cover). Insect, reptile, rodent, and bird faunas are typically diverse in both grasslands and shrublands (though may be locally impoverished in areas under unsustainable land management practices). The floristic diversity of grasslands and shrublands tends to be strongly tied to available soil moisture (except in cases of azonal soils and lithologies). Moist grasslands, especially where soils are deep, , are commonly rich in forb diversity (e.g., the Palouse) whereas very sandy areas (e.g., St. Anthony Dunes, Idaho and portions of the Great Sandy Desert, Oregon) commonly have a mere handful of species. Mountain shrublands commonly have a diverse understory of forbs and perennial grasses whereas desert shrublands are commonly more rich with forbs and annuals.

The history of use and conversion in shrublands and grasslands extends back to pre-European settlement times. Native Americans were known to have burned some of these habitats for a variety of reasons, though usually with only local impacts. Beginning in the 1860's, when domestic livestock grazing became important throughout the ICB, grasslands and shrublands have been continuously converted or degraded. Most of these areas are or were heavily over-grazed (though the Taylor Grazing Act of 1939 instituted significant reforms). Perhaps more insidious has been the introduction and establishment of a broad range of exotic plant species that has been directly attributed to livestock grazing. Exotics such as cheatgrass and Russian thistle have converted millions of acres of relatively diverse shrublands and grasslands to depauperate, fire prone landscapes with significantly lowered economic value. Agricultural conversion has impacted grasslands more than shrublands, especially in valley bottoms. More than 95% of the extensive grasslands of northern Idaho and adjacent eastern Washington have been converted to farmland. Water diversions for agriculture have had significant dilatory effects on the shrublands and grasslands in most watersheds surrounding the major agricultural centers within the ICB. In local areas around burgeoning population centers, many acres of grasslands and shrublands have and continue to be converted for housing and industry. Significant recreational impacts to grasslands and shrublands tends to be localized but are occasionally sever. Activities involving all-terrain or off-road vehicles (including horses) are usually the most destructive often causing sever erosion, losses in vegetation, and slope failures.

Idaho North

Subgroup: Canyon grasslands
Themes and/or Attributes: CRBS06, CRBS07, SRM101, SRM304

Species
Astragalus riparius
Calochortus macrocarpus maculosa
Camassia cusickii
Chrysothamnus nauseosus nanus
Crepis bakeri idahoensis
Erigeron engelmannii davisii
Mimulus washingtonensis ampliatus

Subgroup: Montane balds and ridges grasslands
Themes and/or Attributes: CRBS06, SRM101, SRM304

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Species

Astragalus bourgovii
Carex californica
Eriogonum capistratum welshii

Subgroup: Prairie grasslands
Themes and/or Attributes: CRBS06, CRBS07, SRM101, SRM304

Species

Astragalus bisulcatus bisulcatus
Bouteloua gracilis
Thelomma occelatum
Trifolium plumosum amplifolium

Idaho South

Subgroup: Low sage grassland shrubland
Themes and/or Attributes: SRM403, SRM406

Species

Astragalus salmonis
Gymnosteris parvula
Pediocactus simpsonii robustior
Scutellaria nana nana
Stylocline filaginea

Subgroup: General grasslands and shrublands
Themes and/or Attributes: CRB003, CRBS06, CRBS07, SRM101, SRM104, SRM304, SRM401, SRM402, SRM403, SRM406, SRM607

Species

Allium anceps
Astragalus drummondii
Astragalus newberryi castoreus
Astragalus salmonis
Astragalus tetrapterus
Camissonia palmeri
Camissonia pterosperma
Carex tumulicola
Chaenactis stevioides
Coryphantha vivipara
Cuscuta denticulata
Eriogonum desertorum
Gymnosteris nudicaulis
Gymnosteris parvula
Ipomopsis polycladon (=Gilia polycladon)
Lomatium dissectum dissectum
Lupinus uncialis
Muhlenbergia racemosa
Oryzopsis micrantha
Oxytropis besseyi salmonensis
Pediocactus simpsonii robustior
Peraphyllum ramosissimum
Piptatherum micranthum
Psathyrotes annua
Scutellaria nana nana
Stipa viridula
Stylocline filaginea
Thelomma ocellatum
Townsendia scapigera

Subgroup: Sandy grasslands and shrublands
Themes and/or Attributes: CRBS06, CRBS07, SRM607

Species

Chaenactis stevioides
Glyptopleura marginata
Gymnosteris nudicaulis
Oxytheca dendroidea
Psathyrotes annua
Sporobolus asper

Montana

Subgroup: High-elevation Idaho fescue
Themes and/or Attributes: CRBS06, SRM304

Species
Allium simillimum
Draba densifolia
Erigeron formosissimus viscidus
Lesquerella klausii
Mimulus nanus
Penstemon lemhiensis
Potentilla quinquefolia
Polygonum douglasii austinae
Saxifraga apetala
Thlaspi parviflorum

Subgroup: Low-elevation Idaho fescue
Themes and/or Attributes: CRBS06, SRM304

Species
Allium parvum
Astragalus convallarius convallarius
Athysanus pusillus
Camissonia andina
Erigeron linearis
Halimolobos perplexa lemhiensis
Idahoa scapigera
Lesquerella carinata languida
Penstemon lemhiensis
Penstemon payettensis
Phlox kelseyi missoulensis
Trifolium gymnocarpon
Myosotis verna

Subgroup: Bluebunch wheatgrass
Themes and/or Attributes: CRBS06, SRM101

Species
Allium columbianum
Camissonia andina
Ipomopsis minutiflora
Lagophylla ramosissima
Lesquerella carinata languida
Phlox kelseyi missoulensis

Subgroup: Low-elevation rough fescue
Themes and/or Attributes: CRBS06, SRM304

Species
Aster frondosus
Astragalus convallarius convallarius
Atriplex truncata
Boisduvalia densiflora
Botrychium hesperium
Botrychium paradoxum
Delphinium burkei
Grindelia howellii
Myosotis verna
Oxytropis campestris columbiana
Oxytropis lagopus conjugens
Phlox kelseyi missoulensis
Silene spaldingii

Subgroup: High-elevation rough fescue
Themes and/or Attributes: CRBS06, SRM304

Species
Allium fibrillum
Botrychium paradoxum
Polygonum douglasii austinae

Subgroup: Low-elevation sagebrush
Themes and/or Attributes: SRM401, SRM403

Species
Agastache cusickii
Allium parvum
Arabis fecunda
Aster frondosus
Astragalus ceramicus apus
Astragalus platytropis
Astragalus scaphoides
Astragalus terminalis
Boisduvalia densiflora
Cryptantha fendleri
Delphinium bicolor no
Elymus flavescens
Erigeron linearis
Grindelia howellii
Halimolobos perplexa lemhiensis
Halimolobos virgata
Hutchinsia procumbens
Ipomopsis congesta crebrifolia
Ipomopsis minutiflora
Kochia americana
Lesquerella pulchella
Lomatium attenuatum
Oenothera pallida idahoensis
Oxytropis lagopus conjugens
Penstemon lemhiensis
Phacelia scopulina
Potentilla plattensis
Ranunculus jovis
Sphaeralcea munroana
Sphaeromeria argentea
Sphaeromeria capitata
Townsendia florifer

Subgroup: High-elevation sagebrush
Themes and/or Attributes: SRM402, SRM421

Species
Allium acuminatum
Allium parvum
Astragalus terminalis
Calochortus bruneaunis
Erigeron formosissimus viscidus
Eriogonum caespitosum
Halimolobos perplexa lemhiensis
Haplopappus macronema linearis
Helenium hoopsii
Ipomopsis congesta crebrifolia
Juncus hallii
Mimulus nanus
Oxytropis lagopus conjugens
Penstemon lemhiensis
Saxifraga apetala
Sphaeromeria argentea
Thlaspi parviflorum
Townsendia nuttallii

Oregon, Basin and Range

Subgroup: Mountain big sage
Themes and/or Attributes:

Species
Allium bisceptrum
Allium campanulatum
Astragalus tegetarioides
Caulanthus major
Crepis modocensis modocensis
Hackelia patens patens
Orthocarpus cuspidatus cryptanthus
Pedicularis centranthera
Penstemon janishiae
Penstemon kingii
Penstemon seorsus
Symphoricarpos longiflorus

Subgroup: Low sage
Themes and/or Attributes:

Species
Artemisia papposa
Asclepias cryptoceras
Astragalus tegetarioides
Hymenoxys lemmonii
Orthocarpus cuspidatus cryptanthus
Trifolium owyheense

Subgroup: Salt Desert Shrublands
Themes and/or Attributes:

Species
Allenrolfea occidentalis
Antirrhinum kingii
Chaenactis macrantha
Chaenactis stevioides
Cryptantha propria
Ephedra nevadensis
Ephedra viridis
Langloisia setosissima punctata
Malacothrix torreyi
Pediocactus simpsonii robustior
Phacelia gymnoclada

Subgroup: Basin big sage
Themes and/or Attributes:

Species
Astragalus alvordensis
Astragalus atratus owyheensis
Camissonia palmeri
Eriogonum brachyanthum
Hackelia cronquistii
Malacothrix glabrata
Phacelia gymnoclada
Stylocline psilocarphoides
Trifolium owyheense

Subgroup: Wyoming big sage
Themes and/or Attributes:

Species
Argemone munita rotundata
Astragalus solitarius
Astragalus tetrapterus
Caulanthus crassicaulis
Caulanthus pilosus
Cryptantha propria
Cymopterus purpurascens
Gilia salticola
Hymenoxys cooperi canescens
Lomatium ravenii
Lupinus biddlei
Pectocarya setosa
Penstemon janishiae
Penstemon kingii
Penstemon perpulcher
Penstemon seorsus
Phacelia gymnoclada
Stephanomeria malheurensis

Oregon, Blue Mountains

Subgroup: Idaho fescue grasslands
Themes and/or Attributes: CRBS06, SRM304

Species
Astragalus arthurii
Calochortus macrocarpus maculosum
Erigeron disparipilus
Erigeron engelmannii davisii
Frasera albicaulis idahoensis
Lupinus sabinii
Silene spaldingii

Subgroup: Bluebunch wheatgrass grasslands
Themes and/or Attributes: CRBS06, SRM101

Species
Asclepias cryptocerus
Astragalus arthurii
Calochortus macrocarpus maculosum
Erigeron disparipilus
Erigeron engelmannii davisii
Frasera albicaulis idahoensis
Haplopappus radiatus
Lomatium rollinsii
Lupinus sabinii
Mirabilis macfarlanei
Silene scaposa scaposa
Thelypodium eucosmum

Subgroup: Sandberg bluegrass grasslands
Themes and/or Attributes: CRBS06

Species
Allium brandegei
Allium geyeri
Allium tolmiei platyphyllum
Astragalus salmonis
Collomia macrocalyx
Lomatium ochocensis
Oryzopsis hendersonii
Oryzopsis wallowaensis
Primula cusickiana

Subgroup: Shrublands, general
Themes and/or Attributes: SRM104, SRM322, SRM402, SRM421

Species
Ribes cereum colubrinum
Rubus bartonianus
Silene spaldingii

Subgroup: Rigid sage
Themes and/or Attributes: SRM406

Species
Allium brandegei
Allium macrum
Oryzopsis hendersonii
Oryzopsis wallowaensis

Subgroup: Big sage
Themes and/or Attributes: SRM401, SRM403

Species
Allium brandegei
Astragalus atratus owyheensis
Astragalus tegetarioides
Eriogonum ochrocephalum calcareum
Haplopappus radiatus

Subgroup: Mountain big sage
Themes and/or Attributes: SRM402

Species
Allium campanulatum

Subgroup: Low sage
Themes and/or Attributes: SRM406

Species
Artemisia arbuscula thermopola
Astragalus salmonis
Oryzopsis wallowaensis

Oregon, East Cascades South

Subgroup: Low sagebrush
Themes and/or Attributes:

Species
Allium macrum
Artemisia arbuscula thermopola
Castilleja thompsonii
Claytonia umbellata
Collomia macrocalyx
Coryphantha vivipara vivipara
Lomatium farinosum hambleniae
Lomatium watsonii
Mimulus pygmaeus
Oryzopsis hendersonii
Pediocactus simpsonii robustior
Penstemon seorsus
Silene scaposa scaposa
Talinum spinescens

Subgroup: Wyoming and Mountain big sage
Themes and/or Attributes:

Species
Astragalus hoodianus
Astragalus howellii
Astragalus peckii
Astragalus salmonis
Astragalus tyghensis
Camissonia pygmaea
Castilleja chlorotica
Caulanthus pilosus
Crepis modocensis modocensis
Cryptantha propria
Cryptantha rostellata
Linanthus bolanderi
Lupinus latifolius thompsonianus
Mimulus pygmaeus
Nicotiana quadrivalis
Ranunculus reconditis
Ribes inerme klamathense
Scribneria bolanderi
Silene nuda insectivora
Silene scaposa scaposa

Subgroup: Curlleaf Mountain Mahogany
Themes and/or Attributes:

Species
Melica stricta

Oregon, High Lava Plains

Subgroup: Salt Desert Shrub
Themes and/or Attributes:

Species
Astragalus applegatei
Plagiobothrys salsus
Thelypodium brachycarpum
Thelypodium howellii howellii

Utah

Subgroup: Grassland
Themes and/or Attributes: CRBS06, CRBS07, SRM101, SRM304, SRM607

Species
Haplopappus hirtus
Ligusticum grayi
Lomatium cous
Senecio foetidus

Subgroup: Shrubland
Themes and/or Attributes: CRB003, CRBS07, SRM104, SRM107, SRM322, SRM401, SRM402, SRM403, SRM406, SRM421

Species
Arenaria fendleri aculeata
Aster scopulorum
Astragalus purshii glareosus
Cryptantha interrupta
Erigeron linearis
Eriogonum brevicaule desertorum
Eriophyllum lanatum
Mimulus breweri
Paeonia brownii
Pedicularis contorta
Phacelia ivesiana glandulifera
Silene oregana
Stipa thurberiana

Washington, Columbia Basin

Subgroup: Deep, fine textured soils
Themes and/or Attributes: CRBS06, CRBS07, SRM101, SRM304, SRM607

Species
Astragalus cusickii cusickii
Collinsia sparsiflora bruceae
Erigeron piperianus
Trifolium plumosum plumosum

Subgroup: Deep, coarse textured soils
Themes and/or Attributes: CRBS06, CRBS07, SRM101, SRM304, SRM607

Species
Hackelia hispida hispida
Lomatium rollinsii

Subgroup: Shallow soils
Themes and/or Attributes: CRBS06, CRBS07, SRM101, SRM304, SRM607

Species
Draba douglasii douglasii
Eriogonum maculatum
Githopsis specularioides
Hackelia diffusa diffusa
Linanthus bolanderi
Mimulus washingtonensis
Penstemon denstus variabilis
Saxifraga integrifolia apetala

Subgroup: Shrubland Deep, fine textured soils
Themes and/or Attributes: CRBS07, SRM104, SRM322, SRM401, SRM402, SRM403, SRM406, SRM421

Species

Astragalus arrectus
Balsamorhiza deltoidea
Cuscuta denticulata
Erigeron piperianus
Nicotiana attenuata

Subgroup: Deep, coarse textured soils
Themes and/or Attributes: CRBS07, SRM104, SRM322, SRM401, SRM402, SRM403, SRM406, SRM421

Species
Arabis crucisetosa
Arenaria franklinii thompsonii
Cuscuta denticulata
Cryptantha leucophaea
Oenothera cespitosa
Oenothera flava

Subgroup: Deep, saline-alkali soils
Themes and/or Attributes: CRBS07, SRM104, SRM322, SRM401, SRM402, SRM403, SRM406, SRM414, SRM421

Species
Astragalus geyeri
Thelypodium howellii howellii

Subgroup: Shallow soils
Themes and/or Attributes: CRBS07, SRM104, SRM322, SRM401, SRM402, SRM403, SRM406, SRM421

Species
Allium constrictum
Astragalus arthurii
Astragalus misellus pauper
Cryptantha interrupta
Cryptantha rostillata
Eatonella nivea
Eriogonum maculatum
Hackelia hispida disjuncta
Juncus uncialis
Pectocarya setosa
Pediocactus simpsonii robustior
Phacelia tetramera
Polygonum austiniae

Washington, East Cascades North

Subgroup: Shrublands
Themes and/or Attributes: SRM104, SRM401, SRM402, SRM403, SRM406, SRM421

Species
Aster sibericus meritus
Astragalus arrectus
Astragalus hoodianus
Astragalus misellus pauper
Carex stenophylla
Collinsia sparsiflora bruceae
Delphinium xantholeucum
Erigeron piperianus
Githopsis speculariodes
Hackelia diffusa diffusa
Hackelia hispida disjuncta
Iliamna longisepala
Linanthus bolanderi
Lomatium quintuplex
Mimulus suksdorfii
Nicotiana attenuata
Oryzopsis hendersonii
Pectocarya setosa
Pediocactus simpsonii
Pellaea brachyptera
Phacelia franklinii
Potentilla nivea
Ranunculus reconditus
Saxifraga apetala
Silene douglasii manatha
Valeriana columbiana

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Subgroup: Grasslands
Themes and/or Attributes: CRBS06, SRM101, SRM304, SRM607

Species
Botrychium simplex
Cypripedium montanum
Cypripedium parviflorum
Eryngium petiolatum
Orthocarpus bracteousus
Potentilla diversifolia perdissecta
Ribes oxyacanthoides cognatum

Washington, Okanogan Highlands

Subgroup: Rhizomatous grasses dominant
Themes and/or Attributes: CRB007, CRBS06

Species
Botrychium simplex
Carex vallicola
Sisyrinchium septentrionale

Subgroup: Bunchgrass dominant
Themes and/or Attributes: SRM101, SRM304

Species
Carex xerantica
Cryptantha interrupta

Wyoming

Subgroup: Grasslands
Themes and/or Attributes: CRBS06, CRBS07, SRM101, SRM304, SRM607

Species
Lomatium bicolor
Triteleia grandiflora

Subgroup: Shrublands
Themes and/or Attributes: CRB003, CRBS07, SRM104, SRM107, SRM322, SRM401, SRM402, SRM403, SRM406, SRM421

Species
Artemisia spiciformis
Calochortus eurycarpus
Clarkia pulchella
Gayophytum humile
Haplopappus macronema linearis
Ipomopsis crebifolia
Kelloggia galioides
Lepidium densifolrum pubicarpum
Monardella odoratissima glauca
Orobanche corymbosa corymbosa
Orobanche ludoviciana arenosa
Paeonia brownii
Perideridia bolanderi bolanderi
Townsendia florifer

ROCK

The rocky habitats within the Interior Columbia Basin (ICB) usually occur as inclusions within other types of habitats. They may be represented as sand dunes, cliffs, mountain tops, talus slopes, lava flows and cinder cones, and scablands. There are some large extensive areas of rocky habitats however, including the Crater's of the Moon area in Idaho and the cliffs of the Columbia River Gorge. These areas are usually low in biological (both floral and faunal) diversity but commonly harbor edaphically endemic species (especially when the rocks are azonal). Limestone and dolomite, rhyolitic ashes, and serpentine commonly have several substrate specific plant species whereas basalt and granite outcrops have very few. Animals typically use rocky habitats only occasionally, though a few species such as marmots, picas, and rock wrens live and reproduce there.

Rocky areas are habitats typically used for relatively few human activities. Mining activities are usually thoroughly destructive though mostly highly localized. Most recreational uses have little impact, the exception being off-road and all-terrain vehicles. Motorized recreation can destroy plant and animal habitat, cause or exacerbate erosion problems, and it the most destructive recreational use of rocky habitats. In some areas, livestock grazing and introduced exotic plant species have significantly impacted the quality of rock inhabiting plant communities.

Idaho North

Subgroup: High Elevation Rock
Themes and/or Attributes: CRB007

Species
Adiantum aleuticum
Cladonia luteoalba
Collomia debilis camporum
Lewisia kelloggii
Romanzoffia sitchensis

Subgroup: Talus Rock
Themes and/or Attributes: CRB007

Species
Lomatium salmoniflorum
Pentagramma triagularis triangularis
Thelypodium lacinatum streptanthoides

Idaho South

Subgroup: Badlands
Themes and/or Attributes: CRB007

Species
Aspicilia fruticulosa
Astragalus amblytropis
Astragalus aquilonius
Blepharidachne kingii
Eriogonum shockleyi packardiae
Eriogonum shockleyi shockleyi
Hymenoxys richardsonii
Ipomopsis polycladon (= Gilia polycladon)

Lupinus uncialis
Nemacladus rigidus
Penstemon janishiae
Xanthoparmelia idahoensis

Subgroup: Cinder
Themes and/or Attributes: CRB007

Species
Dimeresia howellii
Eatonella nivea

Subgroup: Clay Ash
Themes and/or Attributes: CRB007

Species
Cymopterus acaulis greeleyorum
Phacelia lutea calva

Subgroup: Non-Clay Ash
Themes and/or Attributes: CRB007

Species
Eriogonum ochrocephalum calcareum
Mentzelia torreyi acerosa

Subgroup: Rock Outcrops
Themes and/or Attributes: CRB007

Species
Asplenium viride
Astragalus gilviflorus

Oregon Basin and Range and Owyhee Uplands

Subgroup: Talus, Scree and Gravels
Themes and/or Attributes: CRB007

Species
Agastache cusickii
Antirrhinum kingii
Collomia macrocalyx
Collomia renacta
Eriogonum nutans nutans
Eriogonum prociduum
Phacelia gymnoclada

Subgroup: Basalt and Rhyolite Rock Outcrops
Themes and/or Attributes: CRB007

Species
Agastache cusickii
Astragalus tegetarioides
Artemisia packardiae
Claytonia umbellata
Cymopterus nivalis
Draba sphaeroides cusickii
Dryopteris filix-mas
Hackelia ophiobia
Hackelia patens patens
Haplopappus macronema macronema
Ivesia shockleyi
Melica stricta
Mirabilis bigelovii retrorsa
Pediocactus simpsonii robustior
Penstemon davidsonii prateritus
Polemonium viscosum

Polystichum kruckebergii
Saxifraga adscendens oregonensis
Sedum debile
Selaginella watsonii
Symphoricarpos longiflorus

Subgroup: Succor Creek Ash
Themes and/or Attributes: CRB007

Species
Astragalus sterilis
Chaenactis cusickii
Cymopterus acaulis greeleyorum
Mentzelia mollis
Phacelia lutea calva

Subgroup: Leslie Gulch Ash
Themes and/or Attributes: CRB007

Species
Astragalus sterilis
Eriogonum novonudum
Ivesia rhypara rhypara
Lomatium ravenii
Mentzelia packardiae
Phacelia lutea mackenzieorum
Senecio ertterae
Trifolium owyheense

Subgroup: Non-specific Ash
Themes and/or Attributes: CRB007

Species
Allium lemmonii
Amsinckia carinata
Argemone munita rotundata
Astragalus alvordensis
Astragalus sterilis
Astragalus tegetarioides
Astragalus tetrapterus
Chaenactis cusickii
Chaenactis macrantha
Chaenactis stevioides
Cryptantha propria
Cymopterus nivalis
Eriogonum crosbyae
Eriogonum cusickii
Eriogonum novonudum
Eriogonium ochrocephalum
Eriogonum prociduum
Eriogonum salicornioides
Ivesia rhypara rhypara
Ivesia rhypara shellyi
Langloisia setosissima punctata
Stanleya confertiflora
Trifolium leibergii
Trifolium owyheense

Subgroup: Sand
Themes and/or Attributes: CRB007

Species
Astragalus alvordensis
Astragalus atratus owyheensis
Astragalus mufordiae
Astragalus tetrapterus
Camissonia palmeri
Chaetadelpha wheeleri
Eriogonum nutans nutans
Hackelia cronquistii
Stylocline psilocarphoides

Oregon, Blue Mountains

Subgroup: Ash
Themes and/or Attributes: CRB007

Species
Allium pleinthum
Astragalus diaphanus diurnus
Eriogonum ochrocephalum calcareum
Lomatium rollinsii
Lupinus cusickii
Thelypodium eucosmum

Subgroup: Cinder
Themes and/or Attributes: CRB007

Species
Mimulus evanescens
Mimulus hymenophyllus
Mimulus patulus

Subgroup: Cliffs
Themes and/or Attributes: CRB007

Species
Allium geyeri
Anemone multifida tetonensis
Asplenium trichomanes
Bolandra oregana
Carex nardina
Cheilanthes feei
Cryptogramma stelleri
Draba lemmonii cyclomorpha
Epilobium latifolium
Epipactis gigantea
Geum rossii turbinatum
Heuchera grossularifolia grossularifolia
Leptodactylon pungens hazeliae
Mimulus washingtonensis wash.ingtonensis
Pellaea bridgesii
Phlox multiflora
Polystichum kruckebergii
Rubus bartonianus
Salix wolfii
Selaginella watsonii

Subgroup: Scablands
Themes and/or Attributes: CRB007

Species
Allium bisceptrum
Allium dictuon
Allium geyeri
Allium tolmiei platyphyllum
Astragalus salmonis
Claytonia umbellata
Erigeron engelmannii davisii
Lewisia columbiana wallowensis
Lomatium ochocensis
Mimulus washingtonensis wash.ingtonensis
Oryzopsis hendersonii
Oryzopsis wallowaensis
Pediocactus simpsonii robustior
Primula cusickiana
Ranunculus oresterus

Subgroup: Talus
Themes and/or Attributes: CRB007

Species
Claytonia umbellata
Luina serpentina
Mirabilis macfarlanei
Ranunculus verecundus

Ribes oxyacanthoides cognatum
Rubus bartonianus

Suksdorfia violacea

Subgroup: Other Rocks
Themes and/or Attributes: CRB007

Species
Lomatium ravenii

Oregon, East Cascades South

Subgroup: Ash, Clay, Sterile Basalt Gravels
Themes and/or Attributes:

Species
Allium pleianthum
Astragalus diaphanus diaphanus
Astragalus diaphanus diurnus
Chaenactis nevii
Eriogonum prociduum
Mimulus washingtonensis washingtonensis
Thelypodium eucosmum

Subgroup: Cliffs and Talus
Themes and/or Attributes:

Species
Arabis furcata
Erigeron howellii
Erigeron oreganus
Heuchera grossularifolia tenuifolia
Mimulus jungermannioides
Penstemon barrettiae
Suksdorfia violacea
Talinum spinescens

Subgroup: Scablands
Themes and/or Attributes:

Species
Allium campanulatum
Allium lemmonii
Allium macrum
Allium madidum
Artemisia papposa
Asclepias cryptoceras
Astragalus salmonis
Chaenactis macrantha
Chaenactis stevioides
Eriogonum chrysops
Phacelia gymnoclada

Subgroup: Stiff sage
Themes and/or Attributes:

Species
Allium macrum
Allium madidum

Utah

Subgroup: Rock

Themes and/or Attributes: CRB007

Species
Eupatorium occidentale
Polystichum kruckebergii

Washington, Columbia Basin

Subgroup: Bedrock/crevice
Themes and/or Attributes: CRB007

Species
Cheilanthes feei
Hackelia cinerea
Lomatium serpentinum
Lossetacon nevadensii

Subgroup: Talus/rubble
Themes and/or Attributes: CRB007

Species
Lomatium cusickii
Lomatium laevigatum
Ribes cereum columbrinum

Washington, East Cascades North

Subgroup: Rock
Themes and/or Attributes: CRB007

Species
Astragalus whitney sonneanus
Anemone nuttalliana
Bolandra oregana
Carex proposita
Carex stenophylla
Castilleja cervina
Chaenactis ramosa
Chaenactis thompsonii
Claytonia megarhiza nivalis
Cryptantha interrupta
Erigeron basalticus
Erigeron humilis
Erigeron leibergii
Erigeron piperianus
Erigeron salishii
Eritrichium nanum elongatum
Geum rossii depressum
Hackelia diffusa diffusa
Hackelia hispida disjuncta
Hackelia hispida hispida
Heuchera grossulariifolia tenuifolia
Lewisia tweedyi
Lomatium cuspidatum
Lomatium tuberosum
Lomatiumwatsonii
Luzula arcuata
Nicotiana attenuata
Parnassia kotzebuei kotzebuei
Pediocactus simpsonii
Pellaea breweri
Phacelia franklinii
Poa curtifolia
Poa gracillima multnomae
Polypodium hesperium
Polystichum lemmonii
Potentilla nivea
Potentilla quinquefolia
Salix brachycarpa
Saxifraga cernua
Saxifraga debilis
Swertia perennis
Valeriana columbiana
Veratrum insolitum

Washington, Okanogan Highlands

Subgroup: Talus slope
Themes and/or Attributes: CRB007

Species
Ribes oxyacanthoides cognatum
Ribes oxyacanthoides irriguum
Saxifraga adscenden gonensi
Saxifraga cernua
Saxifraga debilis

Subgroup: Moist rocky substrate
Themes and/or Attributes: CRB007

Species
Cryptogramma stelleri

Subgroup: Dry rocky substrate
Themes and/or Attributes: CRB007

Species
Dryas drummondii
Talinum sediforme

Wyoming

Subgroup: Rocky Limestone
Themes and/or Attributes: CRB007

Species
Adiantum aleuticum
Antennaria aromatica
Asplenium viride
Cryptogramma stelleri
Draba borealis
Erigeron tweedyi
Pellaea glabella simplex

Subgroup: Ingneous and Metamorphic
Themes and/or Attributes: CRB007

Species
Aspidotis densa
Lycopodium selago
Polystichum scopulinum

APPENDIX 4

Rare Plant Communities

Rare Plant Communities

With increases in human influences on ecological processes, vegetation structure and function, there has been a significant loss of native plant communities and ecosystems across the United States (Nature Conservancy 1974). Concerns for the maintenance of diversity exists for all its interactive levels, including genetic, species, communities and ecosystems (Langner and Flather 1994). Concerns such as these prompted the need to identify and assess the status of rare plant communities within the Columbia River Basin.

Plant communities that were inherently rare because of a unique set of abiotic features, and those that were once more common, but reduced due to management, are especially vulnerable to extirpation. For example, the bunchgrass grasslands of the Palouse region, once expansive in area, have been reduced to a few remnant stands due to agricultural conversion. Low elevation cedar/hemlock old-growth forests, on the other hand, may never have occupied a large proportion of the landscape, yet have been disproportionately affected due to the extraction of large volumes of timber available in these highly productive areas. It is hoped that the information given here will assist managers by placing the concerns for sustainability of these communities in context with their status at a regional scale. In addition, potential for restoration of some communities may be prioritized and perhaps expedited by knowledge as to which communities are globally at risk, and what the known threats and trends are for these unique areas.

Plant communities are assemblages of organisms that are repeatable over the landscape (Bourgeron and Engelking 1994). Many classification systems have been applied to characterize a grouping of plant species as a definable unit. Although there is still a need for continued classification and standardization, the Natural Heritage Program Network has gone far in compiling and standardizing a classification of plant communities in the Western United States. This work (Bourgeron and Engelking 1994) was used as the basis for identifying rare plant communities that occur in the Columbia River Basin.

Results from the summarization of G1 and G2 communities in the Columbia River Basin are found below. Limited information exists on many of these plant communties. The columns in the Appendix table are defined and described as follows:

Community Name: The Latin name of the plant community. The Heritage Program uses an existing vegetation classification that is based solely on vegetation attributes (i.e. abiotic features such as soil and precipitation were not used). Although these communities represent vegetation that currently exists on the land, some also approximate a potential vegetation type when found in a very late successional stage. For details on the classification, see Bourgeron and Engelking (1994). For ease of use, communities in this table are organized alphabetically within dominant life forms, and therefore, deviates from the more complex classification hierarchy used by the Heritage Program. As mentioned, there has been a major effort by the Heritage Program to standardize community taxonomy, ensure consistent application of the techniques and concepts, and to quality control data across the Western United States. However, the system is constantly evolving as new information becomes available and the classification is refined.

G Rank: Global rank as assigned by the Natural Heritage Program. Only G1 and G2 communities are included. They are defined as, **G1**: Critically imperiled globally because of extreme rarity (5 or fewer occurrences) or because of some factor making it vulnerable to extinction; **G2:** Imperiled globally because of rarity (6 to 20 occurrences) or because other factors demonstrable making it vulnerable to extinction throughout its range.

Classification Type: Each community is identified as to whether it is a Plant Association (PA) which is the existing vegetation ; Potential Vegetation Type (PV), the site climax community; or Community Type (CT) which would dominate a site if there were no disturbance.

Rarity Class: Each community was assigned a rarity class, if known. They are defined as, **I - Intrinsically rare**: those communities that are naturally restricted due to a unique set of environmental attributes, **M - Managed Rare**: those communities that are rare as a result of human caused activities, and **B - Both**: intrinsically rare communities that are also affected by management.

Threats: Existing and potential activities known to threaten these communities are identified below:

AG Agricultural Conversion
BR Blister Rust
CI Climax Invasion
DV Development
EX Exotic Plant Species
FC Fire, Change in Native Regime
FF Fire Suppression Activities
FI Fire, Increased Frequency
FR Fire, In General or Nonspecific
FS Fire, Stand Replacing
FX Fire Exclusion
GI Livestock Grazing, Indirect Effects
GZ Livestock Grazing
HC Hydrological Regime Changes
MN Mining
MT Mistletoe
OV Off Highway Vehicles
PA Pathogens
PL Pipelines
RC Recreation
RD Road Construction
RM Road Maintenance
RP Riparian Disturbances
SC Status Change
TH Timber Harvest
XX Herbicide Spray and Drift

Trend: Where possible, a trend in community viability was assessed. Trend was categorized as, **I - Increasing; D - Decreasing; S - Stable; U - Unknown.**

Distribution Across the Columbia River Basin: Panel members and Heritage Program ecologists identified if a community is known to occur within the Vascular Plant Analysis Areas. Areas were coded as:

Mont - Montana
NID - Idaho/North
SID - Idaho/South
Wyo - Wyoming

Blue - Blue Mountains
NC - East Cascades North
SC/L - East Cascades South and the High Lava Plains
Colu - Columbia Basin
Okan - Okanogan Highlands
OrBa - Oregon Basin and Range and Owyhee Upland

Typically, these communities occupy small acreages on the land which precludes many types of quatitative analyses at a broad spacial scale. Furthermore, very few of these communties are mapped so even with a smaller scale assessment, analysis based on spacial information would be limited. However, some general trends and patterns can be assessed qualitatively.

Reference numbers cited in the table use the same numbers as those in the following documents that were used for the compilation of this section:

Langner, Linda L. 1994. Biological diversity:Status and trends in the United States. U.S.D.A. Forest Service. Gen. Tech. Rep. RM-244. 24 pp.

Bourgeron, P.S. and L.D. Engelking. eds. 1994. A preliminary vegetation classification of the Western United States. Unpublished report prepared by the Western Heritage Task Force for the Nature Conservancy, Boulder, CO

L F	Community name	G Rank	Class Type	R Class	Threats	Trend	Mont	NID	SID	Wyo	Blue	NC	SC/L	Colu	Okan	OrBa	References
	ALPINE COMMUNITIES																
A	Carex aperta	G2	PA	I		U	X					X			X		1197
A	Carex scirpoidea-Potentilla diversifolia	G2	PV	B	GZ	D	X										1236
A	Cassiope mertensiana/Carex paysonis	G2	PV	I		S	X										1236
A	Ivesia gordonii-Arenaria obtusiloba	G2	PV			S			X								2
A	Ivesia gordonii-Eriogonum caespitosum	G2	PV	I		S			X								2
A	Ivesia gordonii-Minuartia obtusiloba	G2	PV			S			X								2
A	Salix arctica/Caltha leptosepala	G2G3															1122
A	Salix arctica/Polygonum bistortoides	G2	PA	I	GZ,HC	S	X										1236
A	Salix reticulata/Caltha leptosepala	G2	PV	I	GZ,HC	S	X										1236
	FOREST AND WOODLAND COMMUNITIES																
F	Abies concolor-Calocedrus decurrens-Pinus ponderosa/Amelanchier alnifolia	G2	PA	M	TH,FF	D							X				825
F	Abies concolor-Pinus lambertiana-Pinus ponderosa/Arctostaphylos patula	G2	PV	M	TH,FF	D							X				825
F	Abies grandis-Thuja plicata/Achlys triphylla	G2	PV	B	TH	D						X					148
F	Abies grandis/Arctostaphylos nevadensis	G2	PV	B	TH,FF	U						X					123, 156
F	Abies grandis/Athyrium felix-femina	G2	PV	B	TH,FS	U	X										1197

L F	Community name	G Rank	Class Type	R Class	Threats	Trend	Mont	NID	SID	Wyo	Blue	NC	SC/L	Colu	Okan	OrBa	References
F	Abies grandis/Castinopsis chrysophylla	G2	PV	I	TH,FS	U							X				148
F	Abies grandis/Coptis occidentalis	G2	PV	I	TH,FS	S					X						124, 1185
F	Abies grandis/Taxus brevifolia	G2	PV	B	TH,FS	D		X			X				X		124
F	Abies grandis/Vaccinium caespitosum	G2	PV	1				X									145, 1185, 1190
F	Acer grandidentatum/Calamagrostis rubescens	G2	PV	I					X								1329
F	Juniperus occidentalis/Artemisia arbuscula/Danthonia unispicata-Poa secunda	G2	PV	1	GZ	S										X	1244
F	Juniperus occidentalis/Artemisia rigida/Poa secunda	G2	PV	1		S					X					X	113, 1244
F	Juniperus occidentalis/Artemisia tridentata/Carex filifolia	G1	PV	M	GZ	D							X				820
F	Juniperus occidentalis/Cercocarpus ledifolius/Carex geyeri	G2		B	GZ						X		X				1179
F	Juniperus occidentalis/Cercocarpus ledifolius/Leymus cinereus	G1		B	GZ	D										X	12
F	Juniperus occidentalis/Cercocarpus ledifolius/Symphoricarpos oreophilus	G2	PV	1	SC	S			X							X	12
F	Juniperus occidentalis/Festuca idahoensis	G2?	PV	M	SC, GZ, FX											X	113, 818, 1258
F	Juniperus osteosperma/Leymus ambiguus	G1	PV	I		S			X								1229

L F	Community name	G Rank	Class Type	R Class	Threats	Trend	Mont	NID	SID	Wyo	Blue	NC	SC/L	Colu	Okan	OrBa	References
F	Juniperus osteosperma/Purshia tridentata-Symporicarpos oreophilus/PSESPI	GI	PV	I		S			X								639, 1339
F	Juniperus osteosperma/Stipa comata	GI	PV	I		S			X								1229
F	Picea engelmannii/Carex disperma	G2	PV	I	HC	D			X								25, 163, 1185
F	Picea engelmannii/Hypnum revolutum	G2	PV	I		S			X								25, 163, 1185
F	Picea engelmannii/Physocarpus malvaceus	G2	PV	I	FS	S											25, 163
F	Picea spp./Lysichiton americanum	G2	PV	I	HC	D	X										1197
F	Pinus contorta-(Populus tremuloides)/Spiraea douglasii/Carex spp.	G2											X				610
F	Pinus contorta/Elymus glaucus	G2											X				113
F	Pinus flexilis/Pentaphylloides floribunda/Distichlis stricta	G1Q		I	GZ,AG,DV	D											1044
F	Pinus flexilis/Potentilla fruticosa/Distichlis stricta	G1Q							X								1044
F	Pinus flexilis/Purshia tridentata	GI	PV	I		S			X								10, 11, 1340
F	Pinus monophylla-Juniperus osteosperma/Artemisia tridentata ssp. vaseyana/PSESPI	GI	PV	I		S			X								1075, 1228
F	Pinus monophylla-Juniperus osteosperma/Cercocarpus ledifolius/PSESPI	GI	PV	I		S			X								1075
F	Pinus monophylla-Juniperus osteosperma/Leymus cinereus	GI	PV	B	GZ, RC				X								1075

L F	Community name	G Rank	Class Type	R Class	Threats	Trend	Mont	NID	SID	Wyo	Blue	NC	SC/L	Colu	Okan	OrBa	References
F	Pinus monophylla-Juniperus osteosperma/Prunus virginiana	G1	PV	B	GZ, RC	S			X								1075
F	Pinus ponderosa-Pseudotsuga menziesii	G1										X					1316
F	Pinus ponderosa-Pseudotsuga menziesii/Arctostaphylos nevadensis	G2	PA		TH,FC	D							X				148, 830
F	Pinus ponderosa-Quercus garryana/Arctostaphylos viscida/Festuca californica	G1	PA		TH,DV,FC	D											1276
F	Pinus ponderosa-Quercus garryana/Balsamorhiza sagittata	G2	PA	M	FC,TH	D							X				148
F	Pinus ponderosa/Amelanchier alnifolia	G2		I	FR	U							X				
F	Pinus ponderosa/Artemisia tridentata ssp. vaseyana/Poa nervosa	G2	PV	B									X				825
F	Pinus ponderosa/Artemisia tridentata/Stipa spp.	G1		B									X				825
F	Pinus ponderosa/Aspidotis densa	G1										X					156
F	Pinus ponderosa/Calamagrostis rubescens	G2	PV	B	FX,GZ,TH	D		X			X	X	X	X			9, 110, 113, 136, 140, 1275
F	Pinus ponderosa/Crataegus douglasii	G1	PV	I	AG,DV,TH, GZ,RP	D		X			X						1254, 1276
F	Pinus ponderosa/Elymus glaucus	G2	PA	B	FC,FX, RD	D					X						113, 837

L F	Community name	G Rank	Class Type	R Class	Threats	Trend	Mont	NID	SID	Wyo	Blue	NC	SC/L	Colu	Okan	OrBa	References
F	Pinus ponderosa/Physocarpus malvaceus	G2	PV	B	FX,FC, TH,EX	D		X						X			7, 9, 95, 110, 113, 134, 145,970, 1185, 1267
F	Pinus ponderosa/Purshia tridentata/Oryzopsis hymenoides	G1	PA	B		S						X	X			X	94, 1258
F	Pinus ponderosa/Purshia tridentata/Stipa occidentalis	G2	PA	I		S							X				822, 826
F	Pinus ponderosa/Spiraea betulifolia	G2	PV	M	FX,TH	D	X	X			X?						163, 626, 761, 808
F	Pinus ponderosa/Stipa comata	G1	PA	I		S									X	X?	7, 9, 110, 149, 1185
F	Pinus ponderosa/Wyethia mollis	G2	PA	B	FX,GZ ,TH	D					X		X				825
F	Pseudotsuga menziesii/Pachystima myrsinites	G2G3	PV	M	TH,FC	D					X	X					7, 142, 144, 162, 169, 207, 1116
F	Pseudotsuga menziesii/Purshia tridentata	G2	PA	B	FX,EX	D	X										MNHP
F	Pseudotsuga menziesii/Rosa gymnocarpa/Holodiscus discolor	G2										X					116, 151
F	Pseudotsuga menziesii/Symphorocarpos albus/Holodiscus discolor	G1										X					102, 110, 1267
F	Thuja plicata/Achlys triphylla	G2	PV	B	TH	D						X					152
F	Thuja plicata/Adiantum pedantum	G2	PV	B	TH,RC	D			X								95
F	Thuja plicata/Aralia nudicaulis	G2	PV	B	TH	D		X									145, 1190 .
F	Thuja plicata/Linnaea borealis	G2	PV	B	TH	D											834, 1270

L F	Community name	G Rank	Class Type	R Class	Threats	Trend	Mont	NID	SID	Wyo	Blue	NC	SC/L	Colu	Okan	OrBa	References
F	Tsuga heterophylla/Athyrium filix-femina	G2	PV	I	TH	D		X									95, 1345, 1346
F	Tsuga heterophylla/Lysichiton americanum	G2		I				X				X					24, 93, 110, 116, 128, 151, 153, 831, 1213, 1274
F	Tsuga heterophylla/Menziesia ferruginea	G2	PV	B				X				X					95, 1190
F	Tsuga heterophylla/Rhododendron albiflorum	G1	PV	I				X									145
F	Tsuga heterophylla/Xerophyllum tenax	G2	PV	I	TH	D		X				X					95, 110, 116, 145, 151, 1190
F	Tsuga mertensiana/Caltha biflora	G2		B								X					118, 153, 1213
F	Tsuga mertensiana/Oplopanax horridum	G2										X					118, 119, 153, 1213
F	Tsuga mertensiana/Streptopus amplexifolius	G2	PV	B	HC,TH	D		X									95
	SHRUB STEPPE AND GRASSLAND COMMUNITIES																
S/G	Agropyron dasystachyum-Stipa comata	G1	PA	B	EX,AG,GZ	D								X			850, 860
S/G	Agropyron spicatum/Eriogonum ovalifolium	G1	PA	I	GZ,DV	D	X										MNHP
S/G	Agrostis exerata-Agrostis scabra	G2															29, 30

LF	Community name	G Rank	Class Type	R Class	Threats	Trend	Mont	NID	SID	Wyo	Blue	NC	SC/L	Colu	Okan	OrBa	References
S / G	Allenrolfea occidentalis	G2	PV	B	GZ	S										X	1245, 1276
S / G	Amelanchier alnifolia	G2															877
S / G	Arctostaphylos viscida-Ceanothus cuneatus/Festuca idahoensis-Stipa lemmonii	G2	PA	M	FF,FI, GZ,GI	D											830, 1276
S / G	Aristida longiseta/Sporobolis cryptandrus	G2		B	HC	D								X	X	X	124
S / G	Artemisia arbuscula ssp. thermopola/Festuca idahoensis	G2	PV	B	DV,GZ	D		X	X					X			15, 23
S / G	Artemisia arbuscula/Leymus ambiguus	G1G2	PV	I		S			X								1229
S / G	Artemisia cana ssp. viscidula/Deschampsia cespitosa	G2G3	PV	M	GZ	D							X			X	685, 1052, 1134
S / G	Artemisia cana-Artemisia tridentata ssp. vasyana/Poa cusickii	G2	PV	B	GZ	S							X			X	1276
S / G	Artemisia cana/(Elymus caninus)-Poa nevadensis	G1	PV	M		D							X				1276, 1306
S / G	Artemisia cana/Carex nebrascensis-Poa cusickii	G2	PV	M	GZ	D					X		X			X	610, 1050, 1307

L F	Community name	G Rank	Class Type	R Class	Threats	Trend	Mont	NID	SID	Wyo	Blue	NC	SC/L	Colu	Okan	OrBa	References
S / G	Artemisia cana/Leymus cinereus	G1	PV	M	GZ	D										X	1276
S / G	Artemisia nova/Leymus ambiguus	G1G2	PV	I													1332
S / G	Artemisia tridentata ssp. tridentata/Hilaria jamesii	G2G4															41, 366, 528, 994, 1019, 1049
S / G	Artemisia tridentata ssp. tridentata/Leymus cinereus	G2G3	PV	M	GZ,AG,FR	D			X							X	228, 284
S / G	Artemisia tridentata ssp. tridentata/Pascopyrum smithii	G2G3	PV	M	GZ,FR	D											272, 273, 274, 325
S / G	Artemisia tridentata ssp. tridentata/Pseudoroegneria spicata-Poa secunda	G1	PV	M		D								X			1276
S / G	Artemisia tridentata ssp. tridentata/Stipa comata	G2	PV	B	DV,GZ,AG	D			X		X		X	X	X	X	ONHP
S / G	Artemisia tridentata ssp. vaseyana-Cercocarpus ledifolius/Elymus caninus-POASEC	G1	PV	I	GZ	D										X	12
S / G	Artemisia tridentata ssp. vaseyana/Stipa occidentalis	G2	PV	B		D							X				1179, 1276
S / G	Artemisia tridentata ssp. wyo.-Peraphyllum ramosissimum/Festuca idahoensis	G2	PV	B	GZ	U					X		X			X	1276

L F	Community name	G Rank	Class Type	R Class	Threats	Trend	Mont	NID	SID	Wyo	Blue	NC	SC/L	Colu	Okan	OrBa	References
S / G	Artemisia tridentata ssp. wyo./Carex filifolia	G1Q											X				1336
S / G	Artemisia tridentata ssp. wyomingensis/Stipa comata	G2	PV	M		D										X	15, 1230, 1336
S / G	Artemisia tridentata-Atriplex canescens-Sarcobatus vermiculatus/(ORYHYM)	G2	PA	M	GZ	D										X	827
S / G	Artemisia tridentata-Purshia tridentata/Oryzopsis hymenoides-Stipa comata	G1	PV	B		D								X		X	835, 850
S / G	Artemisia tridentata/Leymus cinereus	G2G4	PV	I	GZ	D			X								1143,1157, 1193, 904, 1077, 1094, 1095
S / G	Artemisia tripartita/Festuca scabrella	G2	PV	B	GZ	D								X			12 67
S / G	Artemisia tripartita/Stipa comata	G1	PV	B										X			8, 15, 134, 1267
S / G	Atriplex confertifolia/Leymus ambiguus	G2	PV	I		S			X								1229
S / G	Atriplex confertifolia/Oryzopsis hymenoides	G2	PV	M	SC,GZ	S/U			X							X	228, 229, 325, 372, 1332,1093, 1096, 1138
S / G	Calamagrostis purpurascens	G2	PV	M	GZ	S			X								103

LF	Community name	G Rank	Class Type	R Class	Threats	Trend	Mont	NID	SID	Wyo	Blue	NC	SC/L	Colu	Okan	OrBa	References
S/G	Carex stenophylla/Poa secunda	G2	PV	I		S			X								1337
S/G	Cercocarpus ledifolius/Calamagrostis rubescens	G2	PV	I	GZ,XX	D		X								X	12
S/G	Cercocarpus ledifolius/Festuca idahoensis	G2	PV	B	GZ,FI	D	X				X						12, 113, 1235
S/G	Cercocarpus ledifolius/Holodiscus dumosus	G1	PV	I		U			X								1343
S/G	Cercocarpus ledifolius/Leymus ambiguus	G2	PV	I	SC	U			X								1343
S/G	Cercocarpus ledifolius/Pseudoroegneria spicata-Festuca idahoensis	G2	PV	B	GZ,FI	S									X	X	12
S/G	Cercocarpus ledifolius/Symphoricarpos oreophilus	G2	PV	B	SC,GZ	D			X						X	X	12
S/G	Chrysothamnus nauseosus/Leymus flavescens/Psoralum lanceolatum	G1	PV	I		S			X								4
S/G	Danthonia californica (valley grassland)	G1	PV	M	AG,GZ,FR	D											816, 845, 855, 876
S/G	Danthonia californica-Festuca idahoensis	G1Q	PV	M	AG,DV,GZ	D											862, 1289

LF	Community name	G Rank	Class Type	R Class	Threats	Trend	Mont	NID	SID	Wyo	Blue	NC	SC/L	Colu	Okan	OrBa	References
S / G	Danthonia intermedia	G2G3										X					103, 162, 222, 347, 1020, 1134
S / G	Elymus flavescens	G2	PV	I		S			X								4
S / G	Elymus glaucus	G2															1308
S / G	Eriogonum ovalifolium var. depressum	GI	PV	I		S			X								10, 11
S / G	Festuca idahoensis-Carex scirpoidea	G2	PV	B	GZ	D	X										326
S / G	Festuca idahoensis-Eriogonum caespitosum	G2	PV	I													2
S / G	Festuca idahoensis-Eriogonum heracleoides	G2	PV	M								X		X			8, 134, 1266, 1319
S / G	Festuca idahoensis-Festuca kingii	G2?	PV	B		D	X		X								1259
S / G	Festuca idahoensis-Hieracium cynoglossoides	G2	PV	B	GZ,EX	D							X	X			8
S / G	Festuca idahoensis-Symphoricarpos albus	G2	PA	M	FX,AG,GZ	D					X						8, 141, 1252

L F	Community name	G Rank	Class Type	R Class	Threats	Trend	Mont	NID	SID	Wyo	Blue	NC	SC/L	Colu	Okan	OrBa	References
S / G	Festuca viridula-Festuca idahoensis	G2	PV	I	GZ	D		X			X						124
S / G	Festuca viridula-Lupinus latifolius	G2	PV	B	GZ	S					X						96, 103, 114, 117, 122, 124, 141, 842, 1252, 1256, 1318
S / G	Grayia spinosa-Sarcobatus vermiculatus/(Oryzopsis hymenoides)	G2	PV	I	GZ,EX	U										X	817
S / G	Leymus ambiguus-Enceliopsis nudicaulis	G2	PV	I		S			X								1343
S / G	Leymus ambiguus-Lupinus argenteus	G2	PV	B	GZ	S			X								1343
S / G	Leymus cinereus-Distichlis stricta	G1	PV	B	GZ,AG	S			X							X	8, 110
S / G	Leymus cinereus-bottomlands	G1	PV	M	GZ,AG	D					X		X			X	8, 817, 835, 1252, 1298
S / G	Leymus flavescens	G2															4
S / G	Leymus triticoides-Poa secunda	G2	PV	M	GZ,AG	D										X	1292
S / G	Poa cusickii	G2	PV	M	GZ,AG	D							X				610

LF	Community name	G Rank	Class Type	R Class	Threats	Trend	Mont	NID	SID	Wyo	Blue	NC	SC/L	Colu	Okan	OrBa	References
S/G	Poa nevadensis-Puccinellia lemmonii-Elymus elymoides	G1	PV	B	GZ						X		X			X	859, 1289
S/G	Pseudoroegneria spicata-Aristida longiseta-Sporobolus cryptandrus	G2	PV	1	GZ	S					X	X					24, Wooton report
S/G	Pseudoroegneria spicata-Eriogonum heracleoides	G1?	PV	B	GZ	S		X					X				852, 252
S/G	Pseudoroegneria spicata-Festuca idahoensis (Palouse)	G1?	PV	M	DV,AG	D		X			X			X			8, 113, 124, 141, 813, 835, 1179
S/G	Purshia tridentata-Artemisia tridentata ssp. tridentata	G1											X				4
S/G	Purshia tridentata/(Pseudoroegneria spicata)-Festuca idahoensis	G1	PA	B	MN,FX	D			X		X	X		X			1179
S/G	Purshia tridentata/Carex pensylvanica-Stipa occidentalis	G1	PV	B	MN,GZ	S							X				822
S/G	Purshia tridentata/Chrysothamnus nauseosus	G1	PV	B		S		X	X								4
S/G	Purshia tridentata/Oryzopsis hymenoides	G1	PV	B	AG,GZ	D			X			X		X		X	8, 1233, 1267
S/G	Purshia tridentata/Poa nevadensis	G1?															1344

LF	Community name	G Rank	Class Type	R Class	Threats	Trend	Mont	NID	SID	Wyo	Blue	NC	SC/L	Colu	Okan	OrBa	References
S/G	Purshia tridentata/Prunus virginiana	G1?	PV	B	FX,SC			X	X								1330
S/G	Purshia tridentata/Pseudoroegneria spicata-Leymus cinereus	G1		M					X								11
S/G	Purshia tridentata/Stipa comata	G2	PV	B	FR, GZ, DV				X			X		X			8, 835, 1266
S/G	Quercus garryana/Carex geyeri	G2															156
S/G	Quercus garryana/Ceanothus cuneatus/Festuca idahoensis	G2	PA	M	AG,DV,GZ, FX	D											1288
S/G	Quercus garryana/Elymus glaucus	G2	PA	M	AG,DV,GZ, FX	D											123
S/G	Quercus garryana/Festuca idahoensis	G1	PV	M	FX,TH,GZ	D						X	X				123
S/G	Quercus garryana/Rhus diversiloba-Symphoricarpos albus/Elymus glaucus	G2	PA	M	FX,GZ,TH,DV	D											1276, 1303
S/G	Rhus aromatica-Salix exigua	G2															1225
S/G	Rosa nutkana/Festuca idahoensis	G2G3	PV	B	DV, AG	U		X			X			X			8, 1252

LF	Community name	G Rank	Class Type	R Class	Threats	Trend	Mont	NID	SID	Wyo	Blue	NC	SC/L	Colu	Okan	OrBa	References
S/G	Salicornia rubra	G2	CT	B	AG,GZ	U			X								497, 521, 1197
S/G	Sphaeromeria argentea-Artemisia frigida-Poa secunda	G2															1337
S/G	Sphaeromeria argentea-Oryzopsis swallenii	G2															1337
S/G	Sporobolus cryptandrus	G2	PA	M	RP,HC,GZ	D					X						109
S/G	Sporobolus cryptandrus-Poa secunda	G2												X	X	X	8, 141, 1252
S/G	Tanacetum nuttallii/Artemisia frigida/Poa secunda	G2	PV	M	GZ	S			X								1337
S/G	Tanacetum nuttallii/Oryzopsis swallenii	G2	PV	B	GZ	S			X								1337
	WETLAND AND RIPARIAN COMMUNITIES																
W	Acer negundo/Equisetum arvense	G2?															1134
W	Alnus incana-Betula occidentalis	G1	CT	B	GZ,HC,AG	D					X		X			X	1304, 1305
W	Alnus incana-Populus tremuloides/Betula glandulosa-Ribes/Carex	G1	CT	M	DV	D					X						1253

L F	Community name	G Rank	Class Type	R Class	Threats	Trend	Mont	NID	SID	Wyo	Blue	NC	SC/L	Colu	Okan	OrBa	References
W	Alnus incana-Populus tremuloides/Cornus stolonifera	G1	CT	M	GZ,HC ,AG	D					X		X			X	1241
W	Alnus incana-Populus trichocarpa/(Salix) Carex spp.	G1	CT	B	GZ	D							X			X	610
W	Alnus incana/Spiraea douglasii	G2	CT	1	GZ	U					X		X				610
W	Alnus incana/Symphoricarpos albus	G2	CT	M	GZ,A G	D						X				X	610, 1050, 1254, 1255
W	Alnus incana/mesic forb	G2G3	PV	M		U			X		X		X				1052, 1134
W	Alnus incana/mesic graminoid (Carex)	G2G3	PV	M		S-D			X		X		X			X	1134
W	Alnus rhombifolia/Abies grandis	G2	PV	B	GZ,TH	D		X									17
W	Alnus rhombifolia/Betula occidentalis	G1	PV	B	GZ	U		X									17
W	Alnus rhombifolia/Celtis reticulata	G2	PV	B		U		X			X						17
W	Alnus rhombifolia/Philadelphus lewisii	G1	PV	B	GZ, RD	U		X			X						17
W	Alnus rhombifolia/Prunus virginiana	G2	PV	B		U		X									17
W	Alnus rhombifolia/Rosa woodsii	G1	PV	B		U		X			X						17
W	Alnus rhombifolia/Sambucus cerulea	G2	PV	B	GZ	U											17
W	Alnus sinuata	G2?	CT	1	none	S	X					X					1197
W	Betula occidentalis/Crataegus douglasii	G2	PV	B	GZ	D		X			X		X				1276
W	Betula occidentalis/Populus trichocarpa/Salix	G2									X		X				150, 1306,
W	Betula occidentalis/Purshia tridentata/Stipa comata	G1															1344

L F	Community name	G Rank	Class Type	R Class	Threats	Trend	Mont	NID	SID	Wyo	Blue	NC	SC/L	Colu	Okan	OrBa	References
W	Betula occidentalis/mesic forb	G2G3	PV	M	GZ,RD	D			X								1134
W	Carex praegracilis-Carex aquatilis	G2G3	PV	M		U			X								1219
W	Crataegus douglasii	G2	PV	I	HC,GZ	U	X										950
W	Crataegus douglasii/Heracleum lanatum	G2	PV	B	BN			X						X			8
W	Crataegus douglasii/Rosa woodsii	G2	PV	M	AG			X			X			X			610, 1276
W	Deschampsia cespitosa-Carex/alkaline bottomland	G2	PV	M	DV,GZ	D					X					X	ONHP
W	Eleocharis palustris-Distichlis spicata	G2G4	PV	M	AG,GZ	D										X	1100
W	Eleocharis palustris-Juncus balticus	G2G4	PV	M	AG,GZ	D										X	1141
W	Juncus balticus-Carex rossii	G2G4															1187
W	Populus angustifolia/Acer grandidentatum	G2G3															1134
W	Populus tremuloides-Abies lasiocarpa/Shepherdia canadensis	G2?		M					X								266, 810
W	Populus tremuloides/Carex spp.	G2		B	FX,GZ,EX											X	610, 1311
W	Populus tremuloides/Rubus parviflorus	G2?	PV	B	GZ				X								266
W	Populus tremuloides/Symphoricarpos albus/Elymus glaucus	G2	PA	B	FX,GZ,EX							X				X	610, 1311
W	Populus trichocarpa/Cicuta douglasii	G1	PV	B										X			8
W	Populus trichocarpa/Crataegus douglasii	G1	PV	B	GZ, HC	D		X		X							1254, 1255

L F	Community name	G Rank	Class Type	R Class	Threats	Trend	Mont	NID	SID	Wyo	Blue	NC	SC/L	Colu	Okan	OrBa	References
W	Populus trichocarpa/Salix exigua	G1	PA		GZ,RP					X			X			X	835, 1306
W	Salix amygdaloides-Salix exigua-Salix lasiandra	G1	PA	M	GZ,RP	D					X			X		X	1249
W	Salix amygdaloides-Salix fluviatilis-Salix lasiandra/Carex spp.	G1	PA	1	GZ,RP	D					X						1249
W	Salix boothii-Salix geyeriana	G2	PA	M	GZ,RP	D										X	610
W	Salix boothii-Salix geyeriana/Carex eurycarpa	G2	PA	M	GZ,RP	D							X				610
W	Salix boothii-Salix lemmonii	G2	PA	M	GZ,RP	D					X		X				610, 1306
W	Salix boothii/Carex aquatilis	G2G3	PV	1	GZ,RP	D		X			X		X				31, 1052, 1084
W	Salix boothii/Poa palustris	G1	PV	1		U		X									31, 1134
W	Salix drummondiana/Calamagrostis canadensis	G2	CT	1		U		X	X								30, 163, 191, 221, 322
W	Salix eastwoodiae	G1															31
W	Salix eastwoodiae/Carex aquatilis	G2	PV	M	GZ			X									686
W	Salix eastwoodiae/Carex rostrata	G2	PV	M	GZ			X									686
W	Salix exigua-Salix lasiandra	G1	PA	M	GZ,RP	D					X		X	X		X	1312
W	Salix exigua/mesic forb	G2Q	PV	M	GZ							X				X	1052, 1134
W	Salix geyeriana-Salix lemmonii	G2	PA	M	GZ,RP	D					X						610
W	Salix geyeriana/Poa palustris	G2	PV	M	GZ	U			X								31, 686, 1134
W	Salix geyeriana/mesic graminoid	G2G3	PV	M	GZ	U			X								31, 1052, 1134
W	Salix lasiolepis/barren	G2Q															1134

L F	Community name	G Rank	Class Type	R Class	Threats	Trend	Mont	NID	SID	Wyo	Blue	NC	SC/L	Colu	Okan	OrBa	References
W	Salix planifolia	G2															31
W	Salix wolfii/Carex nebraskensis	G2	PV	M	GZ	U			X	X							31
W	Salix wolfii/Poa palustris	G2	PV	I		U		X									31
W	Salix wolfii/Swertia perennis-Pedicularis groenlandica	G2	PV	M	GZ	S		X									29, 30
W	Scirpus americanus	G1Q	PV	I		U			X							X	29
W	Scirpus cespitosus/Carex livida	G1	PV	I		S		X									29
W	Scirpus pungens	G2G4	PV	I	HC	S											1197, 1219
W	Senecio triangularis	G2?									X		X				347, 1197

APPENDIX 5

Plants of Cultural Importance

Culturally Significant Plants
Interior Columbia Basin Ecosystem Management Project

July 10, 1995

Report Prepared by:
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Species Selected For Inclusion

This list of species should **not** be considered to be a complete list of all species that are used by Indian peoples of the project area. It is apparent that there was formally much wider recognition and utilization of the native flora than there is currently. Elders stress that at one time all plants had a name and a recognized use. But even today there remains hundreds of plant species that continue to be utilized, some only by individual groups or families but others are recognized as being integral to continuing cultural practices and tribal tradition.

It would have been an unwieldy task to attempt to analyze all of the many hundreds of species for which there are recorded purposes, particularly the many that have purported but uncorroborated medicinal uses. Therefore, the decision was made to attempt to narrow the analysis to those species which are currently considered to be the most important to the seventeen tribal groups whose area of interest lies within the project area. Some of these species are very local in use and or occurrence, while others are more widespread. There are some species whose primary range and use is outside of the project area but are important enough to one or more of the tribes to warrant inclusion.

Native Taxonomy

The area encompassing this project includes the area of interest of tribes who speak many languages included within five major language families. These are Sahaptin, Interior Salish, Lutuami, Chinookin, and the Numic group of Uto-Aztecan family. many of these languages include use of sounds that are not used in the English language but more importantly they include concepts for plants and their relationship to the environment and culture which do not translate directly into English.

The plants are listed by scientific name for the purpose of being consistent with and thereby useable with the rest of the ICBEMP analysis being conducted by the Project. However, it is important to recognize that not everything that goes by a certain name by a plant taxonomist would be equally recognized by an Indian elder. *Lomatium nudicaule* would be one example of this. In spring when the first sprouts appear, this plant is called "*pt'ishpt'ish*" in Warm Springs Sahaptin, which refers to the edible first leaves. Mature plants with a stout stem are referred to as "*xamsi*" which has an edible stem while other plants with a narrow, spindly, stem are called "*ashwaniya*" which means "slave to xamsi" (from a story) and is not eaten. These are not names for stages of growth, strictly speaking; these are individual plat names.

Taxonomy is further complicated by local differences in what one tribal group prefers relative to another and also differences within a taxa across it's range. For instance, *Lomatium piperi* and *L. gormanii* are two are closely related species that are often mistaken for one another. However in Central Washington members of the Yakama tribe readily distinguish between the two, *L. piperi* is recognized as edible while *L. gormanii* is eschewed as "groundhog food". However in southern Oregon, *L. gormanii*, is considered to be quite palatable (L. Housely, personal communication).

Summary of Information Presented

The table of information presented in Appendix 5 has been organized into three main cultural areas. There are three fields for each of these areas, with either a "1" to represent primary use, a "2" to represent a species with less important or localized use, and a blank to represent that it was essentially not used by that group. The habitat types that these taxa occur in, is in the following column. The codes used are the same as those used in the ICBEMP analysis and are explained on pages 79-81, Tables 3-4, of the main body of the document.

Management of Plant Populations

Finally, it must be noted that management of culturally significant plants is not a question of maintaining species viability but rather it is imperative that species harvestability be maintained. For the most part, these are not rare species. Most of these taxa are at least locally abundant someplace. Small, isolated or difficult to harvest populations may have no bearing. It is generally the large, healthy, accessible populations that Federal agencies must manage consistently to insure continued harvestability of these species.

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SCIENTIFIC NAME	COLUMBIA PLATEAU	PAIUTE-SHOSHONE	KLAMATH-MODOC	VEGTYPE	SERAL STAGE
Allium acuminatum	2	2	2	CRBSO1, CRBS03, CRBS08, SRM104, CRBS04, SRM402, SRM406, SAF237, SAF245	OF:SS, SE:OC, SI,
Allium spp.	2	2	2	CRBS01, CRBS03, CRBS08, SRM104, CRBS04, SRM402, SRM406, SAF237, SAF245	
Alnus incana	2	2	2	CRBS05	
Amelanchier alnifolia	2	2	2	CRBS02, SRM421, CRBS09, SAF210, SAF237, SAF243, SAF245, CRB003	OF:SS, SE:OC, SI
Apocynum cannabinum	1	1	2	CRBS07, CRBS06	
Arctostaphylos nevadensis	2	2	2	CRBS02, SAF210, SAF218, SAF243, SAF245, CRB003, SAF237	OF:SS, SE:OC, SI
Arctostaphylos uva-ursi	2	2	2	CRBS02, SAF210, SAF218, SAF237, CRB003	OF:SS, SE:OC, SI
Artemisia tridentata	2	2	2	CRBS03, CRBS04, SRM402	
Atriplex confertifolia		2		CRBS05, SRM414	
Balsamorhiza hookeri		2		CRBS06, SRM406	
Balsamorhiza sagittata	2	2	2	SAF233, CRBS06, CRBS13, CRBS01, CRBS03, SAF237, SAF245	OF:SS, SE:OC, SI
Berberis nervosa	2		2	CRB008, CRBS09, SAF227	UR, YF, OF:MS, OF:SS
Brodiaea grandiflora		2		CRBS07, CRBS06	
Brodiaea hyacinthina	2	2	2	CRBS07, CRBS06	
Bryoria fremontii	1	2	1	CRBS02, SAF237, SAF243, SAF245	OF:MS, OF:SS
Calochortus macrocarpus	2	2	2	CRBS01, CRBS03, CRBS13, SRM104, CRBS04, SRM402, SRM322, SAF237	OF:SS, SE:OC, SI

SCIENTIFIC NAME	COLUMBIA PLATEAU	PAIUTE-SHOSHONE	KLAMATH-MODOC	VEGTYPE	SERAL STAGE
Calochortus nutalli		2		CRBS01, CRBS03, CRBS06, CRBS13, CRBS04	
Camassia leichtlinii	1			CRB007, CRBS07	
Camassia quamash	1	1	1	CRB007, CRBS07	
Claytonia lanceolata	2			SAF233, CRBS07, CRBS09, SAF206	UR, YF, OF:MS, OF:SS
Cornus stolonifera	2	2	2	CRBS05, SAF235	
Corylus cornuta	2		2	CRBS09, SAF210, SAF233	SI, SE:OC, UR, OF:MS, OF:SS
Crataegus columbiana	2			CRBS05, SAF235	
Crataegus douglasii	2			CRBS05, SAF235	
Elymus cinereus		1		CRBS06, CRBS13, CRBS04	
Fragaria vesca	2	2	2	CRBS09, CRBS11, SAF210, SAF212, SAF215, SAF243	SI, SE:OC, OF:SS
Fragaria virginiana	2	2	2	CRBS09, CRBS02, CRBS11, SAF210, SAF212, SAF218, SAF237, SAF243, SAF245	SI, SE:OC, OF:SS
Fritillaria pudica	2	2	2	CRBSO1, CRBS03, SAF233, CRBS06, CRBS13, SRM104, CRBS04, SRM402, SRM406	
Helianthus annuus		2		CRBS03, CRBS06, CRBS04	
Heracleum lanatum	2		2	CRBS05	
Juniperus occidentalis	2	2	2	CRBS01, CRBS03	All
Lewisia rediviva	1	1	1	CRBS06, SRM406	
Ligusticum canbyi	2	2		CRBS05, CRB007, CRBS07, SAF217, SAF235	

SCIENTIFIC NAME	COLUMBIA PLATEAU	PAIUTE-SHOSHONE	KLAMATH-MODOC	VEGTYPE	SERAL STAGE
Ligusticum grayi	2	2	2	CRBS05, CRB007, CRBS07, SAF217, SAF235	
Lomatium canybi	1	1	2	CRBS06, SRM406	
Lomatium cous	1	1	2	CRBS06, SRM406	
Lomatium dissectum	1	1		CRBS01, CRBS03, SAF233, SRM322, SAF237, SAF210, SAF245	Talus and rocky openings
Lomatium farinosum var. hambleniae	2			CRBS06, SRM406	
Lomatium gormanii			2	CRBSO6, SRM406	
Lomatium grayi	1			CRBS01, CRBS03, SAF233, CRBS04, SRM402, SRM406	Rocky openings
Lomatium hendersonii		1		CRBS06, SRM406	
Lomatium macrocarpum	2	2		CRBS06, SRM406	
Lomatium minus	2			CRBSO6, SRM406	
Lomatium nudicaule	1	1		CRBS01, CRBS03, SAF233, SRM104, CRBS04, SRM406, SAF237	
Lomatium piperi	2	2		CRBS06, SRM406	
Lomatium suksdorfii	1			CRBS06, CRBS13, SAF233	
Mentha arvensis	2	2	2	CRBS07	
Mentzelia albicaulis		2	2	CRBS03, CRBS06, CRBS04	
Mentzelia laevicaulis		2		CRBSO1, CRBS03, CRBS04	
Nicotiana attenuata	2	2	2	CRBS01, CRBS02, CRBS03, CRBS06, CRBS13, CRBS04, SAF237, SAF245	Sometimes cultivated

SCIENTIFIC NAME	COLUMBIA PLATEAU	PAIUTE-SHOSHONE	KLAMATH-MODOC	VEGTYPE	SERAL STAGE
Nuphar polysepalum			1	CRB007, CRBS20	
Orobanche uniflora var. purpurea		2		CRBS06, SRM406	
Oryzopsis hymenoides		1		CRBS01, CRBS03, CRBS06, CRBS13, CRBS04, SRM414	
Perideridia bolanderi		1		CRBS07, CRBS06	
Perideridia erythrorhiza			2	CRBS07, CRBS06	
Perideridia gairdneri	1	1	1	CRBS07, CRBS06	
Perideridia oregana		1	1	CRBS07, CRBS06	
Phragmites communis		2		CRB007, CRBS07	
Pinus albicaulis	2			SAF208	
Pinus monophylla		1		CRBS01, CRBS03	
Pinus ponderosa		2		SAF245	
Prunus subcordata		1	1	CRBS05, SAF235, SAF243, SAF245	
Prunus virginiana	1	1	1	CRBS05, SRM421	
Psoralea esculeta		2		CRBS06, CRBS13	
Quercus garryana	2			SAF233	
Rhizopterus plurijugas		2		CRBS06, SRM406	
Ribes aureum	2	2	2	CRBS05, SAF235	
Rosa nutkana	2	2	2	CRBS05, SRM421, SAF210, SAF237, SAF243, SAF245, CRBS02, CRBS09, SAF235	

SCIENTIFIC NAME	COLUMBIA PLATEAU	PAIUTE-SHOSHONE	KLAMATH-MODOC	VEGTYPE	SERAL STAGE
Rosa spp.	2	2	2	CRBS05, SRM421, SAF210, SAF237, SAF243, SAF245, CRBS02, CRBS09, SAF235	
Rubus spp.	2	2	2	CRBS02, SAF210, SAF237, SAF243, SAF245, CRBS09, CRBS11, SAF227, CRB003	SI, SE:OC, OF:SS
Sagittaria cuneata	2		2	CRB007, CRBS07	
Sagittaria latifolia	2		2	CRB007, CRBS07	
Salix spp.	1	1	1	CRBS05, SAF235	
Sambucus cerulea	2	2	2	CRBS02, CRBS09, SAF210, SAF243, SAF245, CRB003	
Scirpus acutus	2	2	2	CRB007, CRBS20	
Scirpus validus	2	2	2	CRB007, CRBS20	
Shepherdia argentea		2		CRBS05, SRM414	
Suaeda depressa		2		CRBS05, SRM414	
Tauschia hooveri	2			CRBS06, SRM406	
Typha latifolia	2	2	2	CRB007, CRBS20	
Vaccinium caespitosum	2		2	SAF218, SAF227	SI, SE:OC, OF:SS
Vaccinium deliciosum	2			CRB008, SAF205, SAF206	SI, SE:OC, OF:SS
Vaccinium globulare	1			SAF210, SAF212, SAF218	SI, SE:OC, OF:SS
Vaccinium membranaceum	1	2	1	CRB008, CRBS11, SAF205, SAF218, SAF227	SI, SE:OC, OF:SS
Vaccinium ovalifolium	2		2	CRB008, CRBS11, SAF227	SI, SE:OC, OF:SS
Vaccinium oxycoccus	2			CRBS05, CRB007, CRBS07	
Valeriana edulis		2	2	CRBS07, CRBS06	

APPENDIX 6

Research, Development, and Applications Database

Research, Development, and Application Needs for Rare Vascular Plants within the Interior Columbia Basin

During the vascular plant panel process, it became clear that the lack of knowledge concerning certain areas of species biology and ecology was interfering with the experts' ability to develop accurate assessments and taxa-specific management guidelines and recommendations. Broad, one size fits all, direction for rare plant management has proven to be problematic in many cases. Vague guidelines are often difficult to interpret or implement (and are hence sometimes ignored). To rectify this situation, panel members were encouraged to identify research needs that would specifically improve our ability to manage or protect species of conservation concern. The results of that assignment are summarized in the table that follows.

The Research Needs (RDA) table is divided into three columns. The "Species Name" column contains the Latin binomial for each plant with an identified research need. The "Research Need" column identifies an area of species biology or ecology that the panel felt was necessary to pursue in order to provide specific management recommendations. These needs were compiled over the three days allotted to each panel and may not represent an exhaustive list of research needs. Some species have several identified research needs, others have only one. This is not necessarily a reflection of current levels of knowledge or some inferred relative importance. In many cases, more knowledge begets more questions. Alternatively, species with few threats or management conflicts require less concern and therefore received less attention during the panel process. It should also be pointed out that panelist were drawn from a variety of backgrounds and some emphasized the need to acquire new knowledge more than did others. Finally, the "Research Needs" column does not represent the only areas of information lacking about the species in question. The column "Potential Applications" identifies one or two of the benefits of pursuing each area of research. It is important to keep in mind that the benefits of research derived information compounds and unexpected insight is commonly gained through scientific inquiry.

The RDA table is a resource that can be used by many groups in many ways. Most obviously, researchers, graduate students, and organization applying to Federal land management agencies for research funds can use the table to help justify their requests. Federal research organizations (e.g., National Biological Survey and Forest Service Research Stations) can use the RDA table to pursue areas of emphases (e.g., reproductive biology or responses to management activates) identified as important to land managers. Land managers can use the RDA table to become aware of rare plant issues within their jurisdiction. Consumptive industries will be able to use the RDA table to assess where their activates maybe in conflict with plant conservation goals. They may then choose to support research activities that will resolve the issues and clear lingering uncertainties that often constrain management options. Environmental groups and native plant organizations can use the RDA table to focus their conservation concerns, educational activities and advocacy actions. Educators may use the RDA table to help students understand the process of information gathering and to demonstrate the link between research and the application of knowledge. There are certainly other ways that the RDA table can be used. It is hoped that by identifying areas of need, information and understanding that will benefit everyone will be gained.

Species name	Research Need	Potential Application
Abronia ammophila	Are inventory efforts to document population sizes and geographic amplitude adequate for this rare species?	Inventory for this rare species could provide valuable information on population sizes and geographic distribution. This information could be incorporated into monitoring protocol and management direction.
Abronia ammophila	Are the Sublette County and Yellowstone Park populations representative of the same taxon?	Resolution of the taxonomic relationships of the two geographically-separate "populations" could provide valuable information about the geographic amplitude of the species. This information should preclude the development of management.
Abronia ammophila	What are the environmental requirements of this rare species?	Trend, demographic, and ecophysiological monitoring could provide valuable information about the environmental requirements and limiting factors of this rare species. This information could be incorporated into management direction.
Agrostis rossiae	To what extent is this rare species threatened by changes in the geohydrothermal regime that supports its habitat?	Trend and demographic monitoring of populations historically, presently, and or potentially impacted by changes in the geohydrothermal regime supporting its habitat could provide valuable information which could be incorporated into management direction.
Agrostis rossiae	What are the environmental requirements of this rare grass?	Trend, demographic, and ecophysiological monitoring could provide valuable information about the environmental requirements and limiting factors of this rare species. This information could be incorporated into management direction.
Allium aaseae	To what extent is this rare species threatened by mining activities?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by mining activities could provide valuable information for incorporation into management direction.
Allium aaseae	To what extent is this rare species threatened by recreational activities, particularly traffic from off-road vehicles?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by recreational activities including off-road vehicle traffic could provide valuable information which could be incorporated into management direction.
Allium aaseae	To what extent is this rare species threatened by the invasion of its habitat by exotic species, including those introduced in seeding prescriptions?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by exotic species could provide valuable information which could be incorporated into management guidelines.
Allium aaseae	What are the environmental requirements of this species? What are its limiting factors?	Demographic and ecophysiological monitoring could provide valuable baseline information on the environmental requirements and limiting factors of the species. This information could be used in the development of monitoring protocol and management.
Allium dictuon	What are population sizes and geographic amplitude of this narrow endemic species?	Inventory of this rare species could provide valuable information on its population sizes, amplitude, and vulnerability to management activities. This information could be incorporated into monitoring designs and management direction.
Allium dictuon	What are the effects of fire suppression activities on the habitat that supports this narrow endemic species?	Trend, demographic, and ecophysiological monitoring of populations impacted by fire suppression activities (the construction of fire lines, in particular) could provide valuable information for incorporation into management guidelines.
Allium dictuon	What are environmental requirements for this species and why is its geographic amplitude apparently so limited?	Trend, demographic, and ecolophysiological monitoring could provide valuable information on the basic biology of this narrow endemic species. This information could be incorporated into management direction.

Species name	Research Need	Potential Application
Amsinckia carinata	Is this a valid taxon? Why was the species merged with A. tesselata in Jepson's treatment?	Resolution of the taxonomic status of this "species" precludes the development of monitoring and management plans.
Amsinckia carinata	To what extent is the genetic integrity of this species threatened by hybridization with sympatric A. tesselata?	Ecophysiological monitoring could provide information on the extent of hybridization and resultant effects on the gene pool. This information could be incorporated into management guidelines.
Amsinckia carinata	To what extent is this species threatened by the invasion of exotic species, particularly cheatgrass and Russian thistle?	Trend and demographic monitoring of populations historically, presently, and/or potentially threatened by exotic species could provide valuable information for incorporation into management direction.
Amsinckia carinata	What are the environmental requirements of this species?	Ecophysiological monitoring of this species could provide valuable information on its environmental requirements. This information could be incorporated into management guidelines.
Antennaria arcuata	Is this species threatened by agricultural practices including the application of chemicals (herbicides and fertilizers) and tillage?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by these agricultural practices could provide valuable information for incorporation into management direction.
Antennaria arcuata	Is this species threatened by exotic species?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by the invasion of exotic species could provide valuable information for incorporation into management direction.
Antennaria aromatica	To what extent is this rare species threatened by development?	Trend and demographic monitoring in the portion of this species' range (Anaeroid lake) where potential for housing development exists could provide valuable information for incorporation into management guidelines.
Antennaria aromatica	To what extent is this rare species threatened by introduced mountain goats and bighorn sheep?	Trend and demographic monitoring of populations of this rare species historically, presently, and/or potentially impacted by introduced mountain goats and/or big horn sheep could provide valuable information which could be incorporated into management.
Arabis fecunda	Is this species threatened by the encroachment of its habitat by exotic species (spotted knapweed)? Would the use of herbicides for controlling exotics adversely affect the species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by exotics or the herbicides used in controlling them could be useful to management.
Arabis fecunda	What are the effects of grazing and mining on this species?	Assessment of effects on known populations of grazing, trampling associated with grazing, and mining could provide guidelines consistent with the conservation of the species for management.
Arabis fecunda	What is the population trend for this species of concern?	Assessment of the population dynamics and trend of this species could enable management direction consistent with the conservation and viability of the species to be formulated.
Arabis suffrutescens var. horizontalis	Is this rare species adversely impacted by or threatened by recreational activities, particularly trampling by hikers?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by recreational activities could provide valuable information for incorporation into management guidelines.
Arabis suffrutescens var. horizontalis	Is this taxon valid? Does this variety which is supposedly limited to the Crater Lake area also occur in California?	Resolution of the taxonomic status of this rare variety and determination of its population sizes and geographic amplitude precludes the development of monitoring and management guidelines.
Arabis suffrutescens var. horizontalis	What are the environmental requirements of this rare species?	Trend, demographic, and ecophysiological monitoring of this species could provide valuable information on its environmental requirements and limiting factors.

Species name	Research Need	Potential Application
Artemisia campestris var. wormskioldii	How does this variety of concern respond to grazing activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by grazing activities could provide valuable information for incorporation into management direction.
Artemisia campestris var. wormskioldii	To what extent is this variety of concern threatened by the conversion of habitat to agricultural production, particularly conversion to orchards?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by agricultural conversion could provide valuable information for incorporation into management direction.
Artemisia campestris var. wormskioldii	What are the impacts of recreational activities on this rare species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by recreational activities could provide valuable information for incorporation into management direction.
Artemisia campestris var. wormskioldii	What is the reproductive biology of this rare variety? What is its viability threshold, what are its diseases, seed predators, germination requirements?	Laboratory and demographic and ecophysiological monitoring could provide valuable basic biological information about this variety of concern. The limiting factors identified in the studies mentioned above could be used to formulate management guidelines
Artemisia campestris var. wormskioldii	Will elevation of pool levels behind hydroelectric dams adversely affect this species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by changes in hydrology could provide valuable information for incorporation into management direction.
Artemisia ludoviciana ssp. "estesii"	To what extent is this unpublished taxon impacted by alterations in the hydrologic regime supporting its habitat?	Trend and demographic monitoring of populations impacted by changes in hydrology could provide valuable information which could be incorporated into management direction.
Artemisia ludoviciana ssp. "estesii"	To what extent is this unpublished taxon impacted by grazing?	Trend and demographic monitoring in populations affected by grazing could provide valuable information for incorporation into management direction.
Artemisia ludoviciana ssp. "estesii"	To what extent is this unpublished taxon impacted by recreational activities?	Trend and demographic monitoring in populations affected by recreational activities could provide valuable information for incorporation into management direction.
Artemisia ludoviciana ssp. "estesii"	What are the sizes of the populations and geographic amplitude of this unpublished species, specifically in the Deschutes River basin?	Inventory efforts for this species could determine population sizes and geographic amplitude. This baseline information could be used in formulating monitoring and management strategy.
Artemisia ludoviciana ssp. "estesii"	What is the taxonomic status of this unpublished subspecies?	Resolution of the taxonomic status of this unpublished subspecies precludes the development of monitoring and management guidelines.
Aster jessicae	Do exotic species threaten the known populations of this rare species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by the invasion of exotic species could provide valuable information for incorporation into management direction.
Aster jessicae	Is the remaining habitat of this species threatened by housing development on "choice view" sites?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by housing developments could provide valuable information for incorporation into management direction.
Aster jessicae	To what extent has the habitat of this species been diminished because of the agricultural conversion of its habitat?	Trend and demographic of populations historically, presently, and/or potentially impacted by the conversion of habitat to agricultural production could provide valuable information for incorporation into management direction.
Aster jessicae	To what extent has this species been adversely impacted by fire suppression?	Trend and demographic of populations historically, presently, and/or potentially impacted by fire and/or fire suppression could provide valuable information which could be incorporated into management guidelines.

Species name	Research Need	Potential Application
Aster jessicae	To what extent has this species been adversely impacted by grazing activities?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by grazing could provide valuable information for incorporation into management direction.
Aster jessicae	To what extent has this species been adversely impacted by the application, direct and indirect, of herbicides?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by herbicide application could provide valuable information for incorporation into management direction.
Aster jessicae	What impacts have changes in the fire regime had on this rare species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by fire, fire suppression, and/or changes in the fire regime could provide valuable information for incorporation into management direction.
Aster jessicae	What is the reproductive biology of this species? Are there opportunities for seed banking?	Laboratory studies and demographic/ecophysiological monitoring could provide valuable information on the reproductive biology of this rare species. Seed banking and opportunities to incorporate this species into restoration projects could be identified.
Aster jessicae	Will proposed agricultural conversion further diminish the habitat and range of this rare species?	Trend and demographic monitoring of populations historically, presently, and or potentially impacted by agricultural conversion could provide valuable information for incorporation into management direction.
Aster mollis	Are inventory efforts for this rare species adequate in Wyoming?	Inventory for this rare species could provide valuable information on the population sizes and geographic distribution. This baseline information could be useful in the development of monitoring and management strategies.
Astragalus anserinus	To what extent is this rare species threatened by recreational activities, particularly the use of off-road vehicles?	Trend and demographic monitoring of populations impacted by exotics and/or by recreational activities (especially off-road vehicles) could provide valuable information that could be incorporated into management guidelines.
Astragalus anserinus	To what extent is this rare species threatened by the invasion of exotic species including crested wheatgrass?	Trend and demographic monitoring of populations impacted by exotics and/or by crested wheatgrass seedings could provide valuable information which could be incorporated into management guidelines.
Astragalus anserinus	What are the environmental requirements of the species? Its limiting factors?	Demographic and ecophysiological monitoring of this species could provide valuable information on its environmental requirements and limiting factors. This could be incorporated into management direction.
Astragalus applegatei	To what extent is this rare species impacted by fire and/or fire suppression?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by natural or prescribed burns could provide valuable information for incorporation into management guidelines. Indications are for beneficial effects.
Astragalus applegatei	To what extent is this rare species threatened by grazing activities?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by grazing activities could provide valuable information for incorporation into management guidelines.
Astragalus applegatei	To what extent is this rare species threatened by rodents and lagomorphs?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by rodents and/or lagomorphs could provide valuable information for incorporation into management guidelines.
Astragalus applegatei	What are the environmental requirements for this rare species? What are the characteristics of its breeding system, germination requirements, seed bank, etc.?	Ecophysiological monitoring could provide valuable information on the basic environmental requirements of this rare species including its pollinators, seed production and viability rates, ability to withstand transplanting, etc.

Species name	Research Need	Potential Application
Astragalus atratus var. inseptus	To what extent is this rare variety impacted by development, particularly range improvement projects?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by range improvement projects including crested wheat grass seeding could provide valuable information for incorporation into management direction.
Astragalus atratus var. inseptus	To what extent is this rare variety impacted by exotic species?	Trend and demographic monitoring of populations historicall, presently, and/or potentially impacted by the invasion of exotic species including crested wheat grass seeding could provide valuable information for incorporation into management direction.
Astragalus atratus var. inseptus	To what extent is this rare variety impacted by fire and/or fire suppression?	Trend and demographic monitoring of populations historicall, presently, and/or potentially impacted by fire, fire suppression, and/or changes in the fire regime could provide valuable information for incorporation into management direction.
Astragalus atratus var. inseptus	What are the environmental requirements and limiting factors of this rare variety?	Demographic and ecophysiological monitoring could provide valuable information on the environmental requirements of this species and its limiting factors. This information could be incorporated into management direction.
Astragalus collinus var. laurentii	Does housing development threaten this variety of concern?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by housing development could provide valuable information that could be incorporated into management direction.
Astragalus collinus var. laurentii	How is this variety of concern affected by herbicidal application both direct and indirect?	Trend monitoring in known roadside populations that are periodically boom sprayed by the county road department should provide valuable information that can be incorporated into the formulation of management guidelines.
Astragalus collinus var. laurentii	How is this variety of concern being impacted by the invasion of exotic species?	Trend and demographic monitoring of populations historically, presently, and/or potentially threatened by the invasion of exotic species could provide valuable information which could be incorporated into management direction.
Astragalus collinus var. laurentii	How is this variety of concern impacted or potentially impacted by road construction and/or maintenance?	Trend monitoring in known roadside populations that might be impacted by road construction/maintenance activities could provide valuable information which could be incorporated into management direction.
Astragalus collinus var. laurentii	Is seed banking a viable alternative for increasing this variety of concern and incorporating it into restoration opportunities?	Exploring the possibilities of seed banking may enable a seed increasing program to be developed. This variety of concern could then be used in restoration prescriptions for appropriate habitats.
Astragalus collinus var. laurentii	What is the genetic and taxonomic "status" of this variety of concern? How does it differ from its sympatric progenitor, A. collinus var. collinus?	Genetic studies could resolve the taxonomic status of this species and also determine its genetic uniformity and vulnerability. This information could be useful to management.
Astragalus columbianus	Are exotic species a threat to this rare plant?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by exotic species could provide valuable information for incorporation into management direction.
Astragalus columbianus	How does this rare species respond to mining activities, particularly those associated with the extraction of diatomaceous earth?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by mining activities could provide valuable information which could be incorporated into management guidelines.

Species name	Research Need	Potential Application
Astragalus columbianus	Is this rare species adversely affected by grazing, particularly sheep grazing?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by grazing activities could provide valuable information for incorporation into management direction.
Astragalus columbianus	Is this species threatened by agricultural conversion of habitat, particularly conversion associated with orchard expansion?	Trend monitoring of populations proximal to orchard operations should provide valuable information which could be used in the formulation of management direction.
Astragalus columbianus	What are the effects of fire and/or fire suppression on this rare species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by fire, fire suppression, and/or changes in the fire regime could provide valuable information for incorporation into management direction.
Astragalus columbianus	What are the effects of military maneuvers (training) on this rare species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by military maneuvers could provide valuable information for incorporation into management direction.
Astragalus columbianus	What are the effects of recreational activities on this rare species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by recreational activities could provide valuable information for incorporation into management direction.
Astragalus diaphanus var. diaphanus	Is scarification of seed essential for the germination of this species?	Ecophysiologic monitoring supported by laboratory work could provide valuable information on the seed physiology of this rare species. This information could be incorporated into management direction.
Astragalus diaphanus var. diurnus	How can this diminutive annual species be monitored?	Development of an appropriate demographic monitoring protocol could provide a monitoring strategy for evaluating impacts of management activities to this species.
Astragalus diaphanus var. diurnus	To what extent is this rare species adversely impacted by predation by insects?	Ecophysiological monitoring of this rare species could provide valuable information on its environmental requirements including seed bank, pollinators, predation of seed by insects, etc. Information could be incorporated into management direction.
Astragalus diaphanus var. diurnus	What are the environmental requirements for this narrow endemic species?	Ecophysiological monitoring of this rare species could provide valuable information on its environmental requirements including seed bank, pollinators, role in nitrogen fixation, etc. This information could be incorporated into management direction.
Astragalus diaphanus var. diurnus	What is the extent of the natural seed bank of this species? What fluctuations in population dynamics are attributable to naturally-induced verses management-induced causes?	Demographic and ecophysiological monitoring could provide valuable information about the basic environmental requirements of this species including its seed bank, germination requirements, dependency upon soil bacteria, etc.
Astragalus diaphanus var. diurnus	What is the genetic variability of this species across its narrow geographic range?	Determination of the genetic variability of the species could provide valuable information for predicting the vulnerability of the species to changing environmental factors.
Astragalus diaphanus var. diurnus	What is the taxonomic relationship between this variety and Astragalus diaphanus var. diaphanus?	Resolution of the taxonomic relationship with progenitors or sympatric species precludes the development of monitoring strategies and/or management direction.
Astragalus howellii	How does this rare species respond to fire?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by natural or prescribed fire could provide valuable information for incorporation into management direction.
Astragalus howellii	How does this rare species respond to grazing?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by grazing could provide valuable information for incorporation into management direction.

Species name	Research Need	Potential Application
Astragalus howellii	What is the ecological niche of this species in succession?	Trend, demographic, and ecophysiological monitoring could provide valuable information on the successional dynamics of this species.
Astragalus mulfordiae	To what extent is this rare species threatened by a combination of increased fuel load caused by exotic species and fire?	Trend and demographic monitoring of populations historically, presently, and/or potentially threatened by high intensity fires attributable to accumulated fuels could provide information on fire effects, exotics, etc.
Astragalus mulfordiae	To what extent is this rare species threatened by fire and/or fire suppression?	Trend and demographic monitoring of populations historically, presently, and/or potentially threatened by natural and/or prescribed fire could provide valuable information on fire effects for incorporation into management direction.
Astragalus mulfordiae	To what extent is this rare species threatened by grazing activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially threatened by grazing could provide valuable information for incorporation into management direction.
Astragalus mulfordiae	To what extent is this rare species threatened by grazing of cattle, sheep, and lagomorphs?	Trend and demographic monitoring of populations historically, presently, and/or potentially threatened by domestic livestock and lagomorph grazing could provide valuable information for incorporation into management guidelines.
Astragalus mulfordiae	To what extent is this rare species threatened by herbicidal applications used in conjunction with sagebrush eradication?	Trend and demographic monitoring of populations historically, presently, and/or potentially threatened by aerial herbicidal application associated with sagebrush eradication could provide valuable information for incorporation into management guidelines.
Astragalus mulfordiae	To what extent is this rare species threatened by recreational activities, particularly the use of off-road vehicles?	Trend and demographic monitoring of populations historically, presently, and/or potentially threatened by recreational activities could provide valuable information for incorporation into management direction.
Astragalus mulfordiae	To what extent is this rare species threatened by road construction and/or road maintenance projects?	Trend and demographic monitoring of populations historically, presently, and/or potentially threatened by road construction/maintenance could provide valuable information for incorporation into management direction.
Astragalus mulfordiae	To what extent is this species threatened by agricultural conversion and/or housing development?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by agricultural conversion or housing development could provide valuable information for incorporation into management guidelines.
Astragalus mulfordiae	To what extent is this species threatened by fire and/or fire suppression?	Trend and demographic monitoring of populations historically, presently, or potentially impacted by natural and/or prescribed fire could provide information for incorporation into management direction.
Astragalus mulfordiae	To what extent is this species threatened by grazing activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by grazing activities could provide valuable information for incorporation into management direction.
Astragalus mulfordiae	To what extent is this species threatened by the invasion of exotic species, including those in seeding prescriptions?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by the invasion of exotics (or seeding of them) could provide valuable information for incorporation into management direction.
Astragalus mulfordiae	What are the environmental requirements and limiting factors of this species?	Demographic and ecophysiological monitoring would provide information on the ecological requirements and limiting factors of this species. This information could be incorporated into management direction.

Species name	Research Need	Potential Application
Astragalus oniciformis	What are the impacts of exotic species on this rare species?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by the invasion of exotic species could provide valuable information for incorporation into management guidelines.
Astragalus oniciformis	What are the impacts of fire and/or fire suppression on this species?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by natural and/or prescribed fire could provide valuable information for incorporation into management guidelines.
Astragalus oniciformis	What are the impacts of seeding prescriptions, particularly of Agropyron cristatum, on this species?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by crested wheatgrass seedings could provide information for incorporation into management guidelines.
Astragalus oniciformis	What is the taxonomic "status" of this species and its genetic relationship to other Astragalus species?	Determination of taxonomic status and relationship should preclude the development of monitoring protocol and management direction.
Astragalus paysonii	Has this species received adequate inventory effort in Wyoming?	Inventory conducted for this species could provide valuable information on its population sizes and geographic amplitude. This valuable information could be incorporated into monitoring protocol and management direction.
Astragalus paysonii	To what extent is this species benefited by periodic fire and its attendant opening of the forest canopy?	Trend and demographic monitoring of populations historically, presently, and potentially impacted by fire or alterations in the fire regime could provide information for incorporation into management direction.
Astragalus paysonii	To what extent is this species impacted by fire and/or fire suppression?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by natural and/or prescribed fire could provide valuable information which could be incorporated into management guidelines.
Astragalus paysonii	To what extent is this species impacted by the invasion of exotic species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by the invasion of exotic species could provide valuable information which could be incorporated into management guidelines.
Astragalus paysonii	To what extent is this species limited to early seral successional communities/associations?	Determination of the successional status and requirements of this species of concern could provide valuable information for incorporation into management direction.
Astragalus paysnnii	What are the environmental requirements of this species?	Trend, demographic, and ecophysiolngical monitoring could provide information on the environmental requirements of this species. This information could be incorporated into management direction.
Astragalus paysonii	What is the seral status of this species in natural succession?	Ecological plot analysis combined with trend and demographic monitoring could provide information relative the species' requirement for seral conditions.
Astragalus peckii	How does this rare species respond to fire?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by natural or prescribed fire could provide valuable information for incorporation into management direction.
Astragalus peckii	To what extent is this species threatened by housing developments?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by housing development could provide valuable information for incorporation into management direction.
Astragalus peckii	To what extent is this species threatened by recreational activities, particularly off road vehicles?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by recreational activities could provide valuable information for incorporation into management direction.

Species name	Research Need	Potential Application
Astragalus peckii	To what extent is this species threatened by timber harvest?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by timber harvest could provide valuable information for incorporation into management direction.
Astragalus peckii	What are the environmental requirements for this narrow endemic species?	Ecophysiological monitoring of this rare species could provide valuable information on its environmental requirements including seed bank, pollinators, role in nitrogen fixation, etc. This information could be incorporated into management direction.
Astragalus pulsiferae var. suksdorfii	To what extent is this rare variety threatened by fire, fire suppression, and/or changes in the fire regime?	Trend and demographic monitoring of populations historically, presently, and/or potentially threatened by natural and/or prescribed fire could provide information for incorporation into management direction.
Astragalus pulsiferae var. suksdorfii	To what extent is this rare variety threatened by recreational activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially threatened recreational activities could provide valuable information for incorporation into management direction.
Astragalus pulsiferae var. suksdorfii	To what extent is this rare variety threatened by the invasion of exotic species?	Trend and demographic monitoring of populations historically, presently, and/or potentially threatened by the invasion of exotic species could provide information for incorporation into management direction.
Astragalus pulsiferae var. suksdorfii	To what extent is this rare variety threatened by timber harvest activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially threatened timber harvest activities could provide valuable information for incorporation into management direction.
Astragalus pulsiferae var. suksdorfii	What are the environmental requirements of this rare species? Do these requirement cause its bicentric distribution (Washington and California)?	Trend, demographic, and ecophysiological monitoring of this rare species could provide valuable information on its environmental requirements and limiting factors. This information could be incorporated into management guidelines.
Astragalus scaphoides	To what extent is this rare species impacted by fire and/or fire suppression?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by fire and/or fire suppression could provide valuable information which could be incorporated into management guidelines.
Astragalus scaphoides	To what extent is this rare species impacted by grazing activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by grazing activities could provide information which could be incorporated into management guidelines.
Astragalus scaphoides	To what extent is this rare species impacted by hydrologic developments?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by projects which alter hydrologic regime could provide information which could be incorporated into management guidelines.
Astragalus sinuatus	Is this rare species threatened by the encroachment of exotic plant species into its habitat?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by the invasion of exotic species could provide information for incorporation into management direction.
Astragalus sinuatus	To what extent is this rare species affected by fire, fire suppression, and/or changes in the fire regime?	Trend and demographic monitoring populations historically, presently, and/or potentially impacted by natural and/or prescribed fire could provide valuable information which could be incorporated into management guidelines.
Astragalus sinuatus	To what extent is this rare species affected by grazing activities?	Trend and demographic monitoring populations historically, presently, and/or potentially impacted by grazing activities could provide information which could be incorporated into management guidelines.
Astragalus sinuatus	To what extent is this rare species affected by mining activities?	Trend and demographic monitoring populations historically, presently, and/or potentially impacted by mining activitics could provide valuable information which could be incorporated into management guidelines.

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Species name	Research Need	Potential Application
Astragalus sinuatus	To what extent is this rare species affected by road construction and/or maintenance?	Trend and demographic monitoring populations historically, presently, and/or potentially impacted by road construction/maintenance could provide valuable information which could be incorporated into management guidelines.
Astragalus sinuatus	To what extent is this rare species affected by the invasion or seeding of exotic species?	Trend and demographic monitoring populations historically, presently, and/or potentially impacted by the invasion of exotic species could provide valuable information which could be incorporated into management guidelines.
Astragalus sinuatus	What are the effects of grazing on this rare species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by grazing activities could provide valuable information for incorporation into management direction.
Astragalus sinuatus	What are the environmental requirements of this rare species?	Trend, demographic, and ecophysiological monitoring of this rare species could provide valuable baseline information on its environmental requirements and limiting factors. This information could be incorporated into management direction.
Astragalus sinuatus	What is its reproductive biology? Do fungi diminish seed set and viability?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by the seed fungus could provide valuable information for incorporation into management direction.
Astragalus sinuatus	Would seed banking work for this species and perhaps enable it to be used for restoration?	Seed banking success could result in an increase in seed available for use in restoration activities. This information could be incorporated into management direction.
Astragalus solitarius	Does Wyoming big sagebrush prevent this rare species from being impacted by grazing?	Ecophysiologic monitoring could document the dependence of the rare species on the dominant shrub. This information could be incorporated into management guidelines.
Astragalus solitarius	How have the population sizes and geographic amplitude of this rare species been diminished by crested wheat grass seedings?	Trend and demographic monitoring of populations historically, presently, and/or potentially threatened by displacement with crested wheat grass could provide valuable information for incorporation into management direction.
Astragalus solitarius	Is this rare species threatened by mining activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by mining activities could provide valuable information for incorporation into management guidelines.
Astragalus solitarius	To what extent is this species affected by impacts to its supporting species, Artemisia tridentata wyomingensis? What are the effects of fire on this relationship and/or dependency?	Trend and demographic monitoring of populations historically, presently, and/or potentially threatened by fire and/or fire suppression could provide information for incorporation into management direction.
Astragalus sterilis	What are the impacts mining activities on this rare species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by the mining activities Could provide valuable information for the formulation of management direction.
Astragalus sterilis	What are the impacts of wildlife grazing on this rare species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by the grazing activities of wild animals could provide valuable information for the formulation of management direction.
Astragalus sterilis	To what extent is this rare species adversely affected by the invasion of exotic species, particularly cheatgrass?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by exotic species, particularly cheatgrass, Could provide valuable information for the formulation of management direction.

Species name	Research Need	Potential Application
Astragalus sterilis	What are the environmental requirements of this rare species?	Ecophysiological monitoring of this species could provide valuable information on its environmental requirements including pollination mechanisms, seed viability, extent of seed banking, etc. This information could be incorporated into management.
Astragalus sterilis	What is the taxonomic status of this rare species? Is it a variety of astragalus cusickii? What is its genetic relationship with A. cusickii?	Resolution of the taxonomic status of this species precludes the formulation of monitoring and/or management strategy.
Astragalus sterilis	Is this a valid taxon? What is its relationship with A. cusickii?	Resolution of the taxonomic status and systematic relationship should preclude the development of monitoring protocol and management direction.
Astragalus sterilis	What are the environmental requirements for this species? What are its limiting factors?	Demographic and ecophysiological monitoring could provide valuable information on the environmental requirements of this species and its limiting factors. This information could be incorporated into management direction.
Astragalus sterilis	How does this species respond to fire and/or fire suppression?	Trend and demographic monitoring of population historically, presently, and/or potentially impacted by natural and/or prescribed burning could provide information for incorporation into management direction.
Astragalus sterilis	How does this species respond to grazing?	Trend and demographic monitoring of population historically, presently, and/or potentially impacted by grazing could provide valuable information for incorporation into management direction.
Astragalus sterilis	How does this species respond to invasive exotics including those introduced in seeding prescriptions?	Trend and demographic monitoring of population historically, presently, and/or potentially impacted by the invasion of exotics could provide valuable information for incorporation into management direction.
Astragalus sterilis	How does this species respond to mining activities?	Trend and demographic monitoring of population historically, presently, and/or potentially impacted by mining could provide valuable information for incorporation into management direction.
Astragalus tegetarioides	How does this rare species respond to fire and/or fire suppression?	Trend and demographic monitoring of populations historically, presently, or potentially impacted by natural and/or prescribed fire could provide information for incorporation into management guidelines.
Astragalus tegetarioides	How does this rare species respond to grazing activities?	Trend and demographic monitoring of populations historically, presently, or potentially impacted by grazing activities could provide valuable information for incorporation into management guidelines.
Astragalus tegetarioides	What are the environmental requirements for this rare species?	Ecophysiological monitoring of this rare species could provide valuable information on its environmental requirements including reproductive success, seed bank, etc.
Astragalus tyghensis	To what extent is this species threatened by excavation (gravel pit) activities?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by gravel pit excavation could provide valuable information for incorporation into management direction.
Astragalus tyghensis	To what extent is this species threatened by habitat fragmentation caused by agricultural conversion?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by agricultural conversion could provide valuable information for incorporation into management direction.
Astragalus tyghensis	To what extent is this species threatened by indirect and direct application of herbicides?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by herbicidal application could provide valuable information for incorporation into management direction.

Species name	Research Need	Potential Application
Astragalus tyghensis	To what extent is this species threatened by the invasion of its habitat by exotic species?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by exotic species could provide valuable information for incorporation into management direction.
Astragalus tyghensis	To what extent is this species threatened fire and/or fire suppression?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by natural and/or prescribed fire could provide valuable information for incorporation into management direction.
Astragalus tyghensis	To what extent is this species threatened grazing by domestic animals and wildlife?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by grazing of domestic and wild species could provide valuable information for incorporation into management direction.
Astragalus vexilliflexus var. nubilus	Are inventory efforts for this rare species adequate, particularly on the west side of the white cloud crest?	Inventory for this rare species could provide valuable information on population sizes and geographic amplitude of this rare species. This information could be useful in the development of monitoring protocol and management guidelines.
Astragalus vexilliflexus var. nubilus	To what extent is this species threatened by grazing activities?	Trend and demographic monitoring of populations historically, presently, and potentially impacted by grazing could provide valuable information which could be incorporated into management direction.
Astragalus yoder-williamsii	What is the genetic relationship of this species with other sympatric species such as A. mulfordiae and A. oniciformis?	Taxonomic status and relationships of this species should preclude the development of monitoring protocol and management direction.
Astragalus yoder-williamsii	How does this rare species respond to fire and/or fire suppression? Does it need periodic fire?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by natural and/or prescribed fires could provide valuable information which could be incorporated into management direction.
Astragalus yoder-williamsii	How does this rare species respond to grazing?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by grazing activities could provide valuable information for incorporation into management direction.
Astragalus yoder-williamsii	How does this rare species respond to juniper encroachment and the resultant alteration of habitat?	Trend and demographic monitoring of the species in areas where juniper encroachment is occurring could provide valuable information which could be incorporated into management direction.
Balsamorhiza rosea	Does hybridization threaten the genetic integrity of this rare species?	Genetic studies in sympatric populations could provide valuable information about the genetic integrity and vulnerability of this species. This information could be incorporated into management direction.
Balsamorhiza rosea	Have seed banking efforts been conducted in an effort to utilize this rare species in restoration prescriptions in sites having suitable habitat?	Seed banking success could result in an increase in available seed stock which could be used in restoration activities.
Balsamorhiza rosea	To what extent are populations of this rare species threatened by herbicidal drift from agricultural applications occurring on adjacent lands?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by agricultural herbicides could provide valuable information for incorporation into management guidelines.
Balsamorhiza rosea	To what extent is this rare species impacted by grazing activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially threatened by grazing activities could provide valuable information for incorporation into management direction.

Species name	Research Need	Potential Application
Balsamorhiza rosea	To what extent is this species threatened by development, particularly the construction Of wind-energy towers, microwave towers, and television towers?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by commercial (tower) development could provideinformation for incorporation into management guidelines.
Balsamorhiza rosea	To what extent is this species threatened by recreational activities, particularly off road vehicular traffic?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by recreational activities could provide valuable information for incorporation into management guidelines.
Botrychium ascendens	Are mycorrhizae essential for the reproduction of this species? If so, which mycorrhizae?	Ecophysiological monitoring could provide information on the specific mycorrhizal requirements of this species. This information could be incorporated into management guidelines.
Botrychium ascendens	How does this rare species respond to fire and/or fire suppression?	Trend monitoring in populations impacted by or potentially impacted by natural or prescribed burning could provide valuable information for incorporation into management direction.
Botrychium ascendens	How does this rare species respond to severe changes in the light and moisture regime caused by clear cutting?	Trend monitoring in populations impacted by or potentially impacted by opening of the canopy by timber harvest could provide valuable information on the species' response to such activities. This information could be incorporated into guidelines.
Botrychium ascendens	How is this species affected by timber harvest activities? By alterations in the light regime?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by logging could provide valuable information which could be incorporated into management direction.
Botrychium ascendens	To what extent does this rare species need site disturbance to survive?	Trend monitoring in various sites in which different types of disturbance have occurred or are scheduled to occur could provide valuable information for the development of management direction.
Botrychium ascendens	To what extent is this rare species impacted by fire, fire suppression, and/or changes in the fire regime?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by fire could provide valuable information which could be incorporated into management direction.
Botrychium ascendens	To what extent is this rare species impacted by grazing activities?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by grazing activities could provide information which could be incorporated into management direction.
Botrychium ascendens	To what extent is this rare species impacted by recreational activities?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by recreational Activities (hiking) could provide valuable information which could be incorporated into management direction.
Botrychium ascendens	What are the environmental requirements of this rare species?	Trend, demographic, and ecophysiological monitoring of this rare species could provide valuable information about its environmental requirements and limiting factors. This information could be incorporated into management direction.
Botrychium ascendens	What are the mycorrhizal requirements for this rare species?	Demographic and ecophysiological monitoring of this species could provide valuable information on its environmental requirements and limiting factors. This information could be incorporated into management direction.
Botrychium ascendens	What is the genetic relationship of this species to other Botrychiums that are usually found in association with it?	Determination of the genetic integrity of the species and its relationship with sympatric species is essential in confirming its "rare" status. From this information, management direction could be developed.

Species name	Research Need	Potential Application
Botrychium ascendens	What is the taxonomic status of this species? What are its genetic relationships with the other Botrychium species with which it frequently grows?	Resolution of the taxonomic status of this rare species through cytogenetic and electrophoretic genetic investigations should preclude the development of monitoring protocol and management direction?
Botrychium crenulatum	Have inventory efforts for this rare species been adequate?	Inventory for this rare species could provide valuable information on its population sizes and geographic amplitude. This information could be incorporated into management direction.
Botrychium crenulatum	How does this rare species respond to fire and/or fire suppression? How does it respond to variation in the seasonality of burning?	Trend and demographic monitoring of this species in conjunction with burn history and/or prescribed fires could provide valuable information for incorporation into management direction.
Botrychium crenulatum	Is this rare species adversely affected by seeding projects which include non-native grass species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by seeding prescriptions could provide valuable information for incorporation into management guidelines.
Botrychium crenulatum	Is this rare species adversely affected by trampling by grazing animals?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by grazing activities could provide valuable information for incorporation into management guidelines.
Botrychium crenulatum	To what extent is this rare species impacted by fire, fire suppression, and/or changes in the fire regime?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by fire could provide valuable information which could be incorporated into management direction.
Botrychium crenulatum	To what extent is this rare species impacted by grazing activities?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by grazing activities could provide valuable information which could be incorporated into management direction.
Botrychium crenulatum	What are the environmental requirements for this rare species? What mycorrhizae are essential for its survival?	Ecophysiological monitoring could provide valuable information about the basic environmental requirements of the species including dependency upon specific mycorrhizae. This information could be incorporated into management direction.
Botrychium crenulatum	What are the environmental requirements of this rare species?	Trend, demographic, and ecophysiological monitoring of this rare species could provide valuable information about its environmental requirements and limiting factors. This information could be incorporated into management direction.
Botrychium crenulatum	What is the genetic relationship of this species to other botrychiums that are usually found in association with it?	Determination of the genetic integrity of the species and its relationship with sympatric species is essential in confirmine its "rare" status. From this information management direction could be developed.
Botrychium crenulatum	What is the taxonomic status of this species? What are its genetic relationships with the other Botrychium species with which it frequently grows?	Resolution of the taxonomic status of this rare species through cytogenetic and electrophoretic genetic investigations should preclude the development of monitoring protocol and management direction?
Botrychium crenulatum	Does this species depend upon specific soil mycorrhizae? What are these mycorrhizae?	Ecophysiological monitoring could provide valuable information on the interrelationship of this rare species and soil mycorrhizae. Management direction could be formulated accordingly.
Botrychium crenulatum	How does this species respond to fire and/or fire suppression?	Trend monitoring in populations impacted by or potentially impacted by natural or prescribed burning could provide valuable information from which management direction could be formulated

Species name	Research Need	Potential Application
Botrychium crenulatum	How does this species respond to the opening of the canopy that is associated with timber harvest activity?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by timber harvest activities could provide useful information which could be incorporated into management direction.
Botrychium lunaria	How does this species respond to fire and/or fire suppression?	Trend monitoring in populations impacted by or potentially impacted by natural or prescribed burning could provide valuable information from which management direction could be formulated
Botrychium lunaria	How does this species respond to harvest activities that result in an opening of the canopy?	Trend monitoring in populations impacted by or potentially impacted by harvest activities could provide valuable information. These findings could be used in the development of management guidelines.
Botrychium lunaria	How genetically different is this species from the other botrychiums that have been split from it taxonomically?	Laboratory research including cytological and electrophoretic work could provide information on the taxonomic status of this rare species. This information could be incorporated into management guidelines.
Botrychium lunaria	What are the mycorrhizal requirements for this species?	Ecophysiological monitoring could provide valuable information regarding the interrelationships of this species and specific mycorrhizae. This information could be incorporated into management direction.
Botrychium paradoxum	How does this species respond to fire and/or fire suppression?	Trend and demographic monitoring conducted in conjunction with historic, present, and potential natural or prescribed burns could provide information which could be used in formulating management direction.
Botrychium paradoxum	How does this species respond to grazing?	Trend and demographic monitoring of this species in areas impacted by grazing could provide useful information which could be incorporated into management direction.
Botrychium paradoxum	How is this species dependent upon mycorrhizae? Which specific mycorrhizae?	Ecophysiological monitoring should determine any type of symbiotic relationship between this rare species and soil mycorrhizae. This information could be incorporated into management guidelines.
Botrychium paradoxum	To what extent does this rare species need site disturbance to survive?	Trend monitoring in various sites in which different types of disturbance have occurred or are scheduled to occur could provide valuable information for the development of management direction.
Botrychium paradoxum	To what extent is this rare species impacted by fire, fire suppression, and/or changes in the fire regime?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by fire could provide valuable information which could be incorporated into management direction.
Botrychium paradoxum	To what extent is this rare species impacted by grazing activities?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by grazing activities could provide information which could be incorporated into management direction.
Botrychium paradoxum	What are the environmental requirements of this grapefern? Are specific mycorrhizae necessary for its survival?	Ecophysiological monitoring and supporting laboratory work could provide information about the ecological requirements of this species that could be incorporated into management direction.
Botrychium paradoxum	What are the environmental requirements of this rare species?	Trend, demographic, and ecophysiological monitoring of this rare species could provide valuable information about its environmental requirements and limiting factors. This information could be incorporated into management direction.
Botrychium paradoxum	What are the mycorrhizal requirements for this species? Are the same mycorrhizae present in geographically separated sites supporting this species?	Determination of the mycorrhizal associates of this species could explain its limited distribution. Assessment of the impacts of management activities on the essential mycorrhizae could provide valuable guidelines for management.

Species name	Research Need	Potential Application
Botrychium paradoxum	What are the responses of this species to impacts caused by unusually large Populations of wildlife, particularly elk? Impacts would include both grazing and trampling.	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by grazing and trampling could provide valuable information for incorporation into management direction.
Botrychium paradoxum	What is the genetic "status" of this species? It usually occurs with several other Botrychium species (sympatric). Does genetic introgression threaten this species?	Determination of valid taxa within the genus Botrychium through genetic research might reduce the number of currently recognized taxa and greatly simplify the task of conserving these species through appropriate management decisions.
Botrychium paradoxum	What is the genetic relationship of this grapefern to other sympatric species?	Genetic studies could indicate whether this species is genetically unique or whether it arises spontaneously from hybridization between/among other species. Resolution of the genetic uniqueness should enable management guidelines to be developed.
Botrychium paradoxum	What is the genetic relationship of this species to the many other grapeferns with which it is sympatric?	Ecophysiological monitoring supported by laboratory studies of this rare species could provide valuable information regarding the genetic integrity (and validity) of the taxon. This information could be incorporated into management direction.
Botrychium paradoxum	What is the taxonomic status of this species? What are its genetic relationships with the other Botrychium species with which it frequently grows?	Resolution of the taxonomic status of this rare species through cytogenetic and electrophoretic genetic investigations should preclude the development of monitoring protocol and management direction?
Botrychium paradoxum	What seral stages provide optimal habitat for this species?	Trend and demographic monitoring in populations in different seral stages could provide valuable information relative to the dependency of the species upon a specific successional stage.
Botrychium pedunculosum	Is this species threatened by the invasion of exotic species? To what extent?	Trend monitoring in areas supporting the rare species proximal to areas have exotic species populations could provide valuable information on the rate of exotic spread and effects on the rare species. Management guidelines could incorporate this.
Botrychium pedunculosum	What are the mycorrhizal requirements for this rare species?	Laboratory and ecophysiological monitoring could provide information regarding the dependency of this rare species on specific mycorrhizae. This information could be incorporated into management direction.
Botrychium pumicola	Is the timing of timber harvest activities important in this species' response to timber harvest?	Trend and demographic monitoring in populations under different logging schedules could provide valuable information for incorporation into management guidelines.
Botrychium pumicola	To what extent is this species threatened by fire and/or fire suppression?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by natural and/or prescribed burning could provide information for incorporation into management direction.
Botrychium pumicola	To what extent is this species threatened by the encroachment of its habitat by lodgepole pine?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by lodgepole encroachment and its elimination could provide valuable information for incorporation into management direction.
Botrychium pumicola	What are the environmental requirements of this rare species? Does it need specific mycorrhizae?	Ecophysiological monitoring of populations could provide valuable information on the environmental requirements of this species including mycorrhizal relationships, shade requirements, etc.
Calochortus longebarbatus var. longebarbatus	How does alteration of the hydrology (channel construction) in the habitat of this variety of concern affect this plant?	Trend monitoring in areas impacted by or potentially impacted by alterations in the hydrologic regime could provide valuable information on the species' response to such activities. This information could be incorporated into management guidelines.

Species name	Research Need	Potential Application
Calochortus longebarbatus var. longebarbatus	How does this rare species respond to fire and/or fire suppression? Is the present day fuel load a threat to this species?	Trend monitoring of this rare species in conjunction with prescribed and/or natural fires could provide valuable information which could be incorporated into management direction.
Calochortus longebarbatus var. longebarbatus	How does this rare species respond to grazing activities?	Trend monitoring of populations historically, presently, and/or potentially impacted by grazing could provide valuable information which could be incorporated into management direction.
Calochortus longebarbatus var. longebarbatus	How does this rare species respond to recreational activities?	Trend monitoring of this rare species in populations historically, presently, and/or potentially impacted by recreational activities could provide valuable information for incorporation into management guidelines.
Calochortus longebarbatus var. longebarbatus	How does this rare species respond to seasonal rotation of grazing? Does spring grazing adversely impact this rare species?	Trend and demographic monitoring conducted under different seasonal rotations of grazing could provide valuable information which could be incorporated into management direction.
Calochortus longebarbatus var. longebarbatus	How does this rare species respond to seeding projects which put additional perennial grasses into its habitat?	Trend and demographic monitoring in populations historically, presently, or potentially impacted by such seeding prescriptions could provide valuable information for incorporation into management guidelines.
Calochortus longebarbatus var. longebarbatus	How is this variety of concern affected by grazing activities?	Trend monitoring in population areas known to be impacted or potentially impacted by grazing could provide valuable information upon which management direction could be formulated.
Calochortus longebarbatus var. longebarbatus	What are the effects of road construction/maintenance on this variety of concern?	Trend and demographic monitoring in areas impacted by or potentially impacted by road construction/maintenance could provide valuable information which could be incorporated into management direction?
Calochortus longebarbatus var. longebarbatus	What are the effects of timber harvest on this variety of concern? Are the casual observations that canopy opening benefits this plant correct?	Trend and demographic monitoring in areas impacted by or potentially impacted by timber harvest activities could provide valuable information which could be incorporated into management direction?
Calochortus longebarbatus var. longebarbatus	What is the genetic relationship between this variety and the variety peckii?	Genetic studies including electrophoresis and the development of morphological keys not dependent upon sampling of the capsule could provide valuable information for refining the taxonomy of these two varieties.
Calochortus longebarbatus var. peckii	What is the genetic relationship between this variety and the variety longebarbatus?	Genetic studies including electrophoresis and the development of morphological keys not dependent upon sampling of the capsule could provide valuable information for refining the taxonomy of these two varieties.
Calochortus longebarbatus var. peckii	How does this rare variety respond to competition from exotic species?	Trend monitoring in populations historically, presently, or potentially impacted by the invasion of exotics could provide valuable information for incorporation into management direction.
Calochortus longebarbatus var. peckii	How does this rare variety respond to competition from perennial sod-forming grasses introduced in seeding prescriptions?	Trend monitoring in populations historically, presently, or potentially impacted by seeding projects could provide valuable information for incorporation into management direction.
Calochortus longebarbatus var. peckii	How does this rare variety respond to fire and/or fire suppression?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by fire could provide valuable information which could be incorporated into management direction.
Calochortus longebarbatus var. peckii	How does this rare variety respond to grazing activities?	Trend monitoring in populations historically, presently, and/or potentially impacted by grazing could provide valuable information which could he incorporated into management direction.
Calochortus longebarbatus var. peckii	Is this rare variety threatened by road construction?	Trend monitoring in populations historically, presently, or potentially impacted by road construction activity could provide valuable information for incorporation into management guidelines.

Species name	Research Need	Potential Application
Calochortus nitidus	To what extent has this rare species been impacted by grazing?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by grazing could provide valuable information for management direction.
Calochortus nitidus	To what extent has this rare species been impacted by the application (direct and indirect) of herbicides?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by the application of herbicides (direct and/or indirect) could provide valuable information for management direction.
Calochortus nitidus	To what extent has this rare species been impacted by the conversion of its habitat to agricultural production?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by agricultural conversion could provide valuable information for management direction.
Calochortus nitidus	To what extent is this rare species threatened by the invasion of exotic species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by exotic species could provide valuable information for management direction.
Calochortus nitidus	To what extent is this species threatened by agricultural conversion of its native habitat?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by the conversion of habitat for agricultural production could provide valuable information which could be incorporated into management direction.
Calochortus nitidus	To what extent is this species threatened by grazing activities?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by grazing activities could provide information which could be incorporated into management direction.
Calochortus nitidus	To what extent is this species threatened by the invasion of exotic species?	Historic sites should be thoroughly inventoried with special data collected on the presence of exotic species. This species is thought to have been extirpated from the state of Washington. Management guidelines can be formulated accordingly.
Camissonia pygmaea	To what extent is this species threatened by the encroachment of exotic species, particularly annual grasses that are part of seeding prescriptions?	Trend and demographic monitoring in populations impacted by or proposed to be impacted by exotic species could provide valuable information for the formulation of management guidelines.
Camissonia pygmaea	To what extent is this species threatened by the excavation of rock material (gravel pit development) from its habitat?	Trend and demographic monitoring in populations impacted by or proposed to be impacted by mining activities (gravel pit excavation) could provide valuable information for the formulation of management guidelines.
Camissonia pygmaea	What are the impacts of grazing, particularly trampling, on this annual species of concern?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by grazing activities could provide information which could be incorporated into management direction.
Camissonia pygmaea	What are the impacts to this species by the direct and indirect application of herbicides?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by the direct and/or indirect application of herbicides could provide valuable information which could be incorporated into management direction.
Camissonia pygmaea	What are the pollinators of this species and are they adversely affected by the application of insecticides used in agriculture?	Trend and demographic monitoring in populations impacted by or proposed to be impacted by the application of insecticides should provide information for the formulation of management guidelines.
Carex lenticularis var. dolia	What are the population dynamics of this variety of concern? Are population numbers stable?	Implement a monitoring project that will tract population dynamics of this variety of concern. This would also help assess grazing effects.

Species name	Research Need	Potential Application
Carex lenticularis var. dolia	Does grazing, particularly by sheep, adversely affect this variety of concern?	Implement a monitoring program to assess the effects of grazing on the species of concern.
Carex lenticularis var. dolia	What environmental factors affect recruitment of this variety of concern? What dispersal mechanism is involved? What are the germination requirements?	Gaining an understanding of the ecological requirements of this variety of concern--dispersal, germination, and conditions for improved recruitment--could conserve the variety.
Carex lenticularis var. dolia	Does the variety exhibit genetic integrity or is genetic introgression by a common variety altering its gene pool?	Opportunity to determine genetic purity of the variety of concern and to determine its genetic relationships with more common varieties.
Carex parryana ssp. idahoa	What is the response of the subspecies of concern to intensive grazing activity?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by grazing activities could provide valuable information for incorporation into management direction.
Carex parryana ssp. idahoa	What is the geographic amplitude of this subspecies?	Inventory for this species could provide valuable information on population sizes and geographic amplitude. This information could be incorporated into management direction.
Castilleja chlorotica	To what extent is this species threatened by the invasion of its habitat by exotic species?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by exotic species could provide valuable information for incorporation into management direction.
Castilleja chlorotica	To what extent is this species threatened fire and/or fire suppression?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by natural and/or prescribed fire could provide information for incorporation into management direction.
Castilleja chlorotica	To what extent is this species threatened grazing by domestic animals?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by grazing of domestic Species could provide information for incorporation into management direction.
Castilleja chlorotica	What are the environmental requirements of this rare species?	Ecophysiological monitoring of populations could provide valuable information on the environmental requirements of this species including pollinators, seed banks, etc.
Castilleja chlorotica	What are the impacts of timber harvest activities to this rare species?	Trend and demographic monitoring in populations historically, presently, and/or potentially threatened by timber harvest activity could provide valuable information for incorporation into management guidelines.
Castilleja chlorotica	What is its genetic "status" and how does it differ from C. glandulifera and C. viscidula?	Genetic investigations including electrophoresis could validate this taxon.
Castilleja chlorotica	What is the host-parasite relationship of this species?	Ecophysiological monitoring of populations could provide valuable information on the environmental requirements of this species including host/parasite relationships.
Castilleja christii	To what extent is this rare species threatened by road construction and/or road maintenance?	Trend and demographic monitoring of the single known population in response to road construction/maintenance activities could provide valuable information which could be incorporated into management direction.
Castilleja cryptantha	To what extent is this rare species threatened by animal damage, particularly from lagomorphs and rodents?	Trend and demographic monitoring of this rare species in habitats historically, presently, and or potentially impacted by animal damage could provide information for incorporation into management direction.
Castilleja cryptantha	To what extent is this rare species threatened by recreational activity?	Trend and demographic monitoring of this rare species in habitats historically, presently, and or potentially impacted by recreational activity could provide information for incorporation into management direction.

Species name	Research Need	Potential Application
Castilleja cryptantha	What are the environmental requirements and limiting factors of this rare species?	Trend, demographic, and ecophysiological monitoring of this rare species could provide valuable information on its environmental requirements and limiting factors. This information could be valuable in formulating monitoring and management direction.
Castilleja pilosa var. steenensis	To what extent is this species affected by grazing activities? Is its response to sheep grazing and cattle grazing different?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by grazing could provide valuable information which could be incorporated into management direction.
Castilleja pilosa var. steenensis	What are the effects of roads on this species?	This species apparently responds favorably to road construction and/or maintenance. Trend monitoring could document this benefit and management direction could reflect this relationship.
Castilleja pilosa var. steenensis	What is the symbiotic relationship of this variety to the subshrubs of its habitat? Which subshrubs is it hemiparasitic with?	Ecophysiological monitoring could elucidate the relationships of this species with the subshrubs of its habitat. This information could be incorporated into management direction, particularly as it concerns the host species.
Castilleja pilosa var. steenensis	What is the taxonomic relationship of this variety to c. Pilosa var. Pilosa?	Resolution of the taxonomy status of this "variety" precludes the development of monitoring and/or management guidelines.
Castilleja rubida	To what extent is this rare species threatened by the impacts of introduced big horn sheep and/or mountain goats?	Trend and demographic monitoring of this rare species in populations historically, presently, and/or potentially impacted by introduced sheep and goats could provide valuable information for incorporation into management guidelines.
Chaenactis cusickii	Are inventory efforts for this species adequate, particularly in Oregon?	Inventory for this rare species could provide valuable information on population sizes, locations, and geographic distribution. This information could be incorporated into management direction.
Chaenactis cusickii	How is this rare species affected by fire suppression activities, particularly those that disturb the soil?	Trend and demographic monitoring of this species in populations historically, presently, and/or potentially impacted by fire suppression activities (especially line construction) could provide valuable information for incorporation into management direction.
Chaenactis cusickii	How is this rare species affected by grazing activities, and particularly trampling by domestic livestock?	Trend and demographic monitoring of this species in populations historically, presently, and/or potentially impacted by grazing and trampling could provide information for incorporation into management direction.
Chaenactis cusickii	To what extent is this rare species threatened by exotic species, including those introduced in seeding prescriptions.	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by exotic species could provide information which could be incorporated into management guidelines.
Chaenactis cusickii	To what extent is this rare species threatened by mining activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by mining activities could provide information which could be incorporated into management guidelines.
Chaenactis cusickii	To what extent is this species impacted by recreational activities, particularly the use of off-road vehicles?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by recreational activities (ORV's) could provide valuable information for management direction.
Chaenactis cusickii	To what extent is this species threatened by recreational activities, particularly by off-road vehicular traffic?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by recreational activities, and especially off road vehicle impacts could provide valuable information for incorporation into management guidelines.

Species name	Research Need	Potential Application
Chaenactis cusickii	To what extent is this species threatened by road construction and/or road maintenance?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by road construction and/or road maintenance activities could provide valuable information for incorporation into management guidelines.
Chaenactis cusickii	What are the environmental requirements and limiting factors of this species?	Ecophysiological and demographic monitoring of this species could provide valuable information on its environmental requirements and limiting factors. This information could be incorporated into management direction.
Chaenactis cusickii	What are the environmental requirements of this species?	Ecophysiological monitoring of this species could provide valuable information on its environmental requirements and limiting factors. This information could be incorporated into management direction.
Chrysothamnus parryi ssp. montanus	What are the environmental requirements and limiting factors of this rare species?	Ecophysiological, trend, and demographic monitoring could provide information on the environmental requirements of this species. This information could be incorporated into management direction.
Chrysothamnus parryi var. montanus	What are the pollinating agents for this species of concem?	Trend, demographic, and ecophysiological monitoring of this species could provide valuable information on its environmental requirements and limiting factors. This information could be used in management.
Chrysothamnus parryi var. montanus	What is the population trend of this species?	Trend monitoring could provide valuable information on the population dynamics and trend of this species. This information could be incorporated into management direction.
Chrysothamnus parryi var. montanus	How will this species respond to increased grazing pressure caused by the reintroduction of bighorn sheep and by mountain goats?	Trend and demographic monitoring in populations impacted by herbivory of big horn sheep and mountain goats could provide valuable information for incorporation into management direction.
Claytonia lanceolata var. flava	What is the taxonomic "status" of this species?	Resolution of the taxonomic status of the var. flava especially in relationship to C. rosea and C. multiscapa should preclude the development of monitoring protocol and management direction.
Claytonia umbellata	To what extent is this species threatened by aggressive exotic species, particularly annual grasses frequently included in seeding prescriptions?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by the invasion of exotic species could provide valuable information which could be incorporated into management direction.
Claytonia umbellata	To what extent is this species threatened by excavation activities, especially gravel pit development and or enlargement?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by mining (gravel pit excavation) could provide valuable information which could be incorporated into management direction.
Collomia mazama	To what extent is this rare species affected by fire, particularly the role of fire in maintaining an open canopy?	Trend, demographic, and ecophysiological monitoring documenting this species' responses to the impacts of prescribed or natural fires could provide information for incorporation into management direction.
Collomia mazama	To what extent is this rare species affected by grazing?	Trend, demographic, and ecophysiological monitoring documenting this species' responses to grazing activities could provide valuable information for incorporation into management documents.
Collomia mazama	To what extent is this rare species affected by recreational activities?	Trend monitoring in populations of this rare species impacted by or potentially impacted by recreational activities could provide valuable information for incorporation into management direction.
Collomia mazama	To what extent is this rare species beneficially affected by timber harvest?	Trend monitoring of populations of this rare species impacted by or potentially impacted by timber harvest activities could provide valuable information for incorporation into management direction.

Species name	Research Need	Potential Application
Collomia renacta	To what extent is this rare species threatened by exotic species?	Trend and demographic monitoring of this species in populations historically, presently, and/or potentially impacted by exotic species could provide information for incorporation into management direction.
Collomia renacta	To what extent is this rare species threatened by road construction activities?	Trend and demographic monitoring of this species in populations historically, presently, and/or potentially impacted by road construction/maintenance could provide valuable information for incorporation into management direction.
Cymopteris nivalis	Is road construction a potential threat to this rare species?	Trend and demographic monitoring in populations threatened by road construction could provide valuable information which could be incorporated into management direction.
Cypripedium fasciculatum	Are inventories for this species adequate, particularly on private lands adjacent to known populations?	Inventory for this rare species could provide valuable baseline information on its population sizes and geographic distribution. This information could be used in the development of monitoring and management strategies.
Cypripedium fasciculatum	How does this rare species respond to grazing activities?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by grazing could provide valuable information for incorporation into management guidelines.
Cypripedium fasciculatum	How does this species respond to fire and/or fire suppression? Is seasonality of burning important?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by fire and/or fire suppression could provide valuable information which could be incorporated into management direction.
Cypripedium fasciculatum	How is this rare species affected by fire, fire suppression, and/or changes in the fire regime?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by natural and/or prescribed fire could provide valuable information which could be incorporated into management direction.
Cypripedium fasciculatum	Is this species still present in the single isolated site within the Columbia Basin?	Inventory for this species could provide valuable information on its population sizes and distribution. This information could be used in the development of monitoring and management guidelines.
Cypripedium fasciculatum	To what extent is this rare species affected by grazing activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by grazing activities could provide valuable information for use in the development of management direction.
Cypripedium fasciculatum	To what extent is this rare species affected by timber harvest activities? In particular, how does this species respond to opening of the canopy and changes in its light regime?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by timber harvest activities could provide valuable information for use in the development of management direction.
Cypripedium fasciculatum	To what extent is this species affected by fire and/or fire suppression?	Trend and demographic monitoring of populations historically, presently, and/or potentially threatened by fire, fire suppression, excessive fuel loading, etc., could provide valuable information for management.
Cypripedium fasciculatum	To what extent is this species affected by increased recreational traffic precipitated by improved access (road construction)?	Trend and demographic monitoring of populations historically, presently, and/or potentially threatened road construction and increased recreational use could Provide information for management.
Cypripedium fasciculatum	To what extent is this species affected by timber harvest activity?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by timber harvest activities could provide valuable information for incorporation into management direction.
Cypripedium fasciculatum	What are the environmental requirements for this rare species? Are specific mycorrhizal species essential for its survival?	Ecophysiological monitoring could provide valuable information on the environmental requirements of this rare species.

Species name	Research Need	Potential Application
Cypripedium fasciculatum	What are the environmental requirements for this rare species? What are its pollinators, it mycorrhizal requirements?	Trend, demographic, and ecophysiological monitoring of this species could provide valuable baseline information about its environmental requirements and limiting factors.
Cypripedium fasciculatum	What are the pollinators of this species of concern?	The sporadic distribution of this species indicates an unusual type of pollination biology. Understanding this biology could ensure that management decisions will not adversely impact that species.
Cypripedium fasciculatum	What are the pollinators of this species? Why is its occurrence so sporadic across its documented range?	Ecophysiological monitoring could provide valuable information regarding the population dynamics of this rare species. This information could be incorporated into management direction.
Cypripedium fasciculatum	What are the responses of this species to changes in the light regime? Particularly, how does the species respond to logging activities that result in an opening of the canopy?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by the opening of the canopy associated with timber harvest could provide valuable information for management.
Cypripedium fasciculatum	What threat does timber harvest pose to this rare species?	Trend and demographic monitoring of populations historically, presently, and/or potentially threatened by timber harvest activity could provide information which could be incorporated into management direction.
Cypripedium fasciculatum	Will this species tolerate alteration of the subterranean hydrology of the habitat in which it grows?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by alterations in the subterranean hydrology could provide valuable information for incorporation into management direction.
Cypripedium fasciculatum	Will this species tolerate timber harvest activities that alter the light regime by opening the canopy?	Trend monitoring in populations historically, presently, or potentially impacted by the opening of the canopy associated with timber harvest activities could provide valuable information for incorporation into management direction.
Cypripedium fasciculatum	What are the mycorrhizal requirements for this species of concern and how do management practices, particularly those that disturb the soil, affect those mycorrhizae?	Determination of the mycorrhizal associates of this species and their responses to management activities could provide valuable information for incorporation into management direction.
Delphinium viridescens	How is this rare species affected by development?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by development could provide valuable information which could be incorporated into management direction.
Delphinium viridescens	How is this rare species affected by fire, fire suppression, and/or changes in the fire regime?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by natural and/or prescribed fire could provide valuable information which could be incorporated into management direction.
Delphinium viridescens	How is this rare species affected by grazing activities?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by grazing activities could provide information which could be incorporated into management direction.
Delphinium viridescens	How is this rare species affected by the invasion of exotic species including those deliberately seeded?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by the invasion of exotic species could provide valuable information which could be incorporated into management direction.
Delphinium viridescens	How is this rare species affected by timber harvest activities?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by timber harvest activities could provide information that could be incorporated into management direction.

Species name	Research Need	Potential Application
Delphinium viridescens	How do exotic plant species effect this taxa?	Trend monitoring of populations threatened by the invasion of exotics could provide valuable information for incorporation into management direction.
Delphinium viridescens	What are the effects of fire and/or fire suppression on this rare species?	Trend and demographic monitoring in populations historically, presently, or potentially impacted by natural or prescribed burning could provide valuable information for incorporation into management guidelines.
Delphinium viridescens	What are the effects of grazing on this rare species?	Trend and demographic monitoring of populations impacted by the trampling of domestic livestock could provide valuable information for incorporation into management direction.
Descurainia torulosa	Is this a valid taxon?	Resolution of the taxonomic status of this species should preclude the development of monitoring and management strategy.
Douglasia idahoensis	How is this species impacted by fire and/or fire suppression? Is the extent of fuel loading critical to its survival through catastrophic fires?	Trend and demographic monitoring of populations historically, presently, and/or potentially threatened by fire, fire suppression, excessive fuel loading, etc., could provide valuable information for management.
Draba trichocarpa	To what extent is this rare species threatened by housing development in its habitat?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by housing development could provide information which could be incorporated into management direction.
Draba trichocarpa	What is the taxonomic relationship of this rare species to sympatric and/or taxonomically "close" relatives such as Draba paysonii var. treleasii?	Resolution of taxonomic "status" and relationship should preclude the development of monitoring protocol and management guidelines.
Erigeron basalticus	Does gravel pit excavation pose a threat to the viability of this rare species?	Trend and demographic of populations historically, presently, and or potentially impacted by gravel pit excavation could provide valuable information for incorporation into management guidelines.
Erigeron basalticus	How has road construction diminished the habitat of this rare species? Are proposed road construction projects a threat to existing populations?	Trend monitoring and an analysis of historic potential habitat could provide valuable information regarding the impacts of road construction on this rare species.
Erigeron basalticus	What are the effects of herbicidal drift on this rare species?	Trend and demographic of populations historically, presently, and or potentially impacted the direct and/or indirect application of agricultural herbicides could provide valuable information for incorporation into management guidelines.
Erigeron basalticus	What is the reproductive biology of this species and how does it affect its geographic amplitude?	Trend, demographic, and ecophysiological monitoring of this species could provide valuable baseline information on its environmental requirements and limiting factors.
Erigeron lackschewitzii	Is this species being adversely impacted by wildlife, particularly bighorn sheep?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by wildlife (bighorn sheep) could provide valuable information for incorporation into management direction.
Erigeron lackschewitzii	Is this species threatened by the invasion of exotic species? To what extent have exotics diminished the natural habitat of this species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by exotic species could provide valuable information for incorporation into management direction.
Erigeron lackschewitzii	To what extent is wind dispersal of the seeds of this species a factor in its limited geographic distribution?	Determination of the dispersal mechanisms of this species could provide valuable information for incorporation into management direction.

Species name	Research Need	Potential Application
Erigeron lackschewitzii	What is the genetic status of this species? Is introgression by more common species a threat to its viability?	Determination of the natural genetic variation of this species and comparisons with sympatric populations could determine whether the genetic integrity of the species is threatened by introgression.
Erigeron lackschewitzii	To what extent does the geographical amplitude of this species extend west of the continental divide? What is the geographical amplitude of the species?	Determination of the exact geographic amplitude would enable management direction consistent with the conservation of the species to be formulated in areas where known populations of the species occur.
Erigeron latus	To what extent is this rare species threatened by the invasion of exotic species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by exotic species could provide valuable information for incorporation into management guidelines.
Erigeron latus	To what extent is this rare species threatened by the proposed designation of its habitat as a U.S. Airforce bombing range?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by a change in land use (conversion to bombing range) could provide valuable information which could be incorporated into management direction.
Erigeron salmonensis	To what extent is this rare species threatened by global warming trends?	Long term trend monitoring could provide information on the species' response to global warming. Artificial seed banking could be employed to conserve genetic material if the species faces extinction.
Eriogonum chrysops	Are inventories for this rare species adequate? What are the population sizes and geographic amplitude of this species?	Inventory of the potential habitat of this species to document its geographic amplitude and population sizes is essential for the development of a monitoring strategy for assessing the impacts of management activities.
Eriogonum chrysops	To what extent is this rare species impacted by the application of herbicides conducted in conjunction with sagebrush eradication?	Trend and demographic monitoring in sites historically, presently, and/or potentially impacted by herbicidal application could provide valuable information for incorporation into management guidelines.
Eriogonum crosbyae	What are the environmental requirements of this species?	Ecophysiological monitoring of this species could provide valuable information about its environmental requirements. This information could be incorporated into management guidelines.
Eriogonum crosbyae	What is the taxonomic status of this species? Is it distinct from e. prociduum? Is it threatened by hybridization with E. prociduum?	Cytogenetic and electrophoretic laboratory analysis could help resolve the taxonomic "status" and threats from hybridization. This information should preclude the development of monitoring and management guidelines.
Eriogonum cusickii	Is this rare species threatened by the invasion of exotic species?	Trend and demographic of populations historically, presently, and/or potentially threatened by the invasion of exotic species could provide valuable information which could be incorporated into management guidelines.
Eriogonum cusickii	What are the environmental requirements for this rare species?	Ecophysiological monitoring of this rare species could provide valuable information for incorporation into management direction.
Eriogonum meledonum	What are the population dynamics of this species? Is recruitment problematic?	Ecophysiological monitoring of this species could provide information on its environmental requirements and population dynamics. This information could be valuable for the development of monitoring protocol and management direction.
Eriogonum novonudum	What are the impacts of grazing by bighorn sheep on this species?	Trend and demographic monitoring of populations historically, presently, and potentially threatened by bighorn sheep could provide valuable information which could be incorporated into management direction.
Eriogonum novonudum	What are the impacts of recreational activity on this species?	Trend and demographic monitoring of populations historically, presently, and potentially threatened by recreational activities could provide valuable information which could be incorporated into management direction.

Species name	Research Need	Potential Application
Eriogonum prociduum	To what extent is this rare species threatened by mining activities?	Trend monitoring in populations of this rare species impacted by or potentially impacted by mining activities could provide valuable information for incorporation into management guidelines.
Eriogonum prociduum	To what extent is this rare species threatened by recreational activities, particularly the use of off road vehicles?	Trend monitoring in populations of this rare species impacted by or potentially impacted by recreational activities, particularly the use of orv's, could provide valuable information for incorporation into management guidelines.
Eriogonum prociduum	To what extent is this rare species threatened by the invasion of exotic species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by exotic species could provide information which could be incorporated into management direction.
Eriogonum prociduum	What is the reproductive biology of this rare species? Why is recruitment so low? How extensive is vegetative versus sexual reproduction?	Ecophysiological monitoring and supporting laboratory work could provide valuable information about the reproductive biology of this rare species. This information could be used in the development of management strategy.
Erythronium grandiflorum var. nudipetalum	To what extent has the historic habitat of this rare species been affected by grazing?	Trend and demographic monitoring of populations historically, presently, and or potentially threatened by grazing activities could provide valuable information about grazing and diminished habitat.
Gratiola heterosepala	To what extent is this species impacted by grazing activities?	Trend and demographic monitoring in populations historically, presently, and potentially impacted by grazing could provide valuable information for incorporation into management guidelines.
Gratiola heterosepala	What are the environmental requirements for this species?	Ecophysiological monitoring of this species could provide valuable information for incorporation into management guidelines.
Grindelia howellii	How extensively distributed is this species in its native habitat rather than artificial habitats created by human disturbance? Is its native habitat grasslands or in draw-down zones of prairie ponds?	Trend monitoring of the status of populations in natural versus disturbed sites could enable predictive modeling of population responses to various management activities.
Grindelia howellii	To what extent has this rare species been impacted by the invasion of exotics?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by the invasion of exotics could provide valuable information for incorporation into management direction.
Grindelia howellii	Why does this species not occupy potential habitat, particularly along the st. Maries river?	Trend, demographic, and ecophysiological monitoring of this rare species could provide valuable information on its environmental requirements. This information could be incorporated into management direction.
Hackelia cronquistii	Has the inventory effort for this species been adequate in Idaho?	Inventory for this species could document population sizes and geographic amplitude of this species. This baseline information could be incorporated into monitoring protocol and management guidelines.
Hackelia cronquistii	To what extent is this species dependent upon fire and the attendant reduction of fuel load created by exotic species like cheatgrass?	Ecophysiological monitoring could provide valuable information on this rare species' dependency upon periodic fire. This information could be incorporated into management direction.
Hackelia cronquistii	What are the effects of grazing on this rare species?	Trend and demographic monitoring could provide valuable information on this species' response to grazing. This information could be incorporated into management guidelines.
Hackelia cronquistii	What are the effects of recreational activities, particularly the use of off-road vehicles, on this rare species?	Trend and demographic monitoring in populations historically, presently, and potentially threatened by recreational activities could provide valuable information for incorporation into management guidelines.

Species name	Research Need	Potential Application
Hackelia cronquistii	What are the environmental requirements of this species? What are its limiting factors?	Ecophysiological monitoring of this rare species could provide valuable information which could be incorporated into monitoring protocol and management direction.
Hackelia cronquistii	Would fire adversely affect this species by converting shrubland to grassland?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by fire and/or fire suppression could provide information for incorporation into management direction.
Hackelia venusta	To what extent is this rare species threatened by road maintenance (sanding) activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by road sanding activities could provide information that could be incorporated into management direction.
Hackelia venusta	What are the environmental requirements of this species? What are its limiting factors?	Trend, demographic, and ecophysiological monitoring of this species could provide valuable baseline information on the environmental requirements and/or limiting factors of this species. This information could be used in management.
Hackelia venusta	What is the taxonomic status of this species? Is it really two different taxa?	Resolution of the taxonomic status of this species could provide valuable baseline information which could preclude the development of management direction.
Haplopappus insecticruris	To what extent is this rare species threatened by herbicidal application, both direct and indirect?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by herbicides could provide valuable information which could be incorporated into management direction.
Haplopappus insecticruris	To what extent is this rare species threatened by the conversion of its habitat to agricultural production?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by agricultural conversion could provide information that could be incorporated into management direction.
Haplopappus insecticruris	What are the environmental requirements of this species? What are its limiting factors?	Trend, demographic, and ecophysiological monitoring of this rare species could provide information on its environmental requirements. This information could be incorporated into management direction.
Haplopappus liatriformis	How has this rare species been affected by changes in the fire regime?	Trend and demographic monitoring of populations historically, presently, and/or potentially threatened by fire, fire suppression, and/or changes in the fire regime could provide valuable information which could be incorporated into management direction.
Haplopappus liatriformis	To what extent has natural habitat been diminished by conversion to agricultural production? Does agricultural conversion pose a threat to known populations?	Trend monitoring of known populations proximal to existing agricultural lands or lands proposed for conversion to agricultural production should provide valuable information for the development of management direction.
Haplopappus liatriformis	To what extent is this rare species threatened by exotic species?	Trend and demographic monitoring in populations threatened by exotic species could provide valuable information for incorporation into management direction.
Haplopappus liatriformis	To what extent is this rare species threatened by grazing activities?	Trend and demographic monitoring in populations threatened by grazing activities could provide valuable information for incorporation into management direction.
Haplopappus liatriformis	To what extent is this rare species threatened by the conversion of its habitat to agricultural production?	Trend and demographic monitoring in populations threatened by agricultural conversion could provide valuable information for incorporation into management direction.
Haplopappus liatriformis	To what extent is this species threatened by the encroachment of its habitat by exotic species?	Trend and demographic monitoring of populations historically, presently, and/or potentially threatened by the invasion of exotic species could provide valuable information which could be incorporated into management direction.

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Species name	Research Need	Potential Application
Haplopappus liatriformis	What is the reproductive biology of this rare species?	Demographic and ecophysiological monitoring of known populations could provide valuable information on the reproductive biology of this species. Management guidelines could be formulated accordingly.
Haplopappus radiatus	Is this a valid taxon?	Resolution of the taxonomic status of this taxa precludes the development of monitoring protocol and management guidelines for it.
Haplopappus radiatus	Is this taxon valid? What is the relationship of this species to Haplopappus carthamoides?	The resolution of the taxonomic status of this species could provide valuable information which could be incorporated into management direction.
Haplopappus radiatus	To what extent is this rare species impacted by grazing activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by grazing activities could provide information which could be incorporated into management direction.
Haplopappus radiatus	To what extent is this rare species threatened by grazing activities?	Trend, demographic, and ecophysiological monitoring in populations historically, presently, and/or potentially impacted by grazing activities could provide valuable information for incorporation into management guidelines.
Haplopappus radiatus	To what extent is this rare species threatened by grazing?	Trend and demographic monitoring of populations of this rare species historically, presently, and/or potentially impacted by grazing could provide information for incorporation into management direction.
Haplopappus radiatus	To what extent is this rare species threatened by road construction and/or maintenance?	Trend and demographic monitoring of populations of this rare species historically, presently, and/or potentially impacted by road construction and/or maintenance could provide valuable information for incorporation into management direction.
Haplopappus radiatus	To what extent is this rare species threatened by the encroachment of exotic species into its habitat?	Trend and demographic monitoring of populations of this rare species historically, presently, and/or potentially impacted by exotic species could provide valuable information for incorporation into management direction.
Haplopappus uniflorus var. howellii	To what extent is this species adversely impacted by recreational activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by recreational activity (especially trampling) could provide valuable information for incorporation into management direction.
Howellia aquatilis	How is this rare species affected by natural aquatic succession or by accelerated eutrophication?	Trend, demographic, and ecophysiological monitoring of this species in habitats undergoing seral transition could provide valuable information on this potential threat. Management guidelines could be developed accordingly.
Howellia aquatilis	Is genetic uniformity problematic for this species? Has the lack of genetic variability in this species been scientifically documented?	Genetic studies of this species across its range could determine the uniformity of its gene pool and predict its vulnerability. This information could be incorporated into management direction.
Howellia aquatilis	Is inventory information adequate? Has the lower Coeur d' Alene river been inventoried for this rare species?	Inventory for this rare species could document population sizes and geographic amplitude. This information could be used in the development of monitoring protocol and management direction.
Howellia aquatilis	To what extent does timber harvest threaten this species, particularly in exposing its habitat to increased evapotranspiration?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by timber harvest activities could provide information that could be incorporated into management direction.

Species name	Research Need	Potential Application
Howellia aquatilis	To what extent is this rare species threatened by housing development projects within its habitat?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by housing development could provide valuable information for incorporation into management direction.
Howellia aquatilis	To what extent is this rare species threatened by the alteration of the hydrologic regime underlying its supporting habitat? Is housing development problematic?	Trend and demographic of populations historically, presently, and/or potentially impacted by housing development that alters the hydrologic regime of habitat could provide valuable information for incorporation into management guidelines.
Howellia aquatilis	To what extent is this species threatened by the encroachment of its habitat by exotic species, particularly reed canary grass?	Trend monitoring of known habitat relative to encroachment by exotics could provide valuable information relative to this threat. Management direction (Phalaris eradication?) could be developed accordingly.
Howellia aquatilis	What are the environmental requirements for this rare species, particularly those factors associated with seed production, viability, and recruitment?	Demographic and ecophysiological monitoring of this species could provide valuable information on all aspects in the life cycle of this poorly-understood rare species. This information could be incorporated into management guidelines.
Howellia aquatilis	What is the role of ungulates in dispersing this species? How is this finding correlated with the sporadic distribution of the species in areas with potential habitat?	Assessment of the role of ungulates in dispersing the seeds of this species of concern could resolve management issues related to grazing.
Howellia aquatilis	What are the long term effects of extreme hydrologic variation on the species of concern? What are the impacts of management practices to the hydrologic regime?	Determination of effects of different management practices on both the hydrologic regime and the populations of the species of concern would enable management direction to be developed.
Iliamna longisepala	Are the populations of this rare species east of the cascade mountains, and particularly in Douglas County, Washington, adequately inventoried? It the actual geographic amplitude of this species known?	Inventory for this rare species could provide valuable information about Population sizes and geographic distribution. This information could be incorporated into management direction.
Iliamna longisepala	How does this species respond to fire? Are casual observations that the species benefits from frequent low-intensity burns correct?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by fire, fire suppression, and/or changes in the fire regime could provide valuable information which could be incorporated into management direction.
Iliamna longisepala	What is the response of this species of concern to direct and indirect effects of herbicides?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by the direct and/or indirect application of herbicides could provide valuable information which could be incorporated into management direction.
Ivesia rhypara var. rhypara	To what extent is this species threatened by grazing activities and the associated trampling of grazing animals?	Trend and demographic monitoring in populations historically, presently, and/or potentially threatened by grazing activities could provide information which could be incorporated into management activities.
Ivesia rhypara var. rhypara	To what extent is this species threatened by road construction and/or road maintenance?	Trend and demographic monitoring in populations historically, presently, and/or potentially threatened by road construction could provide information which could be incorporated into management activities.
Ivesia rhypara var. rhypara	To what extent is this species threatened by the invasion of its habitat by exotic species?	Trend and demographic monitoring in populations historically, presently, and/or potentially threatened by exotic species could provide information which could be incorporated into management activities.
Ivesia rhypara var. rhypara	What are the environmental requirements of this rare species? What are its limiting factors?	Ecophysiological monitoring and supporting laboratory work could provide information on the environmental requirements of this species. This information could be incorporated into management guidelines.

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Species name	Research Need	Potential Application
Ivesia rhypara var. shellyi	What are the environmental requirements of this rare species? What are its limiting factors?	Ecophysiological monitoring of this rare species could provide valuable information on its environmental requirements. This information could be incorporated into management direction.
Ivesia rhypara var. shellyi	What is the systematic relationship of this variety to the variety rhypara? Are they genetically distinct taxa?	Resolution of the systematic relationship of the two varieties could provide valuable information on the genetic variability of the species and its evolutionary stature. This information could be incorporated into management guidelines.
Lepidium davisii	How is this rare species impacted by the grazing and trampling activities of wild horses?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by wild horse trampling and/or grazing could provide valuable information for incorporation into management guidelines.
Lepidium davisii	Is Iva axillaris displacing this rare species?	Trend monitoring in populations supporting both the rare species and Iva axillaris could provide valuable information for incorporation into management direction.
Lepidium davisii	To what extent is this rare species threatened by alteration of the hydrology supporting its habitat?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted activities which alter the underlying hydrology could provide valuable information which could be incorporated into management direction.
Lepidium davisii	To what extent is this rare species threatened by the invasion of its habitat by exotic species, particularly Russian thistle?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by exotic species could provide information which could be incorporated into management direction.
Lepidium davisii	What are the environmental requirements of this species? What are its limiting factors?	Ecophysiological monitoring could provide valuable information about the environmental requirements and limiting factors of this species. This information could be incorporated into monitoring protocol and management direction.
Lepidium papilliferum	What are the effects of exotic species, including deliberate introductions, on this rare species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by exotic species could provide valuable information for incorporation into management direction.
Lepidium papilliferum	What are the effects of fire and/or fire suppression on this rare species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by natural and/or prescribed burning could provide information for incorporation into management direction.
Lepidium papilliferum	What are the effects of grazing activities on this species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by grazing activities could provide valuable information for incorporation into management direction.
Lepidium papilliferum	What are the environmental requirements of this rare species? What are its limiting factors?	Ecophysiological monitoring of this species could provide valuable baseline information on the environmental requirements and limiting factors of this species. This information could be used in the development of monitoring protocol and management.
Leptodactylon glabrum	To what extent is this rare species threatened by dam construction, specifically hydroelectric dam construction on the Bruneau River?	Trend and demographic monitoring in populations where habitat has been altered by inundation, construction, and/or altered hydrology could provide valuable information on the responses of this species to such activities.
Leptodactylon glabrum	What are the environmental requirements of this species? What are its limiting factors?	Ecophysiological monitoring of this rare species could provide valuable baseline information on its environmental requirements and limiting factors. This information could be used in the development of monitoring protocol and management direction.

Species name	Research Need	Potential Application
Leptodactylon pungens ssp. hazeliae	Is this a valid taxon? Could genetic and electrophoretic studies confirm differences with the parental progenitor?	Resolution of the taxonomic status of this species should preclude the development of monitoring guidelines and management direction.
Leptodactylon pungens ssp. hazeliae	To what extent is this rare species threatened by the direct and/or indirect application of herbicides?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by herbicides (direct and/or drift) could provide valuable information which could be incorporated into management direction.
Leptodactylon pungens ssp. hazeliae	To what extent is this species threatened by recreational activities?	Trend and demographic monitoring in populations historically, presently, or potentially impacted by recreational activities (including trail construction) could provide valuable information for incorporation into management direction.
Leptodactylon pungens ssp. hazeliae	What is the basic reproductive biology of this rare subspecies?	Ecophysiological monitoring could provide valuable information on pollinators, seed set, seed viability, soil requirements, etc. That could be incorporated into management direction.
Leptodactylon pungens ssp. hazeliae	Why is the recruitment rate apparently low in this subspecies?	Ecophysiological and demographic monitoring could provide valuable information on pollinators, seed set, seed viability, soil requirements, etc. That could be incorporated into management direction.
Leptodactylon pungens ssp. hazeliae	Are inventories for this rare species adequate in Idaho? In Oregon?	Inventory for this rare species could provide valuable information on population sizes, locations, and geographic distribution. This information could be used in the development of monitoring and management strategy.
Lesquerella (pulchella) sp. novum	Is the species threatened by increased mining activity?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by mining activities could be useful to management.
Lesquerella (pulchella) sp. novum	What are the effects of exotic species (spotted knapweed) on this species? How has the species responded to springtime treatment of the adjacent exotic species with herbicides?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by exotic species and/or the herbicides used in their control could be useful to management.
Lesquerella (pulchella) sp. novum	What are the population trends for this species?	Trend monitoring for the known populations of this species should provide information relative to the impacts of mining, grazing, and wildlife. This information can be incorporated into management guidelines to ensure the conservation of the species.
Lesquerella carinata	Has this species received adequate inventory effort in Wyoming?	Inventory conducted for this species could provide valuable information on its population sizes and geographic amplitude. This valuable information could be incorporated into monitoring protocol and management direction.
Lesquerella carinata var. languida	What are the effects of grazing on the species of concern?	Assessment of the impacts of grazing on the known populations of this species through monitoring would enable the development of management direction consistent with the conservation of the species.
Lesquerella carinata var. languida	What are the specific edaphic requirements of this species and do these requirements cause its constrained geographic amplitude?	Determination of the chemical and physical characteristics of the soils within the known populations of this species of concern could enable predictive modeling of potential habitat and the development of management direction.
Lesquerella carinata var. languida	Why is the geographic amplitude of this species of concern so limited? Why is the amplitude confined to the garnet range in west-central Montana?	Assessment of the true geographic amplitude of this species of concern would enable the issue of edaphic endemism to be resolved. Management direction for the known populations could then be formulated.

Species name	Research Need	Potential Application
Lesquerella carinata var. languida	Are exotic species (spotted knapweed) diminishing the populations and/or range of this species of concern?	Assessment of the impacts of exotic plant species (especially spotted knapweed) on the species of concern would enable the development of management direction consistent with the conservation of the species.
Lesquerella humilis	Does this species of concern have a specific edaphic requirement that determines its distribution?	Determination of all chemical and physical characteristics of the soils at sites of known populations would enable predictive modeling of potential habitat and enable management direction to be formulated consistent with the conservation of the species.
Lesquerella humilis	How does this species of concern respond to disturbance? How is this species affected by recreational use, particularly hiking?	Assessment of the impact on this species of concern by the potential threat of recreational usage and development through monitoring could be incorporated into management direction.
Lesquerella humilis	What is the geographic amplitude of this species of concern?	The determination of the overall geographic amplitude of this species would enable management direction consistent with the conservation of this species to be developed.
Lesquerella humilis	What is the reproductive biology of the species of concern? What is the dispersal mechanism of the species?	Determination of the dispersal aspect of the reproductive biology could yield an understanding of the distributional limits of this species of concern and enable the development of management direction.
Lesquerella paysonii	Do exotic species (especially knapweed) pose a threat to this species of concern?	Assessment of the effects of exotic species upon the species of concern through monitoring could enable management direction to be formulated.
Lesquerella paysonii	Does this species of concern exhibit affinity for a specific soil type?	Determination of the chemical and physical characteristics of the soil in which this single population grows would enable predictive modeling of potential habitat and the development of management direction.
Lesquerella paysonii	Has the taxonomic validity of the identification of the specimens from the single population in Montana been determined?	Resolution of the taxonomic status of the Montana plants should preclude the development of any management opportunities or directions concerning this species.
Lesquerella paysonii	Have inventory efforts for this species been adequate in Wyoming?	Inventory for this species could provide valuable information on population sizes and geographic amplitude. This information should preclude the development of monitoring and management strategies.
Lesquerella paysonii	What are the environmental requirements of this rare species? What are its limiting factors?	Ecophysiological monitoring of this rare species could provide valuable baseline information on its environmental requirements and limiting factors. This information could be incorporated into monitoring protocol and management direction.
Lesquerella paysonii	What is the population trend of this species of concern?	Assessment of the population trend of the single population known to occur in Montana would enable management direction to be developed.
Lomatium "ochocensis"	What are the population sizes and geographic amplitude of this newly described taxon?	Inventory for this newly described species in high potential habitat could provide baseline information which could be used in the development of monitoring plants against which the effects of management activities could be measured.
Lomatium erythrocarpum	To what extent is this rare species threatened by wildlife, particularly mountain goats and big horn sheep?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by the grazing activities of wildlife could provide information for incorporation into management guidelines.
Lomatium erythrocarpum	What are the population sizes and geographic amplitude of this rare species?	Inventory efforts conducted for this species particularly in the Elkhorn mountains could provide valuable baseline information for the development of monitoring plans and management direction.

Species name	Research Need	Potential Application
Lomatium greenmanii	What are the impacts of grazing by wild and domestic species to this rare species?	Trend monitoring in populations historically, presently, or potentially impacted by grazing could provide valuable information which could be incorporated into management direction.
Lomatium greenmanii	What are the impacts of recreational activities (trampling by tramway customers) to this rare species?	Trend and demographic monitoring could provide valuable information which could be incorporated into management direction.
Lomatium suksdorfii	Have inventory efforts for this species been adequate?	Inventory for this rare species could provide valuable baseline information on population sizes and geographic distribution. This information could be used in the development of monitoring and management strategy.
Lomatium suksdorfii	Is there a potential threat as the medicinal values of this species are determined and demand for it increases?	Trend and demographic of populations historically, presently, and or potentially impacted native harvest (for medicinal purposes) could provide information for incorporation into management guidelines.
Lomatium suksdorfii	To what extent do exotic species threaten this rare species?	Trend monitoring of known populations of this rare species known to be impacted by the invasion of exotic species could provide valuable information for incorporation into management direction.
Lomatium suksdorfii	To what extent is this rare species impacted by grazing activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by grazing activities could provide information which could be incorporated into management direction.
Lomatium suksdorfii	To what extent is this rare species impacted by mining activities including gravel pit excavation and quarrying?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by mining activities could provide valuable information which could be incorporated into management direction.
Lomatium suksdorfii	To what extent is this rare species impacted by the direct and/or indirect application of herbicides?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by herbicide application could provide information which could be incorporated into management direction.
Lomatium suksdorfii	What are the effects of grazing on this rare species?	Trend, demographic, and ecophysiological monitoring could provide information on the basic biological requirements of this rare species. This information could be incorporated into management direction.
Lomatium suksdorfii	What are the limiting environmental factors that cause the geographic amplitude of this species to be so constrained?	Trend, demographic, and ecophysiological monitoring of this species could provide valuable information about its environmental requirements and limiting factors. This information could be incorporated into management direction.
Lomatium suksdorfii	What is the amplitude of this rare species?	Inventory conducted for this rare species could determine its geographic amplitude and delineate populations suitable for monitoring. This information is essential for the development of management guidelines.
Lomatium tuberosum	Is excavation of gravel pits (crushed basalt) a threat to this rare species?	Trend monitoring could provide valuable information regarding the effects of excavation on this rare species. This information could be incorporated into management guidelines.
Lomatium tuberosum	To what extent does damage caused by foraging rodents threaten this rare species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by wild animal species could provide information which could be incorporated into management direction.
Lomatium tuberosum	To what extent does harvest of this rare species by native Americans for food purposes pose a threat to this plant?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by native harvest (for food purposes) could provide valuable information which could be incorporated into management direction.

Species name	Research Need	Potential Application
Lomatium tuberosum	To what extent is this rare species threatened by recreational activities, particularly those of petrified wood collectors who frequently alter the habitat of this species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by recreational activities could provideinformation which could be incorporated into management direction.
Lomatium tuberosum	What are the sizes of known populations and what is the true geographic amplitude of the species?	Inventory for this rare species could provide valuable information on population sizes and geographic distribution of this species.
Lomatium tuberosum	What is the reproductive biology of this rare species? How dependent is this species on crustose lichens for nutrient cycling and availability?	Trend, demographic, and ecophysiological monitoring of this species could provide valuable information about its environmental requirements and limiting factors. This information could be incorporated into management direction.
Luina serpentina	Is the lack of genetic variability problematic for this species?	Laboratory research focused on genetic variability of this rare species could provide valuable information about the basic biology of the species?
Luina serpentina	To what extent is this rare species threatened by road construction projects?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by road construction activities could provide valuable information which could be incorporated into management direction.
Luina serpentina	To what extent is viable seed production involved in the population dynamics of this species?	Ecophysiological monitoring and supporting laboratory research could document low seed viability of the species. This information could be incorporated into management direction.
Lupinus biddlei	How is this rare species impacted by gold mining activities?	Trend monitoring in populations historically, presently, and/or potentially impacted by mining activities could provide valuable information for incorporation into management direction.
Lupinus biddlei	How is this rare species impacted by the invasion of seeded and non-seeded exotic species?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by the invasion of seeded or non-seeded exotic species could provide valuable information for incorporation into management direction.
Lupinus biddlei	Is this a valid taxon?	Resolution of the taxonomic status of this species through cytogenetic and electrophoretic methods should preclude the development of management direction conceming this taxa.
Lupinus biddlei	To what extent is this rare species threatened by grazing activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by grazing activities could provide valuable information which could be incorporated into management guidelines.
Lupinus cusickii	How is this rare species impacted by recreational activity?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by recreational activities (and particularly off-road vehicles) could provide valuable information for incorporation into management direction.
Lupinus cusickii	What is the taxonomic status of this "species?"	Resolution of the taxonomic status of this rare taxa precludes the development of any type of monitoring studies and/or management direction.
Meconella oregana	Are annual exotics threatening this species?	Trend monitoring in populations impacted by and/or potentially impacted by exotic species could provide valuable information that could be incorporated into management direction.

Species name	Research Need	Potential Application
Meconella oregana	Are the populations and geographic amplitude of this rare species known? Have inventory efforts been sufficient?	Inventory for this species could provide baseline information on its population sizes and distributions. This information could be used in the development of monitoring and management guidelines.
Meconella oregana	Have inventory efforts for this rare species been adequate?	Inventory for this rare species could provide information on population sizes and geographic distribution. This baseline information could be useful in the development of monitoring and management strategy.
Meconella oregana	How is this species affected by grazing activities?	Trend monitoring in populations impacted by and/or potentially impacted by grazing could provide valuable information that could be incorporated into management direction.
Meconella oregana	To what extent is this rare species impacted by activities which alter the hydrologic regime supporting its habitat?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by activities which alter the hydrologic regime could provide valuable information which could be incorporated into management direction.
Meconella oregana	To what extent is this rare species impacted by grazing activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by grazing activities could provide information which could be incorporated into management direction.
Meconella oregana	To what extent is this rare species impacted by recreational activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by recreational activities could provide information which could be incorporated into management direction.
Meconella oregana	To what extent is this rare species impacted by the invasion of exotic species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by the invasion of exotics species could provide valuable information which could be incorporated into management direction.
Meconella oregana	What are the environmental requirements for this species? What are its limiting factors?	Trend, demographic, and ecophysiological monitoring of this rare species could provide valuable information on the environmental requirements and limiting factors of this species. This baseline information could be incorporated into management direction
Mentzelia mollis	To what extent are inventories for this species adequate, particularly in Nevada?	Inventory for this species could document the sizes of its populations and geographic amplitude. This baseline information could be used in the formulation of management guidelines.
Mentzelia mollis	To what extent is this rare species threatened by exotic species, including those included in seeding prescriptions?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by the invasion or deliberate introduction of exotic species could provide valuable information which could be incorporated into management direction.
Mentzelia mollis	To what extent is this rare species threatened by mechanical disruption of its habitat associated with fire suppression activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by fire suppression activities could provide valuable information which could be incorporated into management guidelines.
Mentzelia mollis	To what extent is this rare species threatened by mining activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by mining activities could provide information which could be incorporated into management guidelines.
Mentzelia mollis	To what extent is this rare species threatened by mining activities? How successful are efforts to use it in the restoration of mining sites?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by mining activities could provide valuable information for incorporation into management direction.

Species name	Research Need	Potential Application
Mentzelia mollis	To what extent is this rare species threatened by recreational activities, particularly the use of off road vehicles?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by recreational activity, particularly orv's, could provide valuable information for incorporation into management guidelines.
Mentzelia mollis	To what extent is this rare species threatened by the invasion of exotic species and the competition that results from such an invasion?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by the invasion of exotic species could provide valuable information which could be incorporated into management guidelines.
Mentzelia mollis	What are the environmental requirements of this rare species?	Ecophysiological monitoring of this rare species could provide valuable baseline information on its environmental requirements and limiting factors. This information could be used in developing monitoring protocol and management direction.
Mentzelia mollis	What are the environmental requirements of this rare species? What is the extent of its seed bank? What factors are involved in the dispersal of its seeds?	Ecophysiological monitoring of this rare species could provide valuable information on its environmental requirements and limiting factors. This information could be incorporated into management direction.
Mentzelia packardiae	To what extent is this rare species adversely impacted by grazing activities?	Trend and demographic monitoring of this species in populations historically, presently, and/or potentially impacted by grazing activities could provide information for incorporation into management direction.
Mentzelia packardiae	To what extent is this rare species adversely impacted by the invasion of exotic species?	Trend and demographic monitoring of this species in populations historically, presently, and/or potentially impacted by exotic species could provide information for incorporation into management direction.
Mentzelia packardiae	What environmental factors prevent this species from occupying all of its potential habitat?	Ecophysiological monitoring of populations of this rare species could provide valuable information about its environmental requirements--pollinators, seed banks, soil factors, dispersal modes, etc. This information could be incorporated into management.
Mimulus clivicola	What are the environmental requirements for this species? What are its soil moisture requirements? Its pollinators? Its seed bank?	Ecophysiological monitoring could provide valuable information about the basic biology of this species. This information could be incorporated into management direction.
Mimulus clivicola	What are the impacts of exotic species on this species of concern?	Trend monitoring in populations threatened by the invasion of exotic species could provide valuable information which could be incorporated into management direction.
Mimulus clivicola	What are the impacts of grazing to this species of concern?	Trend and demographic monitoring of populations impacted by grazing activities could provide valuable information for incorporation into management direction.
Mimulus clivicola	What are the impacts of road construction to this species of concern? Does road construction increase available habitat for this species?	Trend and demographic monitoring in populations impacted by road construction projects could provide valuable information that could be incorporated into management direction.
Mimulus clivicola	What are the impacts of timber harvest activities on this species of concern?	Trend monitoring in populations historically, presently, and/or potentially impacted by timber harvest activities could provide valuable information which could be incorporated into management direction.
Mimulus clivicola	What monitoring protocol is most appropriate for this annual species that exhibits extreme populations annually?	The development of suitable monitoring methods could provide valuable monitoring information for measuring the impacts of management activities.

Species name	Research Need	Potential Application
Mimulus evanescens	How do alterations in the hydrologic regime affect this rare species?	Trend and demographic monitoring in populations impacted by or potentially impacted by reservoir draw-down or other alterations in the hydrologic regime could provide valuable information for incorporation into management direction.
Mimulus evanescens	To what extent is this rare species threatened by grazing activities?	Trend monitoring in populations of this rare species impacted by or potentially impacted by grazing could provide valuable information for incorporation into management guidelines.
Mimulus evanescens	What is the geographic amplitude of this newly-described rare species?	Inventory for this rare species could provide valuable information on population sizes, locations, and geographic range of the species. This information could be used in the development of management and monitoring guidelines.
Mimulus jungermannioides	Have seed banking efforts been conducted to ensure the survival of this species? How important is seed production in the propagation of this rhizomatous species?	Seed banking success could result in an increase in available seed which could enable the species to be used in restoration work.
Mimulus jungermannioides	How is this species affected by agricultural endeavors and the changes in the water table that sometimes are associated with them?	Trend and demographic monitoring of populations growing in areas in which the hydrologic regime has been, is, or will be altered by agricultural endeavors could provide valuable information which could be incorporated into management direction.
Mimulus jungermannioides	How is this species affected by grazing activities and the changes in the water table that sometimes are associated with it?	Trend and demographic monitoring of populations growing in areas in which the hydrologic regime has been, is, or will be altered by grazing activities could provide valuable information which could be incorporated into management direction.
Mimulus jungermannioides	To what extent has the natural habitat of this rare species been diminished by the construction of hydroelectric dams and fluctuations in pool levels?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by the construction of hydroelectric dams and/or by fluctuations in pool levels could provide valuable information useful for management.
Mimulus jungermannioides	To what extent is this rare species threatened by excavation activities, particularly gravel pit development?	Trend and demographic monitoring of populations historically, presently, and/or potentially threatened by mining (gravel pit excavation) could provide information for incorporation into management direction.
Mimulus jungermannioides	To what extent is this rare species threatened by the direct and/or indirect application of herbicides?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by the direct application of herbicides (roadside weed control) and/or indirect application (drift) could provide valuable information for management.
Mimulus jungermannioides	To what extent is this species of moist basaltic crevices affected by alteration of the hydrologic regime?	Trend monitoring in populations of this rare species impacted by or potentially impacted by changes in the hydrologic regime could provide valuable information on the species' response to alterations in hydrology.
Mimulus jungermannioides	To what extent is this species threatened by both direct and indirect application of herbicides? How can county weed control crews be kept from spraying roadside populations?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by the direct and/or indirect application of agricultural herbicides could provide valuable information for incorporation into management direction.
Mimulus jungermannioides	To what extent is this species threatened by excavation activities?	Trend monitoring in populations impacted by or potentially impacted by excavation (gravel pit or mining activities) could provide valuable information for incorporation into management guidelines.

Species name	Research Need	Potential Application
Mimulus jungermannioides	What is the extent of the natural seed bank of this species? Is vegetative or sexual reproduction of greater importance in maintaining its populations?	Ecophysiological monitoring and supporting laboratory/greenhouse work could provide information on the basic reproductive biology of this species. This information could be incorporated into management direction.
Mimulus jungermannioides	What variation in the genetics of this species occurs? How is gene flow maintained within populations?	Genetic variability could be investigated in the laboratory and gene flow could be determined by ecophysiological monitoring. This information on the biological requirements of the species could be used in the formulation of management direction.
Mimulus patulus	Has inventory for this species been adequate? Has this species been extirpated from Idaho?	Inventory for this rare species could provide valuable information on its population sizes, locations, and geographic distribution. This information could be used in the development of management and monitoring strategy.
Mimulus pygmaeus	Is this rare species benefited by the trampling of ungulates?	Trend, demographic, and ecophysiological monitoring in populations impacted by or potentially impacted by trampling by grazing animals could provide information on the beneficial aspects ("capsule burying") of trampling.
Mimulus pygmaeus	To what extent is this species threatened by changes in the hydrologic regime?	Trend monitoring of populations impacted by or potentially impacted by activities that alter the hydrologic regime could provide valuable information for incorporation into management direction.
Mimulus pygmaeus	To what extent is this species threatened by seeding projects that introduce perennial species into its habitat?	Trend monitoring of populations impacted by or potentially impacted by seed prescriptions which include perennial species could provide valuable information for incorporation into management guidelines, particularly the formulation of seed prescriptions.
Mimulus pygmaeus	To what extent is this species threatened by the invasion of exotic species?	Trend monitoring in populations threatened by the invasion of exotic species could provide valuable information on the rate of invasion and effects of invasion by exotic species. This information could be incorporated into management direction.
Mimulus washingtonensis var. washingtonensis	Does grazing adversely affect this species by selectively favoring an increase in a pollen competitor (Mimulus guttatus)?	Ecophysiological monitoring could provide valuable information for determining the indirect role of grazing in depressed seed set caused by increasing populations of a pollen competitor. This information could be incorporated into management direction.
Mimulus washingtonensis var. washingtonensis	Does this rare species have a "cold" requirement for germination? Does this adversely affect its ability to compete with sympatric species?	This rare species reportedly has a "cold" requirement that lessens its ability to compete (through pollination) with Mimulus guttatus. Laboratory investigations could determine if this requirement is a limiting factor.
Mimulus washingtonensis var. washingtonensis	To what extent is this species adversely affected by seeding prescriptions which include annual grasses?	Trend monitoring in populations impacted by or potentially impacted by seeding projects could provide valuable information for incorporation into management guidelines.
Mimulus washingtonensis var. washingtonensis	To what extent is this species threatened by the encroachment of habitat by exotic species? Do seeding prescriptions contribute to this threat?	Trend and demographic monitoring in populations impacted by the invasion of exotic species or by seeding projects which prescribe annual brome grasses could provide valuable information for incorporation into management direction.
Mimulus washingtonensis var. washingtonensis	Was the Nachez river population properly identified?	Collection of a voucher specimen and submission to an appropriate regional herbarium for the verification of identification should preclude the development of monitoring and management strategies.

Species name	Research Need	Potential Application
Mimulus washingtonensis var. washingtonensis	What is the extent of the natural seed bank and is it sufficiently replenished in wet years?	Ecophysiological monitoring and supporting laboratory work could provide valuable information on the seed bank size and viability. This information could be incorporated into management direction.
Mimulus washingtonensis var. washingtonensis	To what extent is this species threatened by activities which alter the hydrologic regime?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by activities which alter the hydrologic regime could provide valuable information which could be incorporated into management direction.
Mimulus washingtonensis var. washingtonensis	To what extent is this species threatened by the invasion of exotic species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by the invasion of exotic species could provide valuable information which could be incorporated into management direction.
Mirabilis bigelovii var. retrorsa	Are inventories for the occurrence of this variety adequate?	Inventory activities could document population sizes and determine geographic amplitude. Both of these parameters are essential in developing monitoring and management strategy.
Mirabilis bigelovii var. retrorsa	How is this variety genetically different from the typovar?	The genetic and taxonomic status of this variety could be determined by electrophoretic studies. This information could be incorporated into management direction.
Mirabilis macfarlanei	How is this rare species affected by grazing activities?	Trend monitoring in populations historically, presently, or potentially impacted by grazing could provide valuable information which could be incorporated into management direction.
Mirabilis macfarlanei	How is this rare species affected by road construction and/or maintenance?	Trend and demographic monitoring of populations threatened by road construction and/or maintenance could provide valuable information on the effects of these activities on the rare species. This information could be incorporated into management direction
Mirabilis macfarlanei	How is this rare species affected by the invasion of exotic species?	Trend and demographic monitoring of populations threatened by exotic species could provide valuable information on the invasion rate and adverse effects of exotics.
Mirabilis macfarlanei	Is the full extent of this species' populations and geographic amplitude known?	Inventory for this species could provide valuable information on its population sizes, locations, and the geographic range of the species. This information could be used in management direction.
Mirabilis macfarlanei	To what extent is this rare species threatened by livestock grazing activities?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by grazing activities could provide valuable information which could be incorporated into management direction.
Mirabilis macfarlanei	To what extent is this species parasitized by fungi? Does this relationship diminish vigor, seed production, etc.?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by fungal infection could provide valuable information for incorporation into management direction.
Mirabilis macfarlanei	What are the environmental requirements for this rare species?	Ecophysiological monitoring of this rare species could provide valuable information about its environmental requirements. This information could be incorporated into management guidelines.
Mirabilis macfarlanei	What is the role of asexual (vegetative) reproduction and what degree of genetic variability occurs within populations and across the range of this rare species?	Ecophysiological monitoring and supporting laboratory work could provide information about the genetic variability of this rare species. This information could be incorporated into management guidelines.

Species name	Research Need	Potential Application
Oenothera psammophila	What are the environmental requirements and limiting factors of this rare species?	Ecophysiological monitoring of this rare species could provide valuable baseline information on its environmental requirements and limiting factors. This information could be incorporated into monitoring protocol and management direction.
Oryzopsis (Achnatherum) hendersonii	Is this rare species adversely affected by recreational activities, specifically the use of off-road vehicles?	Trend and demographic monitoring of populations historically, presently, and or potentially impacted by Recreational activities could provide valuable information for incorporation into management direction.
Oryzopsis (Achnatherum) hendersonii	What is the relationship of this rare species to mycorrhizae or other cryptogamic species?	Demographic monitoring should enable the determination of such relationship. Management direction relative to the findings could then be developed.
Oryzopsis (Achnatherum) hendersonii	What is the reproductive biology of this rare species? Why is recruitment so limited?	Trend, demographic, and ecophysiological monitoring could provide baseline information about the environmental requirements of this species. This information could be incorporated into management direction.
Oryzopsis contracta	What are the demographic trends of this species?	Trend and demographic monitoring of this rare species could provide valuable information which could be incorporated into management guidelines.
Oryzopsis hendersonii var. hendersonii	To what extent are the population sizes and geographic amplitude of this species known?	Inventory for this rare species could provide valuable information on the population sizes and geographic distribution of this species. This information could be used to develop monitoring plans to facilitate proper management.
Oryzopsis hendersonii var. hendersonii	To what extent is this rare species adversely affected by grazing?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by grazing activities could provide information which could be incorporated into management direction.
Oryzopsis hendersonii var. hendersonii	To what extent is this rare species impacted by excavation activities, particularly gravel pit development?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by excavation projects could provide information which could be incorporated into management direction.
Oryzopsis hendersonii var. hendersonii	To what extent is this rare species impacted by fire and/or fire suppression activities?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by natural or prescribed burning could provide valuable information which could be incorporated into management direction.
Oryzopsis hendersonii var. hendersonii	To what extent is this rare species impacted by road construction or maintenance activities?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by road construction and/or maintenance activities could provide valuable information which could be incorporated into management direction.
Oryzopsis hendersonii var. wallowensis	To what extent are the population sizes and geographic amplitude of this species known?	Inventory for this rare species could provide valuable information on the population sizes and geographic distribution of this species. This information could be used to develop monitoring plans to facilitate proper management.
Oryzopsis hendersonii var. wallowensis	To what extent is this rare species adversely affected by grazing?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by grazing activities could provide information which could be incorporated into management direction.
Oryzopsis hendersonii var. wallowensis	To what extent is this rare species impacted by excavation activities, particularly gravel pit development?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by excavation projects could provideinformation which could be incorporated into management direction.

Species name	Research Need	Potential Application
Oryzopsis hendersonii var. wallowensis	To what extent is this rare species impacted by fire and/or fire suppression activities?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by natural or prescribed burning could provide valuable information which could be incorporated into management direction.
Oryzopsis hendersonii var. wallowensis	To what extent is this rare species impacted by road construction or maintenance activities?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by road construction and/or maintenance activities could provide valuable information which could be incorporated into management direction.
Oxytropis campestris var. columbiana	Is this variety of concern threatened by residential development?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by housing development could provide valuable information for incorporation into management guidelines.
Oxytropis campestris var. columbiana	What are the germination requirement for this variety of concern? How does it become established in areas of high wave action?	Conduct studies to determine germination requirements and monitor known populations to determine recruitment rates and mechanisms of establishment. Enables limiting factors to be identified and treated in management prescriptions.
Oxytropis campestris var. columbiana	Is the variety of concern taxonomically valid? Can molecular studies (isozymes) help resolve this taxonomic question?	Resolution of taxonomic status through cytogenetic and electrophoretic investigations precludes the development of monitoring protocol and management direction.
Oxytropis campestris var. wanapum	Do exotic species threaten this rare variety?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by the invasion of exotic species could provide valuable information which could be incorporated into management direction.
Oxytropis campestris var. wanapum	Has this rare variety been adequately inventoried to determine its populations and geographic amplitude?	Inventory for this rare species could provide valuable information about its population sizes and geographic distribution.
Oxytropis campestris var. wanapum	Is the reproductive biology and population dynamics of this rare variety adequately understood?	Trend, demographic, and ecophysiological monitoring could provide valuable baseline information about the environmental requirements and limiting factors of this species.
Oxytropis campestris var. wanapum	Is this rare variety threatened by recreational activities, particularly hang-gliding?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by recreational activities could provide information which could be incorporated into management direction.
Oxytropis campestris var. wanapum	Is this rare variety threatened by the construction of microwave and television towers in its habitat on ridgetops?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by housing and other development could provide valuable information which could be incorporated into management direction.
Papaver pygmaeum	What is the taxonomic relationship between this species and Papaver radicatum?	Resolution of the taxonomic relationship between p. Pygmaeum and p. Radicatum is necessary to validate the "concern" status of this taxon.
Papaver pygmaeus	What are the population dynamics of this species of concern?	Monitoring known populations could enable determination of dynamics and identification of potential threats (although known populations are in protected areas).
Parnassia kotzebuei var. pumila	Have inventory efforts on this rare species been adequate?	Inventory for this rare species could provide valuable baseline information on population sizes and geographic distribution. This information could be incorporated into management direction and the development of monitoring strategy.

Species name	Research Need	Potential Application
Parnassia kotzebuei var. pumila	Is this a valid taxon? What is its relationship with sympatric species?	Resolution of the taxonomic status and relationship of this variety of concern should preclude the development of monitoring and management strategy.
Parnassia kotzebuei var. pumila	To what extent is this variety of concern threatened by mining activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by mining activities could provide information which could be incorporated into management direction.
Parnassia kotzebuei var. pumila	To what extent is this variety of concern threatened by natural geologic changes such as landslides?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by natural geologic phenomena could provide valuable information which could be incorporated into management direction.
Parnassia kotzebuei var. pumila	What are the environmental requirements of this species?	Trend, demographic, and ecophysiological monitoring could provide valuable information about the environmental requirements and limiting factors for this rare species. This baseline information could be incorporated into management guidelines.
Penstemon barrettiae	Does hybridization with other more common species threaten the genetic integrity of this species? Does this problem exist throughout the range of the species?	Genetic studies in sympatric populations could provide valuable information on the genetic integrity and threats of this species. This information could be incorporated into management direction.
Penstemon barrettiae	How are natural populations of this rare species maintained in the vertical cliff habitat?	Ecophysiological monitoring of this rare species could provide valuable information on how the species colonizes the vertical cliff habitat and could also identify restoration opportunities. This information could be incorporated into management guidelines.
Penstemon barrettiae	Is this rare species threatened by alterations in the hydrologic regime of its habitat?	Trend monitoring in populations impacted by or potentially impacted by alterations in the hydrologic regime could provide valuable information for incorporation into management guidelines.
Penstemon barrettiae	To what extent has the known geographic range of this rare species been inventoried for populations of this species?	Inventory for this species could provide valuable information on population sizes and geographic distribution. This information could be used in the development of monitoring and management guidelines.
Penstemon barrettiae	To what extent have artificial seed banking efforts been successful?	Evaluation of seed banking efforts and outplanting success could provide valuable information which could be incorporated into management direction.
Penstemon barrettiae	To what extent is genetic dilution threatening the species in areas where its distribution is sympatric with other species, particularly Penstemon fruticosus?	Genetic studies coupled with demographic monitoring of sympatric populations could provide valuable information relative to genetic dilution and introgression. This information could be incorporated into management direction.
Penstemon barrettiae	To what extent is this attractive rare species threatened by collectors, particularly Penstemon growers?	Trend monitoring in populations impacted by and/or potentially impacted by collection could provide valuable information for incorporation into management guidelines.
Penstemon barrettiae	To what extent is this rare species impacted by the direct and/or indirect application of herbicides?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by the direct (roadside weed control) and/or indirect (drift) application of herbicides could provide valuable information for management.
Penstemon barrettiae	To what extent is this rare species threatened by mining (excavation) activity?	Trend and demographic monitoring of this rare species in populations historically, presently, and/or potentially impacted by excavation activities could provide valuable information which could be incorporated into management guidelines.

Species name	Research Need	Potential Application
Penstemon barrettiae	What are the environmental factors that constrain the geographic amplitude of this rare species?	Demographic and ecophysiological monitoring of populations across the range of the species could provide valuable baseline information on its environmental requirements and geographic amplitude.
Penstemon barrettiae	What are the impacts of road construction on the habitat of this rare species and its known populations?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by road construction activities (including blasting) could provide valuable information for incorporation into management direction.
Penstemon barrettiae	What is the impact of collection ("taking") of specimens of this rare species on its populations and geographical amplitude? Is the horticulture industry threatening this species?	Trend monitoring throughout the range of this rare species should provide baseline information on the impacts of plant collecting on this species. Management direction could be formulated according to the results.
Penstemon barrettiae	Why is the recruitment rate so low in this species?	Trend and demographic monitoring of this rare species could provide valuable information assessing the low recruitment rate. This information could be incorporated into management direction.
Penstemon glaucinus	To what extent is this rare species threatened by fire and/or fire suppression activities?	Trend monitoring in populations historically impacted by, presently impacted by, or potentially impacted by prescribed or natural fire could provide valuable information which could be incorporated into management direction.
Penstemon glaucinus	To what extent is this rare species threatened by the excavation of road building materials?	Trend monitoring in populations impacted by or potentially impacted by the excavation of road bed materials could provide valuable information for the formulation of management guidelines?
Penstemon idahoensis	To what extent is this rare species threatened by the invasion or seeding of exotic species?	Trend and demographic monitoring of this rare species in populations historically, presently, and/or potentially impacted by exotics species (including those in seeding prescriptions) could provide valuable information for management.
Penstemon idahoensis	What are the environmental requirements of this rare species? What are its limiting factors?	Ecophysiological monitoring of this rare species could provide valuable baseline information on its environmental requirements and limiting factors. This information could be incorporated into monitoring protocol and management direction.
Penstemon lemhiensis	Are exotic species a serious threat to this species of concern?	Assessment of the effects of the invasion of exotic species (knapweed) through the monitoring of known populations would enable management direction and effective control measures consistent with the conservation of the species to be developed.
Penstemon lemhiensis	How does this rare species respond to competition from exotic species? Are any of these competitors included in seeding prescriptions?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by the invasion of exotic species could provide information for incorporation into management direction.
Penstemon lemhiensis	How does this rare species respond to fire and/or fire suppression?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by fire, fire suppression, or changes in the fire regime could provide valuable information for incorporation into management direction.
Penstemon lemhiensis	How does this species respond to habitat disturbance, particularly the creation of road cuts?	Assessment of population dynamics in disturbed habitats through monitoring could enable management direction consistent with the conservation of the species to be formulated.
Penstemon lemhiensis	To what extent is this rare species threatened by collection for horticultural purposes?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by plant collectors could provide valuable information for incorporation into management direction.

Species name	Research Need	Potential Application
Penstemon lemhiensis	What are the effects of grazing on this species?	Assessment of the impacts of grazing through monitoring plots, could enable management direction to be determined.
Penstemon lemhiensis	What are the environmental requirements of this rare species and what are its limiting factors?	Ecophysiological monitoring of this rare species could provide baseline information on its environmental requirements and limiting factors. This information could be used in the formulation of monitoring protocol and management direction.
Penstemon lemhiensis	What are the reproductive dynamics of the known populations of this species?	Assessment of population parameters of germination, longevity, seed viability, pollination success, etc., through monitoring would provide valuable information on the viability threshold of this species.
Penstemon lemhiensis	What are the responses of this species to a prescribed fire regime? What are the responses of this species to fire suppression?	Assessment of the effects of fire, both prescribed and natural, could enable management direction to be developed consistent with the conservation of the species.
Penstemon peckii	What is the effect of alteration of the hydrologic regime on this rare species?	Trend monitoring in populations impacted by "dewatering" of subirrigated meadowlands could provide valuable information for incorporation into management direction.
Penstemon peckii	What is the effect of fire and/or fire suppression on this rare species?	Trend monitoring in populations impacted by natural or prescribed fire could provide valuable information which could be incorporated into management direction.
Penstemon peckii	What is the effect of population fragmentation caused by recreational activities or development?	Trend monitoring in populations historically, presently, and/or potentially fragmented by recreational activity could provide valuable information for incorporation into management direction.
Perideridia erythrorhiza	What genetic differences occur between eastside and westside populations?	Ecophysiological monitoring supported by laboratory work involving electrophoresis and cytogenetics could provide valuable information about genetic differences in the two populations. This information could be incorporated into management direction.
Perideridia erythrorhiza	Why is this species so rare while Perideridia gairdneri and P. oregana are much more abundant, even in the same habitat?	Ecophysiological monitoring of the sympatric species could provide valuable information on the dynamics of the populations. This information could be incorporated into management direction
Petrophytum cinerascens	To what extent is this rare shrub threatened by plant collectors, and specifically collections for horticultural usage?	Trend and demographic monitoring of populations historically, presently, and/or potentially threatened by plant collection activities for horticultural purposes could provide valuable information for management, particularly regarding permits.
Petrophytum cinerascens	To what extent is this rare shrub threatened by road construction projects which impact its habitat?	Trend and demographic monitoring of populations historically, presently, and/or potentially threatened by road construction could provide valuable information which could be used in the development of management guidelines.
Petrophytum cinerascens	What are the environmental requirements of this rare species?	Demographic and ecophysiological monitoring of this rare species could provide valuable baseline information on the environmental requirements and limiting factors of this rare species. This information could be incorporated into management direction.
Phacelia inconspicua	To what extent has this annual species been impacted by fire and/or fire suppression?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by natural and/or prescribed fire could provide information for incorporation into management direction.

Species name	Research Need	Potential Application
Phacelia inconspicua	To what extent has this annual species been impacted by mining?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by mining activities could provide valuable information for incorporation into management direction.
Phacelia inconspicua	What are the environmental requirements for this rare species? What are its limiting factors?	Ecophysiological monitoring of this rare species could provide valuable baseline information about its environmental requirements and limiting factors. This information could be useful in the formulation of monitoring protocol and management.
Phacelia lenta	To what extent is this species threatened by gravel excavation?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by mining (gravel pit excavation) activities could provide valuable information which could be incorporated into management direction.
Phacelia lenta	To what extent is this species threatened by herbicide drift?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by the direct and/or indirect application of herbicides could provide valuable information which could be incorporated into management direction.
Phacelia lenta	What is the reproductive biology of this species? Does this contribute to its narrow geographic amplitude?	Trend, demographic, and ecophysiological monitoring could provide valuable baseline information about the environmental requirements and limiting factors for this species.
Phacelia minutissima	To what extent is this rare species threatened by grazing activities?	Trend and demographic monitoring of populations of this rare species historically, presently, and/or potentially impacted by grazing activities could provide valuable information which could be incorporated into management guidelines.
Phlox idahonis	To what extent is this rare species threatened by grazing activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by grazing activities could provide information which could be incorporated into management direction.
Phlox idahonis	To what extent is this rare species threatened by the encroachment of its meadowland habitat by trees?	Trend and demographic monitoring could provide valuable information on tree encroachment into the habitat of this species. Effects of tree removal by logging and/or periodic fire could also be determined and used in management.
Physaria didymocarpa var. lyrata	To what extent is this rare variety threatened by mining activities?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by mining activities could provide valuable information for incorporation into management guidelines.
Physaris integrifolia var. monticola	Are the morphological characteristics used to assign varietal status environmentally, rather than genetically, induced?	Resolution of the taxonomic validity of this variety of concern should preclude the development of monitoring and management strategies.
Physaris integrifolia var. monticola	Is this a valid taxon?	Resolution of the taxonomic validity of this variety of concern should preclude the development of monitoring and management strategies.
Pleuropogon oregonus (Lophochlaena oregona)	To what extent is this rare species threatened by alteration in the hydrological regime of its habitat and particularly by water diversion projects?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by hydrologic alterating projects could provide information for incorporation into management direction.
Pleuropngon oregonus (Lophochlaena oregona)	To what extent is this rare species threatened by fire and/or fire suppression activities?	Trend and demographic monitoring of this species in populations historically, presently, and/or potentially impacted by natural and/or prescribed burning could provide valuable information for incorporation into management direction.

Species name	Research Need	Potential Application
Pleuropogon oregonus (Lophochlaena oregona)	To what extent is this rare species threatened by grazing activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by grazing could provide valuable information for incorporation into management guidelines.
Pleuropogon oregonus (Lophochlaena oregona)	To what extent is this rare species threatened by grazing activities?	Trend and demographic monitoring of this species in populations historically, presently, and/or potentially impacted by grazing could provide valuable information for incorporation into management direction.
Pleuropogon oregonus (Lophochlaena oregona)	To what extent is this rare species threatened by the invasion of exotic species?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by exotic species could provide valuable information for incorporation into management direction.
Pleuropogon oregonus (Lophochlaena oregona)	What are the population sizes and geographic amplitude of this rare species, particularly in the grande ronde basin?	Inventory efforts for this species in the grande ronde basin could provide baseline information on the population sizes and potential threats to those populations as well as the geographic range of the species.
Polemonium pectinatum	To what extent is this rare species threatened by the invasion of exotic species?	Trend and demographic monitoring of this species should provide valuable information on the effects of exotic species on this rare species. This information could be incorporated into management guidelines for controlling the exotic species.
Polemonium pectinatum	To what extent is this species adversely affected by drift from herbicidal spraying?	Trend monitoring could provide valuable information regarding the responses of the species to herbicidal drift. This information could be incorporated into management direction concerning the use of herbicides in areas known to support the species.
Polemonium pectinatum	What are the effects of grazing on this rare species?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by grazing activities could provide information which could be incorporated into management direction.
Polemonium pectinatum	What are the effects of water diversion associated with agricultural production on this rare species?	Trend and demographic monitoring in populations historically, presently, and/or potentially impacted by agricultural practices which alter the hydrology could provide valuable information for incorporation into management direction.
Polemonium pectinatum	What is the reproductive biology of this rare species?	Trend and demographic monitoring of this species should provide important information on seed viability, pollinators, seed bed, etc. This information is basic to understanding the rarity of the species and the development of management guidelines.
Primula alcalina	Has this rare species been adequately inventoried? What are the sizes of its populations and what is its geographic amplitude?	Inventory for this rare species could provide valuable baseline information which could be incorporated into monitoring protocol and management direction.
Primula alcalina	How is this rare species affected by exotic species?	Trend and demographic monitoring of this rare species in populations historically, presently, and/or potentially impacted by the invasion of exotic species could provide valuable information which could be incorporated into management direction.
Primula alcalina	How is this rare species affected by grazing activities, particularly springtime grazing?	Trend and demographic monitoring of this rare species in populations historically, presently, and/or potentially impacted by grazing activities could provide valuable information about the effects of seasonal damage to this species.
Primula alcalina	How is this rare species affected by recreational activities?	Trend and demographic monitoring of this rare species in populations historically, presently, and/or potentially impacted by recreational activities (esp. Camping) could provide valuable information which could be incorporated into management direction.

Species name	Research Need	Potential Application
Ranunculus reconditus	Is this species a valid taxon? How does it differ genetically from Ranunculus glaberrimus?	Electrophoretic comparisons of R. reconditus and R. glaberrimus should resolve any taxonomic questions associated with the rare species. This information is basic to management decisions.
Ranunculus reconditus	To what extent has the historic habitat of this species been converted to agricultural production? Is this conversion still occurring?	Trend monitoring of populations historically, presently, and/or potentially impacted by agricultural conversion could provide information on habitat diminution for incorporation into management direction.
Ranunculus reconditus	To what extent is this rare species threatened by grazing?	Trend monitoring of populations historically, presently, and/or potentially impacted by grazing activities could provide valuable information for incorporation into management direction.
Ranunculus reconditus	What are the specific habitat requirements of this rare species?	Ecophysiological monitoring of populations of this rare species could provide information about its environmental requirements. This information could be incorporated into management direction.
Rorippa columbiae	How does this species respond to activities which result in an alteration of the hydrology of its habitat?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by activities which alter the hydrologic regime of its supporting habitat could provide valuable information for management.
Rorippa columbiae	Is this rare species adversely affected by activities that alter the hydrologic regime supporting its habitat?	Trend monitoring of populations impacted by or potentially impacted by changes in the hydrologic regime could provide valuable information for incorporation into management direction.
Rorippa columbiae	Is this rare species adversely affected by grazing activities?	Trend, demographic, and ecophysiological monitoring in populations impacted by or potentially impacted by grazing activities could provide valuable information for incorporation into management direction.
Rorippa columbiae	Is this rare species threatened by the invasion of exotic species?	Trend monitoring of populations impacted by exotic species could provide valuable information for incorporation into management direction.
Rorippa columbiae	To what extent does riparian rehabilitation work adversely impact this species? Does the equipment used in riparian rehabilitation (bulldozers, spiders, etc.) present a potential threat?	Trend and demographic monitoring in populations impacted by or potentially impacted by riparian restoration activities, especially those involving heavy equipment, could provide valuable information for incorporation into management guidelines.
Rorippa columbiae	To what extent is this species threatened by diminished habitat caused by the invasion of exotic species?	Trend and demographic monitoring studies of populations historically, presently, and/or potentially impacted by the invasion of exotic species could provide valuable information for incorporation into management direction.
Rorippa columbiae	To what extent is this species threatened by the direct and indirect application of herbicides, especially in the roadside habitat?	Trend and demographic monitoring of populations impacted by or potentially impacted by the application of herbicides could provide valuable information for incorporation into management guidelines.
Rorippa columbiae	What are the impacts of pool fluctuation on this rare species?	Trend monitoring of the species during seasonably variable pool fluctuations should provide the baseline information which can be incorporated into management guidelines.
Rorippa columbiae	What are the predicted impacts to this species' habitat associated with development?	Trend and demographic monitoring studies of populations historically, presently, and/or potentially impacted by housing developments could provide information for incorporation into management direction.
Rorippa columhiac	What is the extent of the natural seed bank of this rare species?	Ecophysiological monitoring could provide valuable information regarding the extent of the natural seed bank of this species. This information could be incorporated into management direction.

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Species name	Research Need	Potential Application
Rorippa columbiae	How does this rare species respond to alteration in the hydrologic regime of its habitat?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by alteration of hydrologic regime could provide information for incorporation into management direction.
Rorippa columbiae	How is this rare species impacted by the grazing activities of cattle and antelope?	Trend and demographic monitoring of this rare species in populations historically, presently, and/or potentially impacted by grazing and wildlife utilization could provide valuable information which could be incorporated into management direction.
Rorippa columbiae	What are the environmental requirements of this rare species?	Ecophysiological monitoring of this rare species could provide valuable information about its environmental requirements and limiting factors. This information could be incorporated into management direction.
Rubus bartonianus	To what extent are the known populations of this species threatened by diseases?	Ecophysiological monitoring of populations across the range of the species combined with supporting pathological lab work could provide valuable information about pathogens of this species. This information could be incorporated into management direction.
Rubus bartonianus	To what extent has this species been inventoried, particularly on the idaho side of hells canyon?	Inventory for this rare species could provide valuable baseline information on population sizes and geographic distribution. This information is essential in the development of monitoring protocol and management direction.
Rubus bartonianus	What are the population sizes and their distributions of this species on the oregon side of hells canyon?	Inventory of the potential habitat on the oregon side of hells canyon could provide valuable information on the population sizes and geographic amplitude of this species. This information could be incorporated into management guidelines.
Rubus bartonianus	What are the population trends of this rare species?	Trend monitoring could provide valuable information for incorporation into management direction.
Rubus nigerrimus	How does this rare species respond to impacts associated with grazing?	Trend and demographic monitoring in areas impacted by or potentially impacted by grazing activities could provide valuable information which could be incorporated into management direction.
Rubus nigerrimus	Is this rare species threatened by the direct or indirect use of herbicides?	Trend and demographic monitoring in areas impacted by or potentially impacted by the direct and/or indirect application of herbicides could provide valuable information which could be incorporated into management direction.
Rubus nigerrimus	Is this rare species threatened by the invasion of exotic species?	Trend and demographic monitoring in areas impacted by or potentially impacted by the invasion of exotic species could provide valuable information which could be incorporated into management direction.
Rubus nigerrimus	To what extent does this rare species hybridize with sympatric rubus leucodermis? Does this hybridization threaten the genetic integrity and viability of the species?	Genetic and electrophoretic studies of this rare species in areas sympatric with rubus leucodermis could enable genetic status and health to be determined. This information could be incorporated into management direction.
Rubus nigerrimus	To what extent has the historic range and habitat of this species been affected by the construction of hydroelectric dams? Do pool level fluctuations have adverse effects on this species?	Trend, demographic, and ecophysiological monitoring of populations affected by pool level fluctuation could provide valuable information about this species' response to these fluctuations. This information could be useful to management.
Senecio erterae	How is this rare species impacted by road construction and/or maintenance activities? Do these activities open new habitat for the species?	Trend and demographic monitoring of this rare species in populations historically, presently, and/or potentially impacted by road construction and/or road maintenance could provide valuable information which could be incorporated into management.

Species name	Research Need	Potential Application
Senecio ertterae	To what extent is this rare species threatened by the invasion of exotic species, particularly yellow star thistle?	Trend and demographic monitoring of this species in populations historically, presently, and/or potentially impacted by the invasion of exotic species could provide valuable information for incorporation into management direction.
Senecio ertterae	What are the environmental requirements of this rare species? Its late-season pollinators? Its seed bank?	Ecophysiological monitoring of this rare species could provide information about its environmental requirements and limiting factors. Dispersal, seed bank, pollination, could all be determined in this type of monitoring.
Sidalcea oregana var. calva	Is this a valid taxon?	Resolution of the taxonomic status of this rare variety should preclude the development of monitoring and management strategies.
Sidalcea oregana var. calva	To what extent is this species impacted by activities which alter the hydrologic regime which supports its habitat?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by activities which alter the hydrology could provide valuable information which could be incorporated into management direction.
Sidalcea oregana var. calva	To what extent is this species impacted by fire, fire suppression, and/or changes in fire regimes?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by natural and/or prescribed fire could provide valuable information which could be incorporated into management direction.
Sidalcea oregana var. calva	To what extent is this species impacted by grazing activities and by wildlife grazing?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by the grazing of domestic and/or wild animals could provide valuable information which could be incorporated into management direction.
Sidalcea oregana var. calva	To what extent is this species impacted by the invasion of exotic species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by the invasion of exotic species could provide valuable information which could be incorporated into management direction.
Sidalcea oregana var. calva	To what extent is this species impacted by timber harvest activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by timber harvest activities could provide information that could be incorporated into management direction.
Silene seelyi	What are the environmental requirements of this rare species? What are its pollinators, rate of recruitment, seed production, etc.?	Demographic and ecophysiological monitoring of this species could provide valuable information on the environmental requirements and limiting factors for this species. This baseline information could be used in the development of management strategy.
Silene spaldingii	Is this rare species threatened by diminished habitat attributable to agricultural conversion?	Trend monitoring of populations potentially impacted by agricultural conversion could provide important information which could be incorporated into management direction.
Silene spaldingii	Is this rare species threatened by fire and/or fire suppression?	Fire effects on this rare species could be determined with trend and demographic monitoring conducted in conjunction with natural or prescribed burns. This information could be incorporated into management direction.
Silene spaldingii	Is this rare species threatened by grazing activities?	Trend and demographic monitoring in populations threatened by grazing activities could provide valuable information which could be incorporated into management direction.

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Species name	Research Need	Potential Application
Silene spaldingii	Since this species develops late in the season, what are its responses to the natural fire cycle and to prescribed burning outside the natural "window" of fire events?	Trend monitoring in populations with known fire histories and also conducted in conjunction with prescribed burning could provide information which could be incorporated into management direction.
Silene spaldingii	To what extent has the natural range of this species been diminished because of the conversion of its habitat to agricultural production?	Trend and demographic monitoring of populations historically, presently, and/or potentially threatened by agricultural conversion could provide valuable information for incorporation into management direction.
Silene spaldingii	To what extent have the population sizes and geographic amplitude of this species been documented?	Inventory of potential habitat across the geographic range of this species could provide information on critical population sizes for viability and also determine the true geographic range of the species.
Silene spaldingii	To what extent is this rare species threatened by the invasion of its habitat by exotic species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by exotic species could provide information which could be incorporated into management direction.
Silene spaldingii	To what extent is this species threatened by genetic isolation caused by habitat fragmentation?	Demographic and ecophysiological monitoring of populations could provide valuable information on the effects of habitat fragmentation on genetic isolation and the resulting vulnerability of the species.
Silene spaldingii	To what extent is this species threatened by the conversion of its natural habitat to agricultural production?	Trend monitoring of the known populations historically, presently, or potentially threatened by conversion of habitat to agricultural production could provide valuable information for incorporation into management guidelines.
Silene spaldingii	What are the effects of exotic species on this rare species and its existing and potential habitat?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by the invasion or seeding of exotic species could provide valuable information for incorporation into management direction.
Silene spaldingii	What are the effects of herbicidal drift on this rare species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by the direct and/or indirect application of herbicides could provide valuable information for incorporation into management direction.
Silene spaldingii	What are the effects of recreational activities on this rare species, particularly hiking and mountain biking?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by recreational activities could provide valuable information for incorporation into management direction.
Silene spaldingii	SWhat are the environmental requirements of this rare species?	Trend, demographic, and ecophysiological monitoring could provide valuable information on the environmental requirements and limiting factors of this species. This information could be incorporated into mangement direction.
Silene spaldingii	What are the impacts of grazing on this rare species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by grazing activities could provide valuable information for incorporation into management direction.
Silene spaldingii	What is the level of intraspecific genetic variation within this species? What variation occurs among populations over the known range of the species?	Understanding the genetic variability of this species provides information that is useful in predicting its viability and ability to adapt to changing environmental factors.
Silene spaldingii	What is the reproductive biology of this rare species, its pollinators, its dispersal agents, its reproductive success?	Trend, demographic, and ecophysiological monitoring of this rare species could provide valuable baseline information on its environmental requirements and limiting factors.

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Species name	Research Need	Potential Application
Silene spaldingii	What are the species responses to fire? Has fire suppression historically had an adverse effect?	Determination of optimal fire regime
Silene spaldingii	How does this species respond to encroachment of habitat by exotic species? How does urban development affect the invasion of exotic species?	Determination of the effects of exotic species on the species of concern.
Silene spaldingii	How is genetic variation apportioned among populations within the montana populations and within the populations of the main part of the range of the species? Is species susceptible to inbreeding depression?	Identification of key areas for conservation focus; determination of critical population sizes for viability of species;better understanding of genetic variability across the range of the species
Sisyrinchium sarmentosum	To what extent is this species threatened by activities which result in an alteration of the hydrologic regime supporting its habitat?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by activities which cause an alteration in the hydrologic regime of habitat could provide valuable information for management.
Sisyrinchium sarmentosum	To what extent is this species threatened by grazing activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by grazing activities could provide information which could be incorporated into management direction.
Sisyrinchium sarmentosum	To what extent is this species threatened by mining activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by mining activities could provide valuable information for management.
Sisyrinchium sarmentosum	To what extent is this species threatened by the invasion of exotic species or the deliberate seeding of exotics?	Trend and demographic monitoring of populations historically, presently, and or potentially threatened by the invasion of exotic species or the deliberate seeding of them could provide valuable information for incorporation into management direction.
Stanleya confertiflora	What are the demographic and geographic parameters of this species?	Inventory for this rare species could provide valuable information on its population sizes, locations, and geographic distribution. This information could be used in the development of monitoring and management strategy.
Stephanomeria malheurensis	What are the environmental requirements for this rare species? What is its natural seed bank and is the laboratory seed bank adequate to perpetuate the species?	Ecophysiological monitoring of this species could provide valuable information on its environmental requirements, particularly key elements in increasing its natural and artificial seed banks.
Sullivantia hapemanii var. hapemanii	What are the population trends of this rare species?	Trend monitoring of populations of this rare species could provide valuable information for incorporation into management direction.
Tauschia hooveri	What are the impacts of grazing on this rare species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by grazing activities could provide valuable information for incorporation into management guidelines.
Tauschia hooveri	What are the impacts of logging operations (esp. Selection of landing sites) on this rare species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by timber harvest activities could provide information for incorporation into management guidelines.
Tauschia hooveri	What are the impacts of military operations (particularly tank traffic) on this species? It is known to occur within the yakima firing range and its habitat is impacted by tank maneuvers.	Trend and demographic monitoring could provide valuable information on the responses of this rare species to military operations. This information could be useful in the formulation of management directions consistent with the conservation of the species.

Species name	Research Need	Potential Application
Tauschia hooveri	What are the impacts root harvest by native americans to this rare species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by native harvest (for food purposes) activities could provide valuable information for incorporation into management guidelines.
Tauschia hooveri	What is the reproductive biology of this species? What are its pollinators? Is it dioecious or does it exhibit exaggerated protandry?	Understanding the reproductive biology of this rare species could lead to increased seed production.
Tauschia hooveri	What are the impacts of road construction on this rare species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by road construction/maintenance could provide valuable information for incorporation into management guidelines.
Texosporium sancti-jacobi	Can this rare lichen be transplanted successfully?	Ecophysiological monitoring of this rare species of lichen could provide valuable information documenting the success rates and potential for transplanting this species. This information could be used in management strategies.
Texosporium sancti-jacobi	Has this rare lichen been inventoried adequately?	Inventory for this rare species could provide baseline information on population sizes and geographic amplitude. Collection of this information should preclude the development of monitoring and management strategies.
Thelypodium eucosmum	How is this rare species affected by fire and/or fire suppression?	Trend monitoring documenting the encroachment of juniper into the habitat of this species could provide valuable information which could be incorporated into management direction.
Thelypodium eucosmum	How is this rare species affected by grazing activities?	This species is an "ice cream" plant. Trend monitoring in population threatened by grazing activities could provide valuable information for incorporation into management guidelines.
Thelypodium eucosmum	To what extent is this rare species threatened by fire and/or fire suppression activities?	Trend monitoring in populations impacted by natural or prescribed fire could provide valuable information for incorporation into management direction.
Thelypodium eucosmum	To what extent is this rare species threatened by grazing activities?	Trend and demographic monitoring of this "ice cream" plant could provide valuable information about the impact of grazing to this species. This information could be incorporated into management guidelines.
Thelypodium eucosmum	To what extent is this rare species threatened by the invasion of exotic species?	Trend monitoring documenting the encroachment on habitat and effects of exotic species on this rare species could provide valuable information for incorporation into management direction.
Thelypodium eucosmum	What are the environmental requirements for this rare species? Its pollinators? Its natural seed bank? Its seed viability? Its reproductive biology?	Ecophysiological monitoring of this rare species could provide valuable information on its basic environmental requirements. This information could be incorporated into management direction.
Thelypodium eucosmum	What are the specific environmental requirements of this rare species?	Ecophysiological monitoring of this species could provide valuable information about its environmental requirements (e.g., soils, pollinators, seed longevity, response to fire). This information could be incorporated into management direction.
Thelypodium howellii ssp. spectabilis	Has this species been extirpated from the basin and range province?	Inventory of the historic site of this species in the basin and range province indicates that the species is no longer present. Does it occur in other sites having suitable habitat?

Species name	Research Need	Potential Application
Thelypodium howellii ssp. spectabilis	Is this rare subspecies adversely impacted by grazing activities?	Trend and demographic monitoring of this "ice cream" plant in populations historically, presently, or potentially threatened with grazing could provide valuable information which could be incorporated into management guidelines.
Thelypodium howellii ssp. spectabilis	Is this rare subspecies threatened by agricultural conversion of habitat?	Trend monitoring in populations impacted historically, presently, and potentially by agricultural conversion could provide valuable information which could be incorporated into management guidelines.
Thelypodium howellii ssp. spectabilis	Is this rare subspecies threatened by the invasion of its habitat by exotic species?	Trend monitoring could provide valuable information for incorporation into management guidelines relative to the impacts and invasion rates of exotic species.
Thelypodium repandum	To what extent is this rare species threatened by road construction and/or maintenance activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by road construction/maintenance could provide information for incorporation into management direction.
Thelypodium repandum	What are the environmental requirements of this rare species?	Ecophysiological monitoring of this rare species could provide valuable information for incorporation into management direction.
Tofieldia glutinosa ssp. absona	How does this rare subspecies respond to alteration of the hydrologic regime supporting its habitat?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by activities that alter the hydrologic regime of its habitat could provide valuable information for incorporation into management direction.
Tofieldia glutinosa ssp.absona	What is the taxonomic "status" of this subspecies and the voucher specimens supporting its documented occurrence?	Resolution of the taxonomic "status" of this rare species should preclude the development of monitoring protocol and management direction.
Trifolium douglasii	Is this rare species adversely impacted by recreational activities, particularly pasturage and grazing of horses?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by recreational activities could provide information which could be incorporated into management direction.
Trifolium douglasii	Is this species being impacted by the invasion of exotic species?	Trend and demographic monitoring studies of populations historically, presently, and/or potentially impacted by the invasion of exotic species could provide valuable information for incorporation into management direction.
Trifolium douglasii	To what extent does the conversion of this species' habitat to agricultural production threaten its viability?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by conversion of habitat to agricultural production could provide valuable information which could be incorporated into management direction.
Trifolium douglasii	To what extent is the single documented population of this species threatened by exotic species including non-native perennial grasses included in seeding prescriptions?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by the invasion of exotic species could provide valuable information which could be incorporated into management direction.
Trifolium douglasii	To what extent is this species impacted by conversion of its natural habitat to agricultural production?	Trend and demographic monitoring in populations (only one documented) threatened by agricultural conversion could provide valuable information which could be incorporated into management guidelines.
Trifolium douglasii	To what extent is this species threatened by grazing activities?	Trend and demographic monitoring of the only documented population of this species could provide valuable information for incorporation into management guidelines.
Trifolium douglasii	To what extent is this species threatened by recreational activities?	Trend and demographic monitoring of the only documented population of this species could provide valuable information for incorporation into management guidelines.

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Species name	Research Need	Potential Application
Trifolium douglasii	To what extent is this species threatened by the invasion of its habitat by exotic species?	Trend and demographic monitoring of the only documented population of this species could provide valuable information for incorporation into management guidelines. Knapweed threatens the only population that has been documented.
Trifolium douglasii	What are the impacts and/or potential impacts of grazing activities to this rare species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by grazing activities could provide information which could be incorporated into management direction.
Trifolium owyheense	Are inventories for this rare species adequate?	Inventory for this species could provide valuable information on population sizes, locations, and geographic range of the species. This information could be useful to management.
Trifolium owyheense	Has this species been inventoried adequately?	Inventory for this rare species could document the sizes of its population and delineate its geographic amplitude. This baseline information should preclude the development of management and monitoring strategies for this species.
Trifolium owyheense	To what extent does this rare species require disturbance, particularly periodic fire?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by disturbance could provide valuable information for incorporation into management direction.
Trifolium owyheense	To what extent is this species impacted by mining activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by mining activities could provide valuable information for incorporation into management direction.
Trifolium owyheense	To what extent is this species impacted by road construction and/or maintenance activities?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by road construction/maintenance could provide information for incorporation into management direction.
Trifolium owyheense	To what extent is this species impacted by the grazing activities of cattle and big horn sheep?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by the grazing of cattle and/or big horn sheep could provide valuable information for incorporation into management direction.
Trifolium owyheense	What are the environmental requirements and limiting factors of this rare species?	Ecophysiological monitoring could provide valuable information on the environmental requirements of this rare species. This information could be incorporated into management direction.
Trifolium owyheense	What are the environmental requirements for this species?	Ecophysiological monitoring of this rare species could provide valuable information for incorporation into management direction.
Trifolium thompsonii	To what extent is this rare species threatened by fire, fire suppression, and/or changes in the fire regime?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by fire could provide valuable information for management, particularly in documenting its favorable response to this factor.
Trifolium thompsonii	To what extent is this rare species threatened by road construction and the resultant diminution of habitat?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by road construction could provide valuable information for management direction.
Trifolium thompsonii	To what extent is this rare species threatened by the invasion of exotic species and/or the deliberate seeding of exotic species?	Trend and demographic monitoring of populations historically, presently, and/or potentially impacted by exotic species and/or deliberate seeding of exotics could provide valuable information for management.
Trifolium thompsonii	What are the effects of fire and/or fire suppression on this rare species?	Trend and demographic monitoring studies of this species should provide information on responses to fire that could be incorporated into management direction.

Species name	Research Need	Potential Applieation
Trifolium thompsonii	What are the impaets of grazing on this rare species?	Trend and demographic monitoring studies of populations historieally, presently, and/or potentially impacted by grazing aetivities could provide information for incorporation into management direetion.

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APPENDIX 7

Checklist of the Vascular Plant Flora of the interior Columbia River Basin

CRBFLORA

Abies amabilis
Abies concolor
Abies grandis
Abies lasiocarpa
Abies magnifica
Abies procera
Abronia ammophila
Abronia elliptica
Abronia fragrans
Abronia latifolia
Abronia mellifera
Abronia micrantha
Abronia nana
Abronia turbinata
Abronia umbellata
Abutilon theophrasti
Acaena novae-zelandica
Acalypha rhomboidea
Acalypha virginica
Acer circinatum
Acer ginnala
Acer glabrum
Acergrandidentatum
Acer macrophyllum
Acer negundo
Acer palmatum
Acer platanoides
Acer pseudo-platanus
Acer rubrum
Acer saccharum
Achillea millefolium
Achillea nobilis
Achillea ptarmica
Achillea sibirica
Achlys triphylla
Achyrachaena mollis
Acomastylis depressa
Aconitum X bicolor
Aconitum bakeri
Aconitum carmichaelii
Aconitum columbianum
Aconitum delphiniifolium
Aconitum gracilentum
Aconitum helleri
Aconitum lutescens
Aconitum napellus
Aconitum septentrionale
Aconitum uncinatum
Aconitum variegatum
Acorus calamus
Actaea pachypoda
Actaea rubra
Adenocaulon bicolor
Adiantum capillus-veneris
Adiantum jordanii
Adiantum pedatum
Adonis aestivalis
Adonis annua
Adoxa moschatellina
Aegilops cylindrica
Aeginetia spp.
Aegopodium podagraria
Aesculus glabra
Aesculus hippocastanum
Aesculus octandra
Agalinis aspera
Agalinis tenuifolia
Agastache cusickii
Agastache foeniculum
Agastache occidentalis
Agastache scrophulariaefolia
Agastache urticifolia
Ageratina adenophora
Agoseris alpestris
Agoseris apargioides
Agoseris arizonica
Agoseris aurantiaca
Agoseris elata
Agoseris glauca
Agoseris gracilens
Agoseris grandiflora
Agoseris hendersonii
Agoseris heterophylla
Agoseris laciniata
Agoseris lackschewitzii
Agoseris margaritacea
Agoseris retrorsa
Agoseris taraxacifolia
Agoseris tenuifolia
Agrimonia gryposepala
Agrimonia striata
Agropyron amurense
Agropyron caninum
Agropyron cristatum
Agropyron dasytachyum
Agropyron desertorum
Agropyron elongatum
Agropyron inerme
Agropyron intermedium
Agropyron repens
Agropyron saxicola
Agropyron scribneri
Agropyron sibiricum
Agropyron smithii
Agropyron spicatum
Agropyron triticeum
Agrostemma githago
Agrostis aequivalvis
Agrostis aspera
Agrostis borealis
Agrostis diegoensis
Agrostis exarata
Agrostis hallii
Agrostis hiemalis
Agrostis howellii
Agrostis humilis
Agrostis hyemalis
Agrostis idahoensis
Agrostis interrupta
Agrostis longiligula
Agrostis microphylla
Agrostis oregonensis
Agrostis pallens
Agrostis palustris
Agrostis perennans
Agrostis racemosa
Agrostis rossiae
Agrostis scabra
Agrostis semiverticillata
Agrostis spica-venti
Agrostis stolonifera
Agrostis tenuis
Agrostis thurberiana
Agrostis variabilis
Ailanthus altissima
Aira caryophyllea
Aira elegans
Aira obtusata
Aira praecox
Ajuga reptans
Alchemilla occidentalis
Alchemilla vulgaris
Alectra ferocissimum
Aletes humilis
Alhagi camelorum
Alhagi pseudalhagi
Alisma gramineum
Alisma plantago-aquatica
Allenrolfea occidentalis
Allium aaseae
Allium acuminatum
Allium amplectens
Allium anceps
Allium atrorubens
Allium bisceptrum
Allium bolanderi
Allium brandegei

Allium brevistylum
Allium campanulatum
Allium canadense
Allium cernuum
Allium constrictum
Allium crenulatum
Allium cusickii
Allium dictuon
Allium douglasii
Allium drummondii
Allium falcifolium
Allium fibrillum
Allium geyeri
Allium giganteum
Allium lemmonii
Allium macrum
Allium madidum
Allium nevadense
Allium nevii
Allium nigrum
Allium palmeri
Allium parvum
Allium peninsulare
Allium perdulce
Allium platycaule
Allium punctum
Allium robinsonii
Allium sanbornii
Allium schoenoprasum
Allium scilloides
Allium serratum
Allium simillimum
Allium siskiyouense
Allium stellatum
Allium textile
Allium tolmiei
Allium tricoccum
Allium triquetrum
Allium unifolium
Allium validum
Allium viniale
Allotropa virgata
Alnus incana
Alnus rhombifolia
Alnus rubra
Alnus sinuata
Alopeurus aequalis
Alopecurus alpinus
Alopecurus arundinaceus
Alopecurus borealis
Alopecurus çarolinianus
Alopecurus geniculatus
Alopecurus howellii
Alopecurus myosuroides
Alopecurus pratensis
Alopecurus saccatus
Alsine sincoei
Alternanthera pungens
Alternanthera repens
Alternanthera sessilis
Althaea officinalis
Althaea rosea
Alyssum alyssoides
Alyssum desertorum
Alyssum maritimum
Alyssum obovatum
Alyssum parviflorum
Amaranthus albus
Amaranthus arenicola
Amaranthus californicus
Amaranthus caudatus
Amaranthus graecizans
Amaranthus hybridus
Amaranthus palmeri
Amaranthus powellii
Amaranthus retroflexus
Amaranthus rudis
Amaranthus tuberculatus
Ambrosia acanthicarpa
Ambrosia artemisifolia
Ambrosia chamissonis
Ambrosia grayi
Ambrosia psilostachya
Ambrosia tomentosa
Ambrosia trifida
Amelanchier alnifolia
Amelanchier cusickii
Amelanchier florida
Amelanchier humilis
Amelanchier pallida
Amelanchier utahensis
Ammannia auriculata
Ammannia coccinea
Ammophila arenaria
Amorpha canescens
Amorpha fruticosa
Amorpha nana
Amphicarpaea bracteata
Amsinckia carinata
Amsinckia intermedia
Amsinckia lycopsoides
Amsinckia menziesii
Amsinckia retrorsa
Amsinckia spectabilis
Amsinckia tessellata
Anagallis arvensis
Anaphalis margaritacea
Anchusa arvensis
Anchusa azurea
Anchusa barrelieri
Anchusa officinalis
Andromeda polifolia
Andropogon gerardii
Andropogon hallii
Andropogon scoparius
Androsace elongata
Androsace filiformis
Androsace lehmanniana
Androsace occidentalis
Androsace septentrionalis
Anelsonia eurycarpa
Anemone canadensis
Anemone caroliniana
Anemone cylindrica
Anemone deltoidea
Anemone drummondii
Anemone globosa
Anemone ludoviciana
Anemone lyallii
Anemone multifida
Anemone nemorosa
Anemone occidentalis
Anemone oregana
Anemone parviflora
Anemone patens
Anemone piperi
Anemone quinquefolia
Anemone virginiana
Anemopsis californica
Anethum graveolens
Angelica arguta
Angelica canbyi
Angelica dawsonii
Angelica genuflexa
Angelica hendersoni
Angelica kingii
Angelica lucida
Angelica lyallii
Angelica pinnata
Angelica roseana
Angelica tomentosa
Anoda cristata
Antennaria alpina
Antennaria anaphaloides
Antennaria arcuata
Antennaria argentea
Antennaria arida
Antennaria aromatica
Antennaria corymbosa
Antennaria densifolia
Antennaria dimorpha
Antennaria flagellaris

Antennaria geyeri
Antennaria howellii
Antennaria lanata
Antennaria luzuloides
Antennaria microcephala
Antennaria microphylla
Antennaria monocephala
Antennaria neglecta
Antennaria parlinii
Antennaria parvifolia
Antennaria pulcherrima
Antennaria racemosa
Antennaria speciosa
Antennaria stenophylla
Antennariasuffrutescens
Antennaria umbrinella
Anthemis arvensis
Anthemis cotula
Anthemis tinctoria
Anthoxantum atistatum
Anthoxanthum odoratum
Anthriscus caucalis
Anthriscus cerefolium
Anthriscus sylvestris
Anthyllis vulneraria
Antirrhinum breweri
Antirrhinum orontium
Apargidium boreale
Apera spica-venti
Aphanes arvensis
Apios americana
Apium graveolens
Aplopappus nanus
Apocynum X floribundum
Apocynum X medium
Apocynum androsaemifolium
Apocynum cannabinum
Apocynum pumilum
Apocynum sibiricum
Apocynum tomentellum
Aquilegia brevistyla
Aquilegia canadensis
Aquilegia coerulea
Aquilegia flavescens
Aquilegia formosa
Aquilegia jonesii
Aquilegia laramiensis
Arabidopsis salsuginea
Arabidopsis thaliana
Arabis aculeolata
Arabis alpina
Arabis breweri
Arabis canadensis
Arabis cobrensis
Arabis crandallii
Arabis crucisetosa
Arabis cusickii
Arabis davidsonii
Arabis demissa
Arabis dispar
Arabis divaricarpa
Arabis drummondii
Arabis falcifructa
Arabis fecunda
Arabis fendleri
Arabis fernaldiana
Arabis fruiticosa
Arabis furcata
Arabis glabra
Arabis hirsuta
Arabis holboellii
Arabis koehleri
Arabis lemmonii
Arabis lignifera
Arabis lyallii
Arabis lyrata
Arabis macdonaldiana
Arabis microphylla
Arabis modesta
Arabis nuttallii
Arabis oregana
Arabis pendulocarpa
Arabis perelegans
Arabis platysperma
Arabis puberula
Arabis pusilla
Arabis pycnocarpa
Arabis rectissima
Arabis selbyi
Arabis serpentinicola
Arabis shortii
Arabis sparsiflora
Arabis suffrutescens
Arabis williamsii
Aragallus besseyi
Aralia californica
Aralia chinensis
Aralia elata
Aralia nudicaulis
Aralia racemosa
Aralia spinosa
Arbutus menziesii
Arbutus unedo
Arceuthobium americanum
Arceuthobium campylopodum
Arceuthobium douglasii
Arceuthobium tsugense
Arctium lappa
Arctium minus
Arctium tomentosum
Arctostaphylos X cinerea
Arctostaphylos canescens
Arctostaphylos cinerea
Arctostaphylos columbiana
Arctostaphylos glandulosa
Arctostaphylos hispidula
Arctostaphylos manzanita
Arctostaphylos nevadensis
Arctostaphylos parvifolia
Arctostaphylos patula
Arctostaphylos pungens
Arctostaphylos stanfordina
Arctostaphylos uva-ursi
Arctostaphylos viscida
Arenaria aculeata
Arenaria burkei
Arenaria californica
Arenaria capillaris
Arenaria congesta
Arenaria douglasii
Arenaria formosa
Arenaria franklinii
Arenaria hookeri
Arenaria howellii
Arenaria kingii
Arenaria lateriflora
Arenaria macrophylla
Arenaria nuttallii
Arenaria obtusiloba
Arenaria paludicola
Arenaria pumicola
Arenaria pusilla
Arenaria rossii
Arenaria rubella
Arenaria sajanensis
Arenaria serpyllifolia
Arenaria stricta
Arenaria uintahensis
Argemone munita
Argemone polyanthemos
Arisaema triphyllum
Aristida glauca
Aristida ongiseta
Aristida oligantha
Aristida rightii
Armoracia rusticana
Arnica X gracilis
Arnica alpina
Arnica amplexicaulis
Arnica aurantiaca
Arnica betonicaefolia
Arnica cernua

Arnica chamissonis
Arnica cordifolia
Arnica discoidea
Arnica diversifolia
Arnica foliosa
Arnica fulgens
Arnica gracilis
Arnica latifolia
Arnica lonchophylla
Arnica longifolia
Arnica macounii
Arnica mollis
Arnica nevadensis
Arnica paniculata
Arnica parryi
Arnica parviflora
Arnica rydbergii
Arnica sororia
Arnica spathulata
Arnica tomentella
Arnica viscosa
Arrhenatherum elatius
Artemisia abrotanum
Artemisia absinthium
Artemisia annua
Artemisia arbuscula
Artemisia biennis
Artemisia campestris
Artemisia cana
Artemisia douglasiana
Artemisia dracunculus
Artemisia filifolia
Artemisia frigida
Artemisia gnaphalodes
Artemisia lindleyana
Artemisia longifolia
Artemisia longiloba
Artemisia ludoviciana
Artemisia michauxiana
Artemisia norvegica
Artemisia packardiae
Artemisia papposa
Artemisia pedatifida
Artemisia porteri
Artemisia pygmaea
Artemisia rigida
Artemisia rothrockii
Artemisia scopulorum
Artemisia spinescens
Artemisia suksdorfii
Artemisia tilesii
Artemisia tridentata
Artemisia trifurcata
Artemisia tripartita
Artemisia vulgaris
Arum itlicum
Aruncus dioicus
Aruncus vulgaris
Asarum canadense
Asarum caudatum
Asarum hartwegi
Asarum lemmonii
Asarum marmoratum
Asarum wagneri
Asclepias asperula
Asclepias cordifolia
Asclepias cryptoceras
Asclepias fascicularis
Asclepias incarnata
Asclepias labriformis
Asclepias lanuginosa
Asclepias ovalifolia
Asclepias pumila
Asclepias solanoana
Asclepias speciosa
Asclepias stenophylla
Asclepias subverticillata
Asclepias sullivantii
Asclepias syriaca
Asclepias tuberosa
Asclepias verticillata
Asclepias viridiflora
Asparagus officinalis
Asperugo procumbens
Asperula odorata
Aspidotis densa
Asplenium septentrionale
Asplenium trichomanes
Asplenium trichomanes-ramosum
Aster X amethystinus
Aster X bracteolatus
Aster X sagittifolius
Aster adscendens
Aster alpigenus
Aster alpinus
Aster amethystinus
Aster brachyactis
Aster brickellioides
Aster campestris
Aster chilensis
Aster ciliolatus
Aster conspicuus
Aster curtus
Aster eatonii
Aster elatus
Aster engelmannii
Aster ericoides
Aster falcatus
Aster foliaceus
Aster fremonti
Aster frondosus
Aster glaucescens
Aster glaucodes
Aster gormanii
Aster hesperius
Aster inegrifolius
Aster jessicae
Aster junciformis
Aster laeviculmis
Aster laevis
Aster lateriflorus
Aster ledophyllus
Aster lucidulus
Aster modestus
Aster mollis
Aster novae-angliae
Aster oblongifolius
Aster occidentalis
Aster ontarionis
Aster oolentangiensis
Aster oregonensis
Aster paludicola
Aster pansus
Aster paucicapitatus
Aster pauciflorus
Aster perelegans
Aster pilosus
Aster pubentior
Aster puniceus
Aster radulinus
Aster sagittifolius
Aster scopulorum
Aster sericeus
Aster shastensis
Aster sibircus
Aster sibiricus
Aster simplex
Aster siskiyouensis
Aster stenomeres
Aster subspicatus
Aster tephrodes
Aster vialis
Astilbe simplicifolia
Astragalus aboriginum
Astragalus accidens
Astragalus adanus
Astragalus adsurgens
Astragalus agnicidis
Astragalus agrestis
Astragalus alpinus
Astragalus alvordensis

Astragalus amblytropis
Astragalus americanus
Astragalus amnis-amissi
Astragalus anserinus
Astragalus applegatei
Astragalus aquilonius
Astragalus aretioides
Astragalus argophyllus
Astragalus arrectus
Astragalus arthuri
Astragalus atratus
Astragalus atropubescens
Astragalus australis
Astragalus barrii
Astragalus beckwithii
Astragalus bisulcatus
Astragalus bourgovii
Astragalus californicus
Astragalus calycosus
Astragalus camptopus
Astragalus canadensis
Astragalus caricinus
Astragalus ceramicus
Astragalus chamaeleuce
Astragalus chinensis
Astragalus cibarius
Astragalus cicer
Astragalus collinus
Astragalus columbianus
Astragalus conjunctus
Astragalus cottonii
Astragalus crassicarpus
Astragalus curvicarpus
Astragalus cusickii
Astragalus dasyglottis
Astragalus diaphanus
Astragalus diurnus
Astragalus diversifolius
Astragalus drabelliformis
Astragalus drummondii
Astragalus eremiticus
Astragalus eucosmus
Astragalus falcatus
Astragalus filipes
Astragalus flexuosus
Astragalus gambelianus
Astragalus geyeri
Astragalus gilviflorus
Astragalus glareosus
Astragalus gracilis
Astragalus grayi
Astragalus hoodianus
Astragalus howellii
Astragalus hyalinus
Astragalus impensus
Astragalus inflexus
Astragalus inversus
Astragalus iodanthus
Astragalus jejunus
Astragalus kentrophyta
Astragalus leibergii
Astragalus lemmonii
Astragalus lentiginosus
Astragalus leptaleus
Astragalus lotiflorus
Astragalus lyallii
Astragalus macounii
Astragalus malacus
Astragalus microcystis
Astragalus misellus
Astragalus miser
Astragalus missouriensis
Astragalus molybdenus
Astragalus mortoni
Astragalus mulfordiae
Astragalus neglectus
Astragalus newberryi
Astragalus nudisiliquus
Astragalus obscurus
Astragalus oniciformis
Astragalus oophorus
Astragalus oreganus
Astragalus palousensis
Astragalus paysonii
Astragalus peckii
Astragalus pectinatus
Astragalus plattensis
Astragalus platytropis
Astragalus promianthus
Astragalus pubentissimus
Astragalus pulsiferae
Astragalus purshii
Astragalus racemosus
Astragalus reventiformis
Astragalus reventus
Astragalus riparius
Astragalus robbinsii
Astragalus salinus
Astragalus salmonis
Astragalus scaphoides
Astragalus sclerocarpus
Astragalus sheldonii
Astragalus shultizorium
Astragalus sinuatus
Astragalus sonneanus
Astragalus spaldingii
Astragalus spatulatus
Astragalus speirocarpus
Astragalus stenophyllus
Astragalus succumbens
Astragalus tegetarioides
Astragalus tenellus
Astragalus terminalis
Astragalus tetrapterus
Astragalus toanus
Astragalus tweedyi
Astragalus tyghensis
Astragalus umbraticus
Astragalus utahensis
Astragalus vallaris
Astragalus vexilliflexus
Astragalus watsonianus
Astragalus whitneyi
Athyrium cyclosorum
Athyrium distentifolium
Athyrium filix-femina
Athysanus pusillus
Atriplex argentea
Atriplex californica
Atriplex canescens
Atriplex confertifolia
Atriplex dioica
Atriplex halimus
Atriplex heterosperma
Atriplex hortensis
Atriplex hymenelytra
Atriplex lentiformis
Atriplex nummularia
Atriplex nuttallii
Atriplex oblongifolia
Atriplex patula
Atriplex phyllostegia
Atriplex powellii
Atriplex pusilla
Atriplex rosea
Atriplex truncata
Atropa belladonna
Aucuba japonica
Avena barbata
Avena dubia
Avena fatua
Avena sativa
Axyris amaranthoides
Azolla caroliniana
Azolla filiculoides
Azolla mexicana
Azolla pinnata
Baccharis douglasii
Baccharis pilularis
Bacopa rotundifolia
Baeria maritima
Baeria minor

Balsamorhiza X tomentosa
Balsamorhiza careyana
Balsamorhiza deltoidea
Balsamorhiza hirsuta
Balsamorhiza hookeri
Balsamorhiza incana
Balsamorhiza macrophylla
Balsamorhiza rosea
Balsamorhiza sagittata
Balsamorhiza sericea
Balsamorhiza serrata
Balsamorhiza terebinthacea
Barbarea americana
Barbarea orthoceras
Barbarea verna
Barbarea vulgaris
Bassia hirsuta
Bassia hyssopifolia
Beckmannia syzigachne
Belamcanda chinensis
Bellis perennis
Bensoniella oregona
Berberis aquifolium
Berberis piperiana
Berberis pumila
Berberis repens
Berberis thunbergii
Berberis vulgaris
Bergia texana
Berteroa incana
Berula erecta
Besseya rubra
Besseya wyomingensis
Beta vulgaris
Betula X piperi
Betula X sandbergii
Betula X sargentii
Betula X utahensis
Betula glandulosa
Betula hallii
Betula lenta
Betula occidentalis
Betula papyrifera
Betula pendula
Betula pumila
Bidens beckii
Bidens cernua
Bidens frondosa
Bidens pilosa
Bidens tenuisecta
Bidens tripartita
Bidens vulgata
Blechnum spicant
Blepharidachne kingii
Blepharipappus scaber
Blyxa aubertii
Boisduvalia densiflora
Boisduvalia glabella
Boisduvalia macrantha
Boisduvalia sparsiflora
Boisduvalia stricta
Bolandra oregana
Boltonia asteroides
Borago officinalis
Borreria alata
Boschniakia hookeri
Boschniakia strobilacea
Botrychium ascendens
Botrychium boreale
Botrychium campestre
Botrychium crenulatum
Botrychium hesperium
Botrychium lanceolatum
Botrychium lunaria
Botrychium matricariifolium
Botrychium minganense
Botrychium montanum
Botrychium multifidum
Botrychium paradoxum
Botrychium pedunculosum
Botrychium pumicola
Botrychium silaifolium
Botrychium simplex
Bouteloua barbata
Bouteloua curtipendula
Bouteloua gracilis
Bouteloua hirsuta
Boykinia elata
Boykinia intermedia
Boykinia major
Brachypodium distachyon
Brasenia schreberi
Brassica alba
Brassica campestris
Brassica hirta
Brassica juncea
Brassica kaber
Brassica napus
Brassica nigra
Brassica oleraceae
Braya humilis
Brickellia californica
Brickellia grandiflora
Brickellia greenei
Brickellia microphylla
Brickellia oblongifolia
Briza maxima
Briza minor
Brodiaea californica
Brodiaea capitata
Brodiaea congesta
Brodiaea coronaria
Brodiaea crocea
Brodiaea dissimulata
Brodiaea douglasii
Brodiaea elegans
Brodiaea gracilis
Brodiaea hendersonii
Brodiaea howellii
Brodiaea hyacinthina
Brodiaea ida-maia
Brodiaea laxa
Brodiaea multiflora
Brodiaea pulchella
Brodiaea terrestris
Bromus anomalus
Bromus arenarius
Bromus arvensis
Bromus breviaristatus
Bromus brizaeformis
Bromus carinatus
Bromus catharticus
Bromus ciliatus
Bromus commutatus
Bromus diandrus
Bromus erectus
Bromus inermis
Bromus japonicus
Bromus kalmii
Bromus laevipes
Bromus latiglumis
Bromus macrostachys
Bromus madritensis
Bromus maritimus
Bromus mollis
Bromus orcuttianus
Bromus pacificus
Bromus porteri
Bromus pubescens
Bromus racemosus
Bromus rigidus
Bromus rubens
Bromus secalinus
Bromus sitchensis
Bromus squarrosus
Bromus sterilis
Bromus suksdorfii
Bromus tectorum
Bromus tomentellus
Bromus trinii
Bromus vulgaris
Bryonia alba

Bryonia dioica
Buchloe dactyloides
Buddleia davidii
Bulbostylis annua
Bulbostylis capillaris
Bupleurum americanum
Butomus umbellatus
Cacalia plantaginea
Cacaliopsis nardosmia
Cakile edentula
Cakile maritima
Calamagrostis breweri
Calamagrostis californica
Calamagrostis canadensis
Calamagrostis crassiglumis
Calamagrostis howellii
Calamagrostis koelerioides
Calamagrostis montanensis
Calamagrostis purpurascens
Calamagrostis rubescens
Calamagrostis scopulorum
Calamagrostis sesquiflora
Calamagrostis stricta
Calamagrostis tweedyi
Calamovilfa longifolia
Calandrinia caulescens
Calandrinia ciliata
Calla palustris
Callirhoe involucrata
Callitriche anceps
Callitriche fassettii
Callitriche hermaphroditica
Callitriche heterophylla
Callitriche marginata
Callitriche stagnalis
Callitriche trochlearis
Callitriche verna
Calocedrus decurrens
Calochortus amabilis
Calochortus apiculatus
Calochortus bruneaunis
Calochortus elegans
Calochortus eurycarpus
Calochortus greenei
Calochortus gunnisonii
Calochortus howellii
Calochortus indecorus
Calochortus longebarbatus
Calochortus lyallii
Calochortus macrocarpus
Calochortus maweanus
Calochortus nitidus
Calochortus nuttallii
Calochortus subalpinus
Calochortus tolmiei
Calochortus umpquaensis
Calochortus uniflorus
Calochortus vestae
Caltha asarifolia
Caltha biflora
Caltha howellii
Caltha leptosepala
Caltha palustris
Calycadenia ciliosa
Calycadenia truncata
Calycanthus floridus
Calylophus lavandulifolius
Calylophus serrulatus
Calypso bulbosa
Calyptridium roseum
Calystegia macounii
Calystegia sepium
Camassia cusickii
Camassia howellii
Camassia leichtlinii
Camassia ovata
Camassia quamash
Camassia suksdorfii
Camelina microcarpa
Camelina sativa
Camissonia claviformis
Camissonia graciliflora
Camissonia palmeri
Camissonia parvula
Camissonia pterosperma
Camissonia pygmaea
Campanula aparinoides
Campanula elatines
Campanula glomerata
Campanula lasiocarpa
Campanula medium
Campanula parryi
Campanula persicifolia
Campanula piperi
Campanula prenanthoides
Campanula rapunculoides
Campanula rotundifolia
Campanula scabrella
Campanula scouleri
Campanula uniflora
Campsis radicans
Canbya aurea
Cannabis sativa
Capsella bursa-pastoris
Capsicum frutescens
Caragana arborescens
Caragana pygmaea
Cardamine bellidifolia
Cardamine breweri
Cardamine bulbosa
Cardamine californica
Cardamine concatenata
Cardamine constancei
Cardamine cordifolia
Cardamine gemmata
Cardamine hirsuta
Cardamine lyallii
Cardamine oligosperma
Cardamine pattersonii
Cardamine pensylvanica
Cardamine pulcherrima
Cardamine rupicola
Cardaria chalapensis
Cardaria draba
Cardaria pubescens
Cardaria spp.
Cardionema ramosissima
Carduus acanthoides
Carduus crispus
Carduus nutans
Carduus pycnocephalus
Carduus tenuifloras
Carduus tenuiflorus
Carex ablata
Carex aboriginum
Carex abrupta
Carex adusta
Carex aenea
Carex aggregata
Carex albonigra
Carex alopecoidea
Carex amplifolia
Carex angustata
Carex anthoxanthea
Carex aperta
Carex aquatilis
Carex arapahoensis
Carex arcta
Carex assiniboinensis
Carex atherodes
Carex athrostachya
Carex atrata
Carex aurea
Carex backii
Carex barbarae
Carex bebbii
Carex bella
Carex bicknellii
Carex bigelowii
Carex bipartita
Carex blanda
Carex brainerdii

Carex brevicaulis
Carex brevior
Carex breweri
Carex brunnescens
Carex buxbaumii
Carex californica
Carex campylocarpa
Carex canescens
Carex capillaris
Carex capitata
Carex chordorrhiza
Carex circinata
Carex comosa
Carex concinna
Carex concinnoides
Carex convoluta
Carex crawei
Carex crawfordii
Carex cristatella
Carex cusickii
Carex densa
Carex deweyana
Carex diandra
Carex dioica
Carex disperma
Carex douglasii
Carex drummondiana
Carex ebenea
Carex eburnea
Carex echinata
Carex elynoides
Carex emoryi
Carex epapillosa
Carex eurycarpa
Carex festucacea
Carex feta
Carex filifolia
Carex flava
Carex foenea
Carex foetida
Carex formosa
Carex fracta
Carex geyeri
Carex gigas
Carex gracillima
Carex granularis
Carex gravida
Carex gymnoclada
Carex gynodynama
Carex halliana
Carex hassei
Carex haydeniana
Carex haydenii
Carex hendersonii
Carex hoodii
Carex hookerana
Carex hystricina
Carex illota
Carex integra
Carex interior
Carex interrupta
Carex intumescens
Carex jonesii
Carex lacustris
Carex laeviconica
Carex laeviculmis
Carex lanuginosa
Carex lasiocarpa
Carex lenticularis
Carex leporina
Carex leporinella
Carex leptalea
Carex limnophila
Carex limosa
Carex livida
Carex luzulina
Carex lyngbyei
Carex macrocephala
Carex macrochaeta
Carex maritima
Carex meadii
Carex mendocinensis
Carex mertensii
Carex microglochin
Carex microptera
Carex misandra
Carex molesta
Carex multicaulis
Carex multicostata
Carex nardina
Carex nebraskensis
Carex nervina
Carex neurophora
Carex nigricans
Carex normalis
Carex norvegica
Carex nova
Carex nubicola
Carex nudata
Carex obnupta
Carex obovoidea
Carex obtusata
Carex occidentalis
Carex oederi
Carex oregonensis
Carex ormantha
Carex pachycarpa
Carex pachystachya
Carex pansa
Carex parryana
Carex paucicostata
Carex pauciflora
Carex paupercula
Carex paysonis
Carex peckii
Carex pedunculata
Carex pensylvanica
Carex petasata
Carex petricosa
Carex phaeocephala
Carex phyllomanica
Carex pluriflora
Carex podocarpa
Carex praeceptorum
Carex praegracilis
Carex prairea
Carex praticola
Carex prionophylla
Carex proposita
Carex pseudo-cyperus
Carex pyrenaica
Carex raynoldsii
Carex retrorsa
Carex richardsonii
Carex rosea
Carex rossii
Carex rupestris
Carex sartwellii
Carex saxatilis
Carex saximontana
Carex scabriuscula
Carex scirpoidea
Carex scoparia
Carex scopulorum
Carex senta
Carex serratodens
Carex sheldonii
Carex simulata
Carex sitchensis
Carex spectabilis
Carex sprengelii
Carex stenophylla
Carex stenoptila
Carex sterilis
Carex stipata
Carex straminiformis
Carex stricta
Carex stylosa
Carex subfusca
Carex subnigricans
Carex substricta
Carex sychnocephala

Carex tenera
Carex teneraeformis
Carex tenuiflora
Carex tetanica
Carex tincta
Carex tolmiei
Carex torreyi
Carex tracyi
Carex tribuloides
Carex tumulicola
Carex umbellata
Carex unilateralis
Carex utriculata
Carex vaginata
Carex vallicola
Carex vesicaria
Carex viridior
Carex vulpinoidea
Carex xerantica
Carpinus betulus
Carthamus baeticus
Carthamus lanatus
Carthamus leucocaulos
Carthamus oxycantha
Carthamus tinctorius
Carum carvi
Carya laciniosa
Carya ovata
Cassiope lycopodioides
Cassiope mertensiana
Cassiope stelleriana
Cassiope tetragona
Castanea dentata
Castanopsis chrysophylla
Castanopsis sempervirens
Castilleja affinis
Castilleja angustifolia
Castilleja applegatei
Castilleja arachnoidea
Castilleja breviolobata
Castilleja cervina
Castilleja chlorotica
Castilleja christii
Castilleja chromosa
Castilleja chrysantha
Castilleja covilleana
Castilleja crispula
Castilleja crista-galli
Castilleja cryptantha
Castilleja cusickii
Castilleja elata
Castilleja elmeri
Castilleja exilis
Castilleja flava
Castilleja fraterna
Castilleja glandulifera
Castilleja gracillima
Castilleja hispida
Castilleja inverta
Castilleja lapidicola
Castilleja lauta
Castilleja lemmonii
Castilleja levisecta
Castilleja linariaefolia
Castilleja longispica
Castilleja lutea
Castilleja lutescens
Castilleja miniata
Castilleja nivea
Castilleja occidentalis
Castilleja oreopola
Castilleja oresbia
Castilleja ownbeyana
Castilleja pallescens
Castilleja parviflora
Castilleja peckiana
Castilleja pilosa
Castilleja pinetorum
Castilleja pruinosa
Castilleja psittacina
Castilleja pulchella
Castilleja rhexifolia
Castilleja rubida
Castilleja rupicola
Castilleja rustica
Castilleja schizotricha
Castilleja sessiliflora
Castilleja suksdorfii
Castilleja sulphurea
Castilleja thompsonii
Castilleja viscidula
Castilleja wightii
Castilleja xanthotricha
Catabrosa aquatica
Catalpa speciosa
Caucalis microcarpa
Caulanthus crassicaulis
Caulanthus pilosus
Caulophyllum thalictroides
Ceanothus cordulatus
Ceanothus cuneatus
Ceanothus fendleri
Ceanothus herbaceus
Ceanothus integerrimus
Ceanothus prostratus
Ceanothus pumilus
Ceanothus sanguineus
Ceanothus thyrsiflorus
Ceanothus velutinus
Celastrus orbiculata
Celastrus scandens
Celtis douglasii
Celtis occidentalis
Celtis reticulata
Cenchrus carolinianus
Cenchrus longispinus
Centaurea calcitrapa
Centaurea cyanus
Centaurea dealbata
Centaurea diffusa
Centaurea dubia
Centaurea iberica
Centaurea jacea
Centaurea juncea
Centaurea juncea x nigra
Centaurea macrocephala
Centaurea maculosa
Centaurea melitensis
Centaurea montana
Centaurea nigra
Centaurea nigrescens
Centaurea pratensis
Centaurea repens
Centaurea scabiosa
Centaurea solstitialis
Centaurea trichocephala
Centaurea virgata
Centaurium exaltatum
Centaurium muhlenbergii
Centaurium namophilum
Centaurium umbellatum
Centranthus ruber
Centunculus minimus
Cephalanthera austinae
Cerastium arvense
Cerastium berringianum
Cerastium dubium
Cerastium nutans
Cerastium semidecandrum
Cerastium siculum
Cerastium strictum
Cerastium tomentosum
Cerastium viscosum
Cerastium vulgatum
Ceratoides lanata
Ceratophyllum demersum
Cercis canadensis
Cercocarpus betuloides
Cercocarpus ledifolius
Cercocarpus montanus
Chaenactis alpina
Chaenactis cusickii

Chaenactis douglasii
Chaenactis evermannii
Chaenactis macrantha
Chaenactis nevii
Chaenactis ramosa
Chaenactis stevioides
Chaenactis thompsonii
Chaenomeles japonica
Chaenorrhinum minus
Chaetadelpha wheeleri
Chamaebatiaria millifolium
Chamaechaenactis scaposa
Chamaecyparis lawsoniana
Chamaecyparis nootkatensis
Chamaecyparis pisifera
Chamaerhodos erecta
Chamaesaracha nana
Chamaesyce ocellata
Cheilanthes densa
Cheilanthes feei
Cheilanthes gracillima
Cheilanthes intertexta
Cheilanthes lanosa
Chelidonium majus
Chenopodium album
Chenopodium ambrosioides
Chenopodium botrys
Chenopodium bushianum
Chenopodium capitatum
Chenopodium chenopodioides
Chenopodium foliosum
Chenopodium fremontii
Chenopodium gigantospermum
Chenopodium glaucum
Chenopodium leptophyllum
Chenopodium murale
Chenopodium overi
Chenopodium pratericola
Chenopodium pumilio
Chenopodium rubrum
Chenopodium standleyanum
Chenopodium strictum
Chenopodium watsonii
Chimaphila menziesii
Chimaphila umbellata
Chionophila tweedyi
Chloris verticillata
Chloris virgata
Chlorocrambe hastata
Chlorogalum angustifolium
Chlorogalum pomeridianum
Chondrilla juncea
Chorispora tenella
Chorizanthe brevicornu
Chorizanthe watsonii
Chrysanthemum balsamita
Chrysanthemum leucanthemum
Chrysanthemum maximum
Chrysanthemum parthenium
Chrysanthemum segetum
Chrysolepis chrysophylla
Chrysolepis sempervirens
Chrysolepsis chrysophylla
Chrysopogon aciculatus
Chrysopsis horrida
Chrysopsis oregona
Chrysopsis stenophylla
Chrysopsis villosa
Chrysosplenium glechomaefolium
Chrysosplenium tetrandrum
Chrysothamnus albidus
Chrysothamnus greenei
Chrysothamnus humilis
Chrysothamnus linifolius
Chrysothamnus nauseosus
Chrysothamnus parryi
Chrysothamnus viscidiflorus
Cicer arietinum
Cichorium endiva
Cichorium intybus
Cicuta bulbifera
Cicuta douglasii
Cicuta maculata
Cicuta vagans
Cimicifuga elata
Cimicifuga laciniata
Cinna arundinacea
Cinna latifolia
Circaea alpina
Circaea lutetiana
Circaea pacifica
Cirsium acanthodoton
Cirsium acaulescens
Cirsium altissimum
Cirsium americanum
Cirsium andersonii
Cirsium arvense
Cirsium brevifolium
Cirsium brevistylum
Cirsium breweri
Cirsium callilepis
Cirsium canescens
Cirsium canovirens
Cirsium centaureae
Cirsium ciliolatum
Cirsium coulteri
Cirsium davisii
Cirsium drummondii
Cirsium edule
Cirsium flodmanii
Cirsium foliosum
Cirsium hallii
Cirsium hookerianum
Cirsium lanceolatum
Cirsium longistylum
Cirsium magnificum
Cirsium muticum
Cirsium neomexicanum
Cirsium ochrocentrum
Cirsium pastoris
Cirsium polyphyllum
Cirsium pulcherrimum
Cirsium remotifolium
Cirsium scariosum
Cirsium subniveum
Cirsium tweedyi
Cirsium undulatum
Cirsium utahense
Cirsium vulgare
Cistus X hybidus
Cistus salvifolius
Cladothamnus pyrolaeflorus
Cladothamnus pyroliflorus
Clarkia amoena
Clarkia gracilis
Clarkia pulchella
Clarkia purpurea
Clarkia quadrivulnera
Clarkia rhomboidea
Clarkia viminea
Claytonia asarifolia
Claytonia bellidifolia
Claytonia chamissoi
Claytonia chrysantha
Claytonia dichotoma
Claytonia lanceolata
Claytonia megarhiza
Claytonia megarrhiza
Claytonia nivalis
Claytonia parvifolia
Clematis hirsutissima
Clematis ligusticifolia
Clematis occidentalis
Clematis orientalis
Clematis virginiana
Clematis vitalba
Cleome lutea
Cleome multicaulis
Cleome platycarpa
Cleome serrulata
Cleomella macbrideana

Cleomella oocarpa
Cleomella parviflora
Cleomella plocasperma
Clerodendrum thompsoniae
Clerodendrum trichotomum
Clintonia andrewsiana
Clintonia uniflora
Cnicus benedictus
Cocconia grandis
Cochleria officinalis
Coldenia nuttallii
Coleanthus subtilis
Collinsia floribunda
Collinsia grandiflora
Collinsia greenei
Collinsia linearis
Collinsia parviflora
Collinsia pusilla
Collinsia rattanii
Collinsia sparsiflora
Collinsia tenella
Collinsia torreyi
Collomia aristella
Collomia debilis
Collomia grandiflora
Collomia heterophylla
Collomia linearis
Collomia macrocalyx
Collomia mazama
Collomia tenella
Collomia tinctoria
Comandra californica
Comandra umbellata
Commelina communis
Conimitella williamsii
Conioselinum chinese
Conioselinum pacificum
Conioselinum scopulorum
Conium maculatum
Conringia orientalis
Convallaria majalis
Convolvulus arvensis
Convolvulus californicus
Convolvulus calystegia
Convolvulus japonicus
Convolvulus nyctagineus
Convolvulus polymorphus
Convolvulus subacaulis
Conyza bonariensis
Conyza canadensis
Conyza ramosissima
Coptis asplenifolia
Coptis laciniata
Coptis occidentalis
Corallorhiza maculata
Corallorhiza mertensiana
Corallorhiza odontorhiza
Corallorhiza striata
Corallorhiza trifida
Corallorhiza wisteriana
Cordyalis aquae-gelidae
Cordylanthus capitatus
Cordylanthus parviflorus
Cordylanthus ramosus
Cordylanthus tenuis
Cordylanthus viscidus
Coreopsis tinctoria
Coriandrum sativum
Corispermum hyssopifolium
Corispermum nitidum
Corispermum orientale
Corispermum sibericum
Cornus alba
Cornus canadensis
Cornus drummondii
Cornus foemina
Cornus glabrata
Cornus mas
Cornus nuttallii
Cornus occidentalis
Cornus stolonifera
Coronilla varia
Coronopus didymus
Corydalis aquae-gelidae
Corydalis aurea
Corydalis caseana
Corydalis cusickii
Corydalis lutea
Corydalis scouleri
Corydalis sempervirens
Corylus americana
Corylus avellana
Corylus colurna
Corylus cornuta
Coryphantha missouriensis
Coryphantha vivipara
Cotinus coggygria
Cotoneaster acutifolius
Cotoneaster bullatus
Cotoneaster foveolata
Cotoneaster franchetti
Cotoneaster lactea
Cotoneaster lucidus
Cotoneaster tenuipes
Cotoneaster tomentosus
Cotula coronopifolia
Cowania mexicana
Crassula aquatica
Crassula connata
Crassula viridis
Crataegus columbiana
Crataegus douglasii
Crataegus mollis
Crataegus monogyna
Crataegus oxycantha
Crataegus succulenta
Crataegus suksdorfii
Crateegus carrierei
Crepis acuminata
Crepis atribarba
Crepis bakeri
Crepis barbigera
Crepis capillaris
Crepis elegans
Crepis intermedia
Crepis modocensis
Crepis monticola
Crepis nana
Crepis nicaeensis
Crepis occidentalis
Crepis pleurocarpa
Crepis runcinata
Crepis setosa
Crepis tectorum
Crocidium multicaule
Crocosmia X crocosmiiflora
Crocosmia masoniorum
Crocosmia pottsi
Croton capitatus
Croton texensis
Crucianella angustifolia
Crupina vulgaris
Crypsis alopecuroides
Crypsis vaginiflora
Cryptantha affinis
Cryptantha ambigua
Cryptantha breviflora
Cryptantha caespitosa
Cryptantha cana
Cryptantha celosioides
Cryptantha circumscissa
Cryptantha echinella
Cryptantha fendleri
Cryptantha flaccida
Cryptantha flava
Cryptantha flavoculata
Cryptantha fulvocanescens
Cryptantha gracilis
Cryptantha humilis
Cryptantha intermedia
Cryptantha interrupta
Cryptantha jamesii

Cryptantha kelseyana
Cryptantha leiocarpa
Cryptantha leucophaea
Cryptantha milobakeri
Cryptantha minima
Cryptantha muriculata
Cryptantha nevadensis
Cryptantha nubigena
Cryptantha propria
Cryptantha pterocarya
Cryptantha recurvata
Cryptantha rostellata
Cryptantha rugulosa
Cryptantha salmonensis
Cryptantha scoparia
Cryptantha sericea
Cryptantha simulans
Cryptantha stricta
Cryptantha subcapitata
Cryptantha thompsonii
Cryptantha thyrsiflora
Cryptantha torreyana
Cryptantha watsonii
Cryptogramma cascadensis
Cryptogramma crispa
Cryptogramma densa
Cryptogramma stelleri
Cryptomeria japonica
Cryptotaenia canadensis
Cucumis anguria
Cucumis melo
Cunninghamia lanceolata
Cuphea hyssopifolia
Cupressus bakeri
Cupressus macrocarpa
Cupressus sempervirens
Cuscuta approximata
Cuscuta californica
Cuscuta cephalanthi
Cuscuta coryli
Cuscuta cuspidata
Cuscuta denticulata
Cuscuta dodder
Cuscuta epithymum
Cuscuta glomerata
Cuscuta gronovii
Cuscuta indecora
Cuscuta occidentalis
Cuscuta pentagona
Cuscuta planiflora
Cuscuta polygonorum
Cuscuta salina
Cuscuta spp.
Cuscuta subinclusa
Cuscuta suksdorfii
Cycloloma atriplicifolium
Cydonia oblonga
Cydonia sinensis
Cymbalaria muralis
Cymopterus acaulis
Cymopterus bipinnatus
Cymopterus corrugatus
Cymopterus davisii
Cymopterus douglassii
Cymopterus evertii
Cymopterus glaucus
Cymopterus hendersonii
Cymopterus ibapensis
Cymopterus longipes
Cymopterus montanus
Cymopterus nivalis
Cymopterus petraeus
Cymopterus purpurascens
Cymopterus terebinthinus
Cymopterus watsoni
Cymopterus williamsii
Cynara cardunculus
Cynara scolymus
Cynodon dactylon
Cynoglossum boreale
Cynoglossum echinatus
Cynoglossum grande
Cynoglossum occidentale
Cynoglossum officinale
Cynosurus cristatus
Cynosurus echinatus
Cyperus acuminatus
Cyperus aristatus
Cyperus bipartitus
Cyperus diandrus
Cyperus engelmannii
Cyperus eragrostis
Cyperus erythrorhizos
Cyperus esculentus
Cyperus lupulinus
Cyperus odoratus
Cyperus rivularis
Cyperus rotundus
Cyperus schweinitzii
Cyperus strigosus
Cypripedium X andrewsii
Cypripedium calceolus
Cypripedium californicum
Cypripedium candidum
Cypripedium fasciculatum
Cypripedium montanum
Cypripedium passerinum
Cypripedium reginae
Cystopteris bulbifera
Cystopteris fragilis
Cystopteris montana
Cytisus monspessulanus
Cytisus multiflorus
Cytisus praecox
Cytisus scoparius
Dactylis glomerata
Dalea aurea
Dalea candida
Dalea cylindriceps
Dalea enneandra
Dalea leporina
Dalea purpurea
Dalea searlsiae
Dalea villosa
Damasonium californicum
Danthonia californica
Danthonia intermedia
Danthonia parryi
Danthonia spicata
Danthonia unispicata
Daphne X burkwoodii
Daphne cneorum
Daphne laureola
Daphne mezereum
Dasynotus daubenmirei
Datura inoxia
Datura stramonium
Daucus carota
Daucus pusillus
Delphinium X xylorrhizum
Delphinium ajacis
Delphinium andersonii
Delphinium barbeyi
Delphinium bicolor
Delphinium burkei
Delphinium columbianum
Delphinium cyanoreios
Delphinium decorum
Delphinium depauperatum
Delphinium distichum
Delphinium geyeri
Delphinium glareosum
Delphinium glaucum
Delphinium gracilentum
Delphinium leucophaeum
Delphinium lineapetalum
Delphinium menziesii
Delphinium multiflorum
Delphinium multiplex
Delphinium nelsonii
Delphinium nudicaule
Delphinium nuttallianum

Delphinium nuttallii
Delphinium occidentale
Delphinium oreganum
Delphinium pavonaceum
Delphinium simplex
Delphinium sonnei
Delphinium stachydeum
Delphinium trolliifolium
Delphinium viridescens
Delphinium xantholeucum
Dentaria cardiophylla
Dentaria gemmata
Dentaria grandiflora
Dentaria tenella
Deschampsia atropurpurea
Deschampsia danthonioides
Deschampsia elongata
Descurainia californica
Descurainia incana
Descurainia incisa
Descurainia longipedicellata
Descurainia pinnata
Descurainia richardsonii
Descurainia sophia
Descurainia torulosa
Desmanthus illinoensis
Desmodium canadense
Desmodium glutinosum
Deutzia scabra
Dianthus armeria
Dianthus barbatus
Dianthus deltoides
Dicentra cucullaria
Dicentra formosa
Dicentra pauciflora
Dicentra uniflora
Dichelostemma ida-maia
Dichelostemma venustum
Diervilla lonicera
Digitalis purpurea
Digitaria abyssinica
Digitaria ischaemum
Digitaria sanguinalis
Digitaria scalarum
Digitaria velutina
Dimeresia howellii
Dioscorea batatas
Diplotaxis muralis
Dipsacus fullonum
Dirca palustris
Disporum hookeri
Disporum smithii
Disporum trachycarpum
Distichlis spicata
Dodecatheon alpinum
Dodecatheon austrofrigidum
Dodecatheon conjugens
Dodecatheon dentatum
Dodecatheon hendersonii
Dodecatheon jeffreyi
Dodecatheon poeticum
Dodecatheon pulchellum
Dodecatheon tetrandrum
Doronicum plantagineum
Douglasia idahoensis
Douglasia laevigata
Douglasia montana
Douglasia nivalis
Downingia bacigalupii
Downingia bicornuta
Downingia elegans
Downingia laeta
Downingia pulchella
Downingia willamettensis
Downingia yina
Draba albertina
Draba apiculata
Draba argyraea
Draba aurea
Draba aureola
Draba borealis
Draba brachycarpa
Draba carnosula
Draba crassa
Draba crassifolia
Draba cuneifolia
Draba densifolia
Draba douglasii
Draba fladnizensis
Draba glabella
Draba glacialis
Draba hitchcockii
Draba howellii
Draba incerta
Draba lanceolata
Draba lemmonii
Draba lonchocarpa
Draba longipes
Draba luteola
Draba macounii
Draba nemorosa
Draba nitida
Draba nivalis
Draba oligosperma
Draba oreibata
Draba paysonii
Draba pectinata
Draba porsildii
Draba praealta
Draba reptans
Draba ruaxes
Draba sphaerioides
Draba sphaerocarpa
Draba stenoloba
Draba trichocarpa
Draba ventosa
Draba verna
Dracocephalum nuttallii
Dracocephalum parviflorum
Dracocephalum thymiflorum
Dracopis amplexicaulis
Dracunculus vulgaris
Drosera anglica
Drosera linearis
Drosera longifolia
Drosera rotundifolia
Dryas drummondii
Dryas integrifolia
Dryas octopetala
Drymaria arenarioides
Dryopteris X uliginosa
Dryopteris arguta
Dryopteris cristata
Dryopteris disjuncta
Dryopteris filix-mas
Dryopteris spinulosa
Dudleya farinosa
Dulichium arundinaceum
Dyssodia papposa
Eatonella nivea
Eatonia intermedia
Eburophyton austiniae
Echinacea angustifolia
Echinocereus engelmannii
Echinochloa colona
Echinochloa crusgalli
Echinochloa muricata
Echinocystis lobata
Echinops exaltatus
Echinops ritro
Echinops ruthenicus
Echinops sphaerocephalus
Echium vulgare
Edwardii tedi
Egeria densa
Eichhornia azurea
Eiogonum proliferum
Elaeagnus angustifolia
Elaeagnus commutata
Elaeagnus multiflora
Elaeagnus umbellata
Elatine brachysperma

Elatine californica
Elatine triandra
Eleocharis acicularis
Eleocharis atropurpurea
Eleocharis bella
Eleocharis bolanderi
Eleocharis compressa
Eleocharis flavescens
Eleocharis montevidensis
Eleocharis obtusa
Eleocharis palustris
Eleocharis parvula
Eleocharis pauciflora
Eleocharis rostellata
Eleocharis smallii
Eleocharis tenuis
Eleocharis wolfii
Eleusine indica
Ellisia nyctelea
Elmera racemosa
Elodea bifoliata
Elodea canadensis
Elodea longivaginata
Elodea nuttallii
Elodea schweinitzii
Elsholtzia ciliata
Elyhordeum X macounii
Elyhordeum X montanense
Elyleymus X aristatus
Elymus X hansenii
Elymus X pseudorepens
Elymus X saundersii
Elymus X saxicolus
Elymus ambiguus
Elymus arenicola
Elymus aristatus
Elymus brevifolius
Elymus canadensis
Elymus caput-medusae
Elymus cinereus
Elymus condensatus
Elymus diversiglumis
Elymus flavescens
Elymus glaucus
Elymus hirsutus
Elymus innovatus
Elymus junceus
Elymus macounii
Elymus mollis
Elymus pungens
Elymus racemosa
Elymus triticoides
Elymus villosus
Elymus virginicus
Emex australis
Emex spinosa
Empetrum nigrum
Enceliopsis nudicaulis
Ephedra nevadensis
Ephedra viridis
Epilobium alpinum
Epilobium angustifolium
Epilobium brachycarpum
Epilobium brevistylum
Epilobium canum
Epilobium ciliatum
Epilobium coloratum
Epilobium exaltatum
Epilobium fastigiatum
Epilobium glaberrimum
Epilobium halleanum
Epilobium hirsutum
Epilobium juncundum
Epilobium latifolium
Epilobium leptophyllum
Epilobium luteum
Epilobium minutum
Epilobium nivium
Epilobium obcordatum
Epilobium occidentale
Epilobium palustre
Epilobium paniculatum
Epilobium pringleanum
Epilobium rigidum
Epilobium siskiyouense
Epilobium suffruticosum
Epilobium ursinum
Epipactis gigantea
Epipactis helleborine
Equisetum X ferrissii
Equisetum X mackaii
Equisetum X nelsonii
Equisetum arvense
Equisetum fluviatile
Equisetum hyemale
Equisetum laevigatum
Equisetum litorale
Equisetum palustre
Equisetum pratense
Equisetum prealtum
Equisetum scirpoides
Equisetum sylvaticum
Equisetum telmateia
Equisetum variegatum
Eragrostis cilianensis
Eragrostis curvula
Eragrostis hypnoides
Eragrostis lutescens
Eragrostis mexicana
Eragrostis minor
Eragrostis multicaulis
Eragrostis orcuttiana
Eragrostis pectinacea
Eragrostis pilosa
Eragrostis reptans
Eragrostis spectabilis
Erechtites arguta
Erechtites hieracifolia
Erechtites minima
Erechtites prenanthoides
Erectites minima
Eremocarpus setigerus
Eremurus X warei
Eriastrum sparsiflorum
Ericameria discoidea
Erigeron acris
Erigeron aliceae
Erigeron allocotus
Erigeron annus
Erigeron annuus
Erigeron aphanactis
Erigeron argentatus
Erigeron asperugineus
Erigeron aureus
Erigeron basalticus
Erigeron bellidiastrum
Erigeron bloomeri
Erigeron caespitosus
Erigeron canus
Erigeron cascadensis
Erigeron cervinus
Erigeron chrysopsidis
Erigeron compositus
Erigeron concinnus
Erigeron corymbosus
Erigeron coulteri
Erigeron cronquistii
Erigeron decumbens
Erigeron delicatus
Erigeron disparipilus
Erigeron divergens
Erigeron eatonii
Erigeron elatior
Erigeron elegantulus
Erigeron engelmannii
Erigeron evermannii
Erigeron filifolius
Erigeron flabellifolius
Erigeron flagellaris
Erigeron flettii
Erigeron foliosus
Erigeron formosissimus

Delphinium nuttallii
Delphinium occidentale
Delphinium oreganum
Delphinium pavonaceum
Delphinium simplex
Delphinium sonnei
Delphinium stachydeum
Delphinium trolliifolium
Delphinium viridescens
Delphinium xantholeucum
Dentaria cardiophylla
Dentaria gemmata
Dentaria grandiflora
Dentaria tenella
Deschampsia atropurpurea
Deschampsia danthonioides
Deschampsia elongata
Descurainia californica
Descurainia incana
Descurainia incisa
Descurainia longipedicellata
Descurainia pinnata
Descurainia richardsonii
Descurainia sophia
Descurainia torulosa
Desmanthus illinoensis
Desmodium canadense
Desmodium glutinosum
Deutzia scabra
Dianthus armeria
Dianthus barbatus
Dianthus deltoides
Dicentra cucullaria
Dicentra formosa
Dicentra pauciflora
Dicentra uniflora
Dichelostemma ida-maia
Dichelostemma venustum
Diervilla lonicera
Digitalis purpurea
Digitaria abyssinica
Digitaria ischaemum
Digitaria sanguinalis
Digitaria scalarum
Digitaria velutina
Dimeresia howellii
Dioscorea batatas
Diplotaxis muralis
Dipsacus fullonum
Dirca palustris
Disporum hookeri
Disporum smithii
Disporum trachycarpum
Distichlis spicata
Dodecatheon alpinum
Dodecatheon austrofrigidum
Dodecatheon conjugens
Dodecatheon dentatum
Dodecatheon hendersonii
Dodecatheon jeffreyi
Dodecatheon poeticum
Dodecatheon pulchellum
Dodecatheon tetrandrum
Doronicum plantagineum
Douglasia idahoensis
Douglasia laevigata
Douglasia montana
Douglasia nivalis
Downingia bacigalupii
Downingia bicornuta
Downingia elegans
Downingia laeta
Downingia pulchella
Downingia willamettensis
Downingia yina
Draba albertina
Draba apiculata
Draba argyraea
Draba aurea
Draba aureola
Draba borealis
Draba brachycarpa
Draba carnosula
Draba crassa
Draba crassifolia
Draba cuneifolia
Draba densifolia
Draba douglasii
Draba fladnizensis
Draba glabella
Draba glacialis
Draba hitchcockii
Draba howellii
Draba incerta
Draba lanceolata
Draba lemmonii
Draba lonchocarpa
Draba longipes
Draba luteola
Draba macounii
Draba nemorosa
Draba nitida
Draba nivalis
Draba oligosperma
Draba oreibata
Draba paysonii
Draba pectinata
Draba porsildii
Draba praealta
Draba reptans
Draba ruaxes
Draba sphaerioides
Draba sphaerocarpa
Draba stenoloba
Draba trichocarpa
Draba ventosa
Draba verna
Dracocephalum nuttallii
Dracocephalum parviflorum
Dracocephalum thymiflorum
Dracopis amplexicaulis
Dracunculus vulgaris
Drosera anglica
Drosera linearis
Drosera longifolia
Drosera rotundifolia
Dryas drummondii
Dryas integrifolia
Dryas octopetala
Drymaria arenarioides
Dryopteris X uliginosa
Dryopteris arguta
Dryopteris cristata
Dryopteris disjuncta
Dryopteris filix-mas
Dryopteris spinulosa
Dudleya farinosa
Dulichium arundinaceum
Dyssodia papposa
Eatonella nivea
Eatonia intermedia
Eburophyton austiniae
Echinacea angustifolia
Echinocereus engelmannii
Echinochloa colona
Echinochloa crusgalli
Echinochloa muricata
Echinocystis lobata
Echinops exaltatus
Echinops ritro
Echinops ruthenicus
Echinops sphaerocephalus
Echium vulgare
Edwardii tedi
Egeria densa
Eichhornia azurea
Eiogonum proliferum
Elaeagnus angustifolia
Elaeagnus commutata
Elaeagnus multiflora
Elaeagnus umbellata
Elatine brachysperma

Elatine californica
Elatine triandra
Eleocharis acicularis
Eleocharis atropurpurea
Eleocharis bella
Eleocharis bolanderi
Eleocharis compressa
Eleocharis flavescens
Eleocharis montevidensis
Eleocharis obtusa
Eleocharis palustris
Eleocharis parvula
Eleocharis pauciflora
Eleocharis rostellata
Eleocharis smallii
Eleocharis tenuis
Eleocharis wolfii
Eleusine indica
Ellisia nyctelea
Elmera racemosa
Elodea bifoliata
Elodea canadensis
Elodea longivaginata
Elodea nuttallii
Elodea schweinitzii
Elsholtzia ciliata
Elyhordeum X macounii
Elyhordeum X montanense
Elyleymus X aristatus
Elymus X hansenii
Elymus X pseudorepens
Elymus X saundersii
Elymus X saxicolus
Elymus ambiguus
Elymus arenicola
Elymus aristatus
Elymus brevifolius
Elymus canadensis
Elymus caput-medusae
Elymus cinereus
Elymus condensatus
Elymus diversiglumis
Elymus flavescens
Elymus glaucus
Elymus hirsutus
Elymus innovatus
Elymus junceus
Elymus macounii
Elymus mollis
Elymus pungens
Elymus racemosa
Elymus triticoides
Elymus villosus
Elymus virginicus
Emex australis
Emex spinosa
Empetrum nigrum
Enceliopsis nudicaulis
Ephedra nevadensis
Ephedra viridis
Epilobium alpinum
Epilobium angustifolium
Epilobium brachycarpum
Epilobium brevistylum
Epilobium canum
Epilobium ciliatum
Epilobium coloratum
Epilobium exaltatum
Epilobium fastigiatum
Epilobium glaberrimum
Epilobium halleanum
Epilobium hirsutum
Epilobium juncundum
Epilobium latifolium
Epilobium leptophyllum
Epilobium luteum
Epilobium minutum
Epilobium nivium
Epilobium obcordatum
Epilobium occidentale
Epilobium palustre
Epilobium paniculatum
Epilobium pringleanum
Epilobium rigidum
Epilobium siskiyouense
Epilobium suffruticosum
Epilobium ursinum
Epipactis gigantea
Epipactis helleborine
Equisetum X ferrissii
Equisetum X mackaii
Equisetum X nelsonii
Equisetum arvense
Equisetum fluviatile
Equisetum hyemale
Equisetum laevigatum
Equisetum litorale
Equisetum palustre
Equisetum pratense
Equisetum prealtum
Equisetum scirpoides
Equisetum sylvaticum
Equisetum telmateia
Equisetum variegatum
Eragrostis cilianensis
Eragrostis curvula
Eragrostis hypnoides
Eragrostis lutescens
Eragrostis mexicana
Eragrostis minor
Eragrostis multicaulis
Eragrostis orcuttiana
Eragrostis pectinacea
Eragrostis pilosa
Eragrostis reptans
Eragrostis spectabilis
Erechtites arguta
Erechtites hieracifolia
Erechtites minima
Erechtites prenanthoides
Erectites minima
Eremocarpus setigerus
Eremurus X warei
Eriastrum sparsiflorum
Ericameria discoidea
Erigeron acris
Erigeron aliceae
Erigeron allocotus
Erigeron annus
Erigeron annuus
Erigeron aphanactis
Erigeron argentatus
Erigeron asperugineus
Erigeron aureus
Erigeron basalticus
Erigeron bellidiastrum
Erigeron bloomeri
Erigeron caespitosus
Erigeron canus
Erigeron cascadensis
Erigeron cervinus
Erigeron chrysopsidis
Erigeron compositus
Erigeron concinnus
Erigeron corymbosus
Erigeron coulteri
Erigeron cronquistii
Erigeron decumbens
Erigeron delicatus
Erigeron disparipilus
Erigeron divergens
Erigeron eatonii
Erigeron elatior
Erigeron elegantulus
Erigeron engelmannii
Erigeron evermannii
Erigeron filifolius
Erigeron flabellifolius
Erigeron flagellaris
Erigeron flettii
Erigeron foliosus
Erigeron formosissimus

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Erigeron glabellus
Erigeron glaucus
Erigeron gracilis
Erigeron grandiflorus
Erigeron howellii
Erigeron humilis
Erigeron inornatus
Erigeron lackschewitzii
Erigeron lanatus
Erigeron leibergii
Erigeron leiomerus
Erigeron linearis
Erigeron lonchophyllus
Erigeron macranthus
Erigeron nanus
Erigeron nevadincola
Erigeron ochroleucus
Erigeron oreganus
Erigeron pallens
Erigeron peregrinus
Erigeron petrophilus
Erigeron peucephyllus
Erigeron philadelphicus
Erigeron piperianus
Erigeron poliospermus
Erigeron pulcherrimus
Erigeron pumilus
Erigeron radicatus
Erigeron rydbergii
Erigeron salishii
Erigeron salmonensis
Erigeron salsuginosus
Erigeron simplex
Erigeron speciosus
Erigeron strigosus
Erigeron subtrinervis
Erigeron tener
Erigeron tweedyi
Erigeron ursinus
Erigeron vagus
Eriogonum X lagopus
Eriogonum acaule
Eriogonum alatum
Eriogonum androsaceum
Eriogonum angulosum
Eriogonum annuum
Eriogonum baileyi
Eriogonum caespitosum
Eriogonum capistratum
Eriogonum cernuum
Eriogonum chrysocephalum
Eriogonum chrysops
Eriogonum compositum
Eriogonum congdonii
Eriogonum cusickii
Eriogonum deflexum
Eriogonum desertorum
Eriogonum dichotomum
Eriogonum diclinum
Eriogonum douglasii
Eriogonum effusum
Eriogonum elatum
Eriogonum flavum
Eriogonum heermanii
Eriogonum heracleoides
Eriogonum hirtellum
Eriogonum hookeri
Eriogonum incanum
Eriogonum inerme
Eriogonum kingii
Eriogonum latifolium
Eriogonum lewisii
Eriogonum lobbii
Eriogonum maculatum
Eriogonum mancum
Eriogonum marifolium
Eriogonum meledonum
Eriogonum microthecum
Eriogonum nidularium
Eriogonum niveum
Eriogonum novundum
Eriogonum nudum
Eriogonum ochrocephalum
Eriogonum ovalifolium
Eriogonum palmerianum
Eriogonum pauciflorum
Eriogonum pendulum
Eriogonum piperi
Eriogonum prociduum
Eriogonum proliferum
Eriogonum pusillum
Eriogonum pyrolifolium
Eriogonum salicornioides
Eriogonum salsuginosum
Eriogonum scopulorum
Eriogonum shockleyi
Eriogonum siskiyouense
Eriogonum sp. nov. war eagle mtn.
Eriogonum speciosum
Eriogonum spergulinum
Eriogonum sphaerocephalum
Eriogonum stellatum
Eriogonum strictum
Eriogonum subalpinum
Eriogonum ternatum
Eriogonum thymoides
Eriogonum tolmieanum
Eriogonum umbellatum
Eriogonum vimineum
Eriogonum visheri
Eriogonum watsonii
Erioneuron pilosum
Eriophorum brachyantherum
Eriophorum callitrix
Eriophorum chamissonis
Eriophorum gracile
Eriophorum polystachion
Eriophorum scheuchzeri
Eriophorum virginicum
Eriophorum viridicarinatum
Eriophyllum lanatum
Eriophyllum lanceolatum
Eriophyllum staechadifolium
Eriophyllum watsoni
Eritrichium elongatum
Eritrichium howardii
Eritrichium nanum
Erodium botrys
Erodium cicutarium
Erodium moschatum
Erodium obtusiplicatum
Eruca sativa
Erucastrum gallicum
Eryngium alismifolium
Eryngium articulatum
Eryngium petiolatum
Erysimum arenicola
Erysimum asperum
Erysimum cheiranthoides
Erysimum concinnum
Erysimum elatum
Erysimum franciscanum
Erysimum inconspicuum
Erysimum occidentale
Erysimum repandum
Erysimum torulosum
Erythronium citrinum
Erythronium grandiflorum
Erythronium hendersonii
Erythronium howellii
Erythronium klamathense
Erythronium montanum
Erythronium nudopetalum
Erythronium oregonum
Erythronium revolutum
Escallonia X langleyensis
Escallonia rubra
Eschscholzia caespitosa
Eschscholzia californica
Eschscholzia leptandra
Escobaria missouriensis

Escobaria vivipara
Euclidium syriacum
Euonymus alata
Euonymus atropurpureus
Euonymus europaea
Euonymus fortunei
Euonymus nana
Euonymus occidentalis
Eupatorium adenophorum
Eupatorium maculatum
Eupatorium occidentale
Eupatorium perfoliatum
Eupatorium rugosum
Euphorbia X pseudovirgata
Euphorbia agraria
Euphorbia crenulata
Euphorbia cyparissias
Euphorbia dentata
Euphorbia epichymoides
Euphorbia esula
Euphorbia fendleri
Euphorbia geyeri
Euphorbia glyptosperma
Euphorbia helioscopia
Euphorbia hexagona
Euphorbia lathyrus
Euphorbia maculata
Euphorbia maculosa
Euphorbia marginata
Euphorbia missurica
Euphorbia myrsinites
Euphorbia nutans
Euphorbia peplus
Euphorbia prunifolia
Euphorbia pulcherima
Euphorbia robusta
Euphorbia serpens
Euphorbia serpyllifolia
Euphorbia spathulata
Euphorbia stictospora
Euphrasia arctica
Euphrasia officinalis
Evolvulus nuttallianus
Fagopyrum esculentum
Fagopyrum tartaricum
Fagus sylvatica
Fatsia japonica
Festuca X viviparoidea
Festuca arida
Festuca arizonica
Festuca arundinacea
Festuca baffinensis
Festuca bromoides
Festuca californica
Festuca dertonensis
Festuca elmeri
Festuca grayi
Festuca hallii
Festuca idahoensis
Festuca megalura
Festuca microstachys
Festuca myuros
Festuca obtusa
Festuca occidentalis
Festuca octoflora
Festuca ovina
Festuca pacifica
Festuca pratensis
Festuca reflexa
Festuca rubra
Festuca scabrella
Festuca subulata
Festuca subuliflora
Festuca viridula
Festuca vivipara
Filago arvensis
Filago californica
Filipendula occidentalis
Filipendula rubra
Filipendula vulgaris
Floerkea proserpinacoides
Foeniculum vulgare
Forsellesia spinescens
Forsynthia suspensa
Fragaria bracteata
Fragaria californica
Fragaria chiloensis
Fragaria crinata
Fragaria cuneifolia
Fragaria glauca
Fragaria platypetala
Fragaria vesca
Fragaria virginiana
Franseria bipinnatifida
Franseria chamissonis
Frasera albicaulis
Frasera californica
Frasera fastigiata
Frasera montana
Frasera nitida
Frasera speciosa
Frasera umpquaensis
Fraxinus latifolia
Fraxinus nigra
Fraxinus pennsylvanica
Fritillaria atropurpurea
Fritillaria camschatcensis
Fritillaria camschatensis
Fritillaria falcata
Fritillaria gentneri
Fritillaria glauca
Fritillaria imperialis
Fritillaria lanceolata
Fritillaria pluriflora
Fritillaria pudica
Fritillaria purdyi
Fritillaria recurva
Fumaria officinalis
Fumaria parviflora
Gaillardia aristata
Gaillardia pulchella
Galega officinalis
Galeopsis tetrahit
Galinsoga parviflora
Galinsoga quadriradiata
Galium ambiguum
Galium andrewsii
Galium aparine
Galium asperrimum
Galium bifolium
Galium bolanderi
Galium boreale
Galium cymosum
Galium grayanum
Galium humifusum
Galium hypotrichium
Galium kamtschaticum
Galium labradoricum
Galium matthewsii
Galium mollugo
Galium multiflorum
Galium muricatum
Galium nuttallii
Galium obtusum
Galium oreganum
Galium palustre
Galium pedemontanum
Galium sparsiflora
Galium trifidum
Galium triflorum
Galium vaillantii
Galium verum
Garrya buxifolia
Garrya elliptica
Garrya flavescens
Garrya fremontii
Gastridium ventricosum
Gaultheria hispidula
Gaultheria humifusa
Gaultheria ovatifolia
Gaultheria shallon
Gaura coccinea

Gaura neomexicana
Gaura parviflora
Gayophytum caesium
Gayophytum decipiens
Gayophytum diffusum
Gayophytum humile
Gayophytum intermedium
Gayophytum lasiospermum
Gayophytum nuttallii
Gayophytum pumilum
Gayophytum racemosum
Gayophytum ramosissimum
Gentiana affinis
Gentiana algida
Gentiana andrewsii
Gentiana aquatica
Gentiana bisetaea
Gentiana calycosa
Gentiana douglasiana
Gentiana glauca
Gentiana newberryi
Gentiana oregana
Gentiana pleurisetosa
Gentiana prostrata
Gentiana puberulenta
Gentiana saxicola
Gentiana sceptrum
Gentiana setigera
Gentianella amarella
Gentianella barbellata
Gentianella detonsa
Gentianella propinqua
Gentianella tenella
Gentianopsis macounii
Gentianopsis procera
Gentianopsis simplex
Geocaulon lividum
Geranium bicknellii
Geranium caespitosum
Geranium californicum
Geranium carolinianum
Geranium columbinum
Geranium dissectum
Geranium incisum
Geranium maculatum
Geranium molle
Geranium oreganum
Geranium pusillum
Geranium richardsonii
Geranium robertianum
Geranium sanguineum
Geranium viscosissimum
Geum aleppicum
Geum campanulatum
Geum canadense
Geum ciliatum
Geum macrophyllum
Geum oregonense
Geum rivale
Geum rossii
Geum triflorum
Geum urbanum
Gilia brecciarum
Gilia breweri
Gilia capillaris
Gilia capitata
Gilia ciliata
Gilia filifolia
Gilia inconspicua
Gilia leptomeria
Gilia nuttallii
Gilia opthalmoides
Gilia polycladon
Gilia pulchella
Gilia tenerrima
Ginkgo biloba
Githopsis calycina
Githopsis specularioides
Glaucium corniculatum
Glaux maritima
Glecoma hederacea
Gleditsia triacanthos
Glehnia leiocarpa
Glehnia littoralis
Glossopetalon nevadense
Glossopetalon spinescens
Glyceria borealis
Glyceria elata
Glyceria fluitans
Glyceria grandis
Glyceria occidentalis
Glyceria pauciflora
Glyceria striata
Glycyrrhiza lepidota
Glyptopleura marginata
Gnaphalium californicum
Gnaphalium chilense
Gnaphalium collinum
Gnaphalium japonicum
Gnaphalium microcephalum
Gnaphalium palustre
Gnaphalium purpureum
Gnaphalium uliginosum
Gnaphalium viscosum
Godetia caurina
Godetia gracilis
Godetia pacifica
Godetia quadrivulnera
Godetia tenella
Gomphocarpus cordifolius
Goodyera decipiens
Goodyera oblongifolia
Goodyera repens
Gratiola aurea
Gratiola ebracteata
Gratiola neglecta
Grayia spinosa
Greeneocharis circumscissa
Grindelia columbiana
Grindelia howellii
Grindelia integrifolia
Grindelia nana
Grindelia squarrosa
Gutierrezia sarothrae
Gymnocarpium dryopteris
Gymnocarpium robertianum
Gymnocladus dioica
Gymnosteris nudicaulis
Gymnosteris parvula
Gypsophila acutifolia
Gypsophila muralis
Gypsophila paniculata
Habenaria chorisiana
Habenaria clavellata
Habenaria dilatata
Habenaria elegans
Habenaria greenei
Habenaria hyperborea
Habenaria leucophaea
Habenaria leucostachys
Habenaria maritima
Habenaria obtusata
Habenaria orbiculata
Habenaria saccata
Habenaria sparsiflora
Habenaria stricta
Habenaria unalascensis
Habenaria viridis
Hackelia arida
Hackelia californica
Hackelia ciliata
Hackelia cinerea
Hackelia cronquistii
Hackelia cusickii
Hackelia davisii
Hackelia deflexa
Hackelia diffusa
Hackelia floribunda
Hackelia hispida
Hackelia jessicae
Hackelia micrantha
Hackelia nelsonii

Hackelia ophiobia
Hackelia patens
Hackelia setosa
Hackelia venusta
Hackelia virginiana
Halenia deflexa
Halimolobos perplexa
Halimolobos virgata
Halimolobos whitedii
Halogeton glomeratus
Halophila ballonis
Halophila englemannii
Halophila hawaiiana
Halophila johnsonii
Hamosa paysonii
Haplopappus aberrans
Haplopappus acaulis
Haplopappus arborescens
Haplopappus armerioides
Haplopappus bloomeri
Haplopappus brandegei
Haplopappus carthamoides
Haplopappus contractus
Haplopappus greenei
Haplopappus hallii
Haplopappus hirtus
Haplopappus insecticruris
Haplopappus integrifolius
Haplopappus lanceolatus
Haplopappus lanuginosus
Haplopappus liatriformis
Haplopappus linearis
Haplopappus lyallii
Haplopappus macronema
Haplopappus multicaulis
Haplopappus nanus
Haplopappus pygmaeus
Haplopappus racemosus
Haplopappus radiatus
Haplopappus resinosus
Haplopappus spinulosus
Haplopappus stenophyllus
Haplopappus suffruticosus
Haplopappus uniflorus
Hastingsia bracteosa
Hedeoma drummondii
Hedeoma hispida
Hedera helix
Hedyotis longifolia
Hedysarum alpinum
Hedysarum boreale
Hedysarum occidentale
Hedysarum sulphurescens
Helenium autumnale
Helenium bigelovii
Helenium bolanderi
Helenium hoopesii
Helenium puberulum
Helianthella douglasii
Helianthella quinquenervis
Helianthella uniflora
Helianthemum bicknellii
Helianthus annuus
Helianthus bolanderi
Helianthus ciliaris
Helianthus cusickii
Helianthus grosseserratus
Helianthus maximilianii
Helianthus nuttallii
Helianthus petiolaris
Helianthus rigidus
Helianthus tuberosus
Helictotrichon hookeri
Heliopsis helianthoides
Heliotropium curassavicum
Helleborus niger
Hemerocallis fulva
Hemicarpha drummondii
Hemicarpha micrantha
Hemicarpha occidentalis
Hemitomes congestum
Hemizonella minima
Hemizonia clevelandii
Hemizonia fitchii
Hemizonia pungens
Hepatica sp.
Heracleum lanatum
Heracleum mantegazzianum
Herniaria cineria
Hesperis matronalis
Hesperochiron californicus
Hesperochiron lasianthus
Hesperochiron pumilus
Heterocodon rariflorum
Heterotheca oregana
Heterotheca subaxillaris
Heuchera chlorantha
Heuchera cylindrica
Heuchera glabella
Heuchera glabra
Heuchera grossulariifolia
Heuchera micrantha
Heuchera ovalifolia
Heuchera parviflora
Heuchera parvifolia
Heuchera richardsonii
Heuchera rubescens
Heuchera utahensis
Hibiscus grandiflorus
Hibiscus rosa-sinensis
Hibiscus syriacus
Hibiscus trionum
Hieacium pratense
Hieracium albertinum
Hieracium albiflorum
Hieracium aurantiacum
Hieracium bolanderi
Hieracium canadense
Hieracium chapacanum
Hieracium cynoglossoides
Hieracium floribundum
Hieracium gracile
Hieracium greenei
Hieracium horridum
Hieracium longiberbe
Hieracium parryi
Hieracium pilosella
Hieracium piloselloides
Hieracium pratense
Hieracium rydbergii
Hieracium scouleri
Hieracium umbellatum
Hieracium vulgatum
Hierochloe alpina
Hierochloe occidentalis
Hierochloe odorata
Hilaria jamesii
Hippophae rhamnoides
Hippuris montana
Hippuris vulgaris
Hoffmanseggia densiflora
Holcus lanatus
Holcus mollis
Holodiscus discolor
Holodiscus dumosus
Holodiscus glabrescens
Holosteum umbellatum
Hordeum brachyantherum
Hordeum bulbosum
Hordeum californicum
Hordeum depressum
Hordeum distichon
Hordeum geniculatum
Hordeum glaucum
Hordeum gussonianum
Hordeum jubatum
Hordeum leporinum
Hordeum murinum
Hordeum nodosum
Hordeum pusillum
Hordeum vulgare
Horkelia capitata

Horkelia caruifolia
Horkelia congesta
Horkelia daucifolia
Horkelia fusca
Horkelia hendersonii
Horkelia howellii
Horkelia sericata
Horkelia tenella
Horkelia tridentata
Hosackia denticulata
Howellia aquatilis
Hudsonia tomentosa
Hulsea algida
Hulsea nana
Humulus lupulus
Hutchinsia procumbens
Hydrangea arborescens
Hydrangea quercifolia
Hydrilla verticillata
Hydrilla verticulata
Hydrocharis morsus-ranae
Hydrocotyle ranunculoides
Hydrocotyle umbellata
Hydrocotyle verticillata
Hydrophyllum capitatum
Hydrophyllum fendleri
Hydrophyllum occidentale
Hydrophyllum tenuipes
Hydrophyllum virginianum
Hygrophila polysperma
Hymenopappus filifolius
Hymenopappus tenuifolius
Hymenoxys acaulis
Hymenoxys cooperi
Hymenoxys grandiflora
Hymenoxys jamesii
Hymenoxys richardsonii
Hymenoxys torreyana
Hyoscyamus niger
Hypericum anagalloides
Hypericum androsaemum
Hypericum concinnum
Hypericum formosum
Hypericum majus
Hypericum mutilum
Hypericum perforatum
Hypochaeris radicata
Hypopitys latisquama
Hypopitys monotropa
Hypopitys multiflora
Hypoxis hirsuta
Hyssopus officinalis
Hystrix patula
Iberis amara
Iberis umbellata
Idahoa scapigera
Ilex aquifolium
Iliamna latibracteata
Iliamna longisepala
Iliamna rivularis
Impatiens aurella
Impatiens balfouri
Impatiens capensis
Impatiens ecalcarata
Impatiens glandulifera
Impatiens noli-tangere
Impatiens pallida
Imperata brasiliensis
Imperata cylindrica
Inula helenium
Ipomoea aquatica
Ipomoea coccinea
Ipomoea hirsutula
Ipomoea leptophylla
Ipomoea purpurea
Ipomoea triloba
Ipomopis polycladon
Ipomopsis aggregata
Ipomopsis congesta
Ipomopsis crebrifolia
Ipomopsis minutiflora
Ipomopsis orchidacea
Ipomopsis pumila
Ipomopsis spicata
Ipomopsis tenuituba
Iris bracteata
Iris chrysophylla
Iris douglasiana
Iris hartwegii
Iris innominata
Iris macrosiphon
Iris missouriensis
Iris pseudacorus
Iris tenax
Iris tenuis
Iris thompsoni
Isatis tinctoria
Ischaemum rugosum
Isoetes bolanderi
Isoetes echinospora
Isoetes lacustris
Isoetes melanopoda
Isoetes nuttallii
Isoetes occidentalis
Isoetes setacea
Isopyrum biternatum
Isopyrum hallii
Isopyrum stipitatum
Iva annua
Iva axillaris
Iva xanthifolia
Ivesia baileyi
Ivesia gordonii
Ivesia kingii
Ivesia rhypara
Ivesia shelleyi
Ivesia tweedyi
Jamesia americana
Jasione montana
Jaumea carnosa
Juglans ailanthifolia
Juglans cinerea
Juglans nigra
Juncus abjectus
Juncus acuminatus
Juncus alpinoarticulatus
Juncus alpinus
Juncus arcticus
Juncus articulatus
Juncus badius
Juncus balticus
Juncus biglumis
Juncus bolanderi
Juncus brachycephalus
Juncus brachyphyllus
Juncus brevicaudatus
Juncus bufonius
Juncus capillaris
Juncus castaneus
Juncus columbianus
Juncus compressus
Juncus confusus
Juncus covillei
Juncus drummondii
Juncus dubius
Juncus effusus
Juncus ensifolius
Juncus falcatus
Juncus filiformis
Juncus fucensis
Juncus gerardii
Juncus hallii
Juncus hemiendytus
Juncus howellii
Juncus interior
Juncus kelloggii
Juncus lesueurii
Juncus longistylis
Juncus macranthus
Juncus marginatus
Juncus mertensianus
Juncus nevadensis

Juncus nodosus
Juncus oreganus
Juncus orthophyllus
Juncus oxymeris
Juncus parryi
Juncus patens
Juncus phaeocephalus
Juncus planifolius
Juncus regelii
Juncus supiniformis
Juncus supinus
Juncus tenuis
Juncus tiehmii
Juncus torreyi
Juncus tracyi
Juncus triglumis
Juncus tweedyi
Juncus uncialis
Juncus vaseyi
Juncus xiphioides
Juniperus communis
Juniperus horizontalis
Juniperus occidentalis
Juniperus osteosperma
Juniperus scopulorum
Juniperus virginiana
Jussiaea repens
Jussiaea uruguayensis
Kalmia microphylla
Kalmia occidentalis
Kalmia polifolia
Kalmiopsis leachiana
Kelloggia galioides
Kelseya uniflora
Kerria japonica
Kickxia elatine
Kickxia spuria
Knautia arvensis
Kobresia macrocarpa
Kobresia myosuroides
Kobresia simpliciuscula
Kochia americana
Kochia scoparia
Koeleria cristata
Koelreuteria paniculata
Koenigia islandica
Kolkwitzia amabalis
Kuhnia eupatorioides
Laburnum X watereri
Laburnum anagyroides
Lactuca biennis
Lactuca canadensis
Lactuca ludoviciana
Lactuca muralis
Lactuca oblongifolia
Lactuca saligna
Lactuca sativa
Lactuca serriola
Lactuca spicata
Lagarosiphon major
Lagophylla ramosissima
Lagurus ovatus
Lallemantia peltata
Lamium amplexicaule
Lamium hybridum
Lamium maculatum
Lamium purpureum
Langloisia setosissima
Laportea canadensis
Lappula cenchrusoides
Lappula echinata
Lappula occidentalis
Lappula redowskii
Lappula texana
Lapsana communis
Larix lyallii
Larix occidentalis
Lasthenia chrysostoma
Lasthenia glaberrima
Lasthenia macrantha
Lasthenia minor
Lathyrus americanus
Lathyrus aphaca
Lathyrus bijugatus
Lathyrus cusickii
Lathyrus delnorticus
Lathyrus eucosmus
Lathyrus grimesii
Lathyrus hirsutus
Lathyrus holochlorus
Lathyrus japonicus
Lathyrus lanceolatus
Lathyrus lanszwertii
Lathyrus latifolius
Lathyrus littoralis
Lathyrus nevadensis
Lathyrus nuttallii
Lathyrus obovatus
Lathyrus ochroleucus
Lathyrus odoratus
Lathyrus oregonensis
Lathyrus palustris
Lathyrus pauciflorus
Lathyrus polymorphus
Lathyrus polyphyllus
Lathyrus pratensis
Lathyrus rigidus
Lathyrus schaffneri
Lathyrus sphaericus
Lathyrus sulphureus
Lathyrus sylvestris
Lathyrus torreyi
Lathyrus tuberosus
Lathyrus venosus
Lathyrus vestitus
Lavatera arborea
Layia glandulosa
Lechea intermedia
Lechea stricta
Ledum glandulosum
Ledum groenlandicum
Leersia oryzoides
Leersia virginica
Lemna gibba
Lemna minor
Lemna perpusilla
Lemna trisulca
Lemna turionifera
Lemna valdiviana
Leontodon autumnalis
Leontodon nudicaulis
Leonurus cardiaca
Lepidium campestre
Lepidium davissi
Lepidium densiflorum
Lepidium dictyotum
Lepidium draba
Lepidium lasiocarpum
Lepidium latifolium
Lepidium medium
Lepidium montanum
Lepidium nanum
Lepidium nitidum
Lepidium oxycarpum
Lepidium papilliferum
Lepidium perfoliatum
Lepidium ramosissimum
Lepidium repens
Lepidium ruderale
Lepidium sativum
Lepidium strictum
Lepidium virginicum
Leptarrhena amplexifolia
Leptarrhena pyrolifolia
Leptaxis menziesii
Leptochloa chinensis
Leptochloa fascicularis
Leptochloa uninervia
Leptodactylon caespitosum
Leptodactylon glabrum
Leptodactylon hazelae
Leptodactylon pungens

Leptodactylon watsonii
Leptotaenia dissecta
Leptotaenia multifida
Leptotaenia purpurea
Lepyrodiclis holosteoides
Lesquerella alpina
Lesquerella argentea
Lesquerella carinata
Lesquerella douglasii
Lesquerella fremontii
Lesquerella humilis
Lesquerella kingii
Lesquerella klausii
Lesquerella ludoviciana
Lesquerella macrocarpa
Lesquerella montana
Lesquerella multiceps
Lesquerella occidentalis
Lesquerella paysonii
Leucocrinum montanum
Leucopoa kingii
Leucothoe davisiae
Lewisia columbiana
Lewisia cotyledon
Lewisia kellogii
Lewisia leana
Lewisia oppositifolia
Lewisia pygmaea
Lewisia rediviva
Lewisia triphylla
Lewisia tweedyi
Leymus salinus
Liatris aspera
Liatris ligulistylis
Liatris punctata
Liatris pycnostachya
Libocedrus decurrens
Ligusticum apiifolium
Ligusticum californicum
Ligusticum canbyi
Ligusticum cusickii
Ligusticum filicinum
Ligusticum grayi
Ligusticum porteri
Ligusticum purpureum
Ligusticum tenuifolium
Ligusticum verticillatum
Ligustrum amurense
Ligustrum indicum
Ligustrum japonicum
Ligustrum sinense
Ligustrum vulgare
Lilaea scilloides
Lilaeopsis occidentalis
Lilium bolanderi
Lilium canadense
Lilium columbianum
Lilium kelleyanum
Lilium kelloggii
Lilium occidentale
Lilium pardalinum
Lilium parvum
Lilium philadelphicum
Lilium pudica
Lilium rubescens
Lilium vollmeri
Lilium washingtonianum
Lilium wigginsii
Limnanthes alba
Limnanthes douglasii
Limnanthes gracilis
Limnanthes rosea
Limnobium laevigatum
Limnobium spongia
Limnophila sessiliflora
Limnosella acaulis
Limosella aquatica
Linanthus androsaceus
Linanthus bakeri
Linanthus bicolor
Linanthus bolanderi
Linanthus ciliatus
Linanthus grandiflorus
Linanthus harknessii
Linanthus liniflorus
Linanthus nuttallii
Linanthus pharnaceoides
Linanthus septentrionalis
Linaria canadensis
Linaria dalmatica
Linaria vulgaris
Lindernia dubia
Linnaea borealis
Linum australe
Linum bienne
Linum digynum
Linum kingii
Linum micranthum
Linum perenne
Linum rigidum
Linum sulcatum
Linum usitatissimum
Liparis loeselii
Lippia cuneifolia
Liquidamber styraciflua
Liriodendron tulipfera
Listera borealis
Listera caurina
Listera convallarioides
Listera cordata
Lithocarpus densiflorus
Lithophragma affinis
Lithophragma campanulata
Lithophragma glabra
Lithophragma heterophylla
Lithophragma parviflora
Lithophragma tenellum
Lithospermum arvense
Lithospermum californicum
Lithospermum canescens
Lithospermum incisum
Lithospermum ruderale
Lloydia serotina
Lobelia dortmanna
Lobelia kalmii
Lobelia siphilitica
Lobelia spicata
Lobularia maritima
Loiseleuria procumbens
Lolium multiflorum
Lolium perenne
Lolium persicum
Lolium remotum
Lolium temulentum
Lomatium ambiguum
Lomatium angustatum
Lomatium attenuatum
Lomatium bicolor
Lomatium bradshawii
Lomatium brandegei
Lomatium californicum
Lomatium canbyi
Lomatium circumdatum
Lomatium columbianum
Lomatium cookii
Lomatium cous
Lomatium cusickii
Lomatium cuspidatum
Lomatium dissectum
Lomatium donnellii
Lomatium engelmannii
Lomatium erythrocarpum
Lomatium farinosum
Lomatium foeniculaceum
Lomatium geyeri
Lomatium gormanii
Lomatium graveolens
Lomatium grayi
Lomatium greenmanii
Lomatium hallii
Lomatium hambleniae
Lomatium hendersonii

Lomatium howellii
Lomatium idahoense
Lomatium juniperium
Lomatium laevigatum
Lomatium leptocarpum
Lomatium macrocarpum
Lomatium martindalei
Lomatium minus
Lomatium nelsonianum
Lomatium nevadense
Lomatium nudicaule
Lomatium nuttallii
Lomatium oreganum
Lomatium orientale
Lomatium pastoralis
Lomatium peckianum
Lomatium ravenii
Lomatium rollinsii
Lomatium salmoniflorum
Lomatium sandbergii
Lomatium scabrum
Lomatium serpentinum
Lomatium suksdorfii
Lomatium thompsonii
Lomatium tracyi
Lomatium triternatum
Lomatium tuberosum
Lomatium utriculatum
Lomatium vaginatum
Lomatium watsonii
Lomatogonium rotatum
Lonicera X bella
Lonicera caerulea
Lonicera cauriana
Lonicera ciliosa
Lonicera conjugialis
Lonicera dioica
Lonicera etrusca
Lonicera hispidula
Lonicera interrupta
Lonicera involucrata
Lonicera nitida
Lonicera periclymenum
Lonicera tartarica
Lonicera tatarica
Lonicera utahensis
Lonicera villosa
Lophotocarpus californicus
Lotus aboriginum
Lotus americanus
Lotus bicolor
Lotus corniculatus
Lotus crassifolius
Lotus denticulatus
Lotus douglasii
Lotus formosissimus
Lotus micranthus
Lotus nevadensis
Lotus oblongifolius
Lotus pedunculatus
Lotus pinnatus
Lotus purshiana
Lotus stipularis
Lotus subpinnatus
Lotus tetragonolobus
Ludwigia palustris
Ludwigia polycarpa
Luetkea pectinata
Luina hypoleuca
Luina nardosmia
Luina serpentina
Luina stricta
Lunaria annua
Lupinus X alpestris
Lupinus adsurgens
Lupinus affinis
Lupinus albicaulis
Lupinus albifrons
Lupinus alpestris
Lupinus andersoni
Lupinus arboreus
Lupinus argenteus
Lupinus bicolor
Lupinus biddlei
Lupinus brevicaulis
Lupinus brewerii
Lupinus caudatus
Lupinus corymbosus
Lupinus cusickii
Lupinus formosus
Lupinus holosericeus
Lupinus lapidicola
Lupinus latifolius
Lupinus laxiflorus
Lupinus lepidus
Lupinus leucophyllus
Lupinus littoralis
Lupinus luteolus
Lupinus micranthus
Lupinus microcarpus
Lupinus mucronulatus
Lupinus nanus
Lupinus onustus
Lupinus ornatus
Lupinus plattensis
Lupinus polyphyllus
Lupinus pseudoparviflorus
Lupinus pusillus
Lupinus rivularis
Lupinus sabinii
Lupinus saxosus
Lupinus scheuberae
Lupinus sericeus
Lupinus subalpinus
Lupinus subvexus
Lupinus suksdorfii
Lupinus sulphureus
Lupinus superbus
Lupinus tracyi
Lupinus uncialis
Lupinus wyethii
Luzula arcuata
Luzula campestris
Luzula comosa
Luzula divaricata
Luzula hitchcockii
Luzula parviflora
Luzula piperi
Luzula spicata
Luzula subsessilis
Lychnis X arkwrightii
Lychnis alba
Lychnis apetala
Lychnis chalcedonica
Lychnis coronaria
Lychnis dioica
Lychnis drummondii
Lychnis flos-cuculi
Lycium ferocissimum
Lycium halimifolium
Lycopersicon lycopersicum
Lycopodium alpinum
Lycopodium annotinum
Lycopodium clavatum
Lycopodium complanatum
Lycopodium inundatum
Lycopodium obscurum
Lycopodium selago
Lycopodium sitchense
Lycopus americanus
Lycopus asper
Lycopus uniflorus
Lygodesmia grandiflora
Lygodesmia juncea
Lygodesmia spinosa
Lysichitum americanum
Lysimachia ciliata
Lysimachia clethroides
Lysimachia hybrida
Lysimachia lanceolata
Lysimachia nummularia
Lysimachia punctata

Lysimachia quadriflora
Lysimachia terrestris
Lysimachia thyrsiflora
Lysimachia verticillata
Lysimachia vulgaris
Lythrum alatum
Lythrum hyssopifolia
Lythrum salicaria
Lythrum virgatum
Machaeranthera bigelovii
Machaeranthera canescens
Machaeranthera commixta
Machaeranthera grindelioides
Machaeranthera laetevirens
Machaeranthera linearis
Machaeranthera shastensis
Machaeranthera tanacetifolia
Machaerocarpus californicus
Maclura pomifera
Madia bolanderi
Madia citriodora
Madia dissitiflora
Madia elegans
Madia exigua
Madia glomerata
Madia gracilis
Madia madioides
Madia minima
Madia sativa
Mahonia nervosa
Mahonia pumila
Maianthemum canadense
Maianthemum dilatatum
Maianthemum racemosum
Maianthemum stellatum
Malacothrix californica
Malacothrix glabrata
Malacothrix torreyi
Malcolmia africana
Malus diversifolia
Malus floribunda
Malus fusca
Malva moschata
Malva neglecta
Malva parviflora
Malva rotundifolia
Malva sylvestris
Malva verticillata
Marah oreganus
Mariana lactea
Marrubium vulgare
Marsilea vestita
Martynia louisiana
Matricaria chamomilla
Matricaria discoidea
Matricaria maritima
Matricaria matricarioides
Matteuccia struthiopteris
Mazus japonicus
Meconella californica
Meconella oregana
Medicago arabica
Medicago falcata
Medicago hispida
Medicago lupulina
Medicago sativa
Medicargo arabica
Megarrhiza oregana
Melampyrum lineare
Melica aristata
Melica bulbosa
Melica californica
Melica fugax
Melica geyeri
Melica harfordii
Melica imperfecta
Melica smithii
Melica spectabilis
Melica striata
Melica stricta
Melica subulata
Melilotus alba
Melilotus indica
Melilotus officinalis
Melissa officinalis
Menispermum canadense
Mentha X piperita
Mentha alopecuroides
Mentha arvensis
Mentha citrata
Mentha pulegium
Mentha spicata
Mentha suaveolens
Mentzelia acuminata
Mentzelia albicaulis
Mentzelia congesta
Mentzelia decapetala
Mentzelia dispersa
Mentzelia laevicaulis
Mentzelia mollis
Mentzelia montana
Mentzelia nuda
Mentzelia oligosperma
Mentzelia packardiae
Mentzelia pumila
Mentzelia torreyi
Mentzelia veatchiana
Menyanthes trifoliata
Menziesia ferruginea
Merimea texana
Mertensia alpina
Mertensia arizonica
Mertensia bella
Mertensia brevistyla
Mertensia campanulata
Mertensia ciliata
Mertensia cusickii
Mertensia franciscana
Mertensia fusiformis
Mertensia lanceolata
Mertensia longiflora
Mertensia oblongifolia
Mertensia paniculata
Mertensia perplexa
Mertensia platyphylla
Mertensia umbratilis
Mesembryanthemum aequilaterale
Mesembryanthemum chilense
Microcala quadrangularis
Micromeria chamissonis
Micromeria douglasii
Micropus californicus
Microseris acuminata
Microseris alpestris
Microseris bigelovii
Microseris borealis
Microseris cuspidata
Microseris detlingii
Microseris douglasii
Microseris howellii
Microseris laciniata
Microseris lindleyi
Microseris linearifolia
Microseris nigrescens
Microseris nutans
Microseris troximoides
Microsteris gracilis
Microsteris humilis
Microsteris micrantha
Mikania cordata
Mikania micrantha
Milium vernale
Mimetanthe pilosa
Mimosa invisa
Mimosa pigra
Mimulus alsinoides
Mimulus aurantiacus
Mimulus breviflorus
Mimulus breweri
Mimulus cardinalis
Mimulus clivicola

Mimulus cusickii
Mimulus dentatus
Mimulus douglasii
Mimulus floribundus
Mimulus glabratus
Mimulus guttatus
Mimulus hymenophyllus
Mimulus implexus
Mimulus jepsonii
Mimulus jungermannioides
Mimulus kelloggii
Mimulus lewisii
Mimulus microphyllus
Mimulus moschatus
Mimulus nanus
Mimulus nasutus
Mimulus patulus
Mimulus primuloides
Mimulus pulsiferae
Mimulus pygmaeus
Mimulus ringens
Mimulus scouleri
Mimulus suksdorfii
Mimulus tilingii
Mimulus tricolor
Mimulus washingtonensis
Minuartia cismontana
Minuartia howellii
Minuartia macrantha
Minulus kelloggii
Mirabilis albida
Mirabilis bigelovii
Mirabilis greenei
Mirabilis hirsuta
Mirabilis jalapa
Mirabilis linearis
Mirabilis macfarlanei
Mirabilis nyctaginea
Mitella breweri
Mitella caulescens
Mitella diversifolia
Mitella nuda
Mitella ovalis
Mitella pentandra
Mitella stauropetala
Mitella stenopetala
Mitella trifida
Mollugo verticillata
Moluccella laevis
Monarda didyma
Monarda fistulosa
Monardella discolor
Monardella nervosa
Monardella odoratissima
Monardella purpurea
Monardella sheltoni
Monardella villosa
Monochoria hastata
Monochoria vaginalis
Monolepis nuttalliana
Monolepis pusilla
Monolepis spathulata
Monotropa hypopitys
Monotropa uniflora
Montia arenicola
Montia chamissoi
Montia cordifolia
Montia dichotoma
Montia diffusa
Montia fontana
Montia howellii
Montia linearis
Montia parvifolia
Montia perfoliata
Montia rubra
Montia saxosa
Montia sibirica
Montia spathulata
Morus alba
Morus rubra
Muhlenbergia andina
Muhlenbergia asperifolia
Muhlenbergia cuspidata
Muhlenbergia filiformis
Muhlenbergia frondosa
Muhlenbergia glomerata
Muhlenbergia jonesii
Muhlenbergia mexicana
Muhlenbergia microsperma
Muhlenbergia minutissima
Muhlenbergia racemosa
Muhlenbergia richardsonis
Muhlenbergia squarrosa
Munroa squarrosa
Muscari comosum
Musineon divaricatum
Musineon lineare
Musineon tenuifolium
Musineon vaginatum
Myosotis arvensis
Myosotis discolor
Myosotis laxa
Myosotis micrantha
Myosotis scorpioides
Myosotis sylvatica
Myosotis verna
Myosotis versicolor
Myosurus apetalus
Myosurus aristatus
Myosurus minimus
Myosurus sessilis
Myrica californica
Myrica gale
Myriophyllum brasiliense
Myriophyllum elatinoides
Myriophyllum heterophyllum
Myriophyllum hippuroides
Myriophyllum pinnatum
Myriophyllum sibiricum
Myriophyllum spicatum
Myrrhis odorata
Najas flexilis
Najas guadalupensis
Najas marina
Nama aretioides
Nama densum
Nama lobbii
Nardus stricta
Narthecium californicum
Nassella trichotoma
Nasturtium officinale
Navarretia breweri
Navarretia divaricata
Navarretia heterandra
Navarretia intertexta
Navarretia klickitatensis
Navarretia leucocephala
Navarretia minima
Navarretia squarrosa
Navarretia tagetina
Nemacladus capillaris
Nemacladus rigidus
Nemophila breviflora
Nemophila densa
Nemophila heterophylla
Nemophila inconspicua
Nemophila kirtleyi
Nemophila menziesii
Nemophila parviflora
Nemophila pedunculata
Nemophila sepulta
Nepeta X faassenii
Nepeta cataria
Nephrophyllidium crista-galli
Neslia paniculata
Nicandra physalodes
Nicotiana acuminata
Nicotiana attenuata
Nicotiana bigelovii
Nicotiana glauca
Nigella damascena
Nitrophila occidentalis

Nitrophylla occidentalis
Nothocalais alpestris
Nothochelone nemorosa
Nuphar luteum
Nuphar polysepala
Nymphaea odorata
Nymphaea polysepala
Nymphaea tetragona
Odontites verna
Oemleria cerasiformis
Oenanthe californica
Oenanthe sarmentosa
Oenothera albicaulis
Oenothera alyssoides
Oenothera andina
Oenothera biennis
Oenothera boothii
Oenothera brachycarpa
Oenothera breviflora
Oenothera caespitosa
Oenothera cheiranthifolia
Oenothera claviformis
Oenothera contorta
Oenothera coronopifolia
Oenothera deltoides
Oenothera elata
Oenothera erythrosepala
Oenothera flava
Oenothera heterantha
Oenothera hilgardii
Oenothera laciniata
Oenothera lindleyi
Oenothera macrocarpa
Oenothera minor
Oenothera nuttallii
Oenothera pallida
Oenothera palmeri
Oenothera perennis
Oenothera pilosella
Oenothera psammophila
Oenothera pubens
Oenothera pygmaea
Oenothera rhombipetala
Oenothera rydbergii
Oenothera scapoidea
Oenothera subacaulis
Oenothera tanacetifolia
Oenothera villosa
Oenothera wolfii
Onobrychis viciaefolia
Onoclea sensibilis
Ononis repens
Onopordum acanthium
Onosmodium molle
Ophioglossum vulgatum
Oplopanax horridum
Opuntia aurantiaca
Opuntia erinacea
Opuntia fragilis
Opuntia humifusa
Opuntia hystricina
Opuntia macrorhiza
Opuntia polyacantha
Opuntia rhodantha
Orchis rotundifolia
Orcuttia tenuis
Origanum majoana
Origanum vulgare
Ornithogalum caudatum
Ornithogalum umbellatum
Orobanche californica
Orobanche corymbosa
Orobanche fasciculata
Orobanche grayana
Orobanche ludoviciana
Orobanche minor
Orobanche multiflora
Orobanche pinorum
Orobanche uniflora
Orogenia fusiformis
Orogenia linearifolia
Orthocarpus attenuatus
Orthocarpus barbatus
Orthocarpus bracteosus
Orthocarpus castillejoides
Orthocarpus copelandii
Orthocarpus cryptanthus
Orthocarpus cuspidatus
Orthocarpus erianthus
Orthocarpus faucibarbatus
Orthocarpus hispidus
Orthocarpus imbricatus
Orthocarpus lacerus
Orthocarpus lithospermoides
Orthocarpus luteus
Orthocarpus pusillus
Orthocarpus tenuifolius
Orthocarpus tolmiei
Oryza longistaminata
Oryza punctata
Oryza rufipogon
Oryzopsis asperifolia
Oryzopsis contracta
Oryzopsis exigua
Oryzopsis hendersonii
Oryzopsis hymenoides
Oryzopsis pungens
Oryzopsis racemosa
Oryzopsis swallenii
Oryzopsis webberi
Osmaronia cerasiformis
Osmorhiza brevipes
Osmorhiza chilensis
Osmorhiza claytonii
Osmorhiza depauperata
Osmorhiza divaricata
Osmorhiza longistylis
Osmorhiza nuda
Osmorhiza occidentalis
Osmorhiza purpurea
Ostrya virginiana
Ottelia alismoides
Oxalis corniculata
Oxalis dillenii
Oxalis oregana
Oxalis rubra
Oxalis stricta
Oxalis suksdorfii
Oxalis trilliifolia
Oxalis violacea
Oxypolis occidentalis
Oxyria digyna
Oxytheca dendroidea
Oxytheca dendroides
Oxytropis besseyi
Oxytropis borealis
Oxytropis campestris
Oxytropis deflexa
Oxytropis lagopus
Oxytropis lambertii
Oxytropis luteola
Oxytropis oreophila
Oxytropis parryi
Oxytropis podocarpa
Oxytropis riparia
Oxytropis sericea
Oxytropis splendens
Oxytropis viscida
Pachistima myrsinites
Paeonia brownii
Panax quinquefolium
Panicum capillare
Panicum dichotomiflorum
Panicum flexile
Panicum leibergii
Panicum linearifolium
Panicum miliaceum
Panicum occidentale
Panicum pacificum
Panicum praecocius
Panicum scribnerianum
Panicum thermale

Panicum virgatum
Panicum wilcoxianum
Papaver argemone
Papaver kluanense
Papaver pygmaeum
Papaver rhoeas
Papaver somniferum
Parapholis incurva
Parentucellia viscosa
Parietaria pensylvanica
Parnassia californica
Parnassia fimbriata
Parnassia glauca
Parnassia kotzebuei
Parnassia palustris
Parnassia parviflora
Paronychia depressa
Paronychia pulvinata
Paronychia sessiliflora
Parrya nudicaulis
Parthenium alpinum
Parthenium ligulatum
Parthenocissus quinquefolia
Parthenocissus vitacea
Paspalum dilatatum
Paspalum distichum
Paspalum scrobiculatum
Pastinaca sativa
Paulownia tomentosa
Pectocarya linearis
Pectocarya pusilla
Pectocarya setosa
Pedicularis atrosanguinea
Pedicularis attollens
Pedicularis bracteosa
Pedicularis canadensis
Pedicularis capitata
Pedicularis centranthera
Pedicularis contorta
Pedicularis crenulata
Pedicularis cystopteridifolia
Pedicularis densiflora
Pedicularis flavida
Pedicularis groenlandica
Pedicularis howellii
Pedicularis lanceolata
Pedicularis langsdorfii
Pedicularis oederi
Pedicularis ornithorhyncha
Pedicularis parryi
Pedicularis procera
Pedicularis pulchella
Pedicularis racemosa
Pedicularis rainierensis
Pediocactus simpsonii
Peganum harmala
Pellaea andromedaefolia
Pellaea atropurpurea
Pellaea brachyptera
Pellaea breweri
Pellaea bridgesii
Pellaea glabella
Peltiphyllum peltatum
Pennisetum clandestinum
Pennisetum glaucum
Pennisetum macrourum
Pennisetum pedicellatum
Pennisetum polystachion
Pennisetum setaceum
Penstemon X parishii
Penstemon acaulis
Penstemon acuminatus
Penstemon albertinus
Penstemon albidus
Penstemon anguineus
Penstemon angustifolius
Penstemon arenicola
Penstemon aridus
Penstemon attenuatus
Penstemon azureus
Penstemon barrettiae
Penstemon brevifolius
Penstemon cacuminis
Penstemon caespitosus
Penstemon cardwellii
Penstemon caryi
Penstemon chionophilus
Penstemon cinicola
Penstemon confertus
Penstemon cusickii
Penstemon cyananthus
Penstemon cyaneus
Penstemon davidsonii
Penstemon deustus
Penstemon diphyllus
Penstemon dolius
Penstemon elegantulus
Penstemon ellipticus
Penstemon eriantherus
Penstemon euglaucus
Penstemon flavescens
Penstemon fruticosus
Penstemon gairdneri
Penstemon gibbensii
Penstemon glaber
Penstemon glandulosus
Penstemon glaucinus
Penstemon globosus
Penstemon gracilentus
Penstemon gracilis
Penstemon grandiflorus
Penstemon heterophyllus
Penstemon humilis
Penstemon idahoensis
Penstemon janishiae
Penstemon kingii
Penstemon laetus
Penstemon laricifolius
Penstemon laxus
Penstemon lemhiensis
Penstemon lemmonii
Penstemon leonardii
Penstemon lineolatus
Penstemon lyallii
Penstemon menziesii
Penstemon micranthus
Penstemon miser
Penstemon montanus
Penstemon nemorosus
Penstemon newberryi
Penstemon nitidus
Penstemon oreganus
Penstemon oreocharis
Penstemon ovatus
Penstemon palmeri
Penstemon parvulus
Penstemon payettensis
Penstemon paysoniorum
Penstemon peckii
Penstemon pennellianus
Penstemon perpulcher
Penstemon pratensis
Penstemon procerus
Penstemon pruinosus
Penstemon pseudoprocerus
Penstemon pumilus
Penstemon purpusii
Penstemon radicosus
Penstemon rattani
Penstemon richardsonii
Penstemon roezlii
Penstemon rupicola
Penstemon rydbergii
Penstemon scouleri
Penstemon seorsus
Penstemon serrulatus
Penstemon spathulatus
Penstemon spatulatus
Penstemon speciosus
Penstemon strictus
Penstemon subglaber
Penstemon subserratus

Penstemon tolmiei
Penstemon triphyllus
Penstemon variabilis
Penstemon venustus
Penstemon virens
Penstemon washingtonensis
Penstemon watsonii
Penstemon whippleanus
Penstemon wilcoxii
Penthorum sedoides
Peraphyllum ramosissimum
Perideridia bolanderi
Perideridia erythrorhiza
Perideridia gairdneri
Perideridia howellii
Perideridia kelloggii
Perideridia lemmonnii
Perideridia leptocarpa
Perideridia oregana
Perideridia parishii
Perityle stansburii
Pernettya mucronata
Petalostemon ornatum
Petasites frigidus
Petasites japonicus
Petasites nivalis
Petasites palmatus
Petasites sagittatus
Petasites speciosa
Peteria thompsoniae
Petradoria pumila
Petrohagia prolifera
Petrohagia saxifraga
Petrophytum caespitosum
Petrophytum cinerascens
Petrophytum hendersonii
Petroselinum crispum
Phaca salsula
Phacelia affinis
Phacelia alpina
Phacelia aramosissima
Phacelia argentea
Phacelia bicolor
Phacelia bolanderi
Phacelia capitata
Phacelia corymbosa
Phacelia crenulata
Phacelia franklinii
Phacelia fremontii
Phacelia frigida
Phacelia glandulosa
Phacelia hastata
Phacelia heterophylla
Phacelia humilis
Phacelia idahoensis
Phacelia incana
Phacelia inconspicua
Phacelia inundata
Phacelia ivesiana
Phacelia lenta
Phacelia leonis
Phacelia linearis
Phacelia lutea
Phacelia lyallii
Phacelia malvaefolia
Phacelia minutissima
Phacelia mutabilis
Phacelia nemoralis
Phacelia peckii
Phacelia procera
Phacelia ramosissima
Phacelia rattanii
Phacelia scopulina
Phacelia sericea
Phacelia tanacetifolia
Phacelia tetramera
Phacelia thermalis
Phacelia verna
Phacelia virgata
Phalaris aquatica
Phalaris arundinacea
Phalaris californica
Phalaris canariensis
Phalaris caroliniana
Phalaris minor
Phalaris paradoxa
Phaseolus coccineus
Phaseolus vulgaris
Philadelphus gordonianus
Philadelphus lewisii
Philadelphus oreganus
Philadelphus pubescens
Philadelphus trichothecus
Philostemon radicans
Phippsia algida
Phleum alpinum
Phleum boehmeri
Phleum phleoides
Phleum pratense
Phlomis tuberosa
Phlox aculeata
Phlox adsurgens
Phlox albomarginata
Phlox alyssifolia
Phlox andicola
Phlox austromontana
Phlox bryoides
Phlox caespitosa
Phlox caroliniensis
Phlox colubria
Phlox colubrina
Phlox diffusa
Phlox exuata
Phlox gracilis
Phlox hendersonii
Phlox hirsuta
Phlox hoodii
Phlox idahonis
Phlox kelseyi
Phlox linearifolia
Phlox longifolia
Phlox multiflora
Phlox musciodes
Phlox paniculata
Phlox peckii
Phlox pilosa
Phlox pungens
Phlox speciosa
Phlox variabilis
Phlox viscida
Phoenicaulis cheiranthoides
Phoradendron bolleanum
Phoradendron juniperinum
Phragmites australis
Phryma leptostachya
Phyllanthus caroliniensis
Phyllodoce X intermedia
Phyllodoce empetriformis
Phyllodoce glanduliflora
Phyllospadix scouleri
Physalis hederaefolia
Physalis heterophylla
Physalis ixocarpa
Physalis longifolia
Physalis peruviana
Physalis philadelphica
Physalis pruinosa
Physalis pubescens
Physalis pumila
Physalis wrightii
Physaria acutifolia
Physaria alpestris
Physaria brassicoides
Physaria chambersii
Physaria condensata
Physaria didymocarpa
Physaria dornii
Physaria eburniflora
Physaria geyeri
Physaria integrifolia
Physaria oregona
Physaria saximontana

Physocarpus alternans
Physocarpus capitatus
Physocarpus malvaceus
Physocarpus monogynus
Physocarpus opulifolius
Physostegia ledinghamii
Physostegia parviflora
Physostegia virginiana
Phytolacca americana
Picea abies
Picea breweriana
Picea engelmannii
Picea glauca
Picea pungens
Picea sitchensis
Picradeniopsis oppositifolia
Picradeniopsis woodhousei
Picris echioides
Picris hieracoides
Pieris japonica
Pilea fontana
Pilea pumila
Pilularia americana
Pimpinella anisum
Pimpinella saxifraga
Pinguicula vulgaris
Pinus albicaulis
Pinus attenuata
Pinus banksiana
Pinus contorta
Pinus flexilis
Pinus jefferyi
Pinus lambertiana
Pinus monophylla
Pinus monticola
Pinus nigra
Pinus ponderosa
Pinus radiata
Pinus sabiniana
Pinus sylvestris
Pinus thunbergiana
Pinus wallichiana
Pisum satvium
Pityopus californica
Pityrogramma triangularis
Plagiobothrys figuratus
Plagiobothrys greenei
Plagiobothrys harknessii
Plagiobothrys hirtus
Plagiobothrys hispidus
Plagiobothrys lamprocarpus
Plagiobothrys leptocladus
Plagiobothrys mollis
Plagiobothrys nothofulvus
Plagiobothrys reticulatus
Plagiobothrys scouleri
Plagiobothrys shastensis
Plagiobothrys tenellus
Plagiobothrys tener
Plantago aristata
Plantago asiatica
Plantago canescens
Plantago elongata
Plantago eriopoda
Plantago galeattiana
Plantago hirtella
Plantago lanceolata
Plantago macrocarpa
Plantago major
Plantago maritima
Plantago patagonica
Plantago rugelii
Plantago tweedyi
Platanthera chorisiana
Platanthera praeclara
Platanthera sparsiflora
Platanus occidentalis
Platyschkuhria integrifolia
Platyspermum scapigerum
Plectritis ciliosa
Plectritis congesta
Plectritis macrocera
Pleuricospora fimbriolata
Pleuropogon davyi
Pleuropogon oregonus
Pleuropogon refractus
Poa abbreviata
Poa alpina
Poa annua
Poa arachnifera
Poa arctica
Poa arida
Poa bolanderi
Poa bulbosa
Poa compressa
Poa confinis
Poa curta
Poa curtifolia
Poa epilis
Poa fendleriana
Poa glauca
Poa glaucifolia
Poa howellii
Poa laxiflora
Poa leibergii
Poa leptocoma
Poa lettermanii
Poa longifolia
Poa longiligula
Poa macrantha
Poa macroclada
Poa marcida
Poa nervosa
Poa pachypholis
Poa palustris
Poa pattersonii
Poa paucispicula
Poa piperi
Poa pratensis
Poa pringlei
Poa reflexa
Poa rhizomata
Poa rupicola
Poa secunda
Poa stenantha
Poa suksdorfii
Poa sylvestris
Poa trivialis
Poa unilateralis
Poa vaseyochloa
Pogogyne zizyphoroides
Pogonia ophioglossoides
Polanisia jamesii
Polanisia trachysperma
Polemonium brandegei
Polemonium californicum
Polemonium carneum
Polemonium chartaceum
Polemonium elegans
Polemonium foliosissimum
Polemonium micranthum
Polemonium occidentale
Polemonium pectinatum
Polemonium pulcherrimum
Polemonium reptans
Polemonium viscosum
Polyctenium fremontii
Polygala alba
Polygala californica
Polygala sanguinea
Polygala senega
Polygala verticillata
Polygonatum biflorum
Polygonum achoreum
Polygonum amphibium
Polygonum argryocoleon
Polygonum aubertii
Polygonum austiniae
Polygonum aviculare
Polygonum bistortoides
Polygonum californicum
Polygonum cascadense

Polygonum coccineum
Polygonum confertiflorum
Polygonum convolvulus
Polygonum cuspidatum
Polygonum davisiae
Polygonum douglasii
Polygonum erectum
Polygonum fowleri
Polygonum heterosepalum
Polygonum hydropiper
Polygonum hydropiperoides
Polygonum kelloggii
Polygonum lapathifolium
Polygonum majus
Polygonum minimum
Polygonum montanum
Polygonum newberryi
Polygonum nudum
Polygonum nuttallii
Polygonum orientale
Polygonum paronychia
Polygonum parryi
Polygonum pensylvanicum
Polygonum persicaria
Polygonum phytolaccaefolium
Polygonum polycnemoides
Polygonum polygaloides
Polygonum polystachyum
Polygonum punctatum
Polygonum ramosissimum
Polygonum sachalinense
Polygonum sagittatum
Polygonum sawatchense
Polygonum scandens
Polygonum spergulariaeforme
Polygonum tenue
Polygonum viviparum
Polygonum watsonii
Polypodium glycyrrhiza
Polypodium hesperium
Polypodium scouleri
Polypodium virginianum
Polypogon distans
Polypogon glomeratus
Polypogon interruptus
Polypogon monspeliensis
Polystichum andersonii
Polystichum braunii
Polystichum californicum
Polystichum kruckebergii
Polystichum lemmonii
Polystichum lonchitis
Polystichum mohrioides
Polystichum munitum
Polystichum scopulinum
Poncirus trifoliata
Ponista oregonensis
Populus X acuminata
Populus X brayshawii
Populus X canadensis
Populus alba
Populus angustifolia
Populus balsamifera
Populus deltoides
Populus fremontii
Populus tremuloides
Porterella carnosula
Portulaca oleracea
Potamogeton alpinus
Potamogeton amplifolius
Potamogeton berchtoldii
Potamogeton crispus
Potamogeton diversifolius
Potamogeton epihydrus
Potamogeton filiformis
Potamogeton foliosus
Potamogeton friesii
Potamogeton gramineus
Potamogeton illinoensis
Potamogeton natans
Potamogeton nodosus
Potamogeton obtusifolius
Potamogeton pauciflorus
Potamogeton pectinatus
Potamogeton praelongus
Potamogeton pusillus
Potamogeton richardsonii
Potamogeton robbinsii
Potamogeton strictifolius
Potamogeton vaginatus
Potamogeton zosteriformis
Potentilla anserina
Potentilla argentea
Potentilla arguta
Potentilla bakeri
Potentilla biennis
Potentilla blaschkeana
Potentilla brevifolia
Potentilla breweri
Potentilla cascadensis
Potentilla concinna
Potentilla corymbosa
Potentilla cottamii
Potentilla diversifolia
Potentilla drummondii
Potentilla etomentosa
Potentilla fastigiata
Potentilla fissa
Potentilla flabellifolia
Potentilla fruticosa
Potentilla glabrata
Potentilla glandulosa
Potentilla glaucophylla
Potentilla gracilis
Potentilla hippiana
Potentilla hookeriana
Potentilla nepalensis
Potentilla newberryi
Potentilla nivea
Potentilla norvegica
Potentilla ovina
Potentilla pacifica
Potentilla palustris
Potentilla paradoxa
Potentilla pensylvanica
Potentilla permollis
Potentilla plattensis
Potentilla pumila
Potentilla quinquefolia
Potentilla recta
Potentilla rhomboidea
Potentilla rivalis
Potentilla rubricaulis
Potentilla tridentata
Potentilla uniflora
Potentilla valida
Potentilla villosa
Prenanthes alata
Prenanthes alba
Prenanthes aspera
Prenanthes racemosa
Prenanthes sagittata
Primula alcalina
Primula cusickiana
Primula incana
Primula parryi
Primula wilcoxiana
Prinspeia uniflora
Proboscidea louisianica
Prosartes hookeri
Prunella vulgaris
Prunus americana
Prunus armeniaca
Prunus avium
Prunus cerasifera
Prunus cerasus
Prunus domestica
Prunus emarginata
Prunus fruticosa
Prunus glandulosa
Prunus laurocerasus
Prunus lusitanica

Prunus mahaleb
Prunus padus
Prunus pensylvanica
Prunus persica
Prunus prunifolia
Prunus pumila
Prunus spinosa
Prunus subcordata
Prunus tomentosa
Prunus virginiana
Pseudelymus X saxicola
Pseudotsuga menziesii
Pseudotsuga taxifolia
Psilocarphus brevissimus
Psilocarphus elatior
Psilocarphus oregonus
Psilocarphus tenellus
Psilostrophe bakeri
Psoralea argophylla
Psoralea cuspidata
Psoralea esculenta
Psoralea hypogaea
Psoralea lanceolata
Psoralea linearifolia
Psoralea physodes
Psoralea tenuiflora
Pteretis spicant
Pteridium aquilinum
Pterospora andromedea
Pteryxia petraea
Puccinellia airoides
Puccinellia cusickii
Puccinellia distans
Puccinellia lemmonii
Puccinellia maritima
Puccinellia nutkaensis
Puccinellia nuttalliana
Puccinellia pauciflora
Puccinellia pumila
Purshia mexicana
Purshia tridentata
Pycanthemum californicum
Pycnanthemum virginianum
Pyrola aphylla
Pyrola asarifolia
Pyrola chlorantha
Pyrola dentata
Pyrola elliptica
Pyrola minor
Pyrola pallida
Pyrola picta
Pyrola rotundifolia
Pyrola secunda
Pyrola uniflora
Pyrrocoma lanceolata
Pyrus calleryana
Pyrus communis
Pyrus ioensis
Pyrus malus
Pyrus sylvestris
Quamasia azurea
Quercus bicolor
Quercus chrysolepis
Quercus garryana
Quercus kelloggii
Quercus macrocarpa
Quercus morehus
Quercus robur
Quercus sadleriana
Quercus vaccinifolia
Raillardella argentea
Raillardella scaposa
Rainiera stricta
Ranunculus abortivus
Ranunculus acriformis
Ranunculus acris
Ranunculus alismaefolius
Ranunculus andersonii
Ranunculus aquatilis
Ranunculus arvensis
Ranunculus bongardii
Ranunculus bulbosus
Ranunculus californicus
Ranunculus cardiophyllus
Ranunculus cooleyae
Ranunculus cymbalaria
Ranunculus douglasii
Ranunculus eschscholtzii
Ranunculus ficaria
Ranunculus flabellaris
Ranunculus flammula
Ranunculus gelidus
Ranunculus glaberrimus
Ranunculus gmelinii
Ranunculus gormanii
Ranunculus hebecarpus
Ranunculus hispidus
Ranunculus hyperboreus
Ranunculus inamoenus
Ranunculus intertextus
Ranunculus jovis
Ranunculus lobbii
Ranunculus macounii
Ranunculus muricatus
Ranunculus natans
Ranunculus occidentalis
Ranunculus oresterus
Ranunculus orthorhynchus
Ranunculus parviflorus
Ranunculus pedatifidus
Ranunculus pensylvanicus
Ranunculus populago
Ranunculus purshii
Ranunculus pygmaeus
Ranunculus reconditus
Ranunculus recurvatus
Ranunculus repens
Ranunculus reptans
Ranunculus rhomboideus
Ranunculus sceleratus
Ranunculus subrigidus
Ranunculus testiculatus
Ranunculus unalaschensis
Ranunculus uncinatus
Ranunculus verecundus
Raphanus raphanistrum
Raphanus sativus
Ratibida columnifera
Ratibida pinnata
Redfieldia flexuosa
Reseda lutea
Rhamnus alnifolia
Rhamnus californica
Rhamnus cathartica
Rhamnus davurica
Rhamnus frangula
Rhamnus purshiana
Rheum rhabarbarum
Rhinanthus crista-galli
Rhododendron albiflorum
Rhododendron macrophyllum
Rhododendron occidentale
Rhus copallina
Rhus diversiloba
Rhus glabra
Rhus quercifolia
Rhus trilobata
Rhus typhina
Rhynchospora alba
Rhynchospora capillacea
Rhysopterus plurijugus
Ribes acerifolium
Ribes alpinum
Ribes americanum
Ribes aureum
Ribes binominatum
Ribes bracteosum
Ribes cereum
Ribes cognatum
Ribes cruentum
Ribes cynosbati
Ribes divaricatum

Ribes erythrocarpum
Ribes gooddingii
Ribes hendersonii
Ribes hirtellum
Ribes howellii
Ribes hudsonianum
Ribes indecorum
Ribes inerme
Ribes irriguum
Ribes klamathense
Ribes lacustre
Ribes laxiflorum
Ribes lobbii
Ribes marshallii
Ribes menziesii
Ribes missouriense
Ribes mogollonicum
Ribes montigenum
Ribes nevadense
Ribes nigrum
Ribes niveum
Ribes oxyacanthoides
Ribes petiolare
Ribes reniforme
Ribes sanguineum
Ribes sativum
Ribes setosum
Ribes triste
Ribes velutinum
Ribes viscosissimum
Ribes watsonianum
Ribes wolfii
Ricinus communis
Rigiopappus leptocladus
Robinia hispida
Robinia pseudo-acacia
Robinia viscosa
Romanzoffia californica
Romanzoffia sitchensis
Romanzoffia suksdorfii
Romanzoffia thompsonii
Romanzoffia tracyi
Rorippa austriaca
Rorippa calycina
Rorippa curvipes
Rorippa lyrata
Rorippa palustris
Rorippa sinuata
Rorippa sylvestris
Rorippa tenerrima
Rorippa truncata
Rosa acicularis
Rosa arkansana
Rosa blanda
Rosa californica
Rosa canina
Rosa eglanteria
Rosa gymnocarpa
Rosa multiflora
Rosa nutkana
Rosa pisocarpa
Rosa pyrifera
Rosa spaldingii
Rosa spithamea
Rosa ultramontana
Rosa virginiana
Rosa woodsii
Rotala ramosior
Rottboellia cochinchinensis
Rottboellia exaltata
Rubus acaulis
Rubus bartonianus
Rubus chamaemorus
Rubus discolor
Rubus fruiticosus
Rubus hesperius
Rubus idaeus
Rubus laciniatus
Rubus lasiococcus
Rubus leucodermis
Rubus macropetalus
Rubus macrophyllus
Rubus moluccanus
Rubus nigerrimus
Rubus nivalis
Rubus occidentalis
Rubus parviflorus
Rubus pedatus
Rubus procerus
Rubus pubescens
Rubus spectabilis
Rubus strigosus
Rubus thrysanthus
Rubus ursinus
Rubus vestitus
Rudbeckia alpicola
Rudbeckia californica
Rudbeckia hirta
Rudbeckia laciniata
Rudbeckia nitida
Rudbeckia occidentalis
Rumex acetosa
Rumex acetosella
Rumex altissimus
Rumex aquaticus
Rumex conglomeratus
Rumex crispus
Rumex cuneifolius
Rumex densiflorus
Rumex domesticus
Rumex maritimus
Rumex obtusifolius
Rumex occidentalis
Rumex orbiculatus
Rumex patientia
Rumex paucifolius
Rumex persicarioides
Rumex pulcher
Rumex salicifolius
Rumex sanguineus
Rumex stenophyllus
Rumex venosus
Ruppia maritima
Ruppia occidentalis
Ruscus hypoglossum
Saccharum spontaneum
Sagina apetala
Sagina crassicaulis
Sagina nivalis .
Sagina occidentalis
Sagina procumbens
Sagina saginoides
Sagittaria arifolia
Sagittaria brevirostra
Sagittaria calycina
Sagittaria cuneata
Sagittaria graminea
Sagittaria latifolia
Sagittaria montevidensis
Sagittaria sagittifolia
Sairocarpus kingii
Salicornia europaea
Salicornia rubra
Salicornia virginica
Salix X clarkei
Salix alba
Salix amygdaloides
Salix arctica
Salix argophylla
Salix babylonica
Salix barclayi
Salix barrattiana
Salix bebbiana
Salix boothii
Salix brachycarpa
Salix candida
Salix cascadensis
Salix caudata
Salix commutata
Salix coulteri
Salix delnortensis
Salix discolor

Salix drummondiana
Salix eastwoodiae
Salix eriocephala
Salix exigua
Salix farriae
Salix fluviatilis
Salix fragilis
Salix geyeriana
Salix glauca
Salix hindsiana
Salix hookeriana
Salix humilis
Salix jepsonii
Salix laevigata
Salix lasiandra
Salix lasiolepis
Salix lemmoni
Salix lemmonii
Salix lucida
Salix lutea
Salix maccalliana
Salix mackenzieana
Salix monochroma
Salix nivalis
Salix parksiana
Salix pedicellaris
Salix pentandra
Salix petiolaris
Salix petrophila
Salix piperi
Salix planifolia
Salix pseudocordata
Salix pseudomonticola
Salix rigida
Salix rotundifolia
Salix scouleriana
Salix serissima
Salix sessilifolia
Salix sitchensis
Salix tracyi
Salix tweedyi
Salix vestita
Salix wolfii
Salsola collina
Salsola iberica
Salsola vermiculata
Salvia X sylvestris
Salvia aethiopis
Salvia carnosa
Salvia dorrii
Salvia microphylla
Salvia nemorosa
Salvia officinalis
Salvia pratensis
Salvia reflexa
Salvia sclarea
Salvinia auriculata
Salvinia biloba
Salvinia herzogii
Salvinia molesta
Sambucus arborescens
Sambucus callicarpa
Sambucus canadensis
Sambucus cerulea
Sambucus glauca
Sambucus melanocarpa
Sambucus racemosa
Samolus parviflorus
Sanguinaria canadensis
Sanguisorba annua
Sanguisorba menziesii
Sanguisorba microcephala
Sanguisorba minor
Sanguisorba officinalis
Sanguisorba sitchensis
Sanicula arctopoides
Sanicula bipinnatifida
Sanicula canadensis
Sanicula crassicaulis
Sanicula graveolens
Sanicula gregaria
Sanicula laciniata
Sanicula marilandica
Sanicula peckiana
Sanicula septentrionalis
Sanicula tracyi
Sanicula tuberosa
Saponaria ocymoides
Saponaria officinalis
Sarcobatus vermiculatus
Sarcococca hookerana
Sarcococca hookeriana
Sarcodes sanguinea
Satureja acinos
Satureja douglasii
Satureja vulgaris
Saussurea americana
Saussurea densa
Saussurea weberi
Saxifraga adscendens
Saxifraga aequidentata
Saxifraga aestivalis
Saxifraga aizoides
Saxifraga apetala
Saxifraga arguta
Saxifraga austromontana
Saxifraga bongardii
Saxifraga bronchialis
Saxifraga bryophora
Saxifraga caespitosa
Saxifraga californica
Saxifraga cernua
Saxifraga cherlerioides
Saxifraga chrysantha
Saxifraga columbiana
Saxifraga debilis
Saxifraga ferruginea
Saxifraga flagellaris
Saxifraga foliolosa
Saxifraga fragarioides
Saxifraga fragosa
Saxifraga hieracifolia
Saxifraga howellii
Saxifraga incompta
Saxifraga integrifolia
Saxifraga jamesii
Saxifraga lyallii
Saxifraga marshallii
Saxifraga mertensiana
Saxifraga nuttallii
Saxifraga occidentalis
Saxifraga oppositifolia
Saxifraga oregana
Saxifraga parvifolia
Saxifraga peltata
Saxifraga punctata
Saxifraga ranunculifolia
Saxifraga reflexa
Saxifraga rhomboidea
Saxifraga rivularis
Saxifraga rufidula
Saxifraga subapetala
Saxifraga tempestiva
Saxifraga tischii
Saxifraga tolmiei
Saxifraga tricuspidata
Saxifragopsis fragarioides
Scabiosa atropurpurea
Scandix pecten-veneris
Schedonnardus paniculatus
Scheuchzeria palustris
Schizachne purpurascens
Schoenocrambe linifolia
Schoenolirion album
Schoenolirion bracteosum
Schrankia nuttallii
Scilla siberica
Scirpus acutus
Scirpus atrovirens
Scirpus cernuus
Scirpus cespitosus
Scirpus congdonii

Scirpus criniger
Scirpus cyperinus
Scirpus fluviatilis
Scirpus hallii
Scirpus heterochaetus
Scirpus hudsonianus
Scirpus maritimus
Scirpus microcarpus
Scirpus nevadensis
Scirpus pallidus
Scirpus pauciflorus
Scirpus pendulus
Scirpus pumilus
Scirpus pungens
Scirpus setaceus
Scirpus subterminalis
Scirpus validus
Scleranthus annuus
Sclerochloa dura
Scleropoa rigida
Scoliopus hallii
Scolochloa festucacea
Scorzonera hispanica
Scorzonera laciniata
Scribneria bolanderi
Scrophularia californica
Scrophularia lanceolata
Scutellaria angustifolia
Scutellaria antirrhinoides
Scutellaria epilobiifolia
Scutellaria galericulata
Scutellaria lateriflora
Scutellaria nana
Scutellaria parvula
Scutellaria tuberosa
Secale cereale
Sedum acre
Sedum debile
Sedum divergens
Sedum glanduliferum
Sedum lanceolatum
Sedum laxum
Sedum leibergii
Sedum lineare
Sedum moranii
Sedum oblanceolatum
Sedum oreganum
Sedum oregonense
Sedum purdyi
Sedum purdyitilis
Sedum radiatum
Sedum rhodanthum
Sedum rosea
Sedum spathulifolium
Sedum spectabile
Sedum stenopetalum
Sedum telephium
Sedum watsoni
Selaginella densa
Selaginella douglasii
Selaginella oregana
Selaginella rupestris
Selaginella selaginoides
Selaginella wallacei
Selaginella watsonii
Senecio amplectens
Senecio aronicoides
Senecio atratus
Senecio aureus
Senecio bolanderi
Senecio canus
Senecio clarkianus
Senecio columbianus
Senecio condensatus
Senecio congestus
Senecio crassulus
Senecio cymbalarioides
Senecio debilis
Senecio dimorphophyllus
Senecio elmeri
Senecio eremophilus
Senecio etterae
Senecio eurycephalus
Senecio fendleri
Senecio flavulus
Senecio flettii
Senecio foetidus
Senecio fremontii
Senecio fuscatus
Senecio hesperius
Senecio howellii
Senecio hydrophiloides
Senecio hydrophilus
Senecio hyperborealis
Senecio indecorus
Senecio integerrimus
Senecio integrifolius
Senecio jacobaea
Senecio laetiflorus
Senecio liguliflorus
Senecio ligulifolius
Senecio lugens
Senecio macounii
Senecio megacephalus
Senecio mikanoides
Senecio multilobatus
Senecio neowebsteri
Senecio pauciflorus
Senecio pauperculus
Senecio plattensis
Senecio porteri
Senecio pseudaureus
Senecio purshianus
Senecio rapifolius
Senecio resedifolius
Senecio riddellii
Senecio serra
Senecio sonnei
Senecio spartioides
Senecio sphaerocephalus
Senecio streptanthifolius
Senecio subnudus
Senecio sylvaticus
Senecio triangularis
Senecio tridenticulatus
Senecio tweedyi
Senecio uintahensis
Senecio viscosus
Senecio vulgaris
Senecio websteri
Senecio werneriaefolius
Sequoia sempervirens
Serapias austinae
Sesuvium verrucosum
Setaria glauca
Setaria italica
Setaria pallide-fusca
Setaria verticillata
Setaria viridis
Setcreasea pallida
Shepherdia argentea
Shepherdia canadensis
Sherardia arvensis
Shinnersoseris rostrata
Shoshonea pulvinata
Sibbaldia procumbens
Sicyos angulatus
Sida hederacea
Sidalcea campestris
Sidalcea crenulata
Sidalcea cusickii
Sidalcea eximia
Sidalcea glaucescens
Sidalcea hendersonii
Sidalcea hirtipes
Sidalcea malachroides
Sidalcea malviflora
Sidalcea nelsoniana
Sidalcea neomexicana
Sidalcea oregana
Sidalcea ranunculacea
Sidalcea setosa

Sidalcea spicata
Sidalcea virgata
Sideritis montana
Sildacea candida
Silene acaulis
Silene antirrhina
Silene armeria
Silene californica
Silene campanulata
Silene columbiana
Silene conoidea
Silene cserei
Silene dichotoma
Silene douglasii
Silene gallica
Silene grayi
Silene hitchguirei
Silene hookeri
Silene ingrami
Silene latifolia
Silene lemmonii
Silene lyallii
Silene macounii
Silene menziesii
Silene montana
Silene multicaulis
Silene noctiflora
Silene oregana
Silene parryii
Silene repens
Silene scaposa
Silene scouleri
Silene seelyi
Silene spaldingii
Silene suksdorfii
Silene vulgaris
Silphium laciniatum
Silphium perfoliatum
Silybum marianum
Sisymbrium altissimum
Sisymbrium irio
Sisymbrium loeselii
Sisymbrium officinale
Sisyrinchium bellum
Sisyrinchium californicum
Sisyrinchium campestre
Sisyrinchium douglasii
Sisyrinchium halophilum
Sisyrinchium hendersonii
Sisyrinchium hitchcockii
Sisyrinchium idahoense
Sisyrinchium inflatum
Sisyrinchium montanum
Sisyrinchium mucronatum
Sisyrinchium pallidum
Sisyrinchium sarmentosum
Sisyrinchium septentrionale
Sitanion hanseni
Sitanion hordeoides
Sitanion hystrix
Sitanion jubatum
Sitanion longifolium
Sium suave
Skimmia japonica
Smelowskia calycina
Smelowskia fremontii
Smelowskia ovalis
Smilacina racemosa
Smilacina sessilifolia
Smilacina stellata
Smilax californica
Smilax ecirrhata
Smilax herbacea
Smilax jamesii
Sobaria sorbifolia
Solanum aviculare
Solanum carolinense
Solanum dulcamara
Solanum elaeagnifolium
Solanum furcatum
Solanum interius
Solanum melanocercasum
Solanum melongena
Solanum muricatum
Solanum muticum
Solanum nigrum
Solanum parishii
Solanum physalifolium
Solanum pseudo-capsicum
Solanum rostratum
Solanum sarrachoides
Solanum sisymbriifolium
Solanum torvum
Solanum triflorum
Solanum tuberosum
Solanum umbelliferum
Solanum xantii
Solidago californica
Solidago canadensis
Solidago ciliosa
Solidago decumbens
Solidago flexicaulis
Solidago gigantea
Solidago glutinosa
Solidago graminifolia
Solidago gymnospermoides
Solidago missouriensis
Solidago mollis
Solidago multiradiata
Solidago nana
Solidago nemoralis
Solidago occidentalis
Solidago parryi
Solidago ptarmicoides
Solidago riddellii
Solidago rigida
Solidago scopulorum
Solidago simplex
Solidago sparsiflora
Solidago spathulata
Solidago speciosa
Solidago spectabilis
Soliva pterosperma
Sonchus arvensis
Sonchus asper
Sonchus oleraceus
Sophia parviflora
Sophora arizonica
Sophora japonica
Sophora leachiana
Sophora secundiflora
Sorbus aria
Sorbus aucuparia
Sorbus cascadensis
Sorbus dumosa
Sorbus hybrida
Sorbus intermedia
Sorbus occidentalis
Sorbus sambucifolia
Sorbus scopulina
Sorbus sitchensis
Sorghastrum nutans
Sorghum alum
Sorghum bicolor
Sorghum halepense
Sorghum sudanense
Sparganium androcladum
Sparganium angustifolium
Sparganium chlorocarpum
Sparganium emersum
Sparganium erectum
Sparganium eurycarpum
Sparganium fluctuans
Sparganium minimum
Sparganium simplex
Spartina alterniflora
Spartina anglica
Spartina gracilis
Spartina patens
Spartina pectinata
Spartium junceum
Spartium scoparium

Spergula arvensis
Spergularia canadensis
Spergularia diandra
Spergularia macrotheca
Spergularia marina
Spergularia media
Spergularia rubra
Sphaeralcea angustifolia
Sphaeralcea coccinea
Sphaeralcea emoryi
Sphaeralcea grossulariifolia
Sphaeralcea longisepala
Sphaeralcea munroana
Sphaeralcea parvifolia
Sphaeralcea rivularis
Sphaeromeria argentea
Sphaeromeria capitata
Sphaeromeria potentilloides
Sphaerophysa salsula
Sphenopholis obtusata
Sphenosciadium capitellatum
Spinacea oleracea
Spiraea X arguta
Spiraea X bumalda
Spiraea X pyramidata
Spiraea X vanhoutei
Spiraea alba
Spiraea arbuscula
Spiraea betulifolia
Spiraea densiflora
Spiraea douglasii
Spiraea japonica
Spiraea lucida
Spiraea menziesii
Spiraea pikowensis
Spiraea pyramidata
Spiraea roseata
Spiranthes cernua
Spiranthes magnicamporum
Spiranthes porrifolia
Spiranthes romanzoffiana
Spirodela polyrhiza
Sporobolus airoides
Sporobolus asper
Sporobolus cryptandrus
Sporobolus heterolepis
Sporobolus neglectus
Sporobolus vaginiflorus
Spraguea nuda
Spraguea umbellata
Stachys albens
Stachys byzantica
Stachys ciliata
Stachys cooleyae
Stachys mexicana
Stachys palustris
Stachys rigida
Stachys scopulorum
Stachys tenuifolia
Stanleya confertiflora
Stanleya confertifolia
Stanleya pinnata
Stanleya tomentosa
Stanleya viridiflora
Steironema ciliatum
Steironema lanceolatum
Stellaria americana
Stellaria borealis
Stellaria calycantha
Stellaria crassifolia
Stellaria crispa
Stellaria graminea
Stellaria humifusa
Stellaria jamesiana
Stellaria laeta
Stellaria longifolia
Stellaria longipes
Stellaria media
Stellaria nitens
Stellaria obtusa
Stellaria simcoei
Stellaria umbellata
Stenanthium occidentale
Stenogonum salsuginosum
Stenosiphon linifolius
Stephanie macho
Stephanomeria exigua
Stephanomeria lactucina
Stephanomeria malheurensis
Stephanomeria paniculata
Stephanomeria runcinata
Stephanomeria tenuifolia
Stephanomeria virgata
Stipa columbiana
Stipa comata
Stipa curtiseta
Stipa elmeri
Stipa lemmonii
Stipa lettermanii
Stipa nevadensis
Stipa occidentalis
Stipa pinetorum
Stipa richardsonii
Stipa robustia
Stipa scribneri
Stipa spartea
Stipa speciosa
Stipa thurberiana
Stipa viridula
Stipa webberi
Stipa williamsii
Stiporyzopsis X bloomeri
Stratiotes aloides
Streptanthella longirostris
Streptanthus cordatus
Streptanthus glandulosus
Streptanthus howellii
Streptopus amplexifolius
Streptopus curvipes
Streptopus roseus
Streptopus streptopoides
Striga spp.
Strophostyles leiosperma
Stylocline filaginea
Stylocline psilocarphoides
Suaeda depressa
Suaeda diffusa
Suaeda maritima
Suaeda moquinii
Suaeda nigra
Suaeda occidentalis
Subularia aquatica
Suckleya suckleyana
Suksdorfia ranunculifolia
Suksdorfia violacea
Sullivantia hapemanii
Sullivantia oregana
Sullivantia purpusii
Swertia albicaulis
Swertia modocensis
Swertia perennis
Symphoricarpos acutus
Symphoricarpos albus
Symphoricarpos longiflorus
Symphoricarpos mollis
Symphoricarpos occidentalis
Symphoricarpos orbiculatus
Symphoricarpos oreophilus
Symphoricarpos rotundifolius
Symphoricarpos vaccinioides
Symphytum asperum
Symphytum officinale
Synthyris canbyi
Synthyris missurica
Synthyris pinnatifida
Synthyris platycarpa
Synthyris reniformis
Synthyris rubra
Synthyris schizantha
Synthyris stellata
Syringa villosa
Syringa vulgaris

Veronica wormskjoldii
Veronicastrum virginicum
Viburnum X burkwoodii
Viburnum acerifolium
Viburnum carlesii
Viburnum dilatatum
Viburnum edule
Viburnum ellipticum
Viburnum lanata
Viburnum lentago
Viburnum opulus
Viburnum pauciflorum
Viburnum rafinesquianum
Viburnum rhytidophyllum
Viburnum tinus
Vicia americana
Vicia californica
Vicia cracca
Vicia exigua
Vicia faba
Vicia gigantea
Vicia hirsuta
Vicia oregana
Vicia pannonica
Vicia sativa
Vicia tetrasperma
Vicia trifida
Vicia truncata
Vicia villosa
Viguiera multiflora
Vinca major
Viola adunca
Viola arvensis
Viola bakeri
Viola beckwithii
Viola canadensis
Viola cascadensis
Viola conspersa
Viola cuneata
Viola douglasii
Viola flavovirens
Viola flettii
Viola glabella
Viola hallii
Viola howellii
Viola lanceolata
Viola langsdorfii
Viola lobata
Viola macloskeyi
Viola montanensis
Viola nephrophylla
Viola nuttallii
Viola occidentalis
Viola ocellata
Viola odorata
Viola orbiculata
Viola palustris
Viola pedatifida
Viola pratincola
Viola pubescens
Viola purpurea
Viola quercetorum
Viola rafinesquii
Viola renifolia
Viola retroscabra
Viola selkirkii
Viola sempervirens
Viola septentrionalis
Viola sheltonii
Viola sororia
Viola trinervata
Viola uncinulata
Viola utahensis
Vitis californica
Vitis riparia
Vitis vinifera
Vitis vulpina
Waldsteinia idahoensis
Whipplea modesta
Wolffia columbiana
Wolffia punctata
Wolffiella floridana
Woodsia oregana
Woodsia scopulia
Woodsia scopulina
Woodwardia fimbriata
Wyethia X cusickii
Wyethia amplexicaulis
Wyethia angustifolia
Wyethia helenioides
Wyethia helianthoides
Wyethia mollis
Wyethia scabra
X Agrohordeum macounii
X Elyhordeum X macounii
X Elyhordeum X montanense
X Elyhordeum dakotense
X Elyleymus X aristatus
Xanthium affine
Xanthium saccharatum
Xanthium spinosum
Xanthium strumarium
Xerophyllum tenax
Xylorhiza glabriuscula
Yermo xanthocephalus
Yucca filamentosa
Yucca glauca
Zannichellia palustris
Zanthoxylum americanum
Zauschneria californica
Zauschneria latifolia
Zigadenus elegans
Zigadenus fremontii
Zigadenus micranthus
Zigadenus paniculatus
Zigadenus venenosus
Zizania aquatica
Zizia aptera
Zizia aurea
Zostera marina
Zostera nana
Zosterella dubia
Zoysia tenuifolia
Zygophyllum fabago