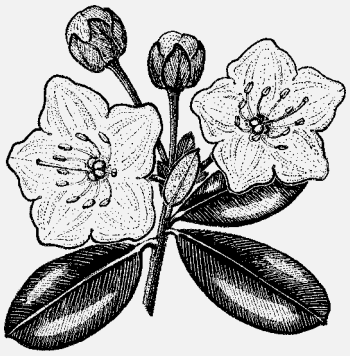

KALMIOPSIS

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Plant of the Year

Basin wildrye (*Leymus cinereus*)

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EDITORIAL

This issue of *Kalmiopsis* offers an assortment of articles, tributes, artwork, poetry, and reviews. It revives the traditions of *Plant of the Year* and *Oregon Plants, Oregon Places*. For me, this has been a year of renewed interest in grasses so I am especially pleased to present Stu Garrett's offering of basin wildrye as *Plant of the Year*. Richard Beidleman shares a historical selection about John Charles Frémont's travels in Oregon. Next time you visit Crater Lake National Park, take Elizabeth Horn's article and explore the Pumice Desert. You may also want to visit the upper Klamath River canyon, the *Oregon Plants,Oregon Places* feature by Susan Gleason. Take some time to peruse the long-awaited tributes to the NPSO Fellows, and you'll learn some NPSO history. Rachel Showalter contributed her botanical art and Jane Gibson her poetry. Rhoda Love and Jim Duncan helped me with the book and CD reviews. Based on the quality and variety of submissions, I see a bright future for *Kalmiopsis*.

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– COVER PHOTO –

A dense stand of basin wildrye (*Leymus cinereus*) on the Malheur Wildlife Refuge four years after a fire, photographed by Stuart Garrett of Bend, Oregon

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Basin Wildrye *(Leymus cinereus)*

Stuart G. Garrett
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"…the soil on this fork is remarkably rich. In some parts, the grass is seven feet high…"

Peter Skene Ogden's Journal for 21 December 1825 while trapping on the Ochoco River, Crook County, Oregon

"When my great grandfather first came into Jefferson County in 1880 the rye grass was so high in the bottoms that he had to stand in his horse's stirrups to be sure the boys were still following him on their ponies."

– Resident of Jefferson County, Oregon, as related to author, ca. 1987

The bunchgrasses of central and eastern Oregon are remarkable, but to my mind, none is so remarkable as basin wildrye. It is hard to find pure stands of it, but when you do you can understand the pioneers' fascination and admiration for this plant.

One is first impressed by the sheer size of this long-lived, perennial bunchgrass. In most years, seed stalks of this bunchgrass reach five to six feet high and, in favorable years, up to nine feet. Individual plants can be three feet across. Under the right conditions basin wildrye forms a dramatic and dominant plant community that thrives under natural fire regimes. Found at sites between 2000 and 9000 feet in elevation, basin wildrye grows best in deep soils that are subirrigated or receive runoff from upslope. It tolerates saline to alkaline soil conditions characteristic of drainages in the semi-arid West. Its range is from Canada south to Mexico, east to Minnesota. The only larger native bunchgrass in western North America is a related species that grows on the California coast (giant wildrye, *Leymus condensatus*).

Many of the lowland meadows in the intermountain west had thick stands of this grass when Euro-Americans arrived. Because this species decreases under heavy grazing regimes, the arrival of large numbers of domestic livestock in eastern Oregon in the 1860s began the decline of basin wildrye communities. Now it is considered one of the rarest plant associations in the Intermountain West.

Nomenclature

Because most North American taxonomists followed A.S. Hitchcock (*Manual of the Grasses of the United States,* 1935, 1951) whose treatment was based on Bentham (in 1881), many of us learned the name *Elymus cinereus* Scrib. & Merr. for basin wildrye. In 1980, the species was transferred to *Leymus cinereus* (Scribn. & Merr.) A. Löve, based on genomic makeup determined from grass breeding experiments. Species of *Leymus* are usually outcrossing, long-anthered perennials with narrow glumes and unawned or short-awned lemmas, while most species of *Elymus* are caespitose, self-fertilizing species with short anthers, often with long-awned lemmas (Barkworth and Dewey 1985).

Distribution and Ecology

In Oregon, basin wildrye grows from the Deschutes River drainage east to the Idaho border. The climate that distinguishes the central part of basin wildrye's range is characterized by wet winters and dry summers. Basin wildrye reaches its best development in valley bottoms with moist soils that are saline to alkaline. It also grows in rich, upland soils in smaller and less dense patches, and occurs in ravines and open woodlands, and on sand dunes and prairie flats. It is most productive where the soil is moist, but not saturated, through the summer. Dense stands of basin wildrye effectively out-compete many weeds that invade other plant communities. It does not grow on shallow soils.

Basin wildrye is susceptible to grazing damage, which is most severe when livestock use it during early spring when it is actively growing. It tolerates moderate dormant season (winter or fall) grazing. Differences in plant density after grazing can be dramatic (see photo of road right-of-way, p. 3). It tolerates fire well. Basin wildrye plants whose tops have been totally scorched by fire sprout vigorously the following spring. Basin wildrye communities are usually fully recovered to pre-burn conditions four years after burning (www.fs.fed.us/database/feis/).

Basin wildrye in sand dunes with greasewood (*Sarcobatus vermiculatus*) in Oregon's Great Basin country. Photo by Stu Garrett.

Franklin and Dyrness (1984) describe two plant associations for basin wildrye. A *Distichlis/Elymus* (*Leymus*) community was described for saline-alkaline soils and an association of *Artemisia tridentata/Elymus* (*Leymus*) *cinereus* was noted in moist, alluvial bottoms. Some herbaceous species were found only in these

Basin wildrye along the Crooked River near Smith Rock, Oregon. Photo by Stu Garrett.

communities. There is perhaps a similar situation for a rare plant near Burns, Oregon.

Malheur wirelettuce (*Stephanomeria malheurensis*), one of Oregon's rarest plants, inhabits a windswept hill south of Burns. Its best populations grow in conjunction with basin wildrye and the harvester ant colonies that dot the area. Although no definitive research has been done yet, one wonders if the wildrye seeds attract the ants whose colonies enhance survival of the wirelettuce.

Basin wildrye stands also provide exceptional cover for a number of wildlife species. Deer, birds, and small mammals use the dense stands for hiding, nesting, and foraging. Federal land management agencies (e.g., Bureau of Land Management, Forest Service, and Fish and Wildlife Service) are beginning to pay more attention to this species. Management sometimes favors the restoration of beautiful stands of basin wildrye that once graced Oregon east of the Cascade Mountains.

Native American Uses

Native Americans were quite familiar with this species and used it for a variety of material and medicinal needs. It was used in a root decoction for internal hemorrhaging and as fiber for mats, rugs, and bedding. It was used for winter fodder for horses. Basin wildrye leaves were used to line graves (Moerman 1998). The Warm Springs Paiutes used basin wildrye roots tied together as hair combs (Mahar 1953). Dry leaves were used to scrape irritations from eyelids. Hunn (1990) noted that basin wildrye culms were used to separate sections of large salmon when drying and was also used for floor coverings and for layering in underground ovens when baking bear meat, camas, or lichens.

Euro-American Uses

The early settlers were astounded by the thick stands of basin wildrye. It provided part of the forage necessary to support the massive numbers of livestock that were introduced into native eastern Oregon ecosystems beginning in the 1860s. Many of the locations named "Ryegrass Flats" that appear on modern maps were named for stands of this species. Ranchers utilized natural meadows of basin wildrye as hayfields, cutting and drying it as winter forage for their livestock. Another valuable attribute for livestock ranching was that basin wildrye/saltgrass communities remain green all summer (Franklin and Dyrness 1988). Today many of these meadows have been planted to commercial forage species.

Ergot Poisoning

An interesting aspect of wildrye ecology is a fungus that attacks it from time to time. Occasional seedheads can be found with a black seedlike protrusion on them. This protrusion is *Claviceps purpurea*, black ergot. The fungus life cycle begins when a fungal mycelium invades the ovary of the seed and forms a dark purple to black structure that looks like a grain of wheat. The hard shell of the structure contains alkaloids that were responsible for the ergot poisoning (St. Anthony's Fire) that was endemic in Europe

Petroglyphs along a basalt rim in Lake County, Oregon. Photo by Stu Garrett.

in the Middle Ages. This fungus is well known for causing ergot poisoning in humans and abortion or death in livestock. It contains a chemical related to LSD and current migraine medications. There are three types of ergotism: hallucinogenic, convulsive, and gangrenous. Among the first symptoms are tingling and loss of sensation in the hands and feet and later an agonizing burning sensation in the extremities. Gangrene often follows, and in the more severe cases limbs may be lost due to the blackened necrotic tissue. Convulsions, hallucinations, severe psychosis, mental disorientation, and death may occur as well. Ergotism is sometimes cited as the cause of the aberrant behavior of people in Salem, Massachusetts, in 1692 which led to the Salem Witchcraft Trials.

An intriguing thought is whether some of the more unusual rock writings that Native Americans left on the basalt rims of Oregon's Great Basin could have been inspired by hallucinogenic ergot poisoning from milled seeds of local basin wildrye that had been infested with ergot. Many of the petroglyph panels depict bizarre figures and shapes (see photo p. 2). They frequently occur in areas where stands of basin wildrye are common.

Finding Basin Wildrye

If you would like to visit a roadside stand of basin wildrye try the following areas: Highway 26 east of Prineville, Highway 31 along Summer Lake, and on the Malheur Wildlife Refuge.

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Dr. Garrett, a family physician in Bend, is co-founder and president of the High Desert Chapter of the Native Plant Society of Oregon. He has a strong interest in the native vegetation of central Oregon. He leads numerous field trips for various organizations throughout the area. He was Oregon's Doctor-Citizen of theYear and is the author of *The Newberry National Volcanic Monument: An Oregon Documentary.*

Fenceline contrast in basin wildrye community along ungrazed highway right-of-way in central Oregon. Photo by Stu Garrett.

John Charles Frémont and His Floral Forays into Oregon (1843-1844 and 1846)

Richard Beidleman
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(Adapted from an essay that will appear in *Plant Hunters of the Pacific Northwest*, edited by A. R. Kruckeberg and R. M. Love)

The winter disaster could have proven much worse for the advancement of botany in Oregon... In late February of 1844, John Charles Frémont left mountain man Thomas Fitzpatrick behind on the west side of California's snowy Sierra Nevada. With Fitzpatrick were most of the expedition's men and what remained of the fatigued horses and mules, heavily laden with packs. The going, though leisurely, proved hazardous. The valleys narrowed into precipitous-walled gorges and rain fell in sheets, melting the snowbanks into the churning river below, already out of its banks. The crude elevated trace was slippery; one by one the pack animals lost their footing and fell to their deaths in the torrent, including the one mule that carried the scientific collections of John Charles Frémont's Second Expedition. Fortunately for northwest botany, the lost Oregon specimens, gathered between Fort Hall in eastern Idaho and the Sierra crest of California (Jackson and Spence, 1970:653), were collected after mid-September, a disappointing time of year for botanists because the flora is largely dormant.

Frémont recognized, but never thoroughly appreciated, the manifold vicissitudes associated with the collection of natural history specimens in the wilderness. Sad to say, a second more serious botanical disaster hit Frémont's 1843-44 expedition the July following his Sierra losses. Flash flood waters of the Kansas River swelled to six hundred yards in breadth and swept through Frémont's Great Plains encampment, destroying most of the plants collected from California eastward (Jackson and Spence, 1970:366-367). Lost were numerous spring and summer collections, including new species from the Sierra, the Great Central Valley of California, the Mohave Desert, the Great Basin, the Rockies of Utah and Colorado, and the Great Plains prairie at the height of the flowering season. Thus, despite the 2,000 miles travelled the previous year, the February disaster paled in comparison with losses from the July flood. From our present viewpoint, however, what is most regretted is that both of John Charles Frémont's ventures into Oregon (l843-44 and 1846) were poorly timed for the botanical pursuits that he cherished.

Of all the scientifically-inclined explorers of the Northwest, with the possible exceptions of Captain James Cook and Lewis and Clark, Frémont became the most famous. He was the romantic and publicized commander of five far-western expeditions, son-in-law of a Manifest Destiny senator, husband of a charming, intelligent and literate wife, namer of the Great Basin and the Golden Gate. Frémont was the first Republican candidate for the presidency of the United States, California's first governor, first senator, leader of the Bear Flag Revolt which abetted accession of California to the Union, and among its first millionaires. He was the rare American recipient of the medal of the Royal Geographical Society of London, Civil War general and commander of the Department of the West, promulgator of a controversial emancipation proclamation which anticipated Lincoln by three years, and territorial governor of Arizona. In modern times he was the hero of a television mini-series (*Dream West,* CBS 1986) and is memorialized by California Native Plant Society's journal, *Fremontia.*

Humble Beginnings

Nothing in Frémont's humble beginnings predicted future successes, especially in the field of natural science. He was born the illegitimate son of an itinerant Frenchman on January 21, 1813, in Savannah, Georgia. Three factors shaped his impressive career: inherent talents, influential acquaintances and fortunate timing. As a young man in the intellectual and cultural city of Charleston, South Carolina, he became a protégé of science-minded Joel Roberts Poinsett, who had served as our first minister to Mexico and who introduced the familiar Christmas plant. Poinsett directed Frémont towards scientific endeavor, steering him into a shipboard mathematics teaching position with the navy, then later into civilian surveying with the US Corps of Topographical Engineers.

Frémont's crucial career break came when Poinsett, having become Secretary of War under President Van Buren, facilitated an officer's commission for him with the Topographical Corps early in 1838. That summer Frémont was assigned as second in command of a surveying expedition into the "Old Northwest" under the leadership of a distinguished French scientist, Joseph Nicolas Nicollet, who molded Frémont into an explorer with mapping expertise and natural history interests. Although the purpose of Nicollet's excursion was primarily surveying, he personally hired botanist Charles Geyer to accompany the party (Jackson and Spence, 1970:10-11). From this young Dresden gardener Frémont would get his first exposure to field botany.

Afterwards, as a young lieutenant back in Washington, Frémont became acquainted with Nicollet's close friend Ferdinand R. Hassler, the head of the US Coast Survey, and Colonel J.J. Abert, chief of the Topographical Corps; and then with influential members of Congress, including Senator Thomas Hart Benton of Missouri, a vocal proponent of western expansion, (Frémont later named Abert Lake and Abert Rim for the Colonel; the Senator became his father-in-law). It was almost inevitable that this able young man would soon be assigned the command of a small

topographical party of his own: a detailed survey in Iowa Territory, in 1841. Like Nicollet before him, he added botanist Geyer to his entourage, viewing him as "of unusual practical knowledge in his profession..." (McKelvey, 1955:771). In the official report after this expedition Frémont noted, "The Botany & Geology of the region visited occupied a considerable share of my attention. Should it be required by the Bureau these may form the subject of a separate report. In this I have noticed the prevailing growth & characteristic plants...." (Jackson and Spence, 1970:119).

First Expedition

Nearly 40 years after Lewis and Clark, there was growing interest in Congress to send a surveying expedition westward towards the Oregon country. Because Nicollet's health was failing, John Charles Frémont led the 1842 government expedition charged with exploring the Rocky Mountains to South Pass, along the route of the developing Oregon Trail.

