

A Floristic Study of Sun Lakes State Park in eastern Washington

Heron J Brae

January 21, 2011

Evergreen State College

Abstract

A vouchered species list of 275 vascular plants was compiled for the Sun Lakes State Park, a 4,027-acre park located in Grant County, Washington, east of the Cascades in the Columbia Basin. Native flora in the park makes up 87% of recorded species. Ninety-seven new collections were made in the spring of 2010, contributing 42 new species to the previous collections housed at the herbaria of University of Washington Burke Museum and the Evergreen State College. The Missoula floods of the last ice age uniquely carved the landscape approximately 15,000 years ago, leaving a mosaic of wetlands, shallow soils scoured from flood action, and large gravel bars, resulting in a heterogeneous landscape of high floristic diversity. The vegetation is dominated primarily by big sagebrush (*Artemisia tridentata*) and various perennial bunchgrasses such as bluebunch wheatgrass (*Agropyron spicatum*). The park represents a relatively intact portion of the sagebrush steppe, a landscape that generally has been heavily impacted by development and agriculture.

Introduction

The Sun Lakes State Park is a unique landscape geologically and floristically, located in the channeled scablands of eastern Washington. It is an oasis within the dry sagebrush steppe typical of the Columbia Plateau, and is unique in its diverse and relatively intact habitats within such a small area. In fact, it has been considered “some of the highest quality examples of botanical and wetland resources remaining in eastern Washington” (Calypso Consulting 1997). The area has been used by centuries as foraging grounds for local Sinkayuse people. It was previously used for grazing and homesteading by Euro-Americans before it was designated a State Park. It is also the site of the dramatic Dry Falls, a giant cliff left as a remnant of giant glacial floods that swept through the area some 15,000 years ago. This paper describes the floristic community of the park, and includes a vouchered list of vascular plants observed. The geology, climate, history, land use, and vegetation patterns are also described.

Acquiring baseline floristic data for shrub-steppe ecosystems is important for informing management decisions, laying the groundwork for future research, and documenting an ecosystem that has suffered much loss of its original range due to land use conversion. The park is an example of a sizeable and relatively high quality shrub-steppe ecosystem. Invasive weeds in the park are mostly

relegated to sites of frequent disturbance, floristic diversity is high, and sagebrush in many places appears healthy with well-developed trunks, indicating a lack of frequent burning. The site hosts numerous high quality wetlands, which have not received much research attention in eastern Washington and merit study. It is within park management goals to sustain natural resources while balancing recreation needs, which points to the need for sound documentation of the floristic diversity, including that of both rare and disturbance associated plants, to assess the impact of recreation on the natural flora. Although significant botanical collections have occurred in the park dating back to the 1930's, and several rare plant surveyors have made plant lists based on their observations (Beck 1998, Visalli 2004), no attempt at a systematic documentation of the flora and review of this past research has been made until now.

The park is used for many recreational purposes and also provides educational opportunities for young children to graduate students as well as adult learners in fields such as ecology, botany, geology, and geography. The unique environment and geologic history of this area supports a rich flora and fauna, with opportunities for interdisciplinary learning.

It is my hope that this study will prove useful for students, educators, managers, and both amateur and professional botanists and naturalists alike. It provides a verifiable record of plant species present at this time, as well as historically back to the 1930's, which is valuable for understanding changing landscapes due to climate change and the impact of human activity on the landscape. It could aid in assessment of distribution and diversity of park flora, understanding of vegetation patterns in relation to environmental factors, management decisions that might affect flora, as a classroom aid for visiting educational groups, and provide the amateur naturalist or hiker a localized reference for enjoying the natural flora.

This flora is a work in progress. Floristic research on the park will be continued by botany professor Frederica Bowcutt and her students at The Evergreen State College.

Location and Physical Geography

Sun Lakes State Park, formerly called the Dry Falls State Park, is a 4,027-acre recreation park situated in the Grand Coulee of central Washington, about 1 air mile southwest of Coulee City and Dry Falls Dam on the southern end of Banks Lake, in Grant county. It is located on the Coulee City and Park Lake 7.5 minute Quadrangles at Latitude 47°36'N, Longitude 119°21'W, primarily in T24N R28E sections 6, 7, 8, and 9, and R27E sections 1, 12, and 11 (see Fig. 1). Elevation ranges from about 1100 feet in the western portion near Park Lake to over 1600 feet in the eastern portion of the park on the mesa near Deep Lake (United States Geological Survey 1965). Public access is along WA Hwy 17,

which cuts through the northeastern corner of the park.

The Grand Coulee itself is a large canyon formed by massive glacial outburst floods, and extends from near Grand Coulee Dam, 32 miles northeast of Dry Falls, to the mouth at Soap Lake, some 17 miles to the south. It is naturally divided into “upper” and “lower” portions at Coulee City, where the walls of the coulee on both sides descend to the floor, creating a natural travel corridor that has been used for centuries. Within the park, the coulee is filled with numerous natural lakes formed from the digging action of the channeled floodwaters. These include four plunge pools at the base of the high wall of Dry Falls: Dry Falls Lake, Red Alkali Lake, Green Alkali Lake and Deep Lake. These lakes are now rainwater and in some cases spring fed, and create a large network of waterways within the park.

The topography of the park includes the wide, rolling floor of the coulee surrounded by the vertical basalt cliffs with talus slopes. On the northeastern side of the park is the majestic feature of Dry Falls, a massive dry waterfall that can be viewed from the public visitor’s center viewpoint on Highway 17. The park includes some land on the mesa tops surrounding the coulee. In the central portion of the coulee is Umatilla Rock, a remnant basalt “island” left by the flood waters, which stands around 1550 feet—the height of the surrounding cliffs—and forms a linear sliver nearly a mile long and 500 feet wide at its maximum point.

Geology

The entire Columbia Plateau was formed from numerous volcanic eruptions in the Miocene epoch, about 15 million years ago, after the formation of the Old Cascades and Rocky Mountains but prior to the formation of the High Cascades. These eruptions originated from fissures in the earth’s crust in southwest Washington and spread from a low seeping volcano all across southeastern Washington, most of eastern Oregon, and small portions of California and Idaho. The lava filled in the intermountain basin with numerous layers of black basalt each averaging 82.5 to 198 feet thick (Baker 1987). Each flow was punctuated by long periods of no volcanic activity, as seen by soil accumulation between the basalt layers built up from the tropical vegetation present at that time. Sometime after the Miocene lava flows and before the end of the last ice age about 15,000 years ago, fine wind-blown deposits called loess accumulated in dunes on top of the Columbia Plateau basalt. These are fertile soils are commonly used for agriculture outside the park boundary (Fig. 2). From within the Sun Lakes State Park, one can easily see the evidence of this geologic history in the layered basalt cliffs and the soft rolling shape of loess hills that lie to the north, above the rim of the coulee.

The Grand Coulee and Dry Falls were formed from the stupendous Missoula floods of the last ice age of the Pleistocene, between 16,000 and 12,000 years ago. These floods originated from the great

glacial Lake Missoula in western Montana when its ice dam failed and reformed repeatedly (Waitt 1987), releasing a wall of water across the more or less flat Columbia Plateau. This created what is known as “the Channeled Scablands” (Fig. 3). Lake Missoula is estimated to have held as much as 480 cubic miles of water (Baker 1987), which created a massive outburst as the dam broke, severely scouring the land of topsoil and digging a network of deep canyons, or coulees, in its path. The Grand Coulee is a spectacular feature of these wide-ranging channeled scablands of eastern Washington. The Dry Falls were created as the flood waters hit a weak fissure in the underlying basalt flows 17 miles to the south of its present location, at Soap Lake. The water eroded backwards to create a cliff 396 feet high and 3.3 miles wide, where it currently stands (Baker 1987).

As the floods eroded the underlying basalt, they scattered large boulders and churned up and gravel, depositing extensive gravel bars below the falls. They also deposited large amounts of the overlaying of loess in dips and eddies. This fine sediment also settled in large amounts in the backwaters where the flood slowed due to obstacles in its path, such as behind the Wallula Gap, and in the Willamette Valley of Oregon, creating fertile agricultural lands (Fig.3). Over time, crumbling of the basalt walls in the coulee has left extensive systems of talus slopes at the base of the cliffs. The resulting pattern of soils creates dramatic variation in a relatively small area within the coulee. Deep loamy-silty sediments are paired nearby extremely thin rocky soils (lithosols), scoured bedrock, gravel sediments, and areas dominated purely by boulders and rubble, all of which have a large effect on the floristic composition.

The mesa tops above the coulee walls are a complex pattern of “butte and basin” topography (Baker 1987), formed of swales and flat-topped plateaus shaped in the directional flow of the floods from the northeast. The tops of the mesas typically host a very different plant community from the coulee floor.

Climate

Sun Lakes State Park is found within the rain shadow of the Cascade Mountains. Climate is typically hot and dry in the summers with moderately cool winters and overall low rainfall. In the nearby town of Ephrata, WA, about 20 miles away to the SW, the average maximum daily temperature from 1949 to 2005 was 62° F, minimum temperature of 41° F. Average annual precipitation is 7.68 inches, with most of this occurring in the months of October through June (0.51”-1.18” a month). In the summer months of July-September, precipitation ranges from 0.25” to 0.33” a month. Average snowfall is 18.6 inches, all within the months of November to March (Western Regional Climate Center).

The growing season is mainly between April and June, when the temperature warms enough to allow plant growth, but ample moisture is still available before summer droughts and high temperatures increase evapotranspiration and cease most growth, triggering many plants to go into dormancy. Only those shrubs with large taproots may remain metabolically active. There seems to be an additional growing season in the fall when the temperatures cool and precipitation increases. The amount and timing of rainfall can have a major impact on the productivity in a given year, and the soil's ability to hold moisture may play a major role in determining plant distributions. It can also determine the abundance and diversity of annuals, because most annuals complete their growth cycle before the summer drought, quickly establishing and setting seed in the spring. Years with higher precipitation will replenish the subsurface water that will help supply perennial plants during the drier years (Daubenmire 1988).

Land use, past and present

Indigenous use—The Sinkayuse people, also known as the Moses-Columbias, were the local seasonal inhabitants of the Dry Falls area before European-American colonizers settled the area. In general, local people were nomadic and followed routes across the land based on seasonal availability of various food sources. They wintered on the rivers, and in spring they moved out to gathering grounds in the upland areas, such as Dry Falls, where they would set up temporary camps (Guy Moura pers. comm.). The Sinkayuse were removed from their traditional lives to the Columbia Reservation in 1879, but in 1883 that reservation was disbanded and they moved again onto the Colville Reservation, which is a confederation of many neighboring indigenous peoples (Miller 1998). The Colville Reservation currently has over nine thousand enrolled members, only about half of who live on the reservation (Confederated Tribes of the Colville 2000).

The landscape around Dry Falls is rich in useful plants. The arid environment has affected many plants to develop adaptations to store food and water during the dry season, such as large roots and bulbs. Many of these underground storage organs are starchy and edible and have significant cultural importance to the people of the area. People come to the area to gather roots in the spring. Primary traditional plant food sources of the regional tribes that are found in the park include various biscuit-roots (*Lomatium canbyi*, *L. farinosum*, *L. macrocarpum*), bitterroot (*Lewisia redeviva*) and camas (*Camasia quamash*). Other edible plants in the park significant to the First Peoples' diet include wild onions (*Allium* spp.), balsamroot (*Balsamorhiza* spp.), and false-agoseris (*Microseris troximoides*), among others (Hunn, Turner, and French 1998). Because of its many natural wetlands, the area is also

bountiful in supplies of tule rush (*Schoenoplectus acutus*), which is traditionally used for many things including mats and floats. Other rushes were also harvested for baskets (Guy Moura pers. comm.).

Fifteen prehistoric archaeological sites are found in the park, supporting evidence that this area was significant to the lives of local people for a long time (Washington State Parks and Recreation Commission 1997). Currently, indigenous people still use the surrounding area as harvesting grounds, particularly the Bureau of Land Management (BLM) uplands surrounding the park, and possibly within park boundaries (Guy Moura, pers. comm.). Traditional gathering grounds are within the park, and park planners have expressed interest in continuing conversation with the Colville Confederated tribes on “the continuance and/or reestablishment of access to these harvest areas for tribal members” (Washington State Parks and Recreation Commission 1997). Tribal authorities currently have monitoring authority over undisclosed cultural sites in the park in coordination with park archaeologists, and should be consulted over the inventory, monitoring, assessment, and management for the long-term protection of Native American cultural sites (Davis 2003).

Settlement and Grazing— Livestock grazing began in the general region with cattle in 1834 and sheep in 1860 (Sullivan 1986). This was the principle economic industry from about the 1850’s to the 1880’s (Corridor Management Plan Committee 2005) and served to open up a formerly inhospitable landscape as a viable place to settle for Euro-Americans. The current Caribou Hiking Trail, which begins along the road to Deep Lake and extends up a slope on the southern coulee wall to the upper mesa, is a historic cattle trail. It was used to run cattle up to the upper mesas from the bottom of the coulee, and points to the park’s history of grazing. There are still remnants of barbed wire in the park that clearly once was used to fence cattle out of Delany Springs.

Grant County was opened up to homesteading during the 1880’s; during this time and into the early 20th century, many homesteads were established in the current park area below Dry Falls (Bureau of Land Management). In the general region, agriculture rather than stock raising became the primary means of economic development (Corridor Management Plan Committee 2005). Signs of at least one past homestead are visible on the road to Deep Lake, as evidenced by the foundation of a house and remnant row cropping, relic pear and apple trees, and old fencing and rock walls (Bowcutt, pers. Comm.). In 1920 the Federal Government deeded over 30,000 acres to Washington State in a patent that included much of the current park area (Bureau of Land Management).

Grazing continues on the upper mesas of the park, along the northeast rim, because no fence exists to exclude them from current cattle operations on neighboring land owned by the BLM and private parties, such as the private property including Rickard Lake, which borders Highway 17. Horses and signs of cattle have been observed on the mesa contiguous with Table Rock, showing particularly

obvious trails to watering holes and vernal moist swales. Livestock grazing is damaging to native flora as it compacts soils and brings in weed seeds that compete heavily with native plants. No history of native grazing animals is known for the Columbia Basin prior to Euro-American settlement, so the ecosystem has not evolved to withstand the heavy pressures imposed upon it by grazing cattle. When lands are overgrazed, we tend to see a “zootic climax” which reduces the landscape irreversibly to invasive annual grasses (Daubenmire 1988) (see section on weedy vegetation).

From Rangeland to State Park—The initial land acquisition for the park began in 1933, and ended in 1972 with a total of 15 parcels mostly purchased from The Bureau of Land Management and Department of Natural Resources, with approximately one third of the land acquired from private parties (Washington State Parks and Recreation Commission 1997).

After park acquisition, development began to serve the land’s new recreational function. In 1938, the Civilian Conservation Corps built mortared rock walls and a lookout feature over Dry Falls called the Vista House near the interpretive center off Highway 17 (Washington State Parks and Recreation Commission unpub. data). They also constructed a residence and water pump house, both just west of Highway 17. These features are now formally considered part of our cultural history. The interpretive center, which overlooks Dry Falls, was built in 1965 and is also designated as a historic location. Camp Delany Environmental Learning Center serves as a camp for visiting educational groups, and was constructed in 1956 (with addition of the kitchen in 1972) and includes a mess hall, a bathhouse, and eight sleeping cabins (Washington State Parks and Recreation Commission unpub. data). There is a privately owned golf course and resort located near Park Lake on the entrance road. The Golf course was established between 1952 when the pump house that irrigates the course was installed, and 1960 when the golf resort starter house was built. The majority of buildings at the Sun Lakes Park Resort were constructed in 1959 (Washington State Parks and Recreation Commission unpub. data). Two main paved roads in the park are the Park Lake Road, which enters the park at Highway 17 and curves around the south shore of Park lake, though the last mile of it is closed to motorized traffic. State Park Road connects with Park Lake Road and ends at Deep Lake. Gravel roads extend to Dry Falls Lake, and a private road connects to the State Campground past Vic Meyers Lake (Rainbow Lake), an old dumpsite, and a sewage treatment plant that processes waste from the resort and Camp Delany (Fig. 1).

The entire Grand Coulee is designated as a National Natural Landmark Property, and part of the larger Coulee Corridor National Scenic Byway, which covers 150 miles of state scenic highways, from Omak to Othello. In 1997 local residents and numerous state, tribal, and federal agencies came together to create a Corridor Management Plan to help with the development and preservation of the region and to increase local tourism for sustainable economic development. This project grew into the Coulee

Corridor Consortium in 1999, which is a non-profit organization dedicated to preserving, promoting, and protecting the corridor (Corridor Management Plan Committee 2005).

Current Management and Recreation—Presently, the park is managed to balance the needs of recreating public with natural and cultural resource conservation. Recreational activities supported at the park include camping, swimming, boating, hiking, fishing, interpretive viewing, and golfing. Environmental education is also a major management objective for the park. The Camp Delany Educational Learning Center currently hosts programs for all kinds of educational groups. In order to make the park a major destination for environmental education, the management plan states priorities in encouraging and expanding educational opportunities at Sun Lakes through networking with statewide organizations and individuals in the field. Increased natural history interpretation has been recommended on a park wide level to further this goal (Washington State Parks and Recreation Commission 1997).

The park has identified a future projected property boundary, which includes surrounding lands currently owned by other government agencies and private individuals. Expanding the park would greatly increase the amount of natural undeveloped area and most likely increase the floristic diversity within the park. In many cases cooperative management rather than outright ownership is the goal, and acquisitions are only to be made through willing sellers. Towards this goal, in 2002, the park purchased the 218-acre “McLeary Property”, which extends the park to the southwest along Park Lake (Grant County Maps), with funds provided by the Washington Wildlife and Recreation Program (Washington Wildlife and Recreation Program).

The park actively coordinates and cooperates with other government agencies to meet the goals of noxious weed and pest control, rare and threatened plant protection, wetland and natural native plant community protection, and recreational fishing. Land classification schemes developed for the park are designed to minimize impact of recreation on certain areas and concentrate it in others in order to preserve some areas for natural diversity. A new visitors center is being planned for the north rim off of Highway 17, to be built alongside the existing visitor’s center.

History of biological research

The notorious northwest botanist and explorer David Douglas was documented at Steamboat Rock State Park 30 miles to the north in 1826 (Grant County Historical Society), and in his journal he describes the plant life and geography of the Grand Coulee briefly, including what cannot be mistook for anything other than an alkaline lake so characteristic of the area (Douglas 1914).

J. W. Thompson made the first significant botanical collections in the park area in the early 1930's. The specimens he deposited at the University of Washington Herbarium at the Burke Museum (WTU) are cited within this flora. Theodore C. Frye, herbarium manager and predecessor to C. L. Hitchcock at the University of Washington, conducted his final summer botanical collection expedition to Dry Falls in 1937 (Howard 1963). Other notable collectors include H. T. Rogers in 1940 and Xerpha M. Gaines and Theo H. Scheffer from 1950 to 1952. Mark Schlessman visited the park in 1976 to collect lomatiums for taxonomic study. In 1962 R. W. Kiser compiled a small plant list of 53 species. Rare plant surveys were conducted by Nancy Wiedman in 1984 (Visalli 2004), Kathryn Beck (who collected with Florence Caplow) in 1998, and Dana Visalli with others in 2004. Collections were limited to the rare plants of focus on these trips, if any collections were made at all; however, both the latter surveys included a qualitative list of all vascular plants observed.

This project has long-term significance at The Evergreen State College in Olympia, Washington. Faculty member Frederica Bowcutt began collecting at Sun Lakes State Park in 2002. Through botany program activities at the site, multiple Evergreen students have contributed specimens to the herbaria at Evergreen (EVE) and the University of Washington (WTU). With Washington State Parks staff approval, plant taxonomy students collected in the park during the springs of 2002 and 2005. The Sun Lakes flora is a special collection focus of The Evergreen State College Herbarium, along with the Puget prairies and Evergreen campus floras.

The WTU also conducts forays to the site, and many collections have been acquired this way. Many of the collections from these trips remain un-mounted and un-catalogued at this time, and are not included in this study.

My research was conducted in April and May of 2010. The park was surveyed on and off trail by foot and from the road by vehicle. I have relied heavily on past collections for documentation of plants that bloom in other months and for areas that I was not able to survey due to time limitations.

Vegetation

The seven vegetation types identified in this study within the park are big sagebrush steppe, rigid sagebrush steppe, talus slopes, alkali flats, wetlands, riparian woodland, and weedy vegetation. I have used Daubenmire's (1988) habitat types as a guideline to interpret the subtleties within my more general physiognomic classifications. Daubenmire uses the term "habitat types" to describe all the area that does or could support the same climax plant community. The big sagebrush steppe, or *Artemisia tridentata*/*Agropyron spicatum* zone, is the primary climatic climax association of the park, and other associations are considered specialized habitats primarily under specialized edaphic influence.

Big Sagebrush Steppe—This zone is considered the standard-type vegetation for this climatic region, characterized by a lack of environmental extremes. It is the dominant vegetation type within the Columbia Plateau of Washington (Sullivan 1986), and within Sun Lakes State Park. It can be found in areas of moderate to deep soils, including the rolling coulee floor, edges of talus slopes, and on the mesa tops mostly in swales. In the park it is associated with loamy soils, and does not tolerate extreme thin soils, saline soils, soils dominated by gravel, or saturated soils of riparian areas and lakesides. Thus, the distribution of big sagebrush steppe is found in a mosaic with other vegetation types that can handle these extremes.

Big sagebrush steppe is characterized by an open shrub cover primarily of *Artemisia tridentata* (big sagebrush), interspersed with *Agropyron spicatum* (bluebunch wheatgrass) and other perennial bunchgrasses such as *Poa sandbergii*, *Sitanion hystrix*, *Stipa comata* and *S. thurberiana* (Fig. 4). Other shrubs occasionally interrupt the continuity of *Artemisia*, including *Tetradymia canescens*, *Chrysothamnus nauseosus*, *C. viscidiflorus* and *Eriogonum* spp. forming a lower layer. On rare occasion, individuals or small stands of *Salvia dorrii* and *Atriplex spinosa* are found. Prominent associated perennial herbs include *Lomatium macrocarpum*, *L. canbyi*, *L. triternatum*, with *L. dissectum* and *Balsamorhiza sagittata* found particularly on rocky outcrops below talus cliffs and on gravel bars. *Poa bulbosa*, an interesting non-native with vivipary (whereby the seeds germinate on the parent plant before dispersal), can also be found in abundance, particularly on thinner soils with *Poa sandbergii*.

Soil depth in this zone can have a dramatic range (Daubenmire 1988). Areas that host deeper soils will be better able to store larger amounts of water and should then be able to support larger vegetation. Also, the moist upper banks of lakes, north facing slopes, and swales or areas that receive increased runoff such as the base of cliffs or the sides of roads, should enjoy increased growth and larger statured sagebrush. These areas may also be the sites of moisture loving forbs such as *Lithophragma bulbifera*, *L. parviflora*, *Ranunculus glaberrimus* var. *glaberrimus*, and *Dodecatheon* spp.

The soil is often covered with small crustose lichens, bryophytes, algae, fungi, and cyanobacteria, collectively called cryptogams, which sometimes form a continuous layer over the soil and rocks. This cryptogamic crust helps to hold water in the soil, reduce erosion, and provides a medium for seed germination in an otherwise hostile environment. Depending on the composition of the crust, it can also improve soil fertility through fixation of gaseous nitrogen into a form useable to vascular plants by the resident bacteria (Fike 1997).

In areas with deep soils with low moisture holding capacity, dominated by sand or gravel, such as the large flood deposit gravel bars found on the coulee floor, the grass *Stipa comata* (needle-and-

thread) comes to dominate over *Agropyron* (Daubenmire 1988). These areas are floristically and physiognomically similar to the more common *Artemisia tridentata*/*Agropyron spicatum* association, except for the substitution of the grasses (Franklin and Dyrness 1973). It appears that *Stipa comata* is common in the park, but that its dominance occurs in moderate sized strips and patches within the *Agropyron spicatum* association, and otherwise it occurs as a common associate but not dominant.

The only rare plant to be found in this vegetation zone in the park is *Astragalus agrestis* (purple milkvetch), which grows in moist swales.

Stiff Sagebrush Steppe—Found strictly where conditions are too harsh for the more dominant big sagebrush steppe vegetation to tolerate, these areas are typically gravelly with extremely thin soils. These lithosols (“rock soils”) are the result of high velocity floodwaters scouring away the topsoil, often to expose patches of the underlying basalt bedrock. They are found in a mosaic pattern with the big sagebrush steppe, typically on the tops of mesas and convex portions of the rolling coulee floor. Mesa tops seem to host more extensive regions of this plant community where more basalt has been exposed as compared to the coulee floor.

Plant species found in this zone are generally adapted to extreme drought tolerance or use avoidance strategies, and they can handle extreme cold exposure in the winter. The woody plants are generally small in stature and equipped with thick leathery leaves or silvery reflective hairs to minimize water loss through transpiration and to cool the leaf through reflectance. Many herbaceous plants have large underground storage organs to hold water and starch during the dormant season, such as bulbs and taproots. Cryptogamic crusts may be particularly important to the plants in these areas because of the extremely thin soils and the roles it plays in holding moisture. Lithosol plants generally flower and reproduce early, from March through early May, and go dormant earlier to avoid summer drought.

The dominant shrub, *Artemisia rigida* (stiff sagebrush), is a small shrub in the family Asteraceae, growing up to 4 dm tall at its maximum (Hitchcock and Cronquist 1973). It has deciduous leaves that are aromatic, deeply three-cleft into linear segments, and covered with dense, short silvery hairs. The flower heads sit sessile in the leaf axils. Its associate *Poa sandbergii* (Sandberg’s bluegrass) is a small tufted bunchgrass usually 1.5-3 dm tall, with short linear leaves and a strong purple hue (Hitchcock and Cronquist 1973). The landscape is sparsely vegetated with small bunches of *P. sandbergii* and a very spread out open canopy of *A. rigida*.

Eriogonum thymoides (thyme-leaved buckwheat) is a low growing shrub with leathery involute leaves and yellow to pink clusters of flowers. It is often co-dominant or abundant with *A. rigida*, or can be dominant in the absence of *A. rigida*, and is found strictly within this zone. Multiple other *Eriogonum* species can be dominant on lithosols as well, or they can co-dominate with others (Franklin and Dyrness

1973). *Happlopappus stenophyllus* is a bright, scattered subshrub found in this zone, but few other shrubs find their home here. *Lomatium* spp. and *Allium* spp. are well-represented perennial herbs with high species diversity within this vegetation zone. As far as rare plants in this habitat, *Polygonum austinae* is a small annual knotweed of which its location in the park is the only known location from Washington, but it has not been located in recent inventories (Visalli 2004).

The ecotone between lithosolic communities and swales, particularly on mesa tops, yields a very interesting unique floristic mix of high diversity. *Delphinium nuttallianum* is found here, often under the shelter of the shrubs, as well as *Phlox longifolia*, *Cryptantha pterocarya*, *Astragalus* spp., *Phacelia linearis*, and *Antennaria dimorpha*.

Talus slopes—Talus slopes are found in abundance in the park, as rubble bordering the bases of all the tall basalt cliffs such as Dry Falls and Umatilla Rock (see Figs. 4 & 6). As the cliff erodes and crumbles the boulders accumulate at the base of the slopes in a 45° angle, the larger boulders collecting at the base. Lack of significant precipitation in the region means that the soil creation process from weathering rocks is very slow. Thus, very little soil is built up in these talus habitats, and so the moisture that falls on them seeps through the rocks and collects below. As a result very little vegetation can survive. What we see is fringes of shrubs called “garlands” that have well developed root systems that can reach deep into the talus where the water collects below. Annual grasses may also be found in places with some soil buildup, such as the tops of the talus slopes just below the cliffs, where the runoff from the cliffs is high and fine windblown material may gather. On the vertical cliffs, opportunistic forbs and grasses use the ground water moisture seeping out from between the soil layers in the basalt flows and can be seen as green bands from a distance.

The few shrubs to occupy the talus are often the same as in riparian zones; they achieve significant moisture from their large root systems, which can reach to the depths of the rubble where the rocks channel runoff. Such shrubs include *Amelanchier alnifolia*, *Philadelphus lewisii*, and *Ribes cereum*. Less common shrubs, or those that are found only in more particular sites, include *Monardella odoratissima*, *Salvia dorrii*, and *Rhus radicans*. *Celtis reticulata* grows only at the base of a waterfall and seepy cliff in the park, intermixed with *Atriplex spinosa*. Several species of small annuals are well adapted to the shifting talus slopes, some of which are listed as sensitive or threatened in Washington. Rare plants limited to this environment that are found within the park are *Camissonia pygmea*, *Mimulus suksdorfii*, *Hackelia hispida* var. *disjuncta* (a regional endemic), *Pellaea glabella* ssp. *simplex*, *Cryptantha scoparia*, and *C. gracilis* (Beck 1998, Visalli 2004).

At the base of the talus, rocks integrate with deeper silt soils and a different kind of vegetation emerges in this moist, rocky zone. Common associates in this transition area include *Lomatium dissectum*, *Penstemon* sp., *Phacelia linearis*, *Dodecatheon* spp., and *Amsinckia* spp.

The rarity and extreme conditions of this specialized environment creates a unique niche, and could be one reason why so many rare plants are found here. The cliffs also provide habitat for a number of important wildlife species in the park, including predators such as bobcat, as well as spotted bats and prairie falcons (Fielder 1997).

Wetland Vegetation—Sun Lakes is an area of particular significance culturally and ecologically because of its many lakes and wetlands in the dry sagebrush steppe landscape. The lake basins formed from the force of floodwaters plunging over the cliffs, and from the gouging action at the base of the channel. Thus, wetlands are found beneath the talus slopes of Dry Falls and down the entire coulee, as well as smaller depressions that sometimes hold water on the mesa tops.

Wetland vegetation generally follows a zonal pattern with open water in the middle, surrounded by solid stands of *Typha latifolia* (common cattail), sometimes intermixed with *Schoenoplectus acutus* (tule or hardstem bulrush) and then gradating to solid *Schoenoplectus*. On the perimeter of the standing water is *Phragmites communis*, and shrubs such as *Salix* spp. and *Cornus stolonifera*. At the ecotone beyond the reeds, in wet soils but not standing water, wetland meadows of *Carex* spp., *Eleocharis* spp., *Juncus* spp., and *Schoenoplectus* spp. form, along with the invasive tree *Elaeagnus angustifolia* (Russian olive) bordering waterways. Forming a distinct narrow band just upslope from the wetland is often found three species uniquely adapted to saline soils: *Elymus cinereus*, sometimes with *Sarcobatus vermiculatus* and *Distichlis spicata* (see section on alkali flats).

Wetlands are a source of habitat for many important wildlife species, including the Yuma skipper butterfly, a state endangered candidate. This native butterfly is dependent on *Phragmites communis*, or common reed, for its sole larval food source. It also uses the nearby non-native *Centaurea* stands as an adult nectar source (Fielder 1997). Sun Lakes State Park is the only known occurrence of the butterfly from Washington State, though it is common in the Great Basin states. *Phragmites* is both of native and introduced origins, and is considered a noxious weed especially in New England, where the invasive genotype is thought to be more prevalent (Blossey et al. 2002). It is difficult to distinguish the native from the invasive strains; however, native strains have changed little in their distributions in western North America (Saltonstall 2002). New invasive strains are known from eastern Washington, however, and may have intergraded and displaced the native strain (Blossey et al. 2002). More research is needed, and it is unclear how this would affect the ecology of wetlands in eastern Washington, though the quick spread in the east has resulted in reduced wetland diversity and wildlife

habitat for waterfowl (Blossey et al. 2002). The populations of *Phragmites* in the park appear to be limited to the fringes of wetlands and share space in the zonal pattern of vegetation.

Multiple species of waterfowl feed and breed in or near the wetlands of the general region, including the state listed species of concern the red-necked grebe, and the multitudes of migrating Canada geese that fill the lakes and sky in April. Also as sources of water in a desert environment, wetlands serve a critical role in the lives of many other wildlife species in the park.

Many rare or sensitive plants grow in the wetlands of the park, such as *Eleocharis rostellata* (beaked spikerush), which grows in the meadow zone along the drier perimeter of saturated wetlands, the orchid *Epipactis gigantea*, which prefers riparian wetlands, *Teucrium canadense* ssp. *viscidum*, and *Carex hystricina*. Both the annual *Phacelia tetramera* and *Castilleja exilis* are found on the edges of alkaline wetlands (Beck 1998, Visalli 2004).

Alkali Flats—The presence of highly soluble alkaline minerals such as sodium, chloride, and potassium in the rocks surrounding wetlands and low-lying areas, combined with a climate of low precipitation, means that leaching minerals don't tend to be washed away. Instead, they accumulate in many lakes and low lying seasonally wet areas, especially when many of these lakes also lack outflows. The plant life must be adapted to these increasingly saline environments. Halophytes are plants that are adapted to growing under high saline conditions.

Most halophytes concentrate salts in their tissues to increase their osmotic potential with the surrounding soils, though other strategies such as exclusion of salts from the roots, reduction of leaf water content, and excretion from glands in the leaves are found as well. Members of *Chenopodiaceae*—the chenopod or goosefoot family—are particularly common inhabitants of saline environments, as more than half the species in this family are halophytes (Glenn et. al 1999). Many chenopods are succulent and deal with excess salts through concentrating them in their vacuoles, which is a common adaptation for halophytic dicotyledons (Flowers et. al 1986; Ungar 1991). Halophytes are also found in abundance in the very large families of the *Fabaceae* (peas), *Poaceae* (grasses), and *Asteraceae* (asters, or sunflowers), though they represent under 5% of the total species in each of these families; the presence of halophytes in such a diversity of families points to the fact that the strategy has evolved multiple times in different lineages throughout evolution (Glenn et. al 1999).

In general, groups of halophytes may have developed suites of adaptations that are unique to that group. Grasses tend to show characteristics of salt exclusion from roots, decreasing water content in plant tissues, excreting through glands, and dilution through high growth rates. Chenopods tend toward succulence, salt hairs, and dropping saturated plant parts (Ungar 1991).

Alkali flats are formed in long flat areas that are vernal wet, sometimes on the perimeter of wetlands, such as at the outflow to the southwest of Dry Falls Lake (Fig 5). Here, the soil is crusted with white salts and very little species diversity occurs. Notably absent is the cryptogamic crust of the sagebrush steppe zones. The halophyte *Distichlis spicata* (salt grass) is found in large swaths of pure stands directly on the edges of alkali lakes. As the land moves slightly upwards to drier areas, mixed stands of the large bunchgrass *Elymus cinereus* (giant wildrye) and/or the chenopodiaceous shrub *Sarcobatus vermiculatus* (greasewood) intermix with *Distichlis* as a groundcover; alternately, the stands may have bare cracked soil between the plants. Another chenopod shrub, *Atriplex spinosa* (hop-sage), is less common in the salt flats but present in localized abundance. A few small annuals such as *Lepidium dictyotum* (alkali peppergrass) are found in the shade of the shrubs or along the rim of the bare salty soil.

Water Birch Riparian Woodland—This vegetation type is found along a narrow band on streambanks, connecting the many wetlands of the park. The overstory is dominated by *Betula occidentalis* (water birch), with a sometimes-thick shrub layer below, sometimes open and populated with riparian forbs. Common shrub associates include *Cornus stolonifera*, *Ribes aureum*, *Prunus virginiana* var. *melanocarpa*, *Philadelphus lewisii*, and *Rosa woodsii* var. *ultramontana*. Herbaceous plants found include *Viola* spp., *Equisetum* spp., and occasionally *Mianthemum stellatum*. Invasion by *Elaeagnus angustifolia* is common, and the non-native *Populus alba*, commonly used in landscaping, is found along riparian and lakeside areas near campgrounds and developed areas such as the dock at Deep Lake.

Weedy vegetation—Cheatgrass (*Bromus tectorum*) is an annual introduced grass that is prevalent in the park and found in highest abundance in disturbed areas. Cheatgrass was introduced to Washington in seed mixtures for pasture grasses in 1890 (although there is evidence that it had not reached Coulee City by as late as 1916) and currently has become widespread (Daubenmire 1988). It is detrimental to native forbs because it can outcompete them for limited water resources with its long (exceeding 2 m) roots and early establishment at the beginning of the rainy season in the fall (Daubenmire 1988). Livestock grazing fosters the spread of cheatgrass because the native perennial bunchgrasses are not adapted to the pressures of heavy livestock grazing; also fire can clear out competing perennial shrubs, particularly *Artemisia tridentata* (Daubenmire 1988). The presence of cheatgrass in the park reflects past livestock grazing, which began in the general region with cattle in 1834 and sheep in 1860 (Sullivan 1986). Grazing in the lower part of the park has ended. Cheatgrass is particularly abundant on the upper mesas where grazing is still practiced, however, and in areas recently burned in the coulee floor. In these locations, particularly on the northeast mesa of the park, which is contiguous with BLM, Department of Fish and Wildlife, and private grazing lands southwest of Coulee City, recent fire and ongoing grazing

has rendered cheatgrass to be abundant in certain wetter swales and the edges of vernal pools which serve as watering holes for livestock. Other annuals and weeds such as *Sisymbrium altissimum* and *Chorispora tenella* also heavily populate these areas and little native vegetation can compete.

The spread of invasives and weedy species is largely due to human activity. Developed areas of the park such as Camp Delaney, the campground, and the resort, are ports of entry for new weed seeds arriving on the vehicles and cloths of visitors and staff. Also, horses carry weed seeds into the park trails by depositing their dung, which carries the weeds from their feed. Hikers also carry weeds in on their shoes and clothing. We see this pattern of weed distribution by looking at where the highest concentrations of weeds are found—in disturbed areas near humans, such as roadsides and campgrounds. The impact of cattle cannot be ignored for spreading and increasing weed habitat. Visitors to the park can help reduce the spread of weeds by cleaning footwear and car tires prior to arrival in the park.

Visalli (2004) found 58 of the 408 plant species observed in the park to be non-native. He states, “...of particular concern is the aggressive species *Asperugo procumbens*, *Bromus tectorum*, *Cardaria draba*, *Centaurea repens*, *Cirsium arvense*, and *Lythrum salicaria*. The latter three of these are perennials that spread from underground rhizomes; they grow in areas with persistent soil moisture, and have displaced an portion of native vegetation in this important habitat type.”

Effects of fire on vegetation—Fires occur sporadically within the park, and can drastically alter the plant communities for some time. Recent fires include in 2003, when a fire spread from Dry Falls Lake to the west facing northern part of Umatilla Rock (Bowcutt, pers. comm.). In 2008 two fires spread across the landscape, one originating from arson just adjacent to Camp Delany mess hall, which traveled up the coulee to Green and Red Alkali Lakes and over the mesa nearly to Coulee City. The other fire started from a scrap brush pile burn (Felton, pers. comm.). In areas that were burned recently *Artemisia tridentata* is notably absent due to its high fire mortality and inability to re-sprout from the root crown. Small seedling regeneration has been observed in a few places. Other shrubs such as *Tetradymia canescens* and *Chrysothamnus* spp. are able to re-sprout, and those appear as the main shrubs in burned areas. Some bunchgrasses have been impacted to various degrees, but seem to be able to regenerate. It also appears that burned areas host larger and more vigorous populations of *Lomatium dissectum* where the soil is rocky, and can trigger spectacular blooms of herbaceous plants such as *Dodecatheon* in the years following the burn (Bowcutt pers. comm.)

The presence of cheatgrass has contributed greatly to the increased fire return interval in the sagebrush steppe, altering the entire ecosystem, possibly permanently. Previously, fires were only common on the steppe every 60-100 years, but as the very flammable cheatgrass has increased, it has

increased the presence of fire to every 3-5 years (D'Antonio and Vitousek 1992). Fire also creates favorable conditions for cheatgrass to regenerate, which means it can easily create a monoculture and has resulted in massive loss of biodiversity, plant cover, and increased erosion (D'Antonio and Vitousek 1992).

Flora

A working checklist for the park was compiled by Frederica Bowcutt based on her collections, those of her students in several Evergreen programs, as well as the observations of other professional botanists including Katherine Beck (1998). Common names were gleaned from several sources by Frederica Bowcutt: Abrams (1940; 1944; and 1951), Abrams and Ferris (1960), Hickman (1993), Munz and Keck (1973), and Taylor (1992); For current nomenclature in some select cases or for identifying taxa not included in Hitchcock and Cronquist (1973), Bowcutt used Hickman 1993. This earlier checklist was the basis for the current flora.

Field visits by myself were made in April and May 2010. Herbarium collections have been sourced from multiple collectors spanning the 1930's to 2010. I have sourced common names from Hitchcock and Cronquist (1973) (abbreviated hereafter as "H&C") and The Washington Flora Checklist online (Weinmann 2002), which were also used to determine the motherland of non-native species. In addition the following notations were used: * for non-native species, + for unnaturalized garden relicts, *cf.* for taxa needing more work to confirm presence, and "s.n." following a collectors name for specimens lacking collection numbers. Flowering times are based on field observations to date and herbarium records. Specimens housed at University of Washington Burke Museum Herbarium are followed by "(WTU)", specimens at The Evergreen State College are followed by "(EVE)". Those species of special protection status in the state as determined by the Washington Natural Heritage Program (2009) are indicated by "WNHP" followed by the state status (Watch, Review, Sensitive, Threatened, or Endangered). Not all plants of special status observed in the park have voucher specimens associated with them. A summary of such plants from the rare plant surveys done by Visalli (2004) and Beck and Caplow (1998) and which hold current special status is included in Table 3. No federally listed plants are present in the park based on current knowledge.

Nomenclature has attempted to follow H&C whenever possible. Exceptions were made in cases where the identification merited the use of another authority because taxa had been so rearranged as to make the former key no longer useful, or in cases where the determinations had been updated by another party in specimens at WTU. I have kept out of date names as the primary name on the list because H&C is still the only widely used flora for botanists in our region, despite it being forty years old. A single

taxon may have multiple specimens determined with both current and not current names, so I have included both names for reference. In cases where synonyms are used I have used brackets [] to indicate outdated names that can be found in H&C and parentheses with an equals sign (=) to indicate current synonyms of outdated taxa on the list. If other sources were used by others or myself for identification, I have included their citation after the name, if known (e.g., Fide: Flora of North America Volume 8=FNA8). Current synonyms have followed Weinmann (2002). Family names are organized alphabetically by current name with any former names included in brackets.

I have attempted to verify the presence of all species at the site through my own field collections and observations, or by inspecting others' herbarium collections. But because of time limitations, it was not possible to personally verify the identification and presence of every herbarium collection. Some historical collections have vague locality data, and I have attempted to be prudent in including only those that seem likely to be in the park area or very nearby. However, some historic specimens without definite localities in the park have been included because it provides a more complete historical perspective on the flora throughout time. Particularly those collections made by J. W. Thompson in the 1930's appear frequently in the flora and have been selected if they mention "Dry Falls" or a specific locality within the park area; his collections such as "near Coulee City" could likely have been within the park, but they have been excluded here for some degree of conservatism. Readers interested in historic collections should also note those made by Gaines and Scheffer, both in the 1950's, Zaring (1935), and Rogers (1940's). The earliest collection is from Pickett in 1916 (*Woodsia scopulina*).

This is a work in progress and will require more contributions to be considered a thorough study. This flora is largely based off of the work of Dr. Frederica Bowcutt and the collections of her students over the years, and I am very grateful for her generosity in allowing me to use her work in this project. Some of the specimens cited are not accessioned but have been contributed to the WTU. Contributions to this flora are welcome and can be addressed to the author and Dr. Frederica Bowcutt (see last page for addresses).

Numerical Analysis of the Flora

Specimens of 275 vascular plant species and infraspecific taxa have been collected and identified from within the Sun Lakes State Park. This study contributed 97 new specimens, of which 42 are new to the vouchered park flora. Over 97% of the flora is represented by Angiosperms, the flowering plants. The remainders are ferns and horsetails, the non-seed-producing plants, and Gymnosperms, the cone-bearing plants (Table 1). Introduced taxa represent 13.4% of the flora, with 38 species recorded. The highest numbers of introduced species are found within the families Brassicaceae and Poaceae, which

have high abundance in the park and are known for their success globally as inhabitants of disturbed locales. Nine families represent 53% of the total species included in this study; the largest three families are Asteraceae, Poaceae, and Brassicaceae, who collectively represent 31% of the flora (Table 2). It is not surprising that, given their diversity and abundance worldwide, Asteraceae and Poaceae are at the top of the list. Fabaceae is also another prominent world family that is diverse within the park as well. The number of Poaceae representatives will certainly increase with further study, as many species have been noted but not collected thus far.

Future Research and Management Recommendations

The flora is in need of many vouchered specimens to verify the taxa that have been reported but not vouchered by other surveyors (Beck 1998, Visalli 2004). The large extent and sometimes-inaccessible nature of the park geography makes it likely that upon further exploration new plants will be discovered that were not previously known from the park. I also think setting up a GIS database to track invasive weed populations would provide extremely useful in understanding the patterns of distribution and strategies on how to minimize introductions and control what is presently there. Future rare plant inventories should be done regularly to keep track of the park's many varied populations and attempts to relocate hard to find historic rare plant populations.

I recommend a cessation of grazing within the park, because it still negatively impacts vegetation, particularly the sensitive wetland areas on the mesa top. Visalli (2004) recommended that grazing should be restricted to later in the season after the native plants have had time to propagate. However this does not go far enough because the continued disturbance of cattle on the soil prevents any possible recovery of cryptogamic crusts, which are vital to a healthy sagebrush steppe ecosystem and for the survival of native flora. Also, many species' seeds don't mature until fall, and if cattle were allowed to graze in the summer these plants would still be prohibited from propagating. Cattle are not complementary to goals of land conservation, sustainable resource management, and recreation in this ecosystem. Secure fencing should be installed to keep them out of park property and measures taken to restore the park land they have degraded.

Acknowledgements

I would like to extend my appreciation to the Sun Lake State Park staff for welcoming this study, particularly Dennis Felton, park manager, for his generosity in sharing resources and knowledge. Thank you to the Evergreen Foundation for offering a generous Foundation Activity Grant to support this work. Thanks to Peter Herzog at State Parks for providing resources and taking time to meet with me

personally. Thanks to Lalita Calabria and the students of the spring 2010 Plant Taxonomy program at the Evergreen State College for their assistance in mounting specimens and excitement about herbarium collecting. Thanks to Alison Styring, Max Whetstein, Brendan Boudinot, and Jesse Vooze at the Evergreen Natural History Collections for their flexibility in working with my space needs. Thanks to Nicole Allen at Lab Stores and all the staff at Evergreen that helped me acquire the tools I needed. Thanks to Guy Moura from the Colville Tribal History Department for his generosity of information. David Giblin and Dick Olmstead at the University of Washington Burke Museum Herbarium were invaluable in providing generous use of the facilities as well as their time. I have immense gratitude to Dr. Frederica Bowcutt for her years of mentorship, kind prodding, exuberant plant enthusiasm, and undying support of my education, not to mention the use of her checklist and collections for the park as the basis for this work.

Annotated Checklist of the Vascular Plants of Sun Lakes State Park, Washington

PTEROPHYTA - Ferns

Polypodiaceae - Polypody Fern Family

Cystopteris fragilis (L.) Bernh. Brittle bladder-fern. Fide: FNA (Family: Dryopteraceae).
Gaines 359 (WTU).

Pellaea glabella Mett. ssp. *simplex* (Butters) A. & D. Love (Now in family Pteridaceae).
Smooth cliffbreak. WNHP watch list. Basalt cliffs. Zika 15093d.

Woodsia oregana D. C. Eat. Woodsia. Shady or moist rocky areas, talus slopes. Brae 123
(EVE), Graser 77 (EVE), Graser & Owen 23 (EVE), Wilson & Baris 6 (EVE).

Woodsia scopulina D. C. Eat. Rocky Mountain woodsia. "Cliffs near lake south of Coulee
City". Historic 1916 collection: Pickett 487 (WTU).

SPHENOPHYTA - Horsetails

Equisetaceae - Horsetail Family

Equisetum arvense L. Common horsetail. Riparian woodland. Brae 109 (EVE).

Equisetum laevigatum A. Braun. Smooth scouring-rush. Ruderal, wetland. Along gravel road,
near wetland and Camp Delaney bath house. Anthony & Owen 15 (EVE), Baris &
Wilson 19 (EVE), Graser & Wides 27 (EVE).

CONIFEROPHYTA - Conifers

Cupressaceae - Cypress Family

Juniperus occidentalis Hook. Western juniper. Rare. Mesa top in small swale. Anthony
& Owen 14 (EVE), Baris 16 (EVE), Graser & Wides 21 (EVE & WTU), Miller &
Stack 11 (WTU), Odwazny, Burkhart, Rao, & Rivers 1 (EVE), Wilson & Baris 15

(EVE).

ANTHOPHYTA - Flowering plants/DICOTYLEDONEAE

Anacardiaceae - Sumac Family

Rhus radicans L. var. *rydbergii* (Small ex. Rydb) Rehd. Poison-ivy. Occasional.
Wetlands, riparian zones, and talus slopes. Thompson 9115 (WTU).

Apiaceae [Umbelliferae] - Carrot Family

- cf. Berula erecta* (Huds.) Cov. Cut-leaved water-parsnip. Mirror Lake in Freshwater Marsh. Scheffer s.n. (WTU).
- Lomatium* sp. Raf. Desert-parsley. Kangiser, Igloi, Rhoades, & Grove 1 (EVE).
- Lomatium canbyi* Coult. & Rose. Canby's desert-parsley. Brae 60 (EVE), Gaines 367 (WTU), Schlessman 68 (WTU).
- Lomatium dissectum* (Nutt.) Mathias & Constance. Fern-leaf desert-parsley. Common. Sagebrush steppe. April. Anthony 7 (EVE), Graser & Wides 9 (WTU), Igloi 1 (EVE), Skurla 19 (WTU).
- Lomatium dissectum* var. *multifidum* (Nutt.) Math. & Const. Zaring 65 (WTU), Gaines 352 (WTU).
- Lomatium farinosum* (Hook.) Coult. & Rose. var. *farinosum*. Coeur d'Alene lomatium. Anthony, Owen, Graser (EVE EVE313), Martindale 32 & 33 (WTU), Dee 1 (WTU), Crater 26 (WTU), Groskopf 35 (WTU), Patrick 15 (WTU), Oogjen 23 (WTU), Skurla 18 (WTU), Hayduke 1 (WTU), Thompson 6157b (WTU).
- Lomatium hambleniae* Math. & Const. (= *Lomatium farinosum* (Hook.) Coult & Rose var. *hambleniae* (Math. & Const.) Schlessman.) Hamblen's desert parsley. Sagebrush steppe scablands. Brae 64 (EVE & WTU), Schlessman 66, 69, 166, 268, & 474 (WTU), Waldren 25 (WTU).
- Lomatium geyeri* (Wats.) Coult. & Rose. Geyer's lomatium. Sagebrush steppe. April. Anthony, Owen, & Graser 23 (EVE).
- Lomatium gormanii* (Howell) Coult. & Rose. Gorman's desert parsley. Lithosol scablands. Mar-April. Brae 59 (EVE), Crater 10 (WTU), May 1 (WTU), Schlessman 66a (WTU), Zaring 61 (WTU).
- Lomatium grayi* Coult. & Rose. Gray's lomatium. Talus slope, at the base of Umatilla Rock. April. Miller, Stack 6 (EVE).
- Lomatium macrocarpum* (Nutt.) Coult. & Rose. Large-fruited biscuitroot. Occasional. Sagebrush steppe. April-May. Baris 11 (EVE), Brae 61 (EVE), Graser & Wides 19 (EVE), Oogjen 22 (WTU), Owen & Anthony 11 (EVE), Rhoades, Grove, Kangisi, & Igloi 1 (EVE), Wilson & Baris 11 (EVE).
- Lomatium triternatum* (Pursh) Coult. & Rose. Nine-leaved desert parsley. Common. Sagebrush steppe. April. Anthony 24 (EVE), Baris 6 (EVE), Graser & Wides 8 (EVE), Grove, Kangisi, Rhoades, & Igloi 1 (EVE), Owen 6 (WTU), Wilson & Baris 5 (WTU).

Apocynaceae - Dogbane Family

Apocynum cannabinum L. Hemp dogbane. Freshwater marsh near Camp Delany.

Fruiting in October. Bowcutt 2333 (EVE), Gaines 699 (WTU).

Apocynum sibiricum Jacq. Claspingleaved dogbane. Thompson 9118 (WTU).

Asclepiadaceae - Milkweed Family

Asclepias speciosa Torr. Greek milkweed. Occasional. Outer edge of wetlands. June. Gaines 717 (WTU).

Asteraceae [Compositae] - Aster Family

Achillea millefolium L. Yarrow. Common. Sagebrush steppe and wetlands. May. Graser & Wides 13 (EVE & WTU), Pett 12.

Agoseris heterophylla (Nutt.) Greene. Annual agoseris. Sagebrush steppe. Fruiting in May. Brae 137 (EVE & WTU).

Antennaria dimorpha (Nutt.) T & G. Cushion pussytoes. Sagebrush steppe on lithosols. Dioecious. April. Bowcutt 2310b (EVE), Brae 70 (EVE).

Arctium minus (Hill) Bernh. Common burdock. Riparian woodland above Mirror Lake. Brae 112 (EVE).

Artemisia dracunculus L. Dragon sagewort. Sagebrush steppe. Bowcutt 2345, 2242a (EVE).

Artemisia ludoviciana Nutt. var. *ludoviciana*. Western mugwort. Rare. Along pond on Table Rock Point. Bowcutt 2344 (EVE), Thompson 9113 (WTU).

Artemisia rigida (Nutt.) Gray. Stiff sagebrush. Occasional. Sagebrush steppe on lithosols. Bowcutt 2312 & 2260 (EVE).

Artemisia tridentata Nutt. Tall sagebrush. Abundant. Sagebrush steppe. Bowcutt 2259 (EVE).

Aster sp. L. Aster. Sagebrush steppe near Camp Delany. Bowcutt 2338 (EVE).

Balsamorhiza careyana Gray. Carey's balsamroot. Sagebrush steppe. Brae 94 (EVE).

Balsamorhiza hookeri Nutt. [in part *Balsamorhiza hirsuta* Nutt.] Hooker's balsamroot. Sagebrush steppe. April. Owen & Anthony 10 (EVE), Wilson & Baris 13 (EVE), Wright, Ray, MacClellan, & Smith 1 (EVE), Rogers 233, 234 (WTU).

Balsamorhiza hookeri X *B. sagittata*. Not a hybrid. Anthony & Owen 13 (EVE), Smith, Wright, Ray, & MacClellan 1 (EVE), Wilson & Baris 26 (EVE), Zaring 63 (WTU).

Balsamorhiza sagittata (Pursh) Nutt. Arrow-leaf balsamroot. Sagebrush steppe. April. Anthony & Owen 12 (EVE), MacClellan, Ray, Smith, & Smith 1 (EVE), Miller & Stack 13 (EVE), Wilson & Baris 13 (EVE).

**Centaurea repens*. Knapweed. Disturbed area near Camp Delany. Noxious weed. Bowcutt 2335 (EVE).

Chaenactis douglasii (Hook.) H. & A var. *achilleaefolia* (H. & A.) A. Nels. Hoary chaenactis. Sagebrush steppe. May. Brae 107 (EVE).

Chrysothamnus nauseosus var. *albicaulis* (Pall.) Britt. Gray rabbit-brush. Common. Sagebrush steppe. October. Bowcutt 2241 (EVE).

Chrysothamnus viscidiflorus (Hook.) Nutt. Green rabbit-brush. Occasional. Sagebrush scrub. October. 2241 (WTU), 2245 (EVE), cf. var. *stenophyllus*, Bowcutt 2240.

**Cirsium arvense* (L.) Scop. Canadian thistle. Freshwater marsh edge near Camp Delany. Bowcutt 2352 (EVE).

Crepis atrabarba Heller. ssp. *originalis* Babc. & Stebb. Slender hawksbeard. Sagebrush

- steppe. May-June. Brae 89 (EVE) & 136 (EVE & WTU).
- Crepis barbiger* Leib. (= *Crepis atrabarba* Heller. ssp. *originalis* Bab. & Stebb.) Bearded hawksbeard. Roadside, sagebrush steppe. May-June. Apomictic polyploid between *C. acuminata*, *C. atrabarba*, and *C. modocensis*. Bowcutt 2332 (EVE), Brae 148 (EVE), Gaines 710A (WTU).
- Crepis occidentalis* Nutt. Western hawksbeard. Sagebrush steppe. May-June. Wilson & Baris 21 (EVE).
- Erigeron filifolius* (Hook.) Nutt. var. *filifolius*. Threadleaf fleabane. Sagebrush steppe. May. Brae 86 (EVE & WTU), Gaines 700 (WTU).
- Erigeron linearis* (Hook.) Piper. Linear-leaf daisy, linear-leaf fleabane, desert yellow daisy. Occasional. Sagebrush steppe. April-May. Totz, Masin, Dobromil, & Benvenuti 1 (EVE), Bowcutt 2307 (EVE), Baris 8 (EVE), Graser & Wides 7 (EVE), Miller & Stack 16 (EVE), Owen & Anthony 9 (EVE), Stack & Miller 4 (EVE), Wilson & Baris 7 (EVE), Thompson 11480 (WTU).
- Erigeron pumilus* Nutt. var. *euintermedius* Cronq. Shaggy fleabane. Sagebrush steppe. Occasional. May. 2314 (EVE & WTU), Anthony & Owen 25 (EVE), Graser & Wides 20 (EVE), Miller & Stack 17 (EVE), Pett 4 (WTU), Wilson & Baris 16 (EVE).
- Eriophyllum lanatum* (Pursh) Forbes var. *integrifolia* (Hook.) Smiley. Woolly sunflower. Occasional. Sagebrush steppe and talus slope. May. Bowcutt 2326 (EVE).
- Gaillardia aristata* Pursh. Blanket flower, Gaillardia. Rare. Sagebrush steppe. May-June. Brae 140 (EVE), Gaines 716 (WTU).
- Grindelia hirsutula* Hooker & Arnott. (Fide: FNA.) [*Grindelia nana* Nutt. var. *nana*.] Low gumweed. Scheffer s.n. (WTU).
- Haplopappus stenophyllus* Gray. Narrow-leaved goldenweed. Sagebrush steppe. April. Baris & Wilson 9 (EVE), Brae 73 (EVE), Gaines 345 (WTU) Graser & Wides 12 (EVE), Owen & Anthony 7 (EVE).
- Helianthus annuus* L. Wild sunflower. Dried up pothole pond on mesa. Bowcutt 2247 (EVE) & 2348 (WTU).
- Iva axillaris* Pursh. Deeproot. Ruderal. May. Brae 146 (EVE & WTU).
- Lactuca pulchella* (Pursh) DC. (= *Mulgedium pulchellum* (Pursh) G. Don. FNA.) Blue lettuce. Edge of freshwater marsh. Bowcutt 2256 (cf. determination) (EVE), Thompson 9124 (WTU).
- Madia exigua* (J. E. Smith) Gray. Little tarweed. Sagebrush steppe. May. Brae 121 (EVE).
- Matricaria matricarioides* (Less.) Porter. Pineapple weed. Ruderal. A native cordilleran weed according to H&C. April-May. VanHess, Aune, Winstead, & Schermerhorn 24 (EVE).
- Microseris troximoides* Gray. (= *Nothocalais troximoides* (Gray) Greene. FNA.) False agoseris, microseris. Occasional. Sagebrush steppe. April. Bowcutt 2315 (EVE), Anthony & Owen 8 (EVE), Gaines 361a & 343 (WTU), Graser & Wides 29 (WTU), Heinburg 1 (EVE), Stack & Miller 29 (EVE), Wilson & Baris (EVE) & Baris (EVE).
- Senecio integerrimus* Nutt. Western groundsel. Rare. Alkali areas near Green Lake. April-May. Pett 29 (EVE), Wilson & Baris 20 (EVE).
- **Senecio vulgaris* L. Common groundsel. Rare. Ruderal. Native to Europe. April-May. Bowcutt 2331 (EVE).
- Solidago canadensis* L. Goldenrod. Along ephemeral moist area near Delany Spring. Bowcutt 2255 (EVE).
- **Taraxacum officinale* Weber. Dandelion. Rare. Disturbed areas around Camp

Delany and in sagebrush steppe. Native to Europe. Benvenuti, Totz, Dobromil, & Masin 1 (EVE), Crater 17 (EVE), Graser & Wides 11 (EVE & WTU), Lemmon 52 (EVE), Oogien, Marzano, & Lipiz 24 (EVE), Owen 22 (EVE), Wilson & Baris 18 (EVE).

Tetradymia canescens DC. Spineless horse-brush. Sagebrush steppe. Re-sprouting after fire, common. May-June. Bowcutt 2246 (WTU), Brae 87 (EVE).

Tetradymia canescens DC. var. *inermis* (Nutt.) A. Gray. Thompson 11644 (WTU).

**Tragopogon dubius* Scop. Yellow salsify. Rare. Ruderal in sagebrush steppe. Native to Europe. May-June. Bowcutt 2330 (EVE).

Xanthium strumarium L. Cocklebur. Rare. Disturbed areas around Camp Delany. Graser & Wides 28 (EVE).

Betulaceae - Birch Family

Betula occidentalis Hook. Water birch. Riparian woodland. April. Anthony & Owen 16 (EVE), Baris 20 (EVE), Brae 74 (EVE & WTU), Graser & Wides 26 (EVE & WTU), Miller & Stack 20 (WTU), Pett 45 (EVE), Wilson & Baris 22 (EVE), Zika 15086d (WTU).

Betula occidentalis Hook. var. *piperi* Britt. Gaines 366 (WTU).

Boraginaceae - Borage Family

Amsinckia cf. tessellata Gray. Fiddleneck. Sagebrush steppe. April-May. Bowcutt 2291 & 2327 (EVE), Pett 54 (EVE).

Amsinckia menziesii (Lehm.) Nels. & Macbr. Small-flowered fiddleneck. Ruderal. May. Brae 147 (EVE & WTU).

Cryptantha pterocarya (Torr.) Greene. Wingnut cryptantha. Talus slope. April-May. Brae 71 (EVE), Lemmon, Madson, Birkhauser, & Thompson 17 (EVE).

Cryptantha scoparia A. Nels. Desert cryptantha. WNHP sensitive species. Talus slopes. Beck 98004 (WTU).

Cryptantha watsonii (Gray) Greene. Watson's cryptantha. Possibly belongs on WNHP rare plant list. Sagebrush steppe. Thompson 11651 (determination unsure) (WTU).

Hackelia hispida (Gray) Johnst. Rough stickseed. (Var. *disjuncta* is endemic to Washington and sensitive. Has been known to occur in the park but may not be present at this time. Specimens not identified to variety.) Talus slopes. June. Thompson 11495 & 9104 (WTU).

Lithospermum ruderales Dougl. Columbia puccoon. Occasional. Sagebrush steppe. April. Fink, Dee, Radin, & Book 3 (EVE), Lemmon & Madson 29 (WTU), Udo 105 (EVE).

Pectocarya linearis (R. & P.) DC. var. *pencillata* (Hook. & Arn.) M. E. Jones (= *P. pencillata* (Hook. & Arn.) A. DC.). Winged combseed. Sagebrush Steppe. Brae 54 (EVE), Gaines 341 (WTU).

Brassicaceae [Cruciferae] - Mustard Family

Arabis cusickii Wats. Cusick's rockcress. Sagebrush steppe. April. Lemmon 48 (EVE), Thompson 6172 (WTU).

Arabis holboellii Hornem. var. *retrofracta* (Grah.) Rydb. Reversed rockcress. Gaines 356

(WTU).

Arabis sparsiflora Nutt. var. *subvillosa* (Wats.) Rollins. Few-flowered rockcress. Gaines 353 (WTU).

**Capsella bursa-pastoris* (L.) Medic. Shepherd's-purse. Native to Europe. Ruderal near Visitor Center. April. VanHess, Aune, Winstead, & Schermerhorn 21 (EVE), Wilson & Baris 19 (WTU).

**Cardaria draba* (L.) Hand. Hoary pepperwort. Ruderal. Native to Eurasia. Birkhauser & Thompson 20 (WTU), Dunn 33 (EVE), Oogjen, Marzano, & Lipiz 27 (EVE & WTU), Simpson & Udo 59 (EVE), Stack & Miller 28 (EVE).

**Chorispora tenella* (Pall.) DC. Blue mustard. Eurasia. Roadside near Camp Delany. April. Bowcutt 2264 (EVE & WTU), Anthony & Owen 17 (EVE), Birkhauser & Thompson 24 (WTU), Dunn 27 (EVE), Gaudioso 29 (WTU), Groskopf 27 (WTU), Lemmon & Madson 33 (EVE), Miller & Stack 19 (EVE), Oogjen, Marzano, & Lipiz 23 (EVE & WTU), Patrick 17 (WTU), Udo 109 (EVE), Wilson & Baris 17 (WTU), Winstead & Schermerhorn 28 (WTU).

Descurainia richardsonii (Sweet) Schulz var. *sonnei* (Robins.) Hitchc. Mountain tansymustard. Sagebrush steppe. April. Bowcutt 2289 (EVE), Birkhauser & Thompson 14 (WTU), Dunn 26 (EVE), Lemmon & Madson 30 (EVE & WTU), Oogjen, & Lipiz 1 (EVE & WTU), Udo 107 (EVE).

**Draba verna* L. Spring whitlow-wort, draba. Abundant. Sagebrush steppe. Europe. April. Febus, Pope, Pett, Plott & Granger 1 (EVE), Lemmon, Madson, Birkhauser, & Thompson 16 (WTU), Martindale 25 (WTU).

Hutchinsia procumbens (L.) Desv. Ovalpurse. Alkali flats. March – April. Brae 77 (EVE).

Idahoia scapigera (Hook.) Nels. & Macbr. Scalepod. Common. Rigid sagebrush scrub. March. Lemmon, Madson, Simpson, & Udo 28 (EVE), Pope, Plott, Febus, Granger, & Pett 1 (EVE).

Lepidium dictyotum Gray var. *dictyotum*. Alkali peppergrass. Alkali flat south of Dry Falls Lake. Brae 76 (EVE).

**Lepidium latifolium* L. Broad-leaved pepperwort. Ruderal. Native to Eurasia. May. Bowcutt 2249 (EVE & WTU).

**Lepidium perfoliatum* L. Claspings peppergrass. Common. Ruderal and sagebrush steppe. Native to Europe. April. Aune & VanHess 25 (EVE), Baris & Wilson 25 (EVE), Crater 8 (WTU), Dunn 20 (WTU) & 28 (EVE), Gaudioso 33 (WTU), Groskopf & Stack 30 (EVE), Lemmon, Birkhauser, & Thompson 51 (EVE), Oogjen, Marzano, & Lipiz 25 (EVE & WTU), Patrick 19 (WTU), Simpson & Udo 51 (EVE), Waldren & Skurla 31 (EVE), Winstead & Schermerhorn 20 (WTU).

Phoenicaulis cheiranthoides Nutt. Dagger-pod. Occasional. Sagebrush steppe. April. Crater 18 (WTU), Plott, Febus, Granger, Pope & Pett 1 (EVE).

**Rorippa nasturium-aquaticum* (L.) Hayek. Water-cress. Occasional. Aquatic in streams and seeps. Native to Europe. Brae 103 (EVE).

Schoenocrambe linifolia (Nutt.) Greene. Flaxleaved plainsmustard. Sagebrush steppe, talus. Bowcutt 2316a (EVE), Brae 131 (EVE & WTU), Gaines 355 (WTU).

**Sisymbrium altissimum* L. Tumblemustard. May. Sagebrush steppe. Native to Eurasia. Brae 88 (EVE & WTU).

Thelypodium integrifolium (Nutt.) Engl. Entire-leaved thelypody. Sagebrush steppe/marsh ecotone. April-May. Bowcutt 2336 (EVE), Thompson 11816 (WTU).

Thelypodium laciniatum (Hook.) Endl. Thick-leaved thelypody. Talus slope. April-May. Pett 41 (EVE), Thompson 9110 & 6177 (WTU).

Campanulaceae - Bellflower Family

Heterocodon rariflorum Nutt. Western pearlflower. Moist area. June. Gaines 709 (WTU).

Caprifoliaceae - Honeysuckle Family

Sambucus cerulea Raf. Blue Elderberry. Occasional. Riparian zones and moist places within sagebrush steppe. Bowcutt 2353 (EVE & WTU), Gaines 711 (WTU).

Symphoricarpos albus (L.) S.F. Blake. Common snowberry. Rare. May. Brae 143 (EVE & WTU).

Caryophyllaceae - Pink Family

**Holosteum umbellatum* L. Jagged chickweed. Common. Sagebrush steppe. April. Dobromil 1 (EVE), Lemmon, Madson, Simpson, & Udo 21 (WTU), Stack & Miller 32 (WTU).

Silene menziesii Hook. var. *viscosa* (Greene) Hitchc. & Mag. Menzies' catchfly. Rare. Swale in sagebrush steppe below talus. May. Brae 138 (EVE).

Ceratophyllaceae - Hornwort Family

Ceratophyllum demersum L. Hornwort. Aquatic. Rainbow Lake. Gaines 723 (WTU).

Chenopodiaceae - Goosefoot Family

Atriplex spinosa (Hook.) Collotzi. (= *Grayia spinosa* (Hook.) Moq.) Hop-sage. Alkali areas and sagebrush steppe. Occasional. Brae 62 (EVE).

Chenopodium sp. L. Lamb's quarters. Bowcutt 2243 (WTU).

Chenopodium fremontii Wats. Fremont's goosfoot. Sagebrush slopes. Thompson 9103 (WTU).

Chenopodium rubrum L. Red goosefoot. Disturbed pond edge, mesa top. July-Oct. Bowcutt 2346 (EVE).

Sarcobatus vermiculatus (Hook.) Torr. Black greasewood. Dominant in alkali areas. May. Thompson 11659 & 7190 (WTU).

Suaeda occidentalis Wats. Sea-blite, seepweed. Beck with Caplow 98074 (WTU), Groskopf 22 (WTU).

Clusiaceae [Hypericaceae] - St. John's Wort Family

Hypericum scouleri Hook. ssp. *scouleri*. [*H. formosum* H.B.K. var. *scouleri* (Hook.) Hitchc.] Western Saint John's wort. Riparian. Gaines 713 (WTU).

Cornaceae - Dogwood Family

Cornus stolonifera Michx. Red-osier dogwood. Common. Riparian. April-May. Madson & Lemmon 35 (EVE & WTU), Pett 9 (EVE).

Elaeagnaceae - Oleaster Family

**Elaeagnus angustifolia* L. Russian olive. Wetland and upland. Native to Eurasia. May.
Bowcutt 2257 (EVE), Madson & Lemmon 36 (EVE & WTU).

Fabaceae [Leguminosae] - Pea Family

- Astragalus agrestis* Dougl. Purple milkvetch. WNHP watch list. Swales in sagebrush steppe. Simpson 54 (EVE), Thompson 11646, 9112 & 7200 (WTU).
- Astragalus canadensis* L. var. *brevidens* (Gandg.) Barneby. Canada milkvetch. Thompson 11645 & 9107 (WTU), Gaines 712 (WTU).
- Astragalus canadensis* L. var. *mortonii* (Nutt.) Wats. Morton's Canadian milkvetch. Thompson 11645 (WTU).
- Astragalus lentiginosus* Dougl. Freckled milkvetch. Sagebrush steppe, ruderal and vernal pools. April-May. Dunn 25 (EVE), Lemmon 34 (EVE), Watkins 182 (WTU).
- Astragalus purshii* Dougl. var. *purshii*. Woolypod milkvetch. Sagebrush steppe. April. Birkhauser & Thompson 22 (EVE), Brae 67 (EVE), Burkhart, Pankratz, Odwazny, & Kao 1 (EVE), Dunn 22 (EVE), Groskopf 20 (EVE), Jacobson 1 (EVE), Lemmon & Madson 31 (EVE), Pett 58 (EVE), Simpson 55 (EVE), Thompson 11499 (WTU), Udo 104 (EVE).
- Astragalus purshii* Dougl. var. *glareosus* (Dougl.) Barneby. Zaring 58 (WTU).
- Astragalus spaldingii* Gray. Spalding's milk-vetch. Sagebrush steppe. April. Birkhauser 25 (EVE), Birkhauser & Thompson 25 (EVE), Brae 68 (EVE), Dunn 23 (EVE), Lemmon & Madson 32 (EVE & WTU), Martindale & Taylor 11 (EVE), Udo 106 (EVE).
- Astragalus stenophyllus* Torr. & Gray var. *filipes* (Torr. ex Gray) Tidestrom. Thompson 7201 (WTU).
- Lupinus sericeus* Pursh. var. *sericeus*. Silky lupine. Occassional. Sagebrush steppe. May. Brae 149 (EVE & WTU), Pett 26 (EVE).
- Lupinus sulphureus* Dougl. Sulphur lupine. Common. Sagebrush steppe. April. Bowcutt 2265 (EVE & WTU), Birkhauser & Thompson 21 (WTU), Dunn 29 (EVE), Lemmon & Madson 50 (EVE & WTU), Simpson & Udo 64 (EVE).
- Lupinus sulphureus* Dougl. ssp. *bingenensis* L. Phillips. Thompson 11500 (WTU).
- Lupinus sulphureus* Dougl. var. *subsaccatus* (Siks.) Hitchc. Thompson 11500 (WTU), Gaines 385 (WTU).
- **Melilotus alba* Desr. White sweet-clover. Rare. Ruderal. Camp Delany. October. Native to Eurasia. Bowcutt 2334 (EVE & WTU).
- Trifolium macrocephalum* (Pursh) Poiret. Big-head clover. Jones s.n. (WTU).
- **Trifolium repens* L. White clover. Rare. Ruderal near campsite at Rainbow Lake. Brae 125 (EVE).

Gentianaceae - Gentian Family

Centaureum exaltatum (Griseb.) Wight. Centaury. Rare. Stock pond above Camp Delany. October. Bowcutt 2343 (WTU), Thompson 9125 (WTU).

Geraniaceae - Geranium Family

**Erodium cicutarium* (L.) L'Her. Rare. Ruderal. Native to Eurasia. April. Birkhauser &

Thompson 12 (EVE & WTU), Dunn 31 (EVE), Oogjen, Marzano, & Lipiz 6 (EVE), Stack & Miller 30 (WTU), Waldren & Skurla 14 (UCD), Winstead, Schermerhorn, VanHess, & Aune 19 (EVE).

Geranium viscosissimum F. & M. Sticky purple geranium. Sagebrush steppe, in swale below talus. May. Brae 142 (EVE & WTU).

Grossulariaceae - Currant Family

Ribes aureum Pursh. Golden currant. Occasional. Stream banks and washes in sagebrush steppe. April. Birkhauser & Thompson 26 (EVE & WTU), Dunn 32 (EVE), Fink, Dee, Radin, & Book 1 (EVE), Simpson 61 (EVE), Waldren & Skurla 33 (WTU), Udo 110 (EVE), Gaines 347 & 721 (WTU).

Ribes cereum Dougl. Wax currant. Occasional. Sagebrush steppe, talus. April. Birkhauser & Thompson 23 (EVE & WTU), Bowcutt 2290 (WTU), Dunn 24 (EVE), Fink, Dee, Radin, & Book 2 (EVE), Gaines 346 (WTU), Lemmon & Madson 24 (WTU), Miller 23 (WTU), Rogers 230 (WTU), Simpson & Udo 60 (EVE).

Haloragaceae - Water Milfoil Family

Myriophyllum sibiricum Komarov. [*Myriophyllum spicatum* L. var. *exalbescens* (Fernald) Jeps.] Northern water-milfoil. Stock pond on mesa, Rainbow Lake. Bowcutt 2349 (EVE “cf”), Scheffer s.n. (WTU), Gaines 724 (WTU).

Hydrophyllaceae - Waterleaf Family

Hesperochiron californicus (Benth.) Wats. California monkey-fiddle. Riparian. Dunn 18 (EVE), Gaines 371 (WTU), Oogjen, Marzano, & Lipiz 28 (WTU).

Phacelia hastata Dougl. var. *hastata* [var. *leucophylla*] (Torr.) Cronq. Whiteleaf phacelia. Occasional. Sagebrush steppe. May. Bowcutt 2299 (EVE).

Phacelia humilis T. & G. Low phacelia. Rare. Top of talus slope, west facing. April-May. Lemmon & Madson 45 (EVE), Simpson & Udo 53 (EVE).

Phacelia linearis (Pursh) Holz. Threadleaf phacelia. Sagebrush steppe, mesa top. May. Birkhauser & Thompson 15 (EVE), Brae 66 (EVE), Thompson 6158 (WTU).

Phacelia ramosissima Dougl. ex Lehm. Branched phacelia. Basalt talus. Thompson 9101 (WTU).

Phacelia tetramera J. T. Howell. Dwarf phacelia. WNHP sensitive species. Alkali flats. Caplow and Beck 972 (WTU).

Lamiaceae [Labiatae] - Mint Family

**Lamium amplexicaule* L. Common henbit. Rare. Roadside at Camp Delany. Native to Eurasia. April. Birkhauser & Thompson 13 (WTU), Masin, Totz, Dobromil, & Benvenuti 1 (EVE).

Lycopus asper Greene. Water horehound. Locally abundant. Marsh and alkali areas. Bowcutt 2254 (EVE & WTU).

Mentha arvensis L. Field mint. Pond on mesa top. Bowcutt 2250 (EVE “cf”).

Mentha arvensis L. var. *canadensis* (L.) Kuntze. Scheffer s.n. (WTU)

Monardella sp. Thompson 11654 (WTU).

- Monardella odoratissima* Benth. var. *discolor* (Greene) St. John. Mountain monardella, coyote mint. Talus slopes. Bowcutt 2252 (WTU) & 2339 (EVE & WTU), Thompson 7185 (WTU).
- Salvia dorrii* (Kell.) Abrams var. *carnosa* (Dougl.) Cronq. Gray ball sage. Sagebrush steppe. Occasional. May. Pett 40 (EVE).
- Scutellaria galericulata* L. March skullcap. Lakeshore below Dry Falls. Thompson 7189 (WTU), Scheffer s.n. (WTU).
- Teucrium canadense* L. var. *occidentale* (Gray) McClintock & Epling. (= *T. c.* ssp. *vicidum* (Piper) Roy L. Taylor & MacBryde p.p.) Germander. Lakeshores. WNHP watch list. Scheffer s.n. (WTU), Thompson 7195 (WTU).

Lentibulariaceae - Bladderwort Family

- Utricularia vulgaris* L. Common bladderwort. Free-floating aquatic. Dry Falls Lake. Gaines 706 (WTU).

Linaceae - Flax Family

- Linum perenne* L. var. *lewisii* (Pursh) Eat. & Wright. Wild blue flax. Rare. Ruderal near campsite at Rainbow Lake. Brae 124 (EVE & WTU).

Loasaceae - Blazingstar Family

- Mentzelia dispersa* Wats. Small-flowered mentzelia. Rare. Fine gravel slope. May. Brae 108 (EVE & WTU).

Malvaceae - Mallow Family

- **Malva neglecta* Wallr. Dwarf mallow. Rare. Ruderal. Camp Delany. May. Bowcutt 2293 (EVE), Dunn & Wozniak 30 (EVE), VanHess, Aune, Winstead, & Schermerhorn 22 (WTU).
- Sphaeralcea munroana* (Dougl.) Spach. White-stemmed globe mallow. Occasional. Sagebrush steppe. May-Jun (Sept). Blooming abundantly just weeks after fire, Sept 1945. Aune & VanHess 27 (EVE), Scheffer s.n. (WTU).
- Sidalcea oregana* (Nutt.) Gray. Oregon checker-mallow. Coulee floor. Gaines 720 (WTU).

Oleaceae - Olive Family

- Fraxinus latifolia* Benth. Oregon ash. Rare. Freshwater marsh by Spring Creek. Brae 118 (EVE).
- +*Syringa vulgaris* L. Common lilac. Sagebrush flat near Meadow Creek east of Meadow Lake. May. Zika 16857 (WTU).

Onagraceae - Evening-Primrose Family

- Oenothera pygmaea* Dougl. (= *Camissonia p.* (Dougl. ex Lehm.) Raven.) Dwarf evening-primrose. WNHP sensitive species. Gravel and silt slopes. Thompson 9105 (WTU).
- Epilobium minutum* Lindl. Small-flowered willow-herb. Sagebrush steppe on thin basalt

lithosols. May. Brae 151 (EVE).

Orobanchaceae - Broom-Rape Family

Orobanche uniflora L. var. *purpurea* (Heller) Achey. Naked broom-rape. On lithosol with *Artemisia rigida*. Owen, Graser & Lemmon 21 (EVE), Simpson 63 (EVE).

Plantaginaceae - Plantain Family

**Plantago major* L. Common plantain. Rare. Riparian. By trail. Brae 101 (EVE & WTU).
Plantago patagonica Jacq. Wooly plantain. Sagebrush steppe. Common. May. Brae 85 (EVE).

Polemoniaceae - Phlox Family

Collomia grandiflora Dougl. Large-flowered collomia. Rare. Talus slopes. May. Brae 130 (EVE).
Collomia linearis Nutt. Narrow-leaved collomia. Rare. Sagebrush steppe. April-May. Brae 120 (EVE).
Leptodactylon pungens (Torr.) Nutt. Granite gilia, prickly phlox. Occasional. Sagebrush steppe. April-May. Bowcutt 2308 (EVE), Brae 92 (EVE).
Microsteris gracilis (Hook.) Greene var. *humilior* (Hook.) Cronquist. Pink microsteris. Occasional. Sagebrush steppe. April. Baum, Hyduke, Einbeinder, & Heimbürg 1 (EVE), Birkhauser, Thompson, Lemmon, & Madson 3 (EVE), Crater 24 (EVE), Groskopf 34 (WTU).
Phlox longifolia Nutt. var. *longifolia*. Phlox. Occasional. Sagebrush steppe. April. Birkhauser & Thompson 4 (EVE & WTU), Bowcutt 2267 (EVE), Crater 24 (WTU), Groskopf 26 (WTU), Madson & Lemmon 4 (EVE), Martindale & Taylor 35 (EVE), Oogjen, Marzano, Skurla, Waldren, & Lipiz 3 (EVE), Simpson 56 (EVE), Zaring 47 & 48 (WTU), Rollins 830 (WTU).
Polemonium micranthum Benth. Littlebells polemonium. Sagebrush steppe, swales on mesa top. April. Brae 69 (EVE & WTU).

Polygonaceae - Buckwheat Family

Eriogonum compositum Dougl. var. *compositum*. Northern buckwheat. Rocky sagebrush slopes. May. Brae 128 (EVE & WTU).
Eriogonum compositum Dougl. var. *leianthum* Hook. Northern buckwheat. Sagebrush steppe. May. Pett 24a (EVE).
Eriogonum heracleoides Nutt. var. *minus* Benth. Parsnip-flowered eriogonum. Sagebrush steppe. May. Brae 134 (EVE & WTU), Pett 55 (EVE).
Eriogonum sphaerocephalum Dougl. Rock buckwheat. Rocky cliffs in sagebrush steppe. Thompson 9122 (WTU), Scheffer s.n. (WTU).
Eriogonum sphaerocephalum Dougl. var. *sphaerocephalum*. Rock buckwheat. Rocky cliffs in sagebrush steppe. May. Brae 129 (EVE & WTU).
Eriogonum strictum Benth ssp. *proliferum* (T. & G.) Stokes var. *proliferum*. Bowcutt 2319 (EVE), Brae 135 (EVE & WTU).
Eriogonum strictum Benth ssp. *proliferum* (T. & G.) Stokes var. *anserinum* (Greene) Davis. Thompson 11652 (WTU).

- Eriogonum thymoides* Benth. Thyme-leaved eriogonum. Sagebrush steppe in lithosols. May. Crater 21 (EVE), Gaines w/ Scheffer 348 (WTU), Groskopf 23 (EVE), Lipiz, Marzano & Oogjen 20 (EVE), Martindale & Taylor 23 (EVE), Oogjen, Lipiz, & Marzano 7 (EVE), Pett 14 (EVE), Waldren & Skurla 15 (EVE).
- Polygonum austinae* Greene. (= *P. douglasii* Greene ssp. *austinae* (Greene) E. Murr.) Austin's knotweed. WNHP threatened species. Fine basalt gravel, basalt cracks. June. Beck 9866 (WTU).
- Polygonum coccineum* Muhl. (= *Persicaria amphibia*). Water smartweed. Shallow edge of Dry Falls Lake. Gaines w/ Scheffer 705 (WTU).

Portulacaceae - Purslane Family

- Montia perfoliata* (Donn) Howell. (= *Claytonia parviflora* Douglas ex Hook. ssp. *parviflora*, in part. FNA.) Miner's lettuce. Sagebrush steppe. April. Bowcutt 2316b (EVE), Baum, Hyduke, Einbeinder, & Heimburg 2 (WTU), Oogjen, Marzano, & Lipiz 4 (EVE), Schlessman 157 (WTU), Waldren & Skurla 12 (WTU).
- Lewisia rediviva* Pursh. Bitterroot. Sagebrush steppe in scablands on mesa tops. April – May. Crater 25 (EVE), Pett 57 (EVE), Thompson 11507 (WTU), Waldren & Skurla 27 (WTU).
- Talinum spinescens* Torr. Spinescent farnflower. Sagebrush steppe in scablands on mesa tops. May. Brae 150 (EVE).

Primulaceae - Primrose Family

- Dodecatheon conjugens* Greene. var. *conjugens*. Fide: FNA8. Desert shooting star. Occasional. Sagebrush steppe. April. Brae 58 (EVE).
- Dodecatheon cusickii* Greene. (= *Dodecatheon pulchellum* (Rafinesque) Merrill var. *cusickii* (Greene) Reveal. FNA8.) Cusick's shootingstar. Brae 57 (EVE), Gaines w/ Scheffer 350 (WTU), Oogjen, Marzano, Lipiz, Waldren & Skurla 22 (WTU), Schlessman 154, 579, 155 & 165 (WTU).
- Dodecatheon pulchellum* (Raf.) Merrill. Dark-throated shooting star. Common. Sagebrush steppe. April. Book, Fink, Dee, & Radin 1 (EVE).
- Glaux maritima* L. Sea-milkwort. (= *Lysimachia maritima*, now placed in family Myrsinaceae.) Saline areas. Thompson 7191 (WTU).
- Lysimachia thyrsiflora* L. (Now placed in family Myrsinaceae.) Tufted loosestrife. Freshwater marsh, lakeshore. May. Brae 145 (EVE).

Ranunculaceae - Buttercup Family

- Clematis ligusticifolia* Nutt. Western virgin's bower. Occasional. Riparian woodland and talus slopes. May-June. Brae 95 (EVE & WTU), Gaines w/ Scheffer 718 (WTU).
- Delphinium nuttallianum* Pritz. var. *nuttallianum*. Common larkspur. Occasional. Sagebrush steppe. April-May. Brushwood, Coleman, & Harrison-Smith 1 (EVE), Crater 20 (EVE), Gaines w/ Scheffer 368 (WTU), Groskopf 32 (WTU), Haines 954 (WTU), Martindale & Taylor 30 (EVE), Oogjen, Lipiz, & Marzano 9 (EVE & WTU), Schlessman 580 (WTU), Skurla & Waldren 24 (EVE).
- Myosurus aristatus* Benth. (= *Myosurus apetalus* C. Gay var. *borealis* Whitt. FNA3.) Bristly mousetail. Sagebrush steppe. March-April. Brae 55 (EVE & WTU), Caplow w/

Beck 97016 (WTU), Schlessman 142 (WTU).

Ranunculus aquatilis L. var. *capillaceus* (Thuill.) DC. White water buttercup. Aquatic in freshwater. Scheffer s.n. (WTU).

Ranunculus cymbalaria Pursh. Alkali buttercup. Lakeshore, wet meadow. May. Thompson 7188 & 9129 (WTU).

Ranunculus glaberrimus Hook. var. *glaberrimus*. Sagebrush buttercup. Sagebrush steppe. March-April. Cook, Degenstein, Font, Lampman, & Levine 1 (EVE).

**Ranunculus testiculatus* Crantz. Hornseed buttercup. Abundant. Sagebrush steppe. Native to Europe. Aune 18 (WTU), Bowcutt 2264b (EVE & WTU), Waldren 30, Osborn 23 (WTU), Patrick 28 (WTU), Crater 14 (WTU), Graser & Wides 17 (WTU), Groskopf, Stack & Graser 24 (EVE), Lampman, Levine, Font, & Degenstein 1 (EVE), Oogjen, Marzano, & Lipiz 2 (EVE), Patrick & Gaudioso 20 (UCD), Simpson & Udo 52 (EVE), Winstead & Schermerhorn 27 (EVE).

Rosaceae - Rose Family

Amelanchier alnifolia Nutt. Western serviceberry. Common. Riparian zones, talus slopes, and moist places in sagebrush steppe. April. Crater 26 (WTU), Dee, Fink, Radin, & Book 1 (EVE), Groskopf 35 (EVE), Martindale & Taylor 33 (WTU), Marzano, Lipiz, & Oogjen 12 (EVE & WTU), Skurla & Waldren 19 (EVE), Winstead 11 (WTU), Legler 229 (WTU), Stack 27 (WTU), Marzano 11 (WTU), Aune 16 (WTU), Wozniak 31 (WTU), Osborn 22 (WTU).

Amelanchier alnifolia Nutt. var. *cusickii* (Fern.) Hitchc. Zaring 57 (WTU), Thompson 9123 (WTU), Rogers 213 (WTU).

Crataegus douglasii Lindl. Black hawthorn. Rare. Sagebrush steppe. Mesa top. April. Oogjen, Lipiz & Marzano 21 (EVE), Waldren & Skurla 25 (EVE).

Potentilla spp. L. Cinquefoil. Brae 119 (EVE).

Potentilla anserina L. Common silverweed. Rare. Freshwater marsh near Delany Spring and Meadow Lake. May-June. Bowcutt 2329 (EVE), Brae 119 (EVE & WTU), Groskopf 36 (EVE), Oogjen, Marzano, & Lipiz 26 (EVE), Stack & Miller 31 (WTU).

Potentilla arguta Pursh var. *convallaria* (Rydb.) T. Wolf. Gladular cinquefoil. Intermediate with *P. glandulosa* var. *intermedia* (see H&C 3:132) Sagebrush steppe. May. Brae 133 (EVE & WTU), Pett 37 (EVE).

Potentilla gracilis Dougl. var. *permollis* (Rydb.) Hitchc. Slender cinquefoil. Lakeside. Thompson 11823 (WTU).

Potentilla gracilis Dougl. var. *flabelliformis* (Lehm.) Nutt. Idaho cinquefoil. Thompson 9109 (WTU).

Prunus virginiana L. Common chokecherry. Occasional. Riparian zones. May. Bowcutt 2317 (EVE), Crater 22 (EVE & WTU), Winstead 27 (WTU), Zika 16856 (WTU), Thompson 6187 (WTU).

Rosa woodsii Lindl. var. *ultramontana* (Wats.) Jeps. Wild rose, pearhip rose. Riparian zones and wetlands. May. Bowcutt 2261 (EVE), Flahaut s.n. (WTU), Gaines w/ Scheffer 719 (WTU), Grazer 17 (WTU), Martindale & Taylor 28 (EVE), Oogjen, Marzano, & Lipiz 29 (EVE), Skurla & Waldren 16 (EVE).

Rubus idaeus L. Red raspberry. Ruderal along road to Deep Lake. Bowcutt 2325 (EVE).

Rubiaceae - Madder Family

- **Galium aparine* L. Bedstraw, goosegrass. Rare. Perhaps native to Europe. May.
Anthony & Owen 19 (EVE), Bowcutt 2264b (WTU), Coleman, Brushman, May, &
Harrison-Smith 1 (EVE), Crater 8 (EVE), Graser & Wides 14 (EVE), Groskopf &
Crater 22 (EVE), Groskopf 24 (WTU), Martindale 10 (WTU), Miller & Stack 23
(WTU), Oogjen, Lipiz, Marzano, Taylor, & Martindale 5 (EVE), Patrick 20 (WTU),
Waldren & Skurla 13 (WTU).

Salicaceae - Willow Family

- **Populus alba* L. White poplar. (Not in H&C.) Shores of Deep Lake and State
campground. Europe. Zika 15085D (WTU).
Populus tremuloides Michx. Aspen. Riparian woodland and mesa top. Dunn 24 (WTU),
Marzano, Lipiz, & Oogjen 11 (EVE & WTU), Skurla & Waldren 26 (EVE).
Salix sp. L. Willow. Riparian. Groskopf 29 (EVE), Waldren & Skurla 34 (EVE).
Salix amygdaloides Anderss. Peach-leaf willow. Occasional. Wetlands and riparian
woodland. April-May. Oogjen, Lipiz, Marzano 13 (EVE), Thompson 6151, 6152
& 6186 (WTU), Rogers 371 & 372 (WTU).
Salix exigua Nutt. ssp. *exigua* Willow. Occasional. Wetlands and riparian woodland.
April-May. Bowcutt 2269 (WTU); Crater 11 (EVE), Font, Degenstein, Levine,
Lampman & Cook 1 (EVE), Rogers 370 (WTU), Thompson 6165 (WTU).
Salix rigida Muhl. Willow. Lakeside below Dry falls. Bowcutt 2268 (EVE & WTU),
Thompson 6167 (WTU).
Salix scouleriana Barratt. Scouler willow. Rimrock at Dry falls. Bowcutt 2268a (EVE),
Thompson 6149 (WTU).

Santalaceae - Sandalwood Family

- Comandra umbellata* (L.) Nutt. Bastard toad-flax. Occasional. Hemiparasitic on
angiosperms in sagebrush steppe. April-May. Beck 98074 (WTU), Birkhauser 23
(WTU), Crater 9 (WTU), Groskopf 28 (WTU), Hyduke, Baum, Einbeinder, &
Heinberg 1 (EVE), Martindale & Taylor 24 (EVE), Oogjen, Lipiz, & Marzano 8
(EVE), Skurla 16 (WTU), Skurla & Waldren 18 (EVE).

Saxifragaceae - Saxifrage Family

- Heuchera cylindrica* Dougl. Roundleaf alumroot, Lava alumroot. Rare. Moist talus
slopes. May. Aune 20 (WTU), Brae 139 (EVE), Bowcutt 2321 (EVE & WTU),
Thompson 9121 (WTU).
Lithophragma bulbifera Rydb. Rocketstar, prairie starflower. Occasional. Sagebrush
steppe. April. Basey 1 (EVE), Gaudioso 14 (WTU), Lemmon & Madson 25
(WTU), Waldren, Skurla, Oogjen, Lipiz, & Marzano 17 (EVE & WTU).
Lithophragma parviflora (Hook.) Nutt. Small-flowered prairie star. Occasional.
Sagebrush steppe. April. Craig 1 (EVE), Crater 15 (EVE), Groskopf 33 (WTU),
Skurla, Waldren, Oogjen, Lipiz, & Marzano 19 (EVE).
Saxifraga integrifolia Hook. Swap saxifrage. Rare. In swales in sagebrush steppe near
Dry Falls Lake and Camp Delany. April. Harrison-Smith, Brushwood, May &
Coleman 1 (EVE & WTU), Oogjen, Lipiz, & Marzano 15 (EVE), Waldren &
Skurla 9 (WTU).
Saxifraga nidifica Greene. var. *nidifica*. (Not in H&C, synonymous with *Saxifraga*

integrifolia in part. Current synonym *Micranthes nidifica* (Greene) Small. FNA8.)
Peak saxifrage. May. Gaines 342 (WTU).

Scrophulariaceae (=Orobanchaceae, in part) - Figwort Family

- Castilleja exilis* A. Nels. Small-flower annual paintbrush. Alkaline, saline areas. WNHP watch list. Bowcutt 2342 (EVE).
- Castilleja thompsonii* Pennell. (Now in family Orobanchaceae.) Thompson's paintbrush. Occasional. Sagebrush steppe. Hemi-parasite on roots of *Artemisia* sp. April-May. Bowcutt 2320 (EVE), Brae 56 (EVE), Gaines and Scheffer 369 (WTU).
- Collinsia parviflora* Lindl. Small-flowered blue-eyed Mary. Rare. Sagebrush steppe. April-May. Brushwood, Coleman, May & Harrison-Smith 1 (EVE), Groskopf & Crater 31 (WTU), Lemmon, Simpson, & Udo 44 (EVE), Skurla, Waldren, Oogjen, Lipiz, Marzano, Taylor, & Martindale 18 (WTU).
- **Linaria dalmatica* (L.) Mill. Dalmatian toadflax. Rare. Sagebrush steppe. Native to Eurasia. May. Pett 44 (EVE).
- Mimulus floribundus* Lindl. Purple-stemmed monkeyflower. Seepy cliffs. Rare. Gaines w/ Scheffer 708 (WTU)
- Mimulus guttatus* DC. Common monkeyflower. Rare. Seepy cliffs, springs. Scheffer s.n. (WTU), Thompson 7187 (WTU).
- Mimulus suksdorfii*. Suksdorf's monkeyflower. WNHP sensitive species. Bare dry areas on slopes. Reported by K. Beck and F. Caplow. Pickett 469 (Locality: "Coulee City", WTU, historic collection.)
- Orthocarpus barbatus* Cotton. (Now in family Orobanchaceae.) Grand Coulee owl clover. Rare. Sagebrush steppe. May. Brae 93 (EVE).
- Penstemon gairdneri* Hook. Penstemon. Sagebrush steppe, rocky thin soil. Martindale & Taylor 31 (WTU), Lipiz, Marzano, & Oogjen 14 (EVE), Rogers 369 (WTU), Bowcutt 2313 (EVE).
- Penstemon glandulosus* Dougl. var. *glandulosa* Rare. Upper talus slope. May. Pett 16 (EVE).
- Penstemon pruinosus* Dougl ex. Linde. Chelan penstemon. Occasional. Sagebrush steppe. May. Bowcutt 2304 & 2305 (EVE), Pett 39 (EVE).
- Penstemon richardsonii* Dougl. var. *dentatus* (Keck) Cronq. Richardson's penstemon. Rocky sagebrush steppe. September. Thompson 7198 & 11810 (WTU).
- Penstemon speciosus* Dougl. ex Lindl. Royal beardtongue. Rare. Moist areas in sagebrush steppe. Brae 141 (EVE).
- Veronica americana* Schwein. American brooklime. Occasional. Delany Spring. Scheffer s.n. (WTU).
- Veronica anagallis-aquatica* L. Water speedwell. Aquatic in stream. May. Brae 102 (EVE).

Solanaceae - Nightshade Family

- **Solanum dulcamara* L. Bittersweet, climbing nightshade, felonwort. Occasional. Riparian woodland, lakeside marsh. Native to Eurasia. May. Brae 144 (EVE), Scheffer s.n. (WTU), Gaines w/ Scheffer 707 (WTU)

Ulmaceae - Elm Family

- Celtis reticulata* Torr. Hackberry. Talus slopes. Northwest of Perch Lake near waterfall.

April. Brae 63 (EVE), Gaines 714 (WTU).

Urticaceae - Nettle Family

Parietaria pennsylvanica Willd. Pellitory. Talus slopes, under large boulders in shade.
May. Brae 78 (EVE).

Urtica dioica L. cf. var. *californica* (Greene) Hitchc. Stinging nettle. Occasional.
Riparian zones, freshwater marshes. Hurd, Basey, Callascibetta & Craig 1 (EVE).

Valerianaceae - Valerian Family

Plectritis macrocera T. & G. White plectritis, long-horned plectritis. Occasional.
Sagebrush steppe. April. Calascibetta, Hurd, Basey, & Craig 1 (EVE), Gaines
w/ Scheffer 360 (WTU), Patrick & Gaudioso (WTU), VanHess, Aune, Winstead,
& Schermerhorn 16 (WTU).

Verbenaceae - Verbena Family

Verbena hastata L. Blue vervain, wild hyssop, simpler's joy. Rare. Freshwater marsh near
Camp Delany mess-hall. Scheffer s.n. (WTU).

Violaceae - Violet Family

Viola adunca. Violet. Rare. Riparian woodland along Meadow Creek. April. Beck &
Caplow 98003 (WTU), Gaines w/ Scheffer 381 (WTU).

Viola nephrophylla Greene. (= *Viola sororia* Willd. var. *affinis* (LeConte) Comb. Nov.) Bog
violet. Riparian along Meadow Creek. Rare. April-May. Gaines 380 (WTU),
Patrick & Gaudioso 22 (EVE).

Viola nuttallii Pursh. Nuttall's violet. Rare. Riparian. Simpson 67 (EVE).

Viola trinervata Howell. Sagebrush violet. Sagebrush steppe, especially with rigid
sagebrush. April. Osborn & Moore-Maley 26 (WTU), Patrick & Gaudioso 13
(EVE), Rao, Rivers, Odwazny & Burkhart 1 (EVE), Van Hess, Aune, Winstead, &
Schermerhorn 25 (EVE).

Zygophyllaceae - Creosote-Bush Family

**Tribulus terrestris* L. Puncture-vine. Rare. Ruderal. Camp Delany. October. Bowcutt
2341 (EVE).

MONOCOTYLEDONEAE

Alismataceae - Water-Plantain Family

Alisma plantago-aquatica L. American waterplantain. Aquatic. Scheffer s.n. (WTU),
Thompson 7192 (WTU).

Cyperaceae - Sedge Family

Identification from FNA23. Synonyms from H&C reported when possible.

- Bolboschoenus maritimus* (L.) Palla. ssp. *paludosus* (A. Nels.) A. & D. Love. Scheffer s.n. (WTU), Thompson 9127 (WTU).
- Carex* spp. L. Sedge. Various habitats. Aune & VanHess 19 (EVE), Brae 97 & 116 (EVE), Gaudioso 20 (EVE), Winstead & Schermerhorn 14 (WTU), Wozniak 13 (EVE).
- Carex douglasii* Boott. Douglas' sedge. Sagebrush steppe. Brae 127 (EVE & WTU), Scheffer s.n. (WTU).
- Carex hystericina* Muhl. ex Willd. Porcupine sedge. WNHP watch list. Pioneer of disturbed saturated wetlands. Zika 15091d (WTU).
- Carex lanuginosa* Michx. (Not current. Possibly a synonym of *C. pellita*. or *C. lasiocarpa*.) Wolly sedge. Thompson 9117 1/2 (WTU).
- Carex pellita* Muhl. ex Willd. West shore Deep Lake. Zika 15092d (WTU).
- Carex praegracilis* Boott. Lakeside below Dry Falls. Thompson 6176 (WTU).
- Eleocharis macrostachya* Britt. Extremely difficult to identify. In complex with *E. palustris*. Thompson 9128 (WTU).
- Eleocharis rostellata* (Torrey) Torrey. Beaked spike rush. WNHP sensitive species. Alkali wetlands and streambanks. Grows with *Epipactis gigantea* (Orchidaceae). Weidman CD1, CD2 (WTU).
- Schoenoplectus acutus* (Muhl ex Bigelow) A. Love and D. Love. [*Scirpus acutus* Muhl]. Tule, hardstem bull-rush. Marshes. Bowcutt 2258 (EVE), Brae 105 (EVE).
- Schoenoplectus acutus* (Muhl ex Bigelow) A. Love and D. Love. var. *occidentalis* (S. Wats.) Beetle. Common tule. Thompson 9108 (WTU)
- Schoenoplectus pungens* (Vahl) Palla. [*Scirpus americanus* Pers. in H&C, missapplied]. Dry Falls Lake. Bowcutt 2244 (EVE & WTU).
- Schoenoplectus pungens* (Vahl) Palla. var. *longispicatus* (Britt.) S. G. Sm. Freshwater marsh. Brae 104 (EVE), Gaines 701 (WTU), Thompson 9130 (WTU).

Iridaceae - Iris Family

- Iris missouriensis* Nutt. Western blue flag, Rocky Mountain flag. Rare. Moist seep in sagebrush steppe. May. Pett 35 (EVE), Thompson 11502 (WTU).

Juncaceae - Rush Family

- Juncus* sp. L. Rush. Common. Wetlands. Brae 117 (EVE).
- Juncus balticus* Willd. ssp. *ater*. (Rydb.) Snogerup. Baltic rush. Moist riparian zone. Brae 100 (EVE & WTU).
- Juncus ensifolius* Wilkst. var. *montanus* (Engelm.) Hitchc. Dagger-leaf rush. No collector-acc. #135088 (WTU).
- Juncus torreyi* Cov. Torrey's rush. Riparian. Scheffer s.n. (WTU), Thompson 9126 (WTU).

Lemnaceae - Duckweed Family

- Lemna trisulca* L. Star duckweed. Aquatic. Dry Falls Lake. Scheffer s.n. (WTU), Gaines 704 (WTU).

Liliaceae - Lily Family

- Allium acuminatum* Hook. Tapertip onion, Hooker onion. Sagebrush steppe. April. Patrick & Gaudiosa 23 (EVE), Simpson 66 (EVE).
- Allium geyeri* Wats. var. *geyeri*. Geyer's onion. Sagebrush steppe. April. Patrick 27 (EVE), Gaudiosa 33 (WTU), Aune & VanHess 31 (EVE), Winstead & Schermerhorn 26 (EVE).
- Allium scilloides* Dougl. Fragile onion. Basalt gravel on mesa top. WNHP watch list. Brae 72 (EVE), Zaring 67 (WTU).
- **Asparagus officinalis* L. ssp. *officinalis*. Asparagus. Rare. Ruderal, along road to Deep Lake. May. Bowcutt 2324 (EVE), Winstead & Schermerhorn 23 (WTU).
- Camassia quamash* (Pursh) E. Greene. Camas. Rare. North shore of Deep Lake. April-May. Bowcutt 2270 (EVE).
- Fritillaria pudica* (Pursh) Spreng. Yellow bell. Sagebrush steppe. March. Gaudioso 30 (EVE).
- Smilacina stellata* (L.) Desf. (= *Mianthemum stellatum* (L.) Link.) Star-flowered false solomon's seal. Occasional. Riparian woodland. May. Aune & VanHess 22 (EVE & WTU), Gaudioso 18 (WTU), Osborn & Moore-Maley 20 (EVE & WTU), Patrick 26 (WTU), Thompson 27 (EVE), Thompson 6184 (WTU), Winstead & Schermerhorn 17 (EVE & WTU).
- Zigadenus paniculatus* (Nutt.) Wats. Death-camas. Occasional. Sagebrush steppe. April. Gaines, 358 (WTU), Levine, Cook, Font, Degenstein, & Lampman 1 (EVE).
- Zigadenus venenosus* Wats. Death-camas. Occasional. Sagebrush steppe. April. Aune & VanHess 20 (EVE & WTU), Bowcutt 2266 (WTU), Gaudioso 14 (EVE), Patrick 14 (EVE), Winstead & Schermerhorn 15 (WTU).
- Zigadenus venenosus* Wats. var. *gramineus* (Rydb.) Walsh. Meadow death-camas. Occasional. Sagebrush steppe. April. Lemmon 25 (WTU), Oogjen 25 (WTU), Osborn & Moore-Maley 28 (EVE & WTU).

Orchidaceae - Orchidaceae

- Epipactis gigantea* Dougl. ex Hook. Giant helleborine. WNHP watch list. Riparian, lakeside. Thompson 9114 (WTU), Zika 15089D (WTU).

Poaceae [Graminae] - Grass Family

- Achantherum thurberianum* (Piper) Barkworth. [*Stipa thurburiana* Piper.] Thurber's needlegrass. Sagebrush steppe. Bowcutt 2302 (EVE "cf."), Brae 114 (EVE).
- **Agropyron cristatum* (L.) Gaertn. Crested wheat grass. Sagebrush steppe. Widely introduced from Europe as forage. May. Brae 80 (EVE, "cf."), Dunn & Wozniak 17 (EVE).
- Agropyron spicatum* (Pursh) Scribn. & Smith. (= *Pseudoroegneria spicata* (Pursh) A. Löve.) Bluebunch wheat grass. Abundant. Sagebrush steppe. May. Brae 84 (EVE), Osborn & Moore-Maley 27 (EVE).
- **Bromus mollis* L. Soft chess. Rare. Ruderal. Native to Europe. May. Bowcutt 2295 (EVE).
- **Bromus tectorum* L. Cheat grass. Abundant. Disturbed places and sagebrush steppe. Native to Eurasia, introduced as a forage. May. Bowcutt 2300 (EVE), Aune & VanHess 15 (UCD), Birkhauser & Thompson 1 (EVE), Gaudioso 12 (WTU),

- Osborn & Moore-Maley 21 (EVE). Patrick 15 (WTU), Pett 3 (EVE), Schlessman 68 (WTU), Waldren & Skurla 29 (UCD), Winstead & Schermerhorn 12 (WTU).
- Calamagrostis stricta* (Timm) Koel. ssp. *inexpansa* (Gray) C. W. Greene. [*Calamagrostis inexpansa* Gray.] Northern reedgrass. Lakeshore below Dry Falls. Thompson 7186 (WTU).
- Distichlis spicata* (L.) Greene. [*Distichlis stricta* is now a synonym.] Salt grass. Abundant. Alkali areas. Brae 82 (EVE), Gaines w/ Scheffer 702 (WTU).
- Echinochloa crus-galli* (L.) P. Beauv. Barnyardgrass. Scheffer s.n. (WTU).
- Elymus cinereus* Scribn. & Merr. (= *Leymus cinereus* (Scribn. & Merr.) A. Love) Basin wild rye. Common. Alkali areas. May. Brae 122 (EVE), Thompson 9119 (WTU).
- Festuca octoflora* Walt. Slender fescue. Sagebrush steppe. Thompson 6185 (WTU).
- Hesperostipa comata* (Trin. & Rupr.) Barkworth cf. ssp. *intermedia* (Scribn. & Tweedy) Barkworth. [*Stipa c.* Trin. & Rupr. cf. var. *i.* Scribn. & Tweedy]. Fide: FNA 24. Needle-and-thread. Common. Sagebrush steppe. May. Brae 115 (EVE).
- Hordeum jubatum* L. Squirrel-tail, foxtail barley. Sagebrush steppe and ruderal. April-May. Bowcutt 2296 (EVE).
- **Hordeum murinum* L. Mouse or wall barley. Fide: Hickman 1993. Ruderal. May. Native to Europe. Brae 111 (EVE & UW).
- **Phragmites communis* (L.) Trin. (= *P. australis* (Cav.) Trin. ex Steud.) Common reed. Locally abundant. Lakes, marshes, streams. Native and introduced genotypes. Bowcutt 2262 (EVE), Bunn 800 & 1178 (WTU), Scheffer s.n. (WTU).
- **Poa annua* L. Annual bluegrass. Ruderal. May. Bowcutt 2298 (EVE), VanHess, Aune, Winstead, & Schermerhorn 10 (WTU).
- **Poa bulbosa* L. Bulbous bluegrass. Common. Disturbed areas in sagebrush steppe. Viviparous. Native to Europe, introduced as forage. April-May. Bowcutt 2297 (EVE), Birkhauser & Thompson 2 (EVE & WTU), Legler 229 (WTU), Osborn & Moore-Maley 18 (WTU), Osborn & Moore-Maley 23 (EVE), Patrick 28 (WTU), Pett 25 (EVE), Waldren & Skurla 30 (EVE), Winstead & Schermerhorn 11 (WTU).
- **Poa compressa* L. Canada bluegrass. Ruderal. April. Gaudiosa 19 (EVE), VanHess, Aune, Winstead, & Schermerhorn 29 (WTU), Wozniak 31 (EVE).
- Poa juncifolia* Scribn. Alkali bluegrass. Moist spring. Thompson 9117 (WTU).
- Poa nevadensis* Vasey ex. Scribn. (= *P. secunda* J. Presl. ssp. *juncifolia* (Scribn.) Soreng. FNA 24.) Alkali bluegrass. Talus cliffs. Brae 90 (EVE).
- **Poa pratensis* L. Riparian along Delany Spring Trail. Rare. May. Bowcutt 2322 (EVE).
- Poa sandbergii* Vasey. (= *Poa secunda* J. Presl.) Sandberg's bluegrass. Sagebrush steppe. Abundant on thin lithosols with *Artemisia rigida*. Aune & VanHess 16 (EVE & WTU), Bowcutt 2306 (EVE), Brae 65 (EVE & WTU), Dunn & Wozniak 3 (EVE), Gaines 349 (WTU), Gaudiosa 11 (WTU), Osborn & Moore-Maley 22 (EVE & WTU), Winstead & Schermerhorn 13 (WTU).
- **Polypogon monspeliensis* (L.) Desf. Rabbitfoot polypogon, annual beard-grass. Borders of spring. Native to southern Europe and Turkey. June. Thompson 9120 (WTU).
- Sitanion hystrix* (Nutt.) Smith. Bottlebrush squirreltail. Sagebrush steppe. Brae 83 (EVE).
- Spartina gracilis* Trin. Alkali cord grass. Alkaline areas. Gaines w/ Scheffer 703 (WTU), Thompson 9116 (WTU).

Potamogetonaceae - Pondweed Family

Potamogeton pectinatus L. (= *Stuckenia pectinata* (L.) Boerner. FNA23.) Fennel-leaved pondweed. Aquatic. Thompson 7193 (WTU).

Ruppiaceae - Ditch-Grass Family

Ruppia cf. cirrhosa (Petag.) Grande. Fide: FNA22. Spiral ditchgrass. Aquatic in brackish standing water. Thompson 6156 (WTU).

Typhaceae - Cattail Family

Typha latifolia L. Cattail. Common. Freshwater marsh. Brae 106 (EVE).

Literature Cited

- Abrams, L. 1940, 1944, and 1951. Illustrated flora of the Pacific States. Volumes 1, 2 and 3. Stanford University Press. Stanford, California.
- _____, and R. S. Ferris. 1960. Illustrated flora of the Pacific States. Volume 4. Stanford University Press, Stanford, California.
- Baker, V. R. 1987. Dry Falls of the Channeled Scabland, Washington. Geological Society of America Centennial Field Guide—Cordilleran Section. 369-373.
- Beck, Kathryn. 1998? A Rare Plant Survey of Sun Lakes State Park, Washington. Unpublished report prepared for Washington Native Plant Society and Washington State Parks & Recreation Commission.
- Blossey, B. and M. Schwarzländer, P. Häfliger, R. Casagrande and L. Tewksbury. 2002. Common Reed. *In* Driesche, F.V. and B. Blossey, M. Hoodle, S. Lyon, R. Reardon. Biological Control of Invasive Plants in the Eastern United States. United States Department of Agriculture Forest Service. Forest Health Technology Enterprise Team. Morgantown, WV. 413 p. Accessed May 26, 2010. <<http://www.invasive.org/eastern/biocontrol/9CommonReed.html>>
- Bowcutt, Frederica. June 6, 2010. Faculty member. Evergreen State College. Olympia, WA. Personal email communication.
- Bureau of Land Management. General Land Office Records website. Accessed Dec 28, 2010. <glorerecords.blm.gov>
- Calypso Consulting. 1997. Rare Plants of Sun Lakes State Park. *In* Washington State Parks and Recreation Commission. Sun Lakes State Park master plan. Volume 2: Appendix D. Olympia, WA. Unpublished report.
- Confederated Tribes of the Colville Reservation. 2000. “Demographics” and “Facts and Information”. Accessed June 3, 2010. <<http://www.colvilletribes.com>>
- Corridor Management Plan Committee, a subcommittee of the Coulee Corridor Consortium. 2005. The Coulee Corridor Scenic Byway Corridor Management Plan, 2nd Edition. Unpublished report. Accessed Jan 20, 2011. <<http://www.wsdot.wa.gov/NR/rdonlyres/F5FA00F1-E2C3-425A-B691-D987C1F2563C/0/CouleeCorridorCMP.pdf>>
- D’Antonio, C. M. and P. M. Vitousek. 1992. Biological invasions by exotic grasses, the grass/fire cycle, and global change. *Annual Review of Ecological Systematics*. 23: 63-87.
- Davis, Marty. 2003. Sun Lakes-Dry Falls State Park Management Plan. Unpublished report prepared for the Washington State Parks and Recreation Commission as part of the Classification and

- Management Planning Project. Olympia, WA.
- Daubenmire, Rexford F. 1988. Steppe Vegetation of Washington. Extension bulletin of Washington State University, Cooperative Extension Service 1446, rev. 134 p.
- Douglas, David. 1914. Journal kept by David Douglas during his travels in North America 1823-1827. Under direction of the Royal Horticultural Society. Wesley & Son, London. 348 p. Accessed Jun 3, 2010. <<http://www.archive.org/details/journalkeptbydav00dougiala>>
- eFloras. 2008. Missouri Botanical Garden, St. Louis, MO & Harvard University Herbaria, Cambridge, MA. Last accessed September 22, 2010. <<http://www.efloras.org>>
- Felton, Dennis. May 2010. Sun Lakes State Park General Manager. Personal communications.
- Fielder, Paul C. 1997. Sun Lakes State Park Wildlife Species occurrence and status. *In* Washington State Parks and Recreation Commission. Sun Lakes State Park master plan. Volume 2: Appendix D. Olympia, WA. Unpublished report.
- Fike, Marilyn. 1997. What about cryptogamic crusts? Pacific Northwest National Laboratory. Richland, WA. Last updated October 2010. Accessed November 28, 2010. <http://science-ed.pnl.gov/pals/resource/cards/cryptogamic_crust.stm>
- Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ volumes. New York and Oxford.
- Flowers, T. J., M. A. Hajibagheri, and N. J. W. Clipson. 1986. Halophytes. *The Quarterly Review of Biology*. 61(3): 313-337. The University of Chicago Press, Chicago, IL. Accessed Jan 18, 2011. <<http://www.jstor.org/stable/2826772>>
- Franklin, Jerry F. and C.T. Dyrness. 1973. Natural vegetation of Oregon and Washington. General Technical Report PNW-GTR-008. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Portland, OR. 427 p.
- Grant County Historical Society. "History of the Steamboat Rock Area." Wayside Historical Marker, State Route 155, WA. Accessed Jun 3, 2010. <<http://ncwportal.com/grant/photo/1177>>.
- Grant County Maps: A Service of Grant County Geographical Information Systems. Ephrata, WA. Accessed Nov 24 2010. <gismapserv.co.grant.wa.us>
- Hickman, J., ed. 1993. The Jepson Manual: higher plants of California. University of California Press. Berkeley, California.
- Hitchcock, C. Leo, A. Cronquist, M. Ownbey, and J.W. Thompson. 1955-1969. Vascular plants of the Pacific Northwest. 5 vols. University of Washington Press, Seattle.
- _____, and A. Cronquist. 1973. Flora of the Pacific Northwest: an illustrated manual. University of Washington Press. Seattle, Washington.

- Howard, Grace E. 1963. Theodore Christian Frye (1869-1962). *The Bryologist* 66.3: 124-136.
- Hunn, Eugene S., Nancy Turner, and David H. French. 1998. Ethnobiology and Subsistence. *In* Sturtevant, William C., Editor. Volume editor Deward E. Walker. *Handbook of North American Indians: Plateau*. Vol. 12. Smithsonian Institution, Washington, DC. 808 p.
- Miller, Jay. 1998. Middle Columbia Salishans. *In* Sturtevant, William C., Editor. Volume editor Deward E. Walker. *Handbook of North American Indians: Plateau*. Vol. 12. Smithsonian Institution: Washington, DC. 808 p.
- Moura, Guy. May 27, 2010. Traditional Cultural Property Coordinator, Confederated Tribes of Colville History Department. Personal communication.
- Munz, P. A. 1973. *A California Flora with supplement*. University of California Press. Berkeley, California.
- Saltonstall, Kristin. 2002. Cryptic invasion by a non-native genotype of the common reed, *Phragmites australis*, into North America. *Proceeds of the National Academy Sciences of the United States of America*. 99(4): 2445–2449. Accessed May 26, 2010.
<<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC122384/>>
- Sullivan, Siobhan. 1986. *Plant Ecology of Washington's Shrub and Steppe Habitats*. Unpublished report for Washington Department of Game. Olympia, WA.
- Taylor, R. J. 1992. *Sagebrush country: a wildflower sanctuary*. Mountain Press Publishing Company; Missoula, MT.
- United States Department of Agriculture, Natural Resources Conservation Service. 2010. *The PLANTS Database*. National Plant Data Center, Baton Rouge, LA. Last accessed 26 November 2010.
<<http://plants.usda.gov>>
- United States Geological Survey. 1965. Coulee City, Wash. 7.5 minute series topographic map, published by the U. S. Geological Survey, Denver, CO. 1 sheet: color.
- United States Geological Survey. 1965. Park Lake, Wash. 7.5 minute series topographic map, published by the U. S. Geological Survey, Denver, CO. 1 sheet: color.
- Ungar, A. Irwin. 1991. *Ecophysiology of vascular halophytes*. CRC Press; Boca Raton, FL. 209 pages.
- Visalli, Dana. 2004. *Rare Plant Inventory and Community Vegetation Survey Sun Lakes State Park*. Unpublished report conducted for The Washington State Parks and Recreation Commission.
- Waitt, Richard B. 1987. Evidence for dozens of stupendous floods from Glacial Lake Missoula in eastern Washington, Idaho, and Montana. *Geological Society of America Centennial Field Guide—Cordilleran Section*. 345-350.
- Washington Natural Heritage Program. 2009. *Washington Natural Heritage Information System, List of*

Known Occurrences of Rare Plants in Washington. Grant County. Last accessed November 28, 2010. <www.dnr.wa.gov/ResearchScience/Topics/NaturalHeritage/Pages/amp_nh.aspx>

Washington State Parks and Recreation Commission. 2009? Temp Sun Lakes 465 - 2010 FIS with Parks Edites. Unpublished Excel File accessed September 20, 2010 with permission from Peter Herzog, State Parks planner.

Washington State Parks and Recreation Commission. 1997. Sun Lakes State Park Master Plan. Olympia, WA. Unpublished report.

Weinmann, F., P.F. Zika, D.E. Giblin, B. Legler. 2002+. Checklist of the Vascular Plants of Washington State. University of Washington Herbarium. Last accessed 28 November 2010.

<<http://biology.burke.washington.edu/herbarium/waflora/checklist.php>>

Western Regional Climate Center. Ephrata Airport FCWOS, Washington. Period of Record Monthly Climate Summary: 12/1/1949 to 12/31/2005. Accessed May 16, 2010.

<<http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?waephrr>>

To add new taxa or to suggest changes contact:

Heron Brae

Olympia, WA. (360) 486-4380. email: heronbrae@gmail.com

And

Dr. Frederica Bowcutt

The Evergreen State College, 2700 Evergreen Parkway, NW, Lab II, Olympia, WA 98505-0002
(360) 867-6744 or email: bowcuttf@evergreen.edu

Figures and Tables

Figure 1A. Topographic map of Sun Lakes State Park, Washington, western portion from Park Lake to Rainbow Lake. Dashed line indicates park boundary. USGS Park Lake Quadrangle, 1965.

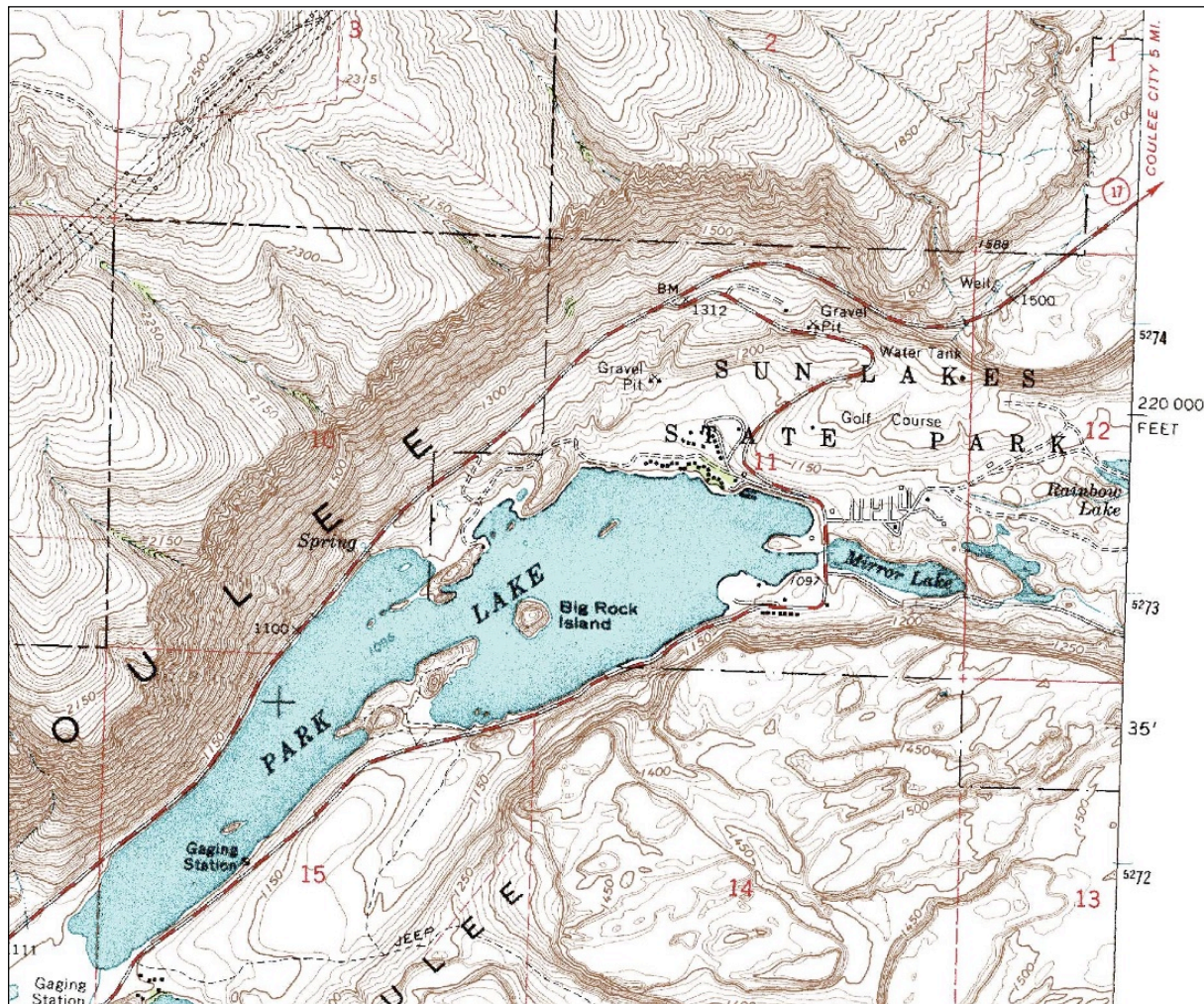


Figure 2B. Topographic map of Sun Lakes State Park, Washington, eastern portion including Coulee City. USGS Coulee City Quadrangle, 1965.

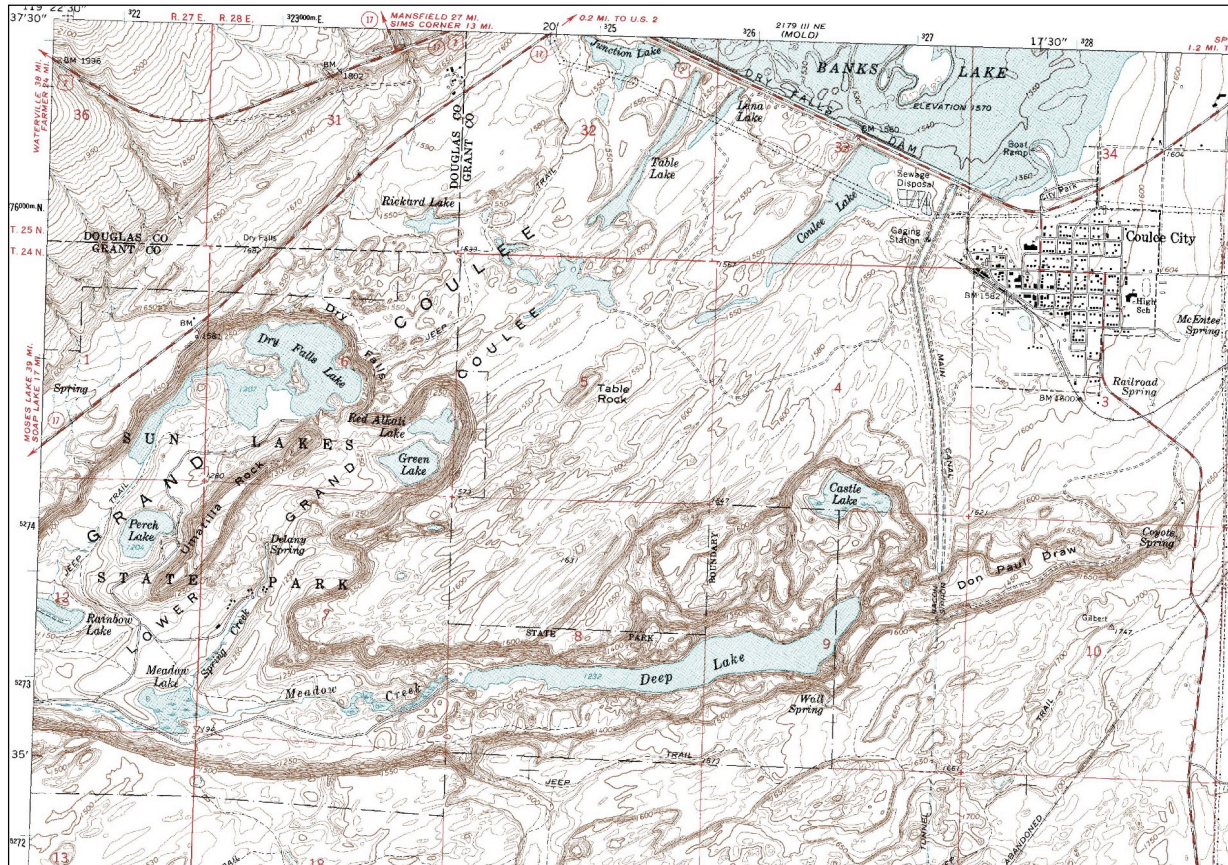


Figure 1. Sun Lakes State Park and surrounding area, showing fertile loess hills in agricultural use surrounding the channeled scabland topography of the Grand Coulee in the lower left, below the engineered Banks Lake (upper center). Photo from GoogleEarth.



Figure 3. Map of the channeled scablands of eastern Washington, showing ice age glacial Lake Missoula, locations of the flood channels and present day Dry Falls.
http://www.washington.edu/burkemuseum/geo_history_wa/Cascade%20Episode.htm



Figure 4. Typical big sagebrush steppe community in Sun Lakes State Park showing the basalt cliffs of Umatilla Rock on the left and Dry Falls in the background.
<http://www.panoramio.com/photo/6091741>



Figure 5. Alkali flat vegetation exemplifying the pattern of *Sarcobatus* scrub with patchy *Dystichlis* ground cover and white salt crusts covering the soil. Photo taken by author, just south of Dry Falls Lake looking northeast; Dry Falls and visitors center in background.



Figure 6. Red Alkali Lake, showing typical wetland zonal vegetation pattern, from open water in the center to upland sagebrush steppe in the strip on the right. Green Lake barely showing on the right. Note invasive Russian olive trees along perimeter. Talus slope in background. Photo by the author, looking east.

Table 1. Number of families, genera, species, and introduced species summarized for Sun Lakes State Park, Washington

Taxonomic group	Number of Families	Percent of total Families	Number of Genera	Percent of total genera	Number of species	Percent of total species	Number of introduced species	Percent total introduced
Ferns and Allies	2	3.2	4	2.2	6	2.2	0	0.0
Gymnosperms	1	1.6	1	0.6	1	0.4	0	0.0
Angiosperms	60	95.2	174	97.2	268	97.5	38	13.4
Dicotyledons	49	77.8	142	79.3	219	79.6	27	9.5
Monocotyledons	11	17.5	32	17.9	56	20.4	11	3.9
Total	63	100	179	100	275	100.0	38	13.4

Table 2. Families with more than ten species represented within the Sun Lakes State Park flora, including number of species and percent of the total flora.

Family	Number of species	Percent of total species
1. Asteraceae	41	15
2. Poaceae	24	9
3. Brassicaceae	19	7
4. Schrophulariaceae	15	5
5. Fabaceae	14	5
6. Cyperaceae	12	4
7. Apiaceae	10	4
8. Liliaceae	10	4
Total	152	53

Table 3. Summary of sensitive, rare, threatened, or endangered species in Sun Lakes State Park,

Scientific name	Common name	Family	WNHP status
<i>Allium scilloides</i>	Fragile onion	Liliaceae	W
<i>Astragalus agrestis</i>	Purple milkvetch	Fabaceae	W
<i>Carex hystrix</i>	Porcupine sedge	Cyperaceae	W
<i>Castilleja exilis</i>	Annual paintbrush	Schrophulariaceae	W
<i>Cryptantha gracilis</i>	Narrow-stem cryptantha	Boraginaceae	S
<i>Cryptantha scoparia</i>	Desert cryptantha	Boraginaceae	S
<i>Eleocharis rostellata</i>	Beaked spikerush	Cyperaceae	S
<i>Epipactis gigantea</i>	Giant helleborine	Orchidaceae	W
<i>Hackelia hispida</i> var. <i>disjuncta</i>	Sagebrush stickseed	Boraginaceae	S
<i>Mimulus suksdorfii</i>	Suksdorf's monkeyflower	Schrophulariaceae	S
<i>Oenothera pygmaea</i>	Dwarf evening-primrose	Onagraceae	S
<i>Pellaea glabella</i> var. <i>simplex</i>	Smooth cliffbreak	Polypodiaceae	W
<i>Phacelia tetramera</i>	Dwarf phacelia	Hydrophyllaceae	S
<i>Polygonum austineae</i>	Austin's knotweed	Polygonaceae	T
<i>Teucrium canadense</i> var. <i>occidentale</i>	Woodsage	Lamiaceae	W
Washington Natural Heritage Program state status: E=Endangered, T=Threatened, S=Sensitive, P=Priority, R=Review, W=Watch			