From early June into early September 1842, Frémont reveled in his introduction to the flowers of the high plains and Rockies, from shortgrass prairie to tundra, recording in his journal that it "resembled a garden in the splendor of fields of varied flowers which filled the air with fragrance" (McKelvey, 1955:760). "There was a rich undergrowth of plants, and numerous gay-colored flowers in brilliant bloom" (McKelvey, 1955:763). "The flora of the region... was extremely rich, and, among the characteristic plants, the scarlet flowers of the *Dodecatheon dentatum* (*Dodecatheon pulchellum*, shooting-star) everywhere met the eye in great abundance. A small ravine...was filled with a profusion of alpine plants in brilliant bloom..." (McKelvey, 1955:763). His account of this first expedition, edited and augmented by his young wife Jessie, included many scientific plant names, probably provided by John Torrey, but not something many explorers would include. Geyer, who had accompanied Frémont as plant collector on several previous occasions but hadn't been invited on the 1842 expedition, expressed a differing opinion about Frémont the botanist: "....neither he, himself, nor any one of his party understood anything about Botany...." (McKelvey, 1955:755). Charles Preuss, Frémont's cartographer who shared this first trip to the Rockies, voiced a similar opinion: "That fellow (Frémont) knows nothing about mineralogy or botany. Yet he collects every trifle in order to have it interpreted later in Washington and to brag about it in his report. Let him collect as much as he wants—if he would only not make us wait for our meal" (Gudde and Gudde, 1958:35). In fairness to Frémont, however, one should understand that both Geyer and Preuss could be contentious Teutonic traveling companions.

Botanical Connections

After the completion of the 1842 expedition three important botanists entered Frémont's life, none initially familiar with him personally: the above-mentioned John Torrey of New York City, Asa Gray of Harvard University and George Engelmann of St. Louis. Encouraged to include a catalog of plants with his official 1842 expedition report, Frémont wrote to Professor Benedict Jaeger, a Princeton University lecturer on natural history, for advice. Jaeger suggested that John Torrey, of Columbia College but now lecturing at Princeton, would be the ideal person for the assignment, having compiled such catalogues for many earlier expeditions, including Nicollet's (Jackson and Spence, 1970:130-132).

Wasting no time, Frémont jumped at the suggestion, dropped Torrey a note of alert, and on November 16, 1842, shipped off the expedition's plant specimens from Washington (Rodgers, 1942:154). By early March of 1843, Torrey's completed botanical report on the first expedition was in Frémont's hands to be printed, though Torrey was not totally delighted with either Frémont's collections or the eventual publication (Rodgers, 1942:155). This marked the beginning of an important collaboration between Frémont and Torrey, something Frémont had hoped for: "Can we not do something together? Is it not customary sometimes for collectors, unskilled as myself to publish their plants in partnership with, & under the shadow of, the standard names in the science? I do not know if I am asking too much, but if I am not, I should be glad if you would write to me on the subject, and I think something good may be done" (Jackson and Spence, 1970:166).

Meanwhile, Torrey alerted Asa Gray, who was just commencing his botanical career at Harvard, about this explorer-collector, "who writes something like a foreigner" (Jackson and Spence, 1970:130), and informed Gray that Frémont expected to proceed to the Pacific the next year (1843), bringing back collections for Torrey (which Torrey assured Gray would be shared with Harvard). "How would it do," Torrey queried Gray, "to send a collector with him?" (Rodgers, 1942: 155). Melines C. Leavenworth was a possibility, a retired army surgeon who was "profoundly interested in botany" and "wishes to go somewhere–& this place might suit *him*– but not *us*–in all respects" (Jackson and Spence, 1970:130-131).

Gray responded with the same thought in mind: "I wish we had a collector to go with Frémont. It is a great chance. If none are to be had, Lieutenant F. must be *indoctrinated*, and taught to collect both dried specimens and seeds." And what would there be in it for Frémont? "...he shall be *immortalized* by having the 999th *Senecio* called *S. Frémontii*..." (Dupree, 1959:157). As a matter of fact, Gray himself had a plant collector in mind, namely Ferdinand Lindheimer of New Braunfels, Texas, who

Senecio fremontii Torr. & Gray, drawn by John H. Rumely, from *Vascular Plants of the Pacific Northwest* (1977), reprinted with permission of the University of Washington Press.

was spending the winter of 1842-43 in St. Louis with his fellow German colleague George Engelmann. Wrote Gray to Torrey: "...As he is a Doctor–a pretty good botanist, I guess, and makes very good specimens of the right kind–flowers–fruit &c.–why not recommend him to Frémont... I think we cannot do better..." (Jackson and Spence, 1970:158-159). Lindheimer indeed became an excellent botanist, but he was to choose the "Lone Star State" as his domain, becoming, as has been written, the "Father of Texas Botany" (Goyne, 1991:xi). When nothing materialized with respect to adding a botanist to Frémont's new expedition, Torrey followed Gray's suggestion and provided Frémont with directions for collecting and preserving plants, "& he promises to pay attention to what we (Torrey and Gray), of course, consider the main object of the expedition" (Rodgers, 1942:157).

Second Expedition

On the May eve of his second major expedition, Frémont spent a fortnight with his third important botanical acquaintance, George Engelmann. In 1839 Frémont and Nicollet dealt indirectly with Dr. Engelmann who was becoming the scientific "clearinghouse" in St. Louis, the "Gateway to the West," for medical and scientific supplies and advice (Jackson and Spence, 1970:77-78). Now Engelmann "assisted him in his preparations and gave him instructions for geological & botanical researches and collections." (Jackson and Spence, 1970:346).

At the end of May 1843, Frémont with his company of more than 40 men, horses, mules, carts, a wagon loaded with scientific equipment, and a controversial howitzer cannon, abruptly departed from the shoreline of the Kaw (Kansas) River. They left quickly after Frémont received a confidential note from his wife warning him of a letter she had intercepted from Colonel Abert ordering Frémont back to Washington to explain why he was taking a howitzer on a peaceful mission (Nevins, 1955:131). And though the party included no botanist, Frémont promised Torrey "still I contemplate doing something for your favorite science" (letter, Frémont to Torrey, 1843).

By the time of this Second Expedition, Frémont was certainly more than a mere leader of a government exploration. He diligently collected plants, animals, fossils, rocks, and minerals, numbering his specimens and adding corresponding numbers to the notes in his field books. He observed the weather, geological formations, made sketches of the countryside, jotted notes on the native inhabitants, took temperatures and astronomical observations, determined the latitude and longitude, used one of the two barometers to estimate elevation, and carried along two pocket chronometers. He interrogated Indians about the medicinal and edible qualities of the plants, showing special interest in cases where certain species were successfully used for medicine. He not only tried to obtain samples of the edibles but ate a good number of them himself to satisfy his curiosity. He "carefully studied the vegetation through every mile of the region traveled and made full notes," anticipating that when he provided his final report to the government it would include "for each day along the line of travel, the characteristic shrubs & plants of the region..." (Jackson and Spence, 1970:366).

During the Second Expedition, Frémont followed fairly closely the developing Oregon Trail, entering Idaho in late August. Members of the expedition, as well as the Shoshone Indians, were more interested in edible plants fruiting at the time. In nearby mountains to the west the Indians gathered abundant serviceberries (probably *Amelanchier alnifolia,* now *A. utahensis*), which they combined with venison to make pemmican. As a gesture of good will, they gave the expedition a variety of different berries, as well as seeds and roots. One of the roots, a favorite with the Shoshone when baked or ground into flour, was "kooyah", which Frémont ate, finding it had "a very strong and remarkably peculiar taste and odor," unlike any other vegetable he had ever sampled. His phlegmatic cartographer Charles Preuss was less excited about this so-called "tobacco root." Driven out of a Shoshone lodge by the offensive odor of the cooked delicacy, he described it as "the most horrid food he had ever put in his mouth" (Jackson and Spence, 1970:475). A modern sampler agreed with Preuss, observing that it "tastes a good deal like chewing tobacco and to have the odor of unwashed feet!" (Harrington, 1967:225).

Had there been more flowers in bloom, Frémont's expedition might not have reached the Columbia River, because he was notorious for pursuing the flora at the expense of more pressing expedition demands. With the approach of winter in Idaho, however, the expedition members were more concerned with their increasingly sparse provisions. They bartered with the Indians for various seeds and roots, including the edible roots of elk thistle (*Cirsium scariosum*). Also, Frémont finally satisfied his curiosity about the identity of "kooyah." Bribing an Indian boy with a knife, Frémont learned that the plant was edible valerian (*Valeriana edulis*). He described it as follows: "The root....is large, of a very bright yellow color, with the characteristic odor.... It loves the rich moist soil of river bottoms, which was the locality in which I always afterwards found it. It was now entirely out of bloom; according to my observations, flowering in the months of May and June." (Jackson and Spence, 1970:515).

Kooyah (*Valeriana edulis*) in late summer, as Frémont would have encountered it. Photo by Richard Beidleman.

Entering Oregon

Continuing northwest, the expedition dropped into the river bottom of *Riviere Boisee* ("wooded river", the Boise) on the afternoon of October 7 and the following morning crossed the broad deep Snake River in two canoes, arriving for the first time in land that is now Oregon, and found themselves back in sagebrush country. On October 13, 1843, as they approached mountains, Frémont reflected on the desert landscape left behind, which he later named the Great Basin: "a term which I apply to the intermediate region between the Rocky mountains and the next range, containing many lakes, with their own system of rivers and creeks...and which have no connexion with the ocean, or the great rivers which flow into it" (Jackson and Spence, 1970:541).

Gone were the flowers of summer and early fall. Now the conifers of the northwest caught Frémont's eye, as the men, carts, horses and mules made their way across the upper headwaters of the Powder River into the expansive grassland of the Grand Ronde, then up and over the Blue Mountains to the Columbia River at Fort Walla Walla. First were the dominant forests of western larch (*Larix occidentalis,* as named by Nuttall), which Frémont mistook for European larch, the needles at that time turning yellow and falling, "here a magnificent tree, attaining sometimes the height of 200 feet, which I believe is elsewhere unknown." Frémont quite accurately estimated the height, as the record is almost 250 feet (Petrides and Petrides, 1992:21). (My earliest experience with the fall larch forest above Grand Ronde was somewhat different than Frémont's. I thought the trees were turning yellow from disease or insect ravage, and was looking for a Forest Service ranger to satisfy my naive curiosity. Fortunately for my professional dignity, I didn't find a forester before I determined the answer for myself.)

Measuring Trees

Frémont was enchanted with Grand Ronde valley, "covered with good grass, on a rich soil, abundantly watered, and surrounded by high and well-timbered mountains." Then began the ascent into the Blue Mountains, "through an open pine forest of large and stately trees (ponderosa pines), among which the balsam pine (subalpine fir) made its appearance," the forest increasing in density and finally consisting "of several varieties of spruce, larch, and balsam pine." One can imagine Frémont, tape line in hand, tramping along at the head of his expedition, measuring a white spruce (grand fir?) twelve feet in circumference, a ten-foot larch, eight feet the average circumference of trees along the line of march, their height from 100 to perhaps 200 feet, larches sometimes without a limb for the first 100 feet, the spruce with branches down to the ground. What did his men secretly think of their leader's forest mensuration inventory? By now they were probably accustomed to his botanical quirks.

Incidentally, Meriwether Lewis measured trees in this northwest country four decades earlier, and described them in his journal. Lewis, confident of his written descriptions, collected few conifers, so that today it is difficult to determine which species Lewis wrote about. In a sense, this is also true for Frémont, whose identifications can often only be surmised. Most of these species, of course, he had never seen before. The conifer he called white spruce may have been white fir (*Abies concolor*), as both Welsh

Lodgepole pine and other conifers near the Little Deschutes River south of Bend, Oregon, on Frémont's 1843 route. Photo by Richard Beidleman.

(1998:71) and Jackson and Spence (1970:633) suggest, although Engelmann spruce (*Picea engelmannii*) has been called white spruce and occurs here at higher elevations. It seems most likely, however, that Frémont referred to grand fir (*Abies grandis*), which is common in the mountains of eastern Oregon, has been called "white fir" because of its whitish bark. In contrast, true white fir grows primarily in southwestern Oregon and the Sierra Nevada. He had undoubtedly seen a real white fir the previous July when he was in the Colorado Springs foothills, noting that that particular tree, with long, broad needles might be an *Abies*. The actual white spruce (*Picea glauca*) does not grow in Oregon. When he wrote of hemlock spruce he was probably referring to *Tsuga mertensiana,* mountain hemlock, although it also has another common name, black spruce. He recorded seeing the alleged black spruce near Fort Vancouver. There is no question about his designation of the larch, even though he had the incorrect species name, since he noted that it was changing color. Today, where Frémont's expedition passed over the Blue Mountains through the Umatilla National Forest, there is a mixed coniferous forest composed largely of ponderosa and lodgepole pine (*Pinus ponderosa, P. contorta*), abundant grand fir and Douglas-fir, and, of course, western larch, with Engelmann spruce and subalpine fir (*Abies lasiocarpa*, which Frémont likely referred to as balsam pine) coming in at higher elevations (Perry and Perry, 1983:108).

As the snow-capped volcano of Mount Hood came into view, the forest became more open. Small hemlock spruce ("*perusse*," as Frémont appended; probably *Tsuga heterophylla*, western hemlock, smaller than mountain hemlock) had been added to the forest roster, interspersed among larger trees including a "black spruce" 15 feet in circumference. And as the expedition descended towards the Walla Walla River ponderosa pines reappeared, some very large, which "appeared to love the open grounds."

Moving towards the Columbia River, Frémont recorded that "our road...had in it nothing of interest." Grass was sparse, the

only trees were riverbank willows (*Salix*), and the air was filled with clouds of grit borne on winds sweeping eastward from the Pacific Ocean. But the first view of the Columbia River thrilled Frémont, "the great river on which the course of events for the last half century has been directing attention and conferring historical fame." (Jackson and Spence, 1970:553).

Culmination at Ft. Vancouver

On November 1, 1843, Frémont was traveling downstream along the Oregon side of the Columbia towards the culmination of his northwestern trip. His orders of March 10, 1843, from Colonel Abert had been to "connect the reconnaissance of 1842, which I (Frémont) had the honor to conduct, with the surveys of Commander Wilkes on the coast of the Pacific Ocean, so as to give a connected survey of the interior of our continent" (Jackson and Spence, 1970:426). Charles Wilkes' around-the-world United States Exploring Expedition, with its team of scientists, had returned to North America from the South Pacific in the summer of 1841. A contingent arrived at the mouth of the Columbia on July 17, and continued its surveys up that river and south into Alta California (Stanton, 1975:248).

During the first week of November, the Frémont men moved downstream by boat, enjoying increasingly beautiful scenery and

Sugar pine in a mixed coniferous forest north of Klamath Marsh. Photo by Richard Beidleman.

Indian summer weather, and camped on the Columbia north shore, in present-day Washington, about a mile above the famous Hudson's Bay Company's Fort Vancouver. Here John McLoughlin proffered room at the fort to Frémont, telling him to "make myself at home while I staid." Frémont longed to proceed "down to the Pacific, and, solely, in the interest and in the love of geography, to have seen the ocean on the western as well as the eastern side of the continent, so as to give a satisfactory completeness to the geographical picture which had been formed in our minds" (Jackson and Spence, 1970:567). But, because the wet winter weather had set in and Frémont had fulfilled his expedition's instructions (to connect with the surveys of the Wilkes Expedition), he decided to turn back.

The Return Journey

Near sunset on November 10, Frémont's men, in three canoes and a Mackinaw barge, headed up the Columbia River. There were no more floral collections now, but Frémont was carrying along newly acquired geological specimens, including "dicotyledonous" fossil plants and ashes from the eruption of Mt. Helens the previous November. And something of a botanical coincidence occurred several days downstream from The Dalles. In a little bay Frémont ran into "a man of kindred pursuits," Friedrich G.J. Lüders, a German botanist from Hamburg. Frémont had heard of Lüders, because Frémont's acquaintance George Engelmann in St. Louis was outfitting Lüders, as well as Charles Geyer, and had promised to sell any botanical collections they might obtain, reserving however the right to describe new species (Jackson and Spence, 1970:370-371). Frémont and Lüders only had time for a brief conversation before Lüders continued by land towards Fort Vancouver.

On his upstream trip Frémont made an astute ecological deduction. At scattered sites along the edge of the river one could discern a "submerged forest" (flooded stands of dead conifers) by looking down through the clear water. This phenomenon was supposedly the result of some major earth convulsion like an earthquake, which had formed the river's cascades and dammed up the river, drowning the trees. Frémont observed where a number of landslides had taken place along the Columbia River gorge, in one case actually bringing down into the riparian deciduous woodland an entire stand of mountain conifers. He attributed the possible origin of the "submerged forest" to landslides, phenomena much more recent than the source of the cascades. He also noted, "It occurred to me that this would have been a beautiful illustration to the eye of a botanist." (Jackson and Spence, 1970:573).

On November 25, with the temperature at sunrise below freezing, the expedition left the Columbia River and headed south overland through central Oregon on a newly planned route—"...a great part of it absolutely new to geographical, botanical, and geological science"—which would eventually take the men into the western edge of the Great Basin, over the Sierra and into California, before heading back to Washington, DC. But for another month they would be traveling through Oregon, south from The Dalles to the Deschutes River and its tributaries, then on towards Klamath Lake before veering eastward.

More Eastern Oregon Trees

This was not the time of year for the kind of botanical collections which would excite the "closet naturalists" back east, who anticipated the indoor scrutinizing, describing, and naming of new flora....which they themselves had not collected. But Frémont was enjoying the trek through new country, at first with deciduous creek bottoms dominated by oaks (*Quercus garryana*, Oregon white oak, encountered by Archibald Menzies and by Lewis and Clark along the Columbia River, but named and described by David

Current taxa still bearing Frémont's name, listed alphabetically by genus, from the USDA database P.L.A.N.T.S. [http://plants.usda.gov/]. An asterisk (*) indicates presence in Oregon.

Amphipappus fremontii Torr. & Gray
FREMONT'S CHAFFBUSH
Astragalus lentiginosus Dougl. ex Hook. var. *fremontii* (Gray ex Torr.) S. Wats.
FREMONT'S MILKVETCH
Bryoria fremontii (Tuck.) Brodo & D. Hawksw.
FREMONT'S HORSEHAIR LICHEN
**Calycadenia fremontii* Gray
FREMONT'S WESTERN ROSINWEED
Chaenactis fremontii Gray
PINCUSHION FLOWER
**Chenopodium fremontii* S. Wats.
FREMONT'S GOOSEFOOT
Clematis fremontii S. Wats.
FREMONT'S LEATHER FLOWER
**Garrya fremontii* Torr.
FREMONT'S SILK TASSEL, BEARBRUSH
Gentiana fremontii Torr.
MOSS GENTIAN
Geranium caespitosum James var. *fremontii* (Torr. ex Gray) Dorn
FREMONT'S GERANIUM
Lasthenia fremontii (Torr. ex Gray) Greene
FREMONT'S GOLDFIELDS
Layia fremontii (Torr. & Gray) Gray
FREMONT'S TIDYTIPS
Lepidium fremontii S. Wats.
DESERT PEPPERWEED
Lesquerella fremontii Rollins & Shaw
FREMONT'S BLADDERPOD
Lotus argophyllus (Gray) Greene var. *fremontii* (Gray) Ottley
FREMONT'S BIRDSFOOT TREFOIL
Lycium fremontii Gray
FREMONT'S DESERT-THORN
Mahonia fremontii (Benth.) Gray
[*Berberis fremontii* Torrey, *The Jepson Man.*] FREMONT'S BARBERRY
Malacothamnus fremontii (Torr. ex Gray) Torr. ex Greene
FREMONT'S BUSHMALLOW
Mimulus fremontii Benth.
FREMONT'S MONKEYFLOWER
Nemophila pulchella Eastw. var. *fremontii* (Elmer) Constance
FREMONT'S BABY BLUE EYES
Oenothera macrocarpa Nutt. ssp. *fremontii* (S. Wats.) W.L. Wagner
FREMONT'S EVENING-PRIMROSE
Penstemon fremontii Torr. & Gray ex Gray
FREMONT'S BEARDTONGUE
Phacelia fremontii Torr.
FREMONT'S PHACELIA
**Polyctenium fremontii* (S. Wats.) Greene
DESERT COMBLEAF
Populus fremontii S. Wats.
FREMONT COTTONWOOD
Prunus fremontii S. Wats.
DESERT APRICOT
Psorothamnus fremontii (Torr. ex Gray) Barneby
FREMONT'S DALEA
**Senecio fremontii* Torr. & Gray
DWARF MOUNTAIN RAGWORT
Syntrichopappus fremontii Gray
YELLOWRAY FREMONT'S-GOLD
**Zigadenus fremontii* (Torr.) Torr. ex S. Wats.
FREMONT'S DEATHCAMAS

Douglas (Pavlik, *et al.* 1991:19-20)) and then over a low ridge into open coniferous forest, with ponderosa pine, scattered cedar, and other evergreens, and high rocky plateaus of volcanic rock dissected by the many tributaries of the Deschutes and Little Deschutes rivers. It has been suggested (Majors, 1982:243) that the cedars were incense cedar (*Calocedrus decurrens*), the type specimen of which was later collected by Frémont for Torrey in the Sierra Nevada (Jackson and Spence, 1970:633), but it is also possible that the cedars were western juniper (*Juniperus occidentalis*), as both species occur throughout the region (Majors, 1982:243).

Surprisingly, the weather warmed for a spell, and the men temporarily discarded their winter clothes. Where the trail finally left a sagebrush flat and entered a beautiful pine forest with meadows and creek bottoms, Frémont was again measuring record specimens, one ponderosa pine 22 feet in circumference at its base, larches 140 feet tall and over 3 feet in diameter. He also measured pine cones, especially one species about which he had been alerted by Columbia River Indians. As anticipated, some cones reached 18 inches long. Although Frémont didn't recognize the pine, he wrote an adequate description: "The leaflets are short–only two or three inches long, and five in a sheath; the bark of a red color." This was sugar pine, a species first discovered in 1825 by David Douglas on the Umpqua River of western Oregon. The outer bark of this pine is gray-brown but the underbark is red. However, along the route of travel the profusion of pines that Frémont observed, "remarkable for the red color of the bolls," were most likely ponderosa pine, which occur commonly in the same countryside. Much of the substrate was now volcanic in origin, at one site some miles north of Klamath Marsh "a yellowish white pumice stone, producing varieties of magnificent pines, but not a blade of grass."

On December 10, his guides mistook Klamath Marsh for Klamath Lake, and Frémont turned his party southeast, a firing of the expedition's howitzer sending a successful warning to the possibly hostile Indians in the region. Supposedly this was only the second firing of the howitzer during the entire trip. (The first time was near Great Salt Lake as a signal for Frémont and some missing companions.) By mid-December, still traveling through coniferous forest country, but not where Frémont thought he was, winter snows began to descend on the men as they looked down the mountain wall into a green valley, the edge of the Great Basin!

Soon they were again moving through sagebrush with slopes of fescue–"a better grass than we had found for many days"–and here and there alkali lake basins where "Chenopodiaceous shrubs constituted the growth," one of these shrubs the greasewood with whose original generic name Torrey had honored Frémont (*Fremontia*, now *Sarcobatus*). Following some Yuletide coffee and sugar, and "one of the most useful articles a traveler can carry" (a shot of brandy) apiece, members of Frémont's expedition left the northwest the day after Christmas 1843. Botanical specimens that they might have collected from Fort Hall west (e.g., giant sugar pine cones, clematis, and golden current), were lost with the mule in the Sierra.

Despite the forthcoming homeward-bound summer disaster on the flooded Kansas River, many interesting, new, and valuable plant species from California and eastward were salvaged and would return from Frémont's Second Expedition, to be worked over by Torrey and Gray, incorporated into herbaria, and

appear in press; but, unfortunately, few from Oregon. Winter botanical observations (such as tree measurements) and names of Oregon features, such as Summer Lake and Winter Ridge in Lake County, which he named on December 16, 1843, are the legacy of Frémont's explorations in Oregon.

Third Expedition

John Charles Frémont returned to Oregon once more, in 1846, as a side excursion on his Third Expedition. Unfortunately the side trip from California preceded the full-blown advent of spring. This expedition, with its involvement in the Bear Flag Revolt and the Mexican War, left little time for botany, despite the fact that Frémont's wife Jessie wrote John Torrey that her husband would rather be pursuing flora than fighting. Frémont managed enough botanical collecting so that new plants eventually reached Torrey and Gray, but none from Oregon.

On May 1, the Third Expedition camped on the southeastern end of what today is Tule Lake National Wildlife Refuge. The next day they moved into Oregon, through more open country but still surrounded by broken and hilly landscape. Frémont's attention to vegetation was vaporizing, with concern over a missing hunter and the threat of "hostile and treacherous" Indians. After a rest of several days, during which time the hunter returned, the expedition continued north, passing Upper Klamath Lake. As Frémont sadly noted, "I had no time now for idling days, and I had to lose the pleasure to which the view before me invited" (Spence and Jackson, 1973:103).

The expedition was about to connect with Frémont's survey line of 1844, north of Klamath Lake; and even though it was approaching mid-May, there were still patches of snow in the shade, and heavier snow in the timber and atop the surrounding mountains, "where winter still held sway." Frémont was eager to continue his exploration, his quest after natural history, to map this wild country, to provide an easier route to the Columbia River: "All this gave the country a charm for me. It would have been dull work if it had been to plod over a safe country and here and there to correct some old error." But "how fate pursues a man!" (Spence and Jackson, 1973:106-107).

On May 8, south of Klamath Marsh where he had turned his expedition southeast less than three years before, Frémont's pursuit of flora in Oregon came to an end. On a chilly early spring evening he was standing by his campfire, "enjoying its warmth," when the wilderness silence was broken by the sound of horses laboriously approaching from the south. The two horsemen were an advance for a messenger from Washington, with information that war with Mexico seemed inevitable. Frémont was to move with his company as rapidly as possible south, back to California. He was no longer the explorer, but rather "an Officer of the American Army..."

In 1890, the year recognized by historians as the end of the American frontier, botanical explorer Frémont died on July 13, almost penniless, at a boarding house in New York City (Nevins, 1955:609). He was seventy-seven. Jessie, his beautiful, talented wife, penned a most appropriate tribute to her husband when she wrote, "from the ashes of his campfires have sprung cities" (Nevins, 1955:611). Because of the vagaries of seasonal time and political fortune we cannot say that from Frémont's plant collections sprang a wealth of knowledge about Oregon botany. But his transcendent enthusiasm for flora, and his productive pursuit of it in western America, make us grateful that Oregon briefly fell within his province.

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The Pumice Desert – Crater Lake National Park

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An opening in the lodgepole pine forest. A quick vista of open pumice. This is the impression most travelers have of the Pumice Desert as they enter Crater Lake National Park by the north portal.

The Pumice Desert is a striking natural feature within the Park. It is a rather barren-appearing, flat area of about five and one-half square miles that contrasts with the surrounding mature forest of lodgepole pine. Even the casual observer asks why this opening persists while the surrounding forest flourishes. Why has lodgepole pine not become established? Why has plant succession been slow?

As a graduate student and a seasonal ranger naturalist at Crater Lake National Park during the summers of 1964 and 1965, I began an ecological study of the Pumice Desert (Horn 1968), beginning a long love affair with this fascinating landscape.

Pumice Desert Geography and Geology

The Pumice Desert is located at an elevation of 6,000 feet and is bisected by the North Entrance road about four and one-half miles from the northern border of Crater Lake National Park. The Watershed Divide of the Cascade Range is adjacent to the Pumice Desert along the west side, a cinder ridge of the divide forming one boundary of the desert. Mount Mazama was a volcanic peak that reached ca. 12,000 feet elevation and occupied what is now Crater Lake National Park. According to geologist Howell Williams's (1942) monograph on ancient Mount Mazama, glaciers covered the entire mountaintop during the volcano's dormant periods. Several of these glaciers extended down into the canyons below, gouging them into broad U-shaped valleys and leaving glacial debris and moraines along their flanks. One of these glaciers extended northward past Diamond Lake, about eleven miles from the current rim of Crater Lake. This glacier covered the area now occupied by the Pumice Desert.

The glacier had apparently receded by the time Mount Mazama's summit was destroyed during its final eruption about 7,700 years ago. The glowing pumice accumulated and filled the glacial valley with a gaseous, frothy, buff-colored deposit. On top of this is grayish-colored scoria, which, in some places, mixed with the earlier pumice. The exact depth of this deposit is not known, but a boring made by Williams (1942) exceeded 100 feet in depth.

Pumice Desert Physiography

The Pumice Desert consists of a large east-west wedge-shaped opening in the lodgepole pine forest that carpets the northern portion of the park. The slight depression in the center of the generally flat, rather homogenous area may have resulted from either the original valley topography or a slight settling of the pumice substrate. There are two elevation benchmarks in the area. The first records an elevation of 5,962 feet where the road crosses the center of the Pumice Desert at its lowest point, and the second one, on the southern ridge, records 6,010 feet, probably representing one of the highest points. This difference in elevation occurs over a distance of about a quarter mile, causing a gentle north and south facing slope across the surface. Topographic relief in the Pumice Desert consists of minor ridges and depressions, creating dry washes. The pumice soil is very loose and porous, allowing water to infiltrate quickly.

View across the Pumice desert from eastern corner of the tree plot in 1965. Photo by Elizabeth Horn.

The same view in 2000. Note increased number of trees. Photo by Elizabeth Horn.

Climate

At Park Headquarters, about 14 miles south of the Pumice Desert, records show an annual average precipitation of 69 inches (Sternes 1963). However, about 70% of this comes in the form of snow. Moisture derived from snowmelt is gradual, and the snow usually persists into early June. During the summer of 1965 only 3 inches of rainfall were recorded on the Pumice Desert. Winter high temperatures (November through February) average between 32° and 39°F at Park Headquarters. Average lows for the same period range between 17° and 22°F. Summers are cool with high temperatures averaging about 70°F. Summer lows range between 33° and 42°F. Pumice Desert measurements for the summer of 1965 showed higher daytime temperatures and lower nighttime temperatures. Average high temperatures recorded for June, July, and August in 1965 were 72°, 78°, and 72°F. Average low temperatures for the same period were 33°, 35°, and 35°F.

Some erosion from wind and water is evident in the slight depressions throughout the area. During summer fieldwork, wind was almost constant, and I observed grains of pumice being moved across the soil surface.

Desert environments are known for their temperature extremes. Except for widely scattered lodgepole pine, vegetation on the Pumice Desert is only a few inches tall and a great deal of the ground completely lacks vegetation. Consequently, the soil surface and the air directly above it are quickly heated by solar radiation. As heat accumulates through the day, the soil surface often becomes quite hot. The heat re-radiates to the atmosphere during the night. Thus, diurnal soil temperatures fluctuate more widely than air temperature.

Vegetation Description

I began studying the vegetation of the Pumice Desert in 1965 with 22 line transects. In addition, lodgepole pine were tabulated in a 100-acre plot. Nine of the transects and the four corners of the 100-acre plot were marked with iron rods for future monitoring. I resampled the line transects in 1977 and 1995. Over the years, I recorded only fourteen species of plants in the line transects, in contrast to the 570 species in the flora of Crater Lake National Park, listed by Applegate (1939). The vegetation on the Pumice Desert is quite meager, both in the numbers of different species and in plant density.

Umbellate pussypaws (*Calyptridium umbellatum*). Photo by Elizabeth Horn.

All but one of the fourteen plant species on the Pumice Desert are perennial herbs or small shrubs. The exception is lodgepole pine scattered throughout the area. Most of the plants have various adaptations typical of desert and alpine communities. Using nomenclature from Hickman (1993) and Hitchcock and Cronquist (1973), the following list describes those fourteen species.

Pumice sandwort (*Arenaria pumicola*). Photo by Elizabeth Horn.

Achnatherum occidentale (Thurber) Barkworth (western needlegrass) and *Elymus elymoides* (Raf.) Swezey (bottlebrush squirreltail; Poaceae), are the only grasses growing on the Pumice Desert. They bloom in late July and disseminate fruit in mid-August. Needlegrass is common, found in nearly all of the sample plots, while squirreltail is infrequent.

Plants of *Arabis platysperma* A. Gray (flatpod rockcress; Brassicaceae) demonstrate the rapid life cycle so important to species that survive desert and alpine settings. It is in full flower in mid-June and sets seed by the first of July. Seeds are released by the first part of August. This plant is sparsely scattered throughout the area.

Arenaria pumicola Coville & Leiberg (pumice sandwort; Caryophyllaceae), abundant throughout the area, is especially prevalent on the south-facing slope. Like *Arabis platysperma*, it is in full bloom by mid-June, but it continues flowering into July. Although a few flowering plants can still be found in early August, most of the flowering is finished by mid-July. Fruit formation has begun by July 1 and continues through mid-August.

Calyptridium umbellatum (Torrey) E. Greene (umbellate pussypaws; Portulacaceae) lies close to the ground in a low mat.

Dwarf hulsea (*Hulsea nana*). Photo by Elizabeth Horn.

It flowers in late June and sets fruit in mid-July. By mid-August, most of the plant has dried and the seeds have dispersed.

Carex halliana L. Bailey and *Carex breweri* Boot (Cyperaceae) are the only two sedge species found on the Pumice Desert. The former is found along the periphery of the desert while the latter is found throughout and dominates the central low area. Both flower in late June and fruit in mid-July.

Eriogonum marifolium Torr. & A. Gray (mountain eriogonum; Polygonaceae) is one of the most abundant species on the Pumice Desert. Its small, waxy leaves still appear dry in mid-June. Most of the stem is woody, and the bases of some plants reach a half inch in diameter. The only non-woody portion of the plant is the new season's growth. *Eriogonum marifolium* flowers when temperatures are higher, with peak blooming in mid-July. Fruit is set in early August. The entire plant resembles a compact small bush, its stems protecting each other from the wind and cold.

Hulsea nana A. Gray (dwarf hulsea; Asteraceae) occurs in only a few of the sampling plots, primarily in the center washes. Epidermal hairs densely cover it when it pushes through the pumice soil in mid-June. Its yellow flowers burst open the first week in July. Although some individuals remain in bloom in August, most are in fruit by then; and seeds are disseminated by the end of the month.

Lomatium martindalei Coult. and Rose (few-fruited desert parsley; Apiaceae) is scattered thinly throughout the Pumice Desert but is absent in the central wash area. It flowers in mid-June, setting fruit the first part of July. The oblong fruits are retained through the summer, eventually becoming quite dry and brown.

Machaeranthera canescens (Pursh) A. Gray var. *shastensis* (A. Gray) B. L. Turner (Shasta aster; Asteraceae), in contrast to many of the other Pumice Desert species, flowers later in the summer, blooming in mid-July. The flowers are short-lived and fruit is set by the end of the month. It is widely distributed throughout the Pumice Desert, but like *Lomatium martindalei*, is absent from the central wash area.

Pinus contorta ssp. *murrayana* (Grev. & Balf.) Critchf. (lodgepole pine; Pinaceae) is scattered widely throughout the Pumice Desert. It forms an almost pure stand of forest along the northern portion of Crater Lake National Park, blending into and interspersed with mountain hemlock (*Tsuga mertensiana*) between the Pumice Desert and the rim of Crater Lake to the south. Lodgepole pine prefers mostly level terrain and grows extensively on the pumice soils of central Oregon.

Polygonum newberryi Small (Newberry fleeceflower; Polygonaceae) is the most conspicuous of the desert plants because of its large fleshy leaves. The slightly succulent nature of *Polygonum newberryi* undoubtedly is important in its successful establishment on the Pumice Desert. It is most common in the central flat area. The shoots emerge immediately after the snow melts and are well developed by mid-June. The shoots as well as roots store water for the growing season. Flowering takes place the end of June so that by mid-July most specimens have borne fruit. The leaves turn a brilliant red as they dry before being dislodged by the wind. The following year shoots arise from the persistent thick storage roots, which extend more than three feet underground.

Viola purpurea Kellogg ssp. *venosa* (S.Watson) M. S. Baker & J. C. Clausen (purple-tinged violet; Violaceae) blooms for only a short period, beginning in mid-June and ending the first week in July. The capsules dehisce by the first week in August. This violet is found sparingly throughout the Pumice Desert, but is absent from the central wash area.

Although not found in any of the sample plots, *Lupinus lepidus* Douglas (prairie lupine; Fabaceae) is found in the surrounding forest edge and alongside the North Entrance Road, where it may become quite lush due to rain runoff from the pavement.

Nearly all of these plants exhibit many characteristics typical of both alpine and desert plants. *Eriogonum marifolium*, *Calyptridium umbellatum*, and *Arabis platysperma* have small leathery leaves while leaves of *Arenaria pumicola* are short, needle-like structures. Those of *Machaeranthera canescens* var. *shastensis* are sessile, small, and narrow. A thickened cuticle found on leathery and needle-like leaves reduces transpiration and benefits plants growing in arid conditions.

Calyptridium umbellatum further reduces desiccation by its prostrate habit in which the leaves form a flat rosette. This species has an additional adaptive characteristic: its leaves lie flat on the surface of the ground in the morning when it is cool, then as the soil heats, slowly lift off the hot surface, until evening when they return to the cooling surface. The leaves of this species do

Newberry fleeceflower (*Polygonum newberryi*). Photo by Elizabeth Horn.

not turn brown and dry, as do the thinner, more elevated leaves of *Lomatium martindalei* or *Viola purpurpea*, although the diminutive size of plants of *Viola purpurea* help reduce wind exposure. The wind is reduced close to the ground due to friction. A smaller plant is protected from mechanical wind damage as well as its drying effects. Plants of *Eriogonum marifolium* grow a dense cluster of short stems, forming a compact ball, useful in wind retardation within the plant body. The dense hairy covering of *Hulsea nana* plants serves not only in wind reduction but also reflects light to reduce heating during the day. These same hairs act as a heat trap to retard reradiation of heat at night.

In proportion to their size all of the above plants have large root systems. Plants of some species, notably *Machaeranthera canescens* var. *shastensis* and *Eriogonum marifolium,* have fibrous root systems. Plants of *Eriogonum marifolium* have thin roots, which extend several feet laterally from the plant. This type of root system quickly absorbs water near the soil surface after a rain. This is also true of the grasses and sedges. On the other hand, long tap roots have the advantage of reaching water held deeper in the soil. The tap root of a two-inch *Calyptridium umbellatum* plant reaches about two feet into the ground. *Lomatium martindalei*, *Viola purpurpea*, and *Hulsea nana* have comparable taproots. The largest roots, however, belong to *Polygonum newberryi*. The thick, fleshy tuber extends over three feet deep, with finer roots extending even further.

Phenologic records showed that all species completed their life cycles well within the short summer. Most break dormancy, flower, and fruit within a few weeks. Although some snow generally persists on the Pumice Desert through early June, by mid-June it is usually completely gone. Most plants shed their seeds by the first of August when their vegetative portions are dry and brown.

Plant Succession

Answers to the question of why lodgepole pine had not covered this area as it did the surrounding terrain are elusive. In 1965 the average density of plants in the line transects was only 0.6 individuals per square foot and plant coverage averaged only 4.5%. Twenty-seven lodgepole pine were found within the 100-acre plot and they averaged (by estimate) about 22 years of age.

Although the numbers for individual plant species varied somewhat upon resampling in 1977 and 1995, the totals did not show a significant trend. Total cover for each of the three years in the permanently marked plots was nearly the same, averaging 4.9%.

In 1965 the average height of the trees in the 100-acre plot was 4.6 feet. The tallest was 9.8 feet while the smallest was 8 inches. In the summer of 2000, I found 47 trees in the 100-acre tree plot. Average height was 8.9 feet, a substantial increase over the interim 35 years. The tallest tree was 49 feet tall; the smallest was a seedling of less than an inch. Increment borings of several larger trees revealed ages ranging from 40 to 66 years. Over half showed soil mounding around the base, caused either by wind deposition or gopher activity. Gopher activity was obvious around 23 of the 47 trees in the plot. Only one seedling was found and it was in the drip line of an older tree.

Over half of the trees tabulated in the summer of 2000 had multiple stems or trunks. This was also true in 1965. There could be several causes. Germination of rodent-cached seeds would yield clusters of trees. Gopher, wind, or ice damage could kill the apical meristem of a young tree and allow lateral meristems to grow. Clustered stems provide several advantages for a plant. Adjacent branches protect each other from abrasion by blowing ice particles or pumice and minimize evapotranspiration in windy conditions. Clustering enhances structural strength in windy environments and forms a windbreak that favors snow deposition, increasing melt water.

Succession is definitely retarded by a lack of recruitment. Few small trees were found in the summer of 2000. Many factors influence the establishment of new plants: temperature extremes at the soil surface, low soil fertility, rodents, lack of seed source and wind damage (desiccation and abrasion from ice and pumice).

Soils

Soil measurements in 1965 revealed that surface temperature extremes and low fertility may be limiting factors for plant establishment. Soil temperatures fluctuate widely on clear days. Soil surface and air temperatures were similar only on cloudy days.

Plot on the eastern portion of the Pumice Desert in 1977 showing multi-stemmed lodgepole pine, in right foreground. Photo by Elizabeth Horn.

During a six-hour period one sunny day in July when the air temperature did not exceed 83° F, the soil surface temperature averaged 102° F. Mount Mazama pumice soils are noted for their low nutrient levels. Pumice Desert soils were compared to pumice soils studied east of Crater Lake near LaPine (Youngberg and Dyrness 1964, 1965; Dyrness and Youngberg 1966). Pumice Desert soils recorded lower levels of nutrients such as P, K, Ca, and Mg than those found near LaPine. There was also less organic matter, reflecting the sparse vegetation. Pumice Desert samples taken from the A soil horizon were comparable to the C horizons sampled near LaPine, indicating that Pumice Desert soils retain more "youthful" characteristics than other Mount Mazama pumice soils.

Rodents

During my fieldwork I noted an abundance of activity by pocket gophers (*Thomomys mazama*). Their mounds were found in 50% of the strip sampling plots, averaging 14.5 mounds per 0.1 acre plot. Their abundance made walking difficult in many areas of the Pumice Desert. Soil genesis is aided by burial of plant fragments and animal residues as well as by bringing deeper material to the surface, where it is exposed to weathering elements. Although their burrowing activity aerates the soil, pocket gophers destroy the root system of young seedlings. For their numbers, the food supply did not appear plentiful. Compared to average density over the entire Pumice Desert in 1965, plant density was lower on nine of the eleven line strips containing gopher mounds, while density was higher than average in the other two plots.

Seed Source

The majority of new trees observed were near the periphery of the Pumice Desert, close to the forest edge. Fewer trees were found in the center of the area. It is logical to expect plant succession to proceed more quickly at the edge of the Pumice Desert than in the center. The growing season on the Pumice Desert is short. Successful establishment of lodgepole pine depends on seeds germinating and surviving on the hot, infertile soil, and the seedlings growing enough during the short growing season to survive the winter threats of wind, ice, and gopher damage. Nonetheless, many of the well-established trees appeared vigorous. During the summer of 2000, I observed two trees in the tree plot with 6- and 7-inch leaders.

The same view in 1995 after the tree had died. Also note the increased number of lodgepole pines in the background. Photo by Elizabeth Horn.

Summary

Typical of primary succession, plant community development is slow on the Pumice Desert. The species that survive in the area demonstrate one or more morphological adaptations commonly found in severe climates of desert and alpine regions. Although succession is slow, it is indeed proceeding. The number of trees established on the Pumice Desert 100-acre tree plot increased by 75% between 1965 and 2000. Climate and the elements dictate that succession will be slow. However, as the soil accumulates organic matter contributed by existing plants, it provides more hospitable conditions for new seedlings. Although it has taken over 7,000 years for plant cover to reach almost 5% on the Pumice Desert, my observations over the past 30 years show a measureable increase in lodgepole pine in the 100-acre tree plot. One can only speculate how long it will be before the area resembles the surrounding forest, or if it will be maintained by periodic fire or severe drought.

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Flora of the Upper Klamath River Canyon, Klamath County, Oregon

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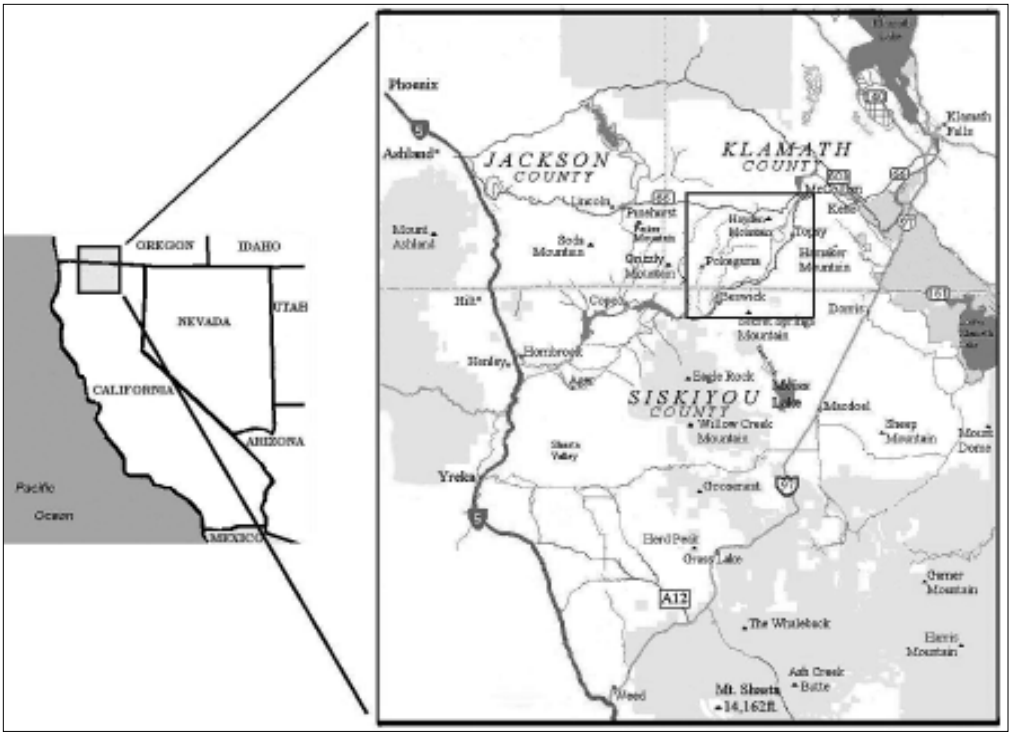
The upper Klamath River canyon lies between John C. Boyle Dam near Highway 66 in Klamath County, Oregon and Copco Lake in Siskiyou County, California. The Klamath River cut this deep (750 to 1,000 ft.) canyon through the Cascade Mountains, providing a drain for the Klamath Basin. Exposed rock, in the form of vertical rock cliffs, bedrock outcrops, talus slopes, and rock slides, comprises approximately 35% of the canyon area. In the narrow gorge, the terrain varies from flat or gently sloping along the river benches to nearly vertical at the canyon walls. The average river gradient varies from 27 to 77 feet per mile along its meandering length, creating in some places the extreme white-water conditions prized by rafters. Remnant volcanoes covered by coniferous forest and relatively flat plateaus (e.g., Pokegama Plateau to the west) surround the canyon. Historically, this section of the Klamath River was less impacted by humans than adjacent areas. This factor, and because the river crosses a transition zone between climates, floristic and geologic provinces, and cultural groups (past and present), led Congress to declare the upper Klamath a Wild and Scenic River in 1990.

The Klamath River drainage was established well before the Pliocene, carving its course to the Pacific Ocean, 22 to 18 million years ago when the western Cascade volcanics were being formed (Williams 1949). During the Pliocene and Pleistocene, the time of the Siskiyou and Cascade mountain uplift and the High Cascade Series volcanics deposition, high water volume maintained the river's course. Meiss Lake, located to the east in the fault-blocked Butte Valley in California, is the remnant of a Pleistocene lake that once contributed to this flow by draining northward through Sam's Neck into the Klamath River (Williams 1949). This additional volume may have helped the Klamath River re-cut its bed when a massive landslide, involving half of what is now Secret Spring Mountain, dammed the river between 150,000 and 225,000 B.P. (Richard Hazlett, pers. comm.).

Within the upper Klamath River canyon area, soils are poorly developed because they derive from relatively young volcanic parent materials, often of High Cascades Series origin. These soils are rocky and shallow with high clay content (montmorillonite) in the surface or subsurface layers. Soil textures vary, but primarily include gravelly loam, stony loam, cobbly loam, gravelly clay loam, clay loams, and clays. Relief and landform have been dominant factors in soil formation.

The climate is continental, modified by distant oceanic effects. The Klamath range to the west diminishes the strength of incoming Pacific storms, decreasing precipitation (rain shadow effect). Furthermore, summer rainfall is severely limited by a semi-permanent anti-cyclonic cell over the Pacific Ocean that blocks oceanic storm systems from moving inland. Thunderstorms break the summer drought in localized areas. The oceanic cell moves southward in winter, allowing Pacific storms to enter the area (Burcham 1957). Above 5,000 feet much of the winter precipitation is deposited as snow, which persists until late spring or early summer. Snow rarely accumulates on the canyon floor. Winter temperatures frequently drop below 30°F with summer temperatures often exceeding 100°F. Cold air drainage down the canyon lowers temperatures well below freezing during winter nights. Conversely, this airflow pattern moderates high temperatures in the canyon during summer.



Location of the upper Klamath River canyon. Map by Milton Gleason.

The upper Klamath River gorge, Oregon (camera facing southwest). Photo by Susan Gleason.

By dissecting the Cascades, the upper Klamath River forms a natural corridor between the Great Basin and California floristic provinces, with the resulting vegetation classed as "Transition Zone" (Bailey 1936). High levels of floristic variation result from the intermingling of characteristic regional plants across this semi-permeable boundary. In addition to this floristic provincial overlap, the area shows wide ecotonal variation due to its topography and drainage pattern. Todt (1998) noted that "the upper reach of the Klamath River, as it flows through the Cascade Mountains, is the most botanically heterogeneous landscape along its entire course." Relic and disjunct plant communities from past environmental changes may have contributed to this present diversity (Todt 1990). According to Franklin and Dyrness (1988), the upper Klamath River canyon area supports both interior valley and mixed conifer vegetation zones. On a landscape level, these

The coniferous forest surrounding the upper Klamath River canyon. Species visible in photo include *Pinus ponderosa*, *Ceanothus cuneatus*, *Symphoricarpos albus* and *Amelanchier utahensis*. Photo by Susan Gleason.

plant communities are associated with elevation gradients, i.e., oak forest and chaparral associations typical of the warmer and drier interior valley communities of California occur at lower elevations and mixed conifer forest communities occur at higher elevations. Plant communities also vary according to slope, aspect, soils, and available moisture. The following community types occur within the upper Klamath River area: mixed coniferous forest, pine/juniper forest, pine/oak forest, oak savanna, oak/shrub, chaparral, riparian, wet meadow, lithosol meadow, and rock talus.

Mixed Coniferous Forest

Mixed coniferous forest is the dominant plant community, encompassing approximately 45% of the area of the upper Klamath River canyon. Coniferous trees dominate this community, including ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*). At lower elevations to the south, incense cedar (*Calocedrus decurrens*) is a frequent associate, especially on alkaline soils (Atzet and Wheeler 1982). To the north, and especially at higher elevations, the community includes white fir (*Abies concolor*). Sugar pine (*Pinus lambertiana*) may have been a larger component of this forest community in the past. These coniferous species occur in many combinations, resulting in multiple potential plant associations (Hayes 1959).

Understory vegetation of the mixed coniferous forest varies by overstory coverage, soil, moisture, elevation, and aspect. Moisture and soil depth appear to be two major factors determining species distribution and abundance. Common understory species include shrubs: snowberry (*Symphoricarpos albus*), manzanita (*Arctostaphylos patula*), Oregon grape (*Berberis aquifolium*), serviceberry (*Amelanchier utahensis*), mahala mat (*Ceanothus prostratus*), snowbrush (*Ceanothus velutinus*), baldhip rose (*Rosa gymnocarpa*), and chinquapin (*Chrysolepis chrysophylla*). These shrubs generally dominate small openings in this community, such

Ponderosa pine on a forest edge, Grizzly Butte, upper Klamath River canyon. Photo by Susan Gleason.

as those resulting from an individual tree fall. The most common forbs are wild strawberry (*Fragaria vesca, F. virginiana*), dogbane (*Apocynum androsaemifolium*), and western starflower (*Trientalis latifolia*). The composition of the understory changes considerably from north to south, following climatic gradients.

Pine/Oak Forest

In the drier regions of the forested area, ponderosa pine increases in dominance until it is almost the only conifer. Under xeric conditions, pine is often codominant with juniper or oak. Where juniper (*Juniperus occidentalis*) is codominant, the community can be labeled a pine/juniper forest. This community, occasionally found on the drier, more exposed slopes in the upper canyon, comprises less than 0.5% of the total area. Elsewhere in the pine forest, juniper appears to be increasing in the understory as a result of decades of fire suppression.

Oaks are the other major codominant with ponderosa pine, forming a pine/oak forest community that covers about 20% of the canyon area. Pine/oak forests are found primarily in the lower canyon, as well as in the uplands of the southern area surrounding the canyon. In the canyon and along the canyon's edge, the codominant oak is Oregon white oak (*Quercus garryana*). California black oak (*Quercus kelloggii*) is also found as a codominant in canyon communities, primarily in the southern portion of the area. In the southern ponderosa pine-dominated forests, California black oak is also found as an understory shrub. Relatively minor amounts of understory characterize the pine/oak community, consisting of annual or perennial grasses with occasional copses of shrubs. Native perennial grasses are primarily fescue species (*Festuca idahoensis*). Potential understory shrubs include species common in the drier portions of the mixed coniferous forest: serviceberry, snowberry, Oregon grape, various buckwheats, and deerbrush (*Ceanothus integerrimus*). A few of the understory forbs include pussytoes (*Antennaria argentea, A. dimorpha, A. howellii, A. rosea*), yarrow (*Achillea millefolium*), sweet cicely (*Osmorhiza occidentalis, O. purpurea*), bedstraw (*Galium aparine, G. bolanderi, G. boreale*), and balsamroot (*Balsamorhiza deltoidea, B. sagittata*).

Oregon white oak savanna, floor of the upper Klamath River canyon. Photo by Susan Gleason.

Oak Savanna

Oak-dominated communities are savannas maintained by logging, fire, or shallow volcanic soils. Oak savanna now occupies about 2% of the area, occurring on slopes and benches within and along the canyon rim. In the past, savannas may have been more widespread (up to 7% of the area), created by frequent low-intensity fires. The overstory is Oregon white oak, with annual and perennial grasses forming the understory. Juniper occasionally establishes in the understory, but is easily removed by disturbance. Other scattered shrubs include snowberry, three-leaf sumac (*Rhus trilobata*), and poison oak (*Toxicodendron diversilobum*).

Oak/Shrub

Elsewhere in the canyon area, pine/oak forest gradually grades into an oak/shrub community. Oak/shrub communities grow on slopes and benchlands both in the canyon and on the southern uplands, covering about 8% of the area. Similar to the oak savanna, Oregon white oak dominates this community. Widely spaced, small- to mid-size oaks grow in a well-developed shrub layer that includes wedgeleaf ceanothus (*Ceanothus cuneatus*), birchleaf mountain mahogany (*Cercocarpus betuloides*), and/or antelope bitterbrush (*Purshia tridentata*). In the southern part of the canyon area, a mosaic of plant communities forms as oak/shrub mixes with oak/pine, oak savanna, chaparral, and various meadow communities. This pattern is maintained by fire and, secondarily, soil development.

Chaparral

Small to extensive brush fields (chaparral), intermingle with the previously described communities and cover approximately 10% of the canyon area. The chaparral community is characteristically a dense stand of shrubs with extensive root systems, interrupted by an occasional tree (Detling 1968). The dominant shrub appears to be determined by soil type and moisture regime. Among the three common *Ceanothus* species, *C. cuneatus* occupies the least productive soils (typically young, coarse, rocky, and xeric), *C. integerrimus* occurs on intermediate sites, and *C. velutinus* occupies the better soils in the forested uplands (Gratkowski 1962). In chaparral communities within the mixed coniferous forest, various manzanitas compete with snowbrush and chinquapin for domination of brushfield openings. Communities dominated by Klamath plum (*Prunus subcordata*), wild buckwheat (*Eriogonum sphaerocephalum*), or sagebrush (*Artemisia*) occur along the edge of meadows or other forest openings.

Riparian Communities

Riparian communities form small, discrete, often ribbon-like units, wherever there is a source of year-round water. Altogether, riparian communities comprise about 3% of the canyon area. Prior to the installation of John C. Boyle Dam in the upper canyon (1958), floods periodically disturbed and renewed the nutrient load in these riparian communities. The resultant coarse-textured soils are well drained and well aerated, at least in the upper horizons. These soils are also relatively young, without hardpans,

The narrow riparian zone of the upper Klamath River canyon.
Photo by Susan Gleason.

and have periodically open niches as the result of flooding, bank erosion, and the deposition of mixed gravels and silts.

The infrequent small streams in the canyon area are characteristically shaded and kept cool by overhanging riparian vegetation. Common shade trees include white alder (*Alnus rhombifolia*), Oregon ash (*Fraxinus latifolia*), black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), quaking aspen (*Populus tremuloides*), Western birch (*Betula occidentalis*), and both Oregon white and California black oak. Riparian shrubs include dogwood (*Cornus glabrata, C. sericea*), black hawthorn (*Crataegus douglasii*), California rose (*Rosa californica*), willow (*Salix exigua, S. laevigata, S. lucida, S. lutea, S. scouleriana*), and California grape (*Vitis californica*). Herbaceous cover in the riparian zones includes sedges (*Carex dudleyi*), bulrushes (*Scirpus acutus, S. microcarpus, S. pungens*), rushes (*Juncus effusus* var. *pacificus*), cattail (*Typha latifolia*), monkeyflowers (*Mimulus guttatus, M. primuloides*), and horsetails (*Equisetum arvense, E. hyemale*), among others. The more stable riparian zone created by the water flow controlled by the John C. Boyle Dam has encouraged extensive stands of reed canarygrass (*Phalaris arundinacea*) along the Klamath River.

Wet Meadow

In contrast to these rocky communities, wet meadows represent the opposite extreme in soil development, with deep, permanently saturated soils. In the upper Klamath River canyon this community occurs both in the upland mixed coniferous forest and along the canyon bottom. These meadows are dominated by a combination of riparian plants previously mentioned, joined by forbs such as dock (*Rumex occidentalis, R. salicifolius*), camas (*Camassia quamash*), bistort (*Polygonum bistortoides*), and buttercup (*Ranunculus aquatilis, R. arvensis*). Within these locations, zones of vegetation vary along soil moisture gradients (including annual fluctuations). On the drier edge, riparian herbs and grasses border riparian trees and shrubs. Wet meadow species dominate the wettest zone.

Lithosol Meadow

The term lithosol meadow includes a variety of meadow or forest openings. The primary distinguishing feature is a large proportion of surface rock. The rounded to sub-angular rocks are volcanic in origin, either basalt or andesite. Ranging in size from pebbles to boulders, they are embedded in a matrix of shallow soils of clay or clay loam. The high clay content causes local soil saturation during the wet season. Other attributes vary greatly, including size, angle of slope, proportion of rock to soil, size of rocks, degree of seasonal soil saturation, and overstory. Franklin and Dyrness (1988) briefly acknowledged the existence of this community in their broad vegetational study of Oregon, describing it as a "nonforested community with very shallow soils" in locations that are "typically warm and extremely dry during the summer." Further east, extensive nonforested areas with shallow soils are called scablands or steppes.

Lithosol meadows consist of scattered grasses and herbs with an occasional tree or shrub. The scarce trees are usually similar to those dominating the surrounding community. They are often dwarfed because the rooting zone is limited by seasonally saturated soil, a hard duripan, or shallow bedrock (conditions that generally prevent tree establishment in these environments). Shrubs include wedgeleaf ceanothus and bitterbrush. Appearing regularly at the edges of lithosol meadows are wild buckwheat and low sagebrush (*Artemisia arbuscula* ssp. *thermopola*), a local endemic on the east side of the canyon. Todt (1998) reported that endemism among certain shrub species is characteristic of lithosol meadow communities in the northern Great Basin.

A few herbaceous dicots commonly occur in lithosol meadows, including yampah (*Perideridia bolanderi, P. erythrorhiza, P. gairdneri, P. oregana*), biscuitroot (*Lomatium bicolor, L. dissectum, L. macrocarpum, L. nudicaule, L. piperi, L. triternatum, L. vaginatum*), broom-rape (*Orobanche uniflora*), owl clover (*Orthocarpus bracteosus, O. imbricatus, O. luteus*), vinegar weed (*Trichostema lanceolatum, T. oblongum*), large-headed clover (*Trifolium macrocephalum*), and daggerpod (*Phoenicaulis cheiranthoides*). Liliaceous monocots are found in lithosol meadows in great numbers and varieties, including several species of wild onion (*Allium acuminatum, A. amplectens,*

Lithosol meadow, upland plateau, upper Klamath River canyon region. Tree species are *Pinus ponderosa* and *Juniperus occidentalis*.
Photo by Susan Gleason.

A. bolanderi, A. membranaceum, A. peninsulare, A. siskiyouense, A. tolmiei), yellow bells (*Fritillaria pudica*), harvest brodiaea (*Brodiaea coronaria, B. elegans*), and deathcamas (*Zigadenus venenosus*). Grasses, an important component of lithosol meadows, include both native perennials and introduced species. Both the annual and perennial non-native grasses are associated with historic grazing of cattle, e.g., cheatgrass (*Bromus tectorum*) and bulbous bluegrass (*Poa bulbosa*). In vernally wet lithosol meadows, specialized herbaceous plants include downingia (*Downingia bacigalupii, D. yina*), globethistle (*Echinops sphaerocephalus*), quillwort (*Isoetes*), hairgrass (*Deschampsia*), and less often, camas. Soil factors appear to determine the biogeography within these lithosol meadows, e.g., rooting depth, duration of soil saturation, and the timing of soil desiccation.

Human History

Humans have been present in the upper Klamath River canyon since about the end of the Pleistocene, and definitely since circa 7500 B.P. During this time, people modified the environment in different ways and degrees as the inhabitors of the top of the ecological food chain. The degree of environmental manipulation that prehistoric inhabitants might have practiced is at present merely speculative beyond that recorded from the contact-period native populations. According to oral tradition, the culture of the Shastan people originated in the upper Klamath River canyon. Archaeological and linguistic pictures both suggest that Shastan-speaking people occupied the canyon area for a long time. The arrival of Euro-Americans beginning in the 1840s dramatically changed a centuries-old dynamic relationship between humans and their environment.

Grazing Impacts

Among these historic changes was the introduction of old world animals. First came horses, traded from neighboring groups even before Euro-Americans entered the region. Horses soon started running wild in the canyon, and later were encouraged to do so as a source of stock for local ranchers. Feral horses remain in the area today, as the federally protected Pokegama Wild Horse herd.

Although they arrived later, cattle have had a greater impact on the local environment. Following the early explorers, settlers came with their herds. As the human population increased, especially with the impetus of the gold rush, cattle ranching became the primary economic activity. Cattle herds were documented as grazing in the Butte Valley as early as the summer of 1858 (Feilner 1865). Thousands of cattle were driven over the Cascades along the Applegate Trail in the 1860s and 1870s to developing cattle empires in eastern Oregon. Until the early 1900s, sheep also grazed throughout the area. Cattle numbers increased after 1940 as sheep were gradually phased out.

Following the initial pulse provided by large numbers of gold-seekers, the cattle industry remained important as ranchers supplied the next local economic boom–logging. Several ranches thrived on the Pokegama Plateau north of the Klamath River. Prior to the Forest Reserve Act of 1893 and the Taylor Grazing Act of 1934, grazing on federal lands was uncontrolled. This availability of free grazing allowed ranches to flourish in the area, since large amounts of land were needed to support herds on this relatively unproductive rangeland. By 1927, the Forest Service produced a Range Management Plan and some federal lands were leased for grazing with minimal fees and regulations. Since then, regulations have gradually become stricter as knowledge of range management improved. Although declining, ranching remains a significant industry in the area (Bartoy 1995).

The vegetation here did not evolve under grazing intensity and duration presented by domestic livestock, as the previous foragers were deer and elk. Early grazing practices, including complete utilization of available forage and early spring grazing, resulted in conversion of perennial native grasslands to stands dominated by introduced annual grasses. The situation was aggravated by historical burning patterns, erosion due to grazing impacts, and trampling and soil compaction (BLM 1990). Riparian vegetation was also severely impacted. Some areas were intentionally seeded to nonnative grasses (e.g., bulbous blue-grass, and timothy, *Phleum pratense*) that under heavy grazing pressure were able to out-compete the native species. Two notable unintentional plant introductions associated with cattle grazing were cheatgrass and yellow starthistle (*Centaurea solstitialis*), both of which flourish on well-drained meadows and hillsides subjected to heavy grazing.

Farming

As the Shasta Indians had before them, the early settlers established homes on the river terraces along the Klamath River. The fertile soil, level ground, and reliable water supply provided a firm resource base for cultivation and other ranching activities. One of the first settlers was A.M. Johnson, who homesteaded near the Klamath Hot Springs (Beswick) around 1860 (Hessig 1978). In 1889 Mart Frain and his half-Shasta family moved to a location further upriver to take possession of the main portion of the river canyon area. These early settlers cleared the river terraces, cutting both pines and oaks, and sowed forage crops (alfalfa and timothy) to supply their growing herds of cattle. They dug irrigation channels leading to fields on the river terraces, into which they diverted river water for annual flood irrigation. The settlers also planted fruit trees, berries, and ornamentals near their homesteads.

Logging

The local need for building supplies was the initial impetus for the logging industry in the region, supplied by small family-oriented operations. Commercial logging began in 1888 with an operation straddling the Klamath River at Kerwin Ranch, midway down the canyon. During the early 1890s larger timber companies began operating along the north rim. These companies, which represented eastern US interests such as the Pokegama Lumber Company and the Sugar Pine Lumber Company, were geared toward massive business ventures (Foley 1994). Because processing was limited to local mills, environmental impacts were small at first. Later, a log chute carried logs to the Klamath River where they were floated downriver to the mill at Klamathon. This practice was replaced by a railroad that transported logs to more distant mills. Logging remains the primary economic activity in

the area and most of the private land has merely changed ownership between various logging companies over time.

The open forest landscape found on the Pokegama Plateau today derives from a combination of human disturbances and environmental conditions (a xeric landscape with low annual precipitation, high summer temperatures, and a high fire frequency pattern; BLM 1998). Soil disturbance from repeated timber harvesting can be tracked by the distribution pattern of certain non-native plants. Skid roads, often associated with extreme erosion, are prevalent throughout the region. As with grazing, timber harvesting started on federal lands before regulation. Policies with long-range goals began with the O & C (Oregon and California) Act of August 28, 1937, and its policy of sustained-yield management rather than wholesale resource disposal.

Fire Regimes

With the reduction and removal of the prehistoric human population, periodic human-initiated burning ceased, permitting natural invasion of sagebrush, juniper, rabbitbrush (*Ericameria nauseosa, E. viscidiflora*), and other shrubs into previously open areas (Sasse 1981). In the mid-1800s, miners, trappers, and ranchers continued to burn to keep the forests open and to maintain the grasslands. However, the majority of these fires were set for different management reasons than those of the Shastas (Atzet and Wheeler 1982). Over time, the fire prevention ethic of Smokey-the-Bear prevailed, in which wildfires were seen as destructive of potentially useful resources. Human-initiated burning was curtailed, and wildfires were vigorously fought. This no-burn policy has had negative consequences for both wildlife and domesticated livestock and is partially responsible for the intentional periodic revegetation of areas with non-native grasses (e.g., Oregon Fish and Wildlife Service's practice of seeding cultivars in the upper Klamath River canyon area). The previous fire regime maintained open old-growth structural characteristics at both the stand and landscape levels. As a result of fire prevention, the understory of the remaining old growth stands, as well as younger stands, are overstocked with shade tolerant species. This situation has contributed to a decline in forest health and increased fire hazard (BLM 1998). The Bureau of Land Management has recently begun fairly successful attempts to reintroduce managed fire into the upper Klamath River canyon.

Hydroelectric Power

Lacking economic concentrations of minerals, the Klamath River canyon escaped one disturbance factor (mining) that significantly impacted landscapes in both northern California and southern Oregon. Instead, early entrepreneurs found another natural resource to exploit—waterpower. The initial dams and water diversion projects along the Klamath River were constructed for flood control and irrigation. The first hydroelectric project (1910-1912) was built on the Klamath River at Keno, Oregon. Subsequently, COPCO (California-Oregon Power Company) Dams I and II (1911-1918) flooded the Klamath River upriver almost to the state border. The other Klamath River dams, including the John C. Boyle Dam, were constructed much later. Generation of electricity and control of destructive flooding, especially after the devastating flood of 1890, were strong incentives for the building of these dams. However, converting the river to extensive lakes has had significant effects on other resources: curtailment of anadromous fish runs (the earliest dams did not have fish ladders); introduction of new environments for waterfowl, migratory birds, and lake fish; alterations in the water quality of the Klamath River; localized climatic impacts; and vegetational disruptions. In the canyon, the control of water flow in the free-flowing section has created abnormally high year-round water levels, producing a fairly stable riparian environment with year-round rather than periodic erosion pressures.

During 1992-2000, Joanne Mack directed a project (with the support of the BLM and PacificCorp) to understand the canyon's archaeological and environmental history. This article reports the botanical portion of that study as well as the author's dissertation (Gleason 2001). A plant list was compiled from surveys carried out from 1998 to 2000, the author's herbarium and field notes, comparable collections and field notes of fellow researcher Donn Todt, and species listed in regional reports. This list is available on the NPSO website [www.npsoregon.org/lists/plantlists/Upper Klamathspecieslist.htm].

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Susan Marie Gleason works as an archaeobotanical, ethnobotanical, and ethnobiogeographical consultant in southern Oregon and northern California. Her dissertation research for a PhD in Anthropology at UC Riverside focused on past cultural use of geophytes in the upper Klamath River canyon.

Clustered ladyslipper *(Cypripedium fasciculatum)* by Rachel Showalter, Grants Pass, Oregon.

Fellows Awards 1998

John Robotham spent a good portion of his life as a New York City librarian. After retiring, this eastern bibliophile moved across the country to Oregon where he soon joined the Native Plant Society and began attending botany field trips. In September 1993, answering an urgent plea from the NPSO Board of Directors, John volunteered to become Bulletin editor. During his six years in that post, in addition to reporting our regular news and events, he contributed short stories, poems and anecdotes that added a delightful personal touch to the publication. Inspired by this volunteer service to the organization, Portland Chapter member Shane Latimer looked for a way to recognize John's important contributions to the Society. The outcome was the launching of a new tradition: NPSO Fellows awards, the most prestigious honor we can bestow on a member.

The first three Fellows of our Society were recognized at the 1998 Annual Meeting in Mosier. In addition to John Robotham, the award was presented at this meeting to a long-time member of our Mid-Columbia Chapter, Keith Chamberlain. Not in attendance but also honored in 1998 was early Portland Chapter member and one-time State President, Ruth Hansen.

– *Rhoda Love*, Emerald Chapter

John Robotham, ca. 1981

John Robotham

My Life and Times

Our national heroes – Jefferson, Lincoln, and the rest – have taken a beating lately, proving they were human too. I still have regard for Lincoln, though; after all he was born on my birthday, although some years earlier. I was born in West Concord, New Hampshire, during the first quarter of the last century, but I don't remember the event. I do remember Lindbergh going past our house in a touring car and waving to the few people in each yard. I have equally vivid memories of a pink lady's slipper (*Cypripedium acaule*) and an Indian pipe (*Monotropa uniflora*). Unlike most plants I saw, they were the only individuals of their species around, which may be why I remember them so clearly. But also, we were surrounded by fields and woods, and the plants and animals that inhabited them seemed close in every way.

We lived on the second floor of a white, clapboard house. Six ancient specimens of *Acer saccharum* shaded the front. A large garden ran down one side, and a chicken coop and a dozen apple trees occupied the back. The owners, Mr. and Mrs. Jedediah Quinn, lived downstairs. Every fall I went to the cider press with Mr. Quinn. Collecting maple sap was a springtime activity, and I remember the big pots on kitchen stoves where it was boiled down to the second best thing on earth, maple syrup, or further boiled down to the best thing, maple sugar.

We fished a lot, for pickerel and "hornpout" in the Merrimack River, for black bass in Long Pond. Everybody went blueberrying. Ghosts were everywhere, the ghosts of history. Mrs. Quinn was descended from Major Rogers of French and Indian War fame. A friend's grandfather had been in the Gold Rush of 1849. A Concord coach (you've all seen them in Westerns) was displayed in the train station. And Hannah Dustin's monument was nearby. The ability to use an axe was once an essential skill. I had read about men who could fell a tree so precisely that it would drive a stake into the ground. That's why I chopped down what seemed like a huge *Pinus strobus*. I was about ten. Ernest Thompson Seton's *Two Little Savages* and his *Book of Woodcraft* were my guides in all this. I quite literally read them to pieces.

We moved to Rhode Island and then to New Jersey not long after these events. My father's trade, paving cutting, had about ceased to exist, and he bought a store. By working 90 hours a week for ten years he made a go of it. I did the usual things—delivered papers, became a Boy Scout, and played whatever sport was in season.

Sunday, December 7, 1941, looked like another dull day in the small towns of New Jersey. The Redskins-Giants game on the radio that afternoon seemed the only bright spot. I was in the store with my little radio, with which I could pick up basketball games from the Middle West and tickertape baseball games when the Giants, Dodgers and Yankees were away. During the football game, military personnel were ordered back to their bases. It didn't seem important at first. Then came news about Pearl Harbor. A year and a day later I was in the Army.

Basic training consisted of close order drill on a golf course in Miami Beach, a session with gas masks, and a session at the firing range with a Springfield bolt action rifle and a Thompson submachine gun. Then I was sent to the Army Air Corps Weather School in Grand Rapids, Michigan, and shortly after to Brazil, where I spent the next two and one half years. About one year of that time I spent in Macapa, a small town on the bank of the Amazon River and right on the Equator. Our job—there were three of us—was to send hourly weather reports to the nearest base. I learned to speak Portuguese, explored the surrounding territory, including a nearby, 18th century fort, and made a 6-day trip into the interior with an alligator hunter.

When the war was over, I didn't enlist again, but went to the City College of New York and, after graduating, to the Columbia School of Library Service. While there, I took a temporary job with The New York Public Library. Thirty years later, I retired. Not wishing to deprive the economy of my spending powers, I worked at several research libraries before retiring again—this time to Oregon. About 30 years earlier, some things I had written were published, and I caught the infection. Since then it's been scribble, scribble, scribble. Editing seemed a logical outcome, and I thank the NPSO for the opportunity to edit its Bulletin.

– *John Robotham,* Emerald Chapter

Keith Chamberlain (1914-1998)

In our modern world there is an inclination to be widely traveled. The more of the world we get to see, the richer we think our lives are. But this is not always the case. Keith Chamberlain (1914-1998) spent his life in the Columbia River Gorge. He attended school in Mosier, Oregon, when there was a single school housing grades one through twelve. He grew up running free in this finest of scenic places. He learned the local names of the wildflowers that have always been outstanding in their showiness and diversity. He learned Native American lore firsthand, from Indian friends who lived in the community. He walked the trails, paddled the river, and hunted the hillsides.

After graduating from high school, he attended Oregon State University in Corvallis, where he majored in horticulture. Under the guidance of some of our finest instructors he was able to put official names to the plants he had known since childhood. He learned about soils, pollinators, temperature, rainfall, and how they affected the growth of plants. He brought that considerable knowledge home to Mosier, where he lived and worked, and married Mary Gould. Keith and Mary together enjoyed more than forty springtimes in the Columbia Gorge, searching out the wildflowers they had grown to love.

For many years Keith worked for Luhr Jensen, fishing equipment manufacturer, in Hood River. Yet all the while he was teaching what he knew about the geology and botany of the gorge. For much of his life he worked with a local troop of The Boy Scouts of America. In the mid-1960s he learned of a Native Plant Society being formed in Portland. He volunteered to lead them on wildflower field trips in the eastern Gorge for several years, until it became apparent that the Mid-Columbia Region could support a chapter of its own. He was instrumental in forming this chapter in 1977, and in organizing a wildflower show at the Mosier school in April. The chapter and the wildflower show have both continued to flourish.

Many people have found Mosier in recent years. By means of Keith's knowledge and patience, and excellent photographs of our wildflowers, he has introduced many people to this valuable asset in our lives.

He led field trips and told of his special plant places until he was past eighty years old. When his body finally surrendered to ravages of time, he was still wanting to sit in the sunshine and look at the wildflowers.

– *Jerry Igo*, Mid-Columbia Chapter

Ruth Hansen

Ruth Hansen is a pioneer of the Native Plant Society of Oregon, which was established in 1961 in Portland. Ruth joined in 1970, and was soon active as a field trip leader and an officer, first treasurer, then vice president. She seldom missed a field trip and even more often was out on the trails, often alone, whenever she could study Oregon's flora. In 1976 she started an NPSO educational wildflower show, which continued for over ten years.

When Ruth became NPSO president in 1976, most of its 200 members lived near Portland, with the remainder scattered throughout the state. She immediately launched her vision of a state-wide society comprising active local chapters. Others eagerly responded, most promptly Frank Lang in southwestern Oregon, forming the first chapter, Siskiyou, in January 1977. Thanks largely to Ruth's dynamic leadership, by 1990 NPSO numbered more than 800 members in nine chapters. Ruth served as state president for two terms, 1977-1979.

For those who do not know Ruth Martin Hansen: she might stretch to five feet tall, thought herself fat if she somehow weighed 100 pounds. She knows Oregon's flora personally and in detail, is patient with anyone who wants to learn, fiercely intolerant of anyone who doesn't take plants seriously, grim or light-hearted as appropriate (to her), tireless and wonderfully good company in the field, a constant and generous friend. Her own garden abounds in unusual trees and shrubs and rare small plants.

Ruth's accomplishments have not been limited to NPSO. When Timberline Lodge was dedicated in 1937, Ruth was one of the four US Forest Service staff responsible for design and landscaping. She had recently received her degree in landscape architecture at the University of Oregon (a five-year course begun at Oregon State College, now University).

Ruth was involved with the American Rhododendron Society (ARS) from its founding in Portland in 1945. She assisted with site selection, design and planting of their test garden, now called Crystal Springs Rhododendron Garden. She and her husband, C.T. Hansen, were on the first ARS Garden Committee, continuing "hands on" participation for over 15 years. She was secretary-treasurer for ten years. In 1975 she received ARS's highest honor, its Gold Medal.

When Berry Botanic Garden (BBG) was incorporated in 1978 to preserve and develop the notable garden of the late Rae Selling Berry, Ruth was a founding member, on the first Board of Trustees, a two term president (1981-1983) and, as long as her health permitted, a diligent volunteer and compiler of a BBG herbarium. Long active in the Portland Garden Club, Ruth was honored in 1990 by the Horticultural Award of the Garden Clubs of America.

– *Louise Godfrey*, Portland Chapter

Fellows Awards 1999

Because Volume 8 was a Festschrift honoring Ken Chambers, readers of *Kalmiopsis* have had the opportunity to read about his contributions to NPSO. For this issue, instead of printing the previously submitted tribute, the editors invited Ken to write a short essay sharing his thoughts.

Ken Chambers and Wilbur Bluhm at the Oregon Flora Project Challenge celebration, January 31, 2001. Photo by Aaron Liston.

Kenton L. Chambers

Biography and Botany – Some Perspectives

In her request for autobiographical remarks, our editor told me to "keep it brief." I'll do my best, but please remember the directions for that Mechanical Professor toy, "Wind it up, and it gives a lecture." My reasons for choosing botanical taxonomy as a career are several. Firstly, I like the Natural History branches of biology, because they represent the *visual* (vs. the mathematical) realm of science, and they deal with the recognition and appreciation of the *forms* and *patterns* of natural objects. All botanists, whether amateur or professional, know what it means to have an "eye" for plants. How else could we amaze our friends when, driving down a highway at 60 miles per hour, we suddenly screech to a halt because we "saw something unusual" growing by the roadside? A geologist might react the same way to a strange rock formation; but for us, *plants* are the attraction. When I ask myself, "Why plants, instead of rocks, birds, or bugs?" I think it's because I admire how *subtle* plants are in their behaviors and adaptations, their modes of reproduction and dispersal, and their biotic interactions! Recently, we have become aware of even more amazing subtleties in their genetic systems–parasitic DNA, transposons, cryptic polyploidy, pseudogenes, etc. Plants are not simply green animals; their unique qualities deserve our special study.

Wildflowers are a particular attraction to me. I like the fact that their forms and patterns are the products of natural evolutionary processes, and their classification, therefore, represents taxa based on *true* historical, phylogenetic relationships. It has been said that, "In biology, nothing makes sense except in the light of evolution." We must keep that fact in mind when we admire and praise the exquisite forms and colors of wildflowers. We might like to think that such beauty exists for *our* enjoyment, but let's remember that the plants evolved as they did because *their* survival depended on it. Unlike cultivated plants, which are mostly human creations, wild species exist for their own sake, and we are merely their observers and beneficiaries.

– *Kenton L. Chambers,* Corvallis Chapter

Wilbur Bluhm

Born in Seward, Nebraska, Wilbur received his bachelor's degree from the University of Nebraska and his MS in plant and soil sciences from Purdue University. He completed other related graduate studies at the University of Illinois and Oregon State University.

Wilbur joined the horticulture staff of OSU Extension Service in 1957. He worked with landscape architects, nursery and greenhouse growers, and the general public. His efforts contributed to the nursery business becoming one of Oregon's largest agricultural enterprises. Wilbur retired in 1984 after serving as chairman on the Salem staff, and has since worked as a consultant to growers and the Association of Nurserymen's Oregon Garden Project and taught plant taxonomy classes at Chemeketa Community College, emphasizing native plant identification. He was Executive Secretary of Western Region, International Plant Propagators' Society from January 1984 until January 2001.

Wilbur has long championed the use of native species for landscape planting and restoration, and has discouraged use of invasive exotic species. His conservation activities include organizing the Salem Beautification Committee, supporting The Nature Conservancy and the Delbert Hunter Arboretum and Botanical Garden, a native plant garden in Dallas, Oregon. He is a member of advisory committees to the Oregon Garden Project and the Cecil and Molly Smith Garden in St. Paul, Oregon, and the board of the Berry Botanic Garden, where he chairs the Collections Committee. His involvement with land use activities led to his receiving the US Department of Agriculture Superior Service Award in 1974.

Wilbur helped establish the Willamette Valley Chapter of NPSO in 1977, which was one of the first chapters to form outside of Portland. He later became chapter president, then state vice president. He has led many field trips and worked on a variety of NPSO projects. He is an active volunteer with the Oregon Plant Atlas Project, having contributed more than 65 plant checklists and suggested several new taxa to the Oregon Vascular Plant Checklist. Wilbur has traveled to all corners our state to photograph more than 1,500 plant species native to Oregon and has given many programs on native plants to audiences throughout the Pacific Northwest.

Wilbur met Mary Brunzell at the University of Nebraska and they married in 1953. They have three children and six grandchildren, all of whom live in Oregon.

– *Walt Yungen*, Willamette Valley Chapter

Karl Urban (1943–1999)

"A flower is an exquisite thing, beautiful and delicate, a harbinger of hope for the green world that lets us all survive."
– Karl Urban, 1983

Karl was born June 6, 1943 in Kimberly, Idaho. In 1962 he entered the botany program at the University of Idaho, earning both BS and MS degrees. In 1968 he began teaching botany at Blue Mountain Community College (BMCC), Pendleton. In addition to his popular spring wildflower classes, he taught an intensive plant identification course at Steens Mountain during the summer. Karl was one of the founding members of the Blue Mountain Chapter of NPSO in the late 1970s.

One of the highlights of Karl's life was his sabbatical year (1988) at Oregon State University. Although taking a full load of classes he announced to Dr. Chambers that he wished to compile a database of the flora of Oregon using the new computer technology. Working day and night for three terms, Karl built the foundation for our current Oregon Flora database, and planted the seeds for the Oregon Flora Project.

In 1991 he became the botanist for the Umatilla National Forest. Karl completed a natural vegetation map and associated database for the forest. He cared a great deal about the forest resources and environment and had "botanized" essentially the entire Umatilla National Forest.

In his free time over the years, Karl drew many of the Blue Mountain wildflowers as pages for coloring so children could learn of their natural heritage. He donated his drawings to the public domain so that others could share his appreciation and love of wildflowers. Karl's wildflower drawings and associated coloring guides have been viewed by over 60,000 visitors on the Plant Conservation Alliance's website. Countless other children have delighted in the drawings through publications such as North Cascade Institute's Celebrating Wildflowers Teacher's Guide. In March 1999 at the 64th North American Wildlife and Natural Resources Conference, the USDA Forest Service (FS) and the Bureau of Land Management (BLM) jointly awarded Karl a posthumous "Celebrating Wildflowers Award" for his outstanding contribution of wildflower drawings and other materials. At the same meeting, Tom Fry (Acting Director, BLM) and Michael Dombeck (Director, USDA FS) announced plans for an interagency "Karl A. Urban Celebrating Wildflowers Award."

– *Jerry E. Baker*, Blue Mountain Chapter

Frank Lang

Frank Lang served three terms as president of NPSO (1985-1986, 1979-1981), was a "Founding Father" of the Siskiyou Chapter (1977), co-edited the Bulletin from 1979-1981, and was the first editor of *Kalmiopsis* (1991-1994). He has won many awards for his research, publications and volunteer work, including 1990 "Volunteer of the Year" for The Nature Conservancy of Oregon.

Frank was born and raised in Olympia, Washington. His life's ambition was to be a biologist and he was fortunate that his Boy Scout merit badge counselor was naturalist Margaret McKenny, author of *The Savory Wild Mushroom*. A good part of his high school years were spent on field trips with Margaret and her friends, a highlight of which was meeting Roger Tory Peterson.

He majored in botany at Oregon State College and there met his wife, Suzanne. He worked filing specimens and drawing plants for his systematic botany instructor, Dr. Albert N. Steward, who was director of the herbarium. Frank planned to pursue his interest in ferns in graduate school at the University of Washington, but was diverted by Dr. Arthur Kruckeberg to determine why Douglas-fir was invading the gravelly prairies of western Washington. After concluding that the cause was lack of regular fires since Indian times, Frank decided it was time to seek a PhD. He met T.M.C. Taylor at the University of British Columbia, who suggested a taxonomic treatment of the *Polypodium vulgare* complex. Frank's thesis, completed in 1965, worked out the evolutionary relationship and taxonomy of three taxa using comparative morphology, cytology, and geographical-ecological criteria. This work was later confirmed by DNA and isozyme analyses.

Frank was professor of botany at Southern Oregon College from 1966 to 1996, teaching botany, ecology, and botanical illustration. He also served as department chair and chairman of the Faculty Senate. He taught biological illustration at the Malheur Field Station for eight summers. Since 1989 he has produced the weekly radio program, Nature Notes, broadcast on Jefferson Public Radio. He served for six years on the editorial board of Madroño, eleven years on the board of directors for Crater Lake Natural History Association, three years on the Board of Editors for OSU Press (the final year as chairman), and the Table Rock Preserve Board for The Nature Conservancy. He took two year-long sabbaticals: one to learn medical illustration, the other as a Visiting Scholar at Harvard University's Gray Herbarium.

As impressive as this list accomplishments is, Frank is most pleased with his forty-year-plus marriage, two wonderful children, and a host of students who took up botany as a career.

– *Joan Seevers*, Siskiyou Chapter

I especially admire Veva for her journey from working in a flower shop near her coastal home, to being one of the foremost authorities of southwestern Oregon plants. Charlene's photography is inspiring, and through her efforts (county checklist) we know so much more about Lane County's flora. And perhaps no one has worked so tirelessly in support of Oregon's flora as Rhoda Love.

– Linda Ann Vorobik

Charlene Simpson

Charlene Simpson wears many hats: mother and grandmother, community committee person, and avid lay botanist. Her botanical interest dates back to childhood Camp Fire Girl projects and a dad whose motto was always "I brake for wildflowers." Family and career obligations, however, restricted serious pursuit of botany in her early years.

Although born in Colorado, Charlene has lived in Oregon since the age of two. "I know this dates me, but when I moved to Oregon, Eugene's population was less than 20,000 and what is now the south half of town was farmland." She points out that this predated the Long Tom, McKenzie, and Willamette River flood control projects. "You don't know what a wetland really looks like in Eugene, unless you lived then!" she claims. Charlene received her Baccalaureate degree in home economics from Oregon State College and her Masters degree in interdisciplinary studies/juvenile corrections from the University of Oregon. She says now that if she had it to do over again, her degrees would be in botany.

Charlene got her first Single Lens Reflex camera in 1975 and purchased a macro lens a year later. From the beginning her favorite photographic subjects were wildflowers. She took a community education class in botany at Lane Community College followed by a summer session class at the University of Oregon. She bought Gilkey and Dennis's *Handbook of Northwest Plants,* and the Hitchcock Manual and then, as she says, she was hooked.

In 1979 Charlene joined eight others from Eugene and Springfield to found the Emerald Chapter of the Native Plant Society of Oregon (NPSO). David Wagner was the new chapter's first president and Charlene was its second in 1980-82. She has served the chapter in various other capacities, including secretary, rare and endangered plant chair, and field trip chair. She is a former NPSO director and currently serves on the bulletin mailing committee. Her most recent project was coordination of the Lane County Checklist Project, an effort to list every native or naturalized vascular plant, with site-specific information, in an electronic data base. Her work on the Lane County Checklist led to becoming a regional coordinator and project leader with the Oregon Atlas Project. Lane County's project, and the earlier Douglas County Floral Survey are as prototype projects within their respective regions, serving as valuable resources in the development of the Oregon Atlas Project.

Although she doesn't call herself an environmental activist, Charlene takes citizen involvement seriously. This is borne out by her service on the Lane County Citizen's Advisory Committee for Management of Roadside Vegetation. She served two three-year terms and was the committee vice chair. The committee worked with public works staff to develop and implement an integrated management program which includes protection for Lane County's rare and endangered plant species.

Charlene's large and comprehensive botanical slide collection, with special emphasis on rare and endangered plants, provides a resource for illustrated programs. She has used this medium to educate NPSO members about Lane County's species of concern. Emerald Chapter's listing format assigns species of concern to three lists according to severity of threat. Charlene enjoys her role in the thick of the biennial reviews, and finds herself drawn to the debates and decisions like a butterfly to a wildflower!

Now retired from the financial aid office of the University of Oregon, Charlene enjoys mid-week field trips and volunteering at the OSU herbarium. She was the organizer and guiding light of Emerald Chapter's new publication, *Vascular Plants of Lane County, Oregon: an Annotated Checklist,* which was published in April 2002. With that major project now completed, Charlene looks forward to travel abroad as well as to more botanical adventures with Veva and Rhoda.

– Rhoda Love, Emerald Chapter.

Veva Stansell

Long-time plant enthusiast Veva Stansell knows there is much work to be done when it comes to cataloguing plants in Oregon, but the 73-year-old southwestern Oregon resident welcomes the challenge. "There are times I wish I lived closer to a university, but on the other hand there are advantages to living far away," said Veva, the Coos and Curry County Regional Coordinator for the Oregon Plant Atlas Project. "One of the things that sparks the imagination is that this corner of Oregon has a lot of botanical secrets yet to be discovered," said Veva, who lives near Gold Beach, at Pistol River. "It hasn't been studied all that much. Who knows what will be found?"

Veva was born on July 20, 1929 in Gold Beach, to Otto and Elma Ismert. In 1936, her family moved to a farm near Pistol River where they raised cows and other livestock. She graduated from Gold Beach High School in 1947 in a class of 16 students. In 1948, she married Bob Stansell. They raised their three sons in Gold Beach, and in 1970 the couple moved back to Pistol River. Bob Stansell lost a brave fight with lung cancer in 1996.

Veva's interest in botany first stirred while she was trail-riding in Curry County's back country. Like many botany enthusiasts, she began to notice the differences between coastal and mountain plants.

"Wildflower books with pictures helped a little, but I had more questions than answers," she explained. "Time marched on, and when our boys were high school students, a young man named Fred Bowen joined the Gold Beach High School staff as a biology teacher. "Fred gave some evening classes in plant identification, and lo and behold, that little light bulb above my head began to flash. I discovered floras by Peck and Jepson, and Randall's *Manual of Oregon Trees and Shrubs.* A brand new world!"

Veva has been a member of the Native Plant Society of Oregon since the early 1970s and at one time in those early years was the only member who lived outside the Portland area. She has served many terms on the Board of Directors and has been Vice President, and Secretary at various times in the past. At present, she is chair of the Fellows Committee.

Veva loves botanizing in her corner of the state. Without a doubt, she says, her favorite habitats are found on serpentine and peridotite soils where many species of broadleaf shrubs and the early spring blooms of *Erythronium* and *Trillium* can be found. "I also love the high Siskiyous and other Klamath Ranges, the mountain lakes and ponds with unknown monocots, *Lewisia* adorning knife-edge ridges, niches in the rocks where odd ferns cling," she said. "In winter, or when it's been too long between outings, daydreams of these places sneak in behind my eyelids and soothe me."

Although Veva is currently retired, she has held an assortment of jobs including waitress, janitor, laborer in plywood and stud mills, florist, nursery worker, botany technician for the Bureau of Land Management and US Forest Service (USFS) Gold Beach Ranger District, and finally District Botanist at Gold Beach. Before her employment with the USFS, Veva became intensely interested in public land use and sensitive plants. These interests led to volunteer work with the USFS, The Nature Conservancy, Kalmiopsis Audubon Society, Malheur Field Station, Jepson Herbarium, and various other agencies and conservation groups.

She received the Conservation Award from the Daughters of the American Republic, the USFS Regional Threatened, Endangered and Sensitive Species Habitat Management Award, and a USFS National Award for Individual Volunteer Service that included a trip to Washington, DC.

Since retiring, Veva has had more time to spend with her family, attend sports and other functions in which her grandchildren are involved, and read more books. "But most important is to continue to get out in the hills to explore new places and return to old favorites."

– *Rhoda Love,* Emerald Chapter

Rhoda Love

A genuine northwesterner, born and educated in Seattle, Rhoda Love claims she discovered her botanical calling in 1951 during a University of Washington botany class with C.L. Hitchcock. "Hitchy was inspiring. I had a superb education at Washington and will always be grateful to the many fine professors who taught me there," she says.

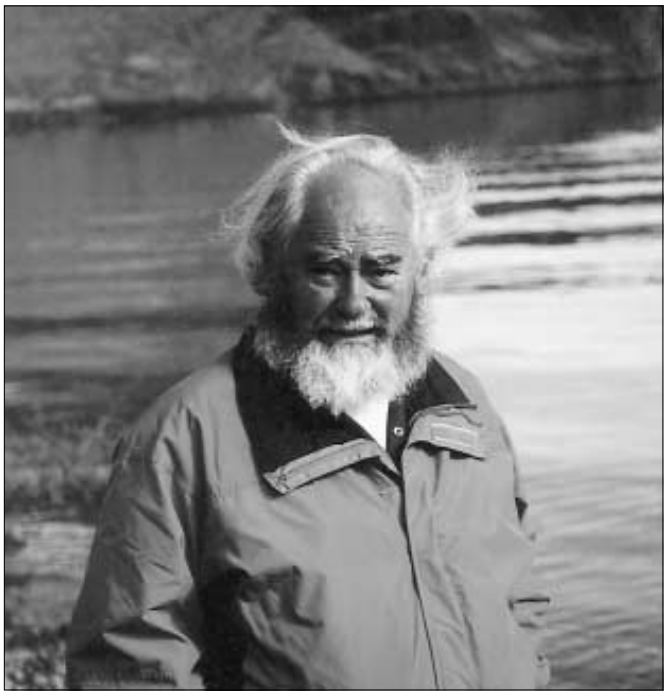
After graduation and a stint as junior high school teacher, Rhoda returned to UW to obtain her MS in botany, and she continued teaching in Seattle and then briefly in California. She and husband Glen moved to Eugene 1965 where she began 30 years of teaching at Lane Community College. Her enthusiasm led many of her former students to pursue botany careers. One recently wrote, "Rhoda expected the best from her students and, knowing that, they usually gave her their best."

Rhoda returned to graduate school at the University of Oregon, where she completed her PhD in 1980, under the direction of plant ecologist Stan Cook. "As the child of relatively unschooled parents, I consider my education to be the most important factor in my life," she tells us.

Rhoda has long been active in the Native Plant Society of Oregon. She worked vigorously for the passage of the Oregon Endangered Species Act of 1987. She was appointed by three governors to terms on the Oregon Natural Heritage Advisory Council, and serves as an advisor to the Oregon Department of Agriculture Rare Plant Program.

When Rhoda learned that a new flora of Oregon was to be launched at OSU she couldn't resist becoming part of the project, and was at once welcomed by members of the Oregon Flora team. She was invited to become a checklist project leader and is writing treatments of the pome-fruited Rosaceae for the checklist. She also serves as editor of the Oregon Flora Newsletter. Rhoda has also been providing common names for all taxa in the Oregon checklist. "My work on the Flora is now one of the most exciting and satisfying activities in my life," she says. Another, she hastens to add, is watching her children mature and prosper, and visiting her two grandsons, who live in Houston, Texas.

– *Charlene Simpson,* Emerald Chapter



Jerry Igo

Rex Jerrold Igo was born April 25, 1929 in Weleetka, Oklahoma, the youngest of ten children of William Everett Igo and Mary E. Igo. They moved west in the early years of the Dust Bowl and Great Depression, arriving in Medford, Oregon, in 1933 where the family farmed and grew peaches. Jerry graduated from Medford High School in 1947. During the war years he worked the family farm going while his older brothers were away in military service. At age 16 he started his first job away from the farm, doing snow surveys for the Soil Conservation Service. He traveled throughout Oregon, visiting the heads of 120 watersheds to inspect snow courses in summer, and to ski in to measure them in winter.

He attended Willamette University with such notables as Mark Hatfield, Tom Bartlett, and Bob Sayre, and was introduced to botany by Dr. Morton Peck. His money ran out before graduation so he took time off to return to Medford, married the "girl next door" who was Ellen Howard, and then began a 27 year career with United Air Lines. After transferring to Portland, he attended Lewis and Clark College. United generously encouraged college attendance when it fit into work schedules. He took botany classes from Dr. Leonid Enari, and worked on an OSU project with Dr. Helen Gilkey. Later, the family returned to Medford, where he attended Southern Oregon College and worked with Dr. Irene Hollenbeck. By now the family included Michael, Stephen, Lawrence, Paula, and Karen. Various mergers brought expansion to United Air Lines, and to avoid a transfer to distant cities such as Cleveland, Detroit, or Omaha, the family returned to Portland. While there Jerry taught at Portland Community College. His favorite class was Wilderness Skills, which combined all the natural sciences, routefinding, mountain climbing, and ski mountaineering. His heavy schedule culminated in a divorce; Ellen and the girls moved back to Medford. In 1975 Jerry, son Stephen, and two women students skied from Mt. Hood to the California border... 42 days living in deep snow, resupplied at intervals by son Michael, and members of the Oregon Nordic Club. After the successful completion of this trip, life for Jerry was simply not the same. As soon as possible he wanted to get away from the scream of jet engines and the rumble of heavy traffic.

He bought land near Mosier, Oregon in 1976. He retired early from United in 1978 and has lived in a log cabin in a quiet canyon ever since. At Mosier he met Keith Chamberlain, founder of the Mid-Columbia Chapter of Native Plant Society. He helped Keith and others set up an annual wildflower show at the Mosier School. He taught plant identification classes at Treaty Oak, predecessor to Columbia Gorge Community College, as well as Wilderness Skills classes both there and in his own school. He climbed Mt. Hood 42 times and Mt. Adams 15 times.

Feeling a need to use his Master's degree in social work, he became Treatment Director in a residential treatment center for teenaged boys who were wards of the court. At the end of this two-year commitment, he needed a change. So he bicycled from Vancouver, British Columbia to Key West, Florida, a 5600-mile, 79-day trip.

Near his home is the Nature Conservancy Tom McCall Preserve. The Mid-Columbia Chapter has volunteered for interpretive projects, as well as weed and trash control, and Jerry has compiled a complete plant list for the preserve.

Between 1985 and 1990 he was Noxious Weed Supervisor for Hood River County, working from Hood River to Mt. Hood Meadows and the Columbia River gorge from Bonneville Dam to Mosier. This was a great opportunity to see the interaction between exotic and native plants. He worked with Oregon Department of Agriculture, Weed Division from 1990-1993 and with Oregon Dept of Transportation 1994-1995, surveying rare plants on roadsides.

He taught botany, wetland ecology, and northwest history at Clark College in Vancouver, Washington for five years. He has been a speaker and quizmaster for Oregon Vegetation Management Association for the last 13 years. He has made many wildflower videotapes, including the NPSO education and promotion video. He is a regional coordinator for the Oregon Plant Atlas Project, working with Wilbur Bluhm and Scott Sundberg.

He has been involved with the Columbia Gorge Discovery Center, helping Michael Igo and Barbara Robinson with revegetation and weed control. The Mid-Columbia chapter of NPSO, of which he is president, holds meetings at the Discovery Center. He was Director-at-large for NPSO for two terms (1988-90 and 1994-96). He currently serves as Education Chair for NPSO. He leads numerous wildflower walks, and can be seen in early spring sharing his knowledge of flowers with groups.

As Jerry winds through his seventh decade he has yet to slow down. At present he is historian/naturalist on Lindblad Expeditions' Cruise Ships on the Columbia and Snake Rivers.... "In the Wake of Lewis & Clark" He tells guests from all over the world about his two favorite subjects: Pacific Northwest history and native plants. He has interacted with people from native plant societies from many other states, and makes sure that everyone knows what is going on with the Native Plant Society of Oregon.

– *Michael Igo,* Mid-Columbia Chapter

Botanical Poetry

by Jane Gibson
PO Box 1321, The Dalles, Oregon 97058

[Jane Gibson related that the following poem was inspired by *Cypripedium montanum* growing at Jerry Igo's place last summer. –ed.]

To A Lady (*Cypripedium montanum*)

Her bedroom's full of shrubs and oaks;
Amid the prickly undergrowths
She's cleared a space and made her bed
And sat down in her petticoats.

Her hat, her coat, her gloves, all shed,
Her dress unbuttoned on the bed;
Like russet leaves she's let them fall,
And stretched, and yawned, and scratched her head.

The dappling sun is hot and tall.
A napping bird gives out a call.
She fluffs her silken underclothes;
She pats her skirts and drapes her shawl.

At last she lifts a slippered toe
And with a tug undoes the bow;
The ribbon's in a knot, and so
She goes to sleep and lets it go.

Seed People

The seed people wait
Wrapped in blankets
Brown and black
They wait
Humming
Heads hidden
Here an eye shows
They wait
Till earth's kiss
Circling sun
Bid them come
Hit their drums
Slip off brown and black
Show their new dance clothes—
Wait!
Didn't they wear those
Last year?

Grass Widows Near Horsethief Butte

Some people say heaven's up there
But I say earth's the miracle place
I say this dark rocky swell of dirt
Is where spirits dwell
The flowing turf is clouds of glory
These slender leaves are anchored angels
These blowing purple bells are unfurled wings
And I say, I believe, I believe.

Field Guide (Ponderosa Pine)

I took my key, I stood outside,
    I looked up at the sky;
I could not count the needles, they
    were growing way too high.
I scrutinized the bark instead –
    I looked it in the eye.

I broke some puzzle pieces off
    that giant scratchy chest
And underneath I thought I saw
    the color of the west,
Or maybe it was just the color
    of a robin's breast.

I saw some insects marching up,
    and some were hiding in
Some little canyons; one was bold
    and crawled out on my skin,
And one had left a tunnel, and
    I wanted to go in.

I pressed my ear against the bark
    where nothing crawled around;
The wind was in the needles and
    I heard a hissing sound;
I heard the big bole flexing from
    the tip down to the ground.

I looked straight up the trunk again,
    the clouds were going fast
And for one dizzy moment there
    the tree became a mast
And I was riding Earth somewhere –
    and then the moment passed.

The wind got stronger, and it must
    have snapped a branch-tip free;
I saw it fall, as if the tree
    had tossed it down to me;
I picked it up, and counted, and
    I looked into my key.

I crushed some needles, and they smelled
    so potent and so clean;
I found the page and learned the name –
    the photograph was keen –
And now they grow all over, where
    before it was just green.

Poetry ©2002 by Jane Gibson

Book and Product Reviews

Handbook of Northwestern Plants

by Helen M. Gilkey and La Rea J. Dennis. 2001. 494 pages. Keys, line drawings, glossary, and index. ISBN 0-87071-490-2. Oregon State University Press, $29.95, paper.

This new edition of the *Handbook of Northwestern Plants* was recently reissued by Oregon State University Press, thanks to La Rea J. Dennis, who updated the nomenclature, added new species, and revised plant keys and descriptions. A part of Helen Gilkey's wonderful legacy to botanists and students of the northwest flora, the first version of this book was published in 1929 as *A Spring Flora of Northwestern Oregon*. It was designed for use in spring field botany courses out of Oregon State College. As the years passed, Gilkey, then Gilkey and Dennis, expanded it to accommodate year-round use by a wider audience over a larger geographical area, adding more plant families and updating nomenclature. When the 1980 edition went out of print in 1999, we lost a valuable asset.

The geographical limits of the handbook are roughly the Cascade summit to the coast from the Puget Sound south to the Umpqua Divide (i.e., most of western Washington and Oregon). For use north and south of this area, one should bear in mind that many species are likely to be absent from the keys.

What is special about this book that makes it worth buying? In a word, the illustrations. Gilkey's beautiful line drawings have been supplemented by six additional artists: Cathrine Davis Young Feikert, Daisy R. Overlander, Alleda Burlage, Fern Duncan, and Patricia Packard. While not all of the species are illustrated, there is an average of one drawing per page, and key characters are clearly shown. In addition to the 12-page glossary in the back of the book, there are two pages near the front of the book that illustrate key terms, e.g., leaf shapes, inflorescence types, and ovule attachment.

Another feature that I particularly like about this book is its arrangement. Newer floras tend to present plant families in alphabetical order. I "grew up" botanically with the system that places the ferns (and their allies), gymnosperms and monocots in the front of the book and finishes up with Asteraceae at the end. The big advantage is that similar plants (belonging to related families) end up being close to each other. I rarely key anything beginning from a higher level than family. Over the years, almost all the new families I've learned have been by checking nearby families when the plant in hand didn't fit the key. For those who need their families alphabetical, there is an index on page 6 from Aceraceae to Zosteraceae, listing the page number for each.

What is there to criticize about this book? *No grasses, sedges or rushed are included!* This is a major omission and I think prospective users should know that they need to carry another flora if they are interested in Poaceae, Juncaceae, and Cyperaceae. The statement on the back cover that that "the *Handbook of Northwestern Plants* brings together in one comprehensive but convenient volume the information necessary to identify the amazing variety of plants found between the Cascade Mountains and the Pacific Coast in Washington and Oregon" is misleading.

Those botanizing from Lane County north in western Oregon are likely to want a copy of the *Handbook* in their backpack. It is a nice regional flora for native plants other than graminoids.

– C*indy Roché*, Siskiyou Chapter

Plants of Oregon: Interactive Keys and Photos

produced by Flora ID Northwest, distributed by the New York Botanical Garden Press and Flora ID Northwest, 731 NW 5th, Pendleton, OR 97801; 541-276-5547; FAX 541-276-8405; www.xidservices.com/FID; $100.00 + $6.00 handling fee.

During the NPSO annual meeting in June, I purchased *Plants of Oregon*, the CD produced by Flora ID Northwest containing interactive keys for all the vascular plants known to grow in Oregon, both native and naturalized. This collection of approximately 3,750 Oregon vascular plant species does not represent a new taxonomic treatment. Rather, it has been compiled from published floras with which most of us are familiar, by selecting those species that occur in Oregon. For field work, even in combination with a laptop computer, this CD is surely more compact and portable than the accumulated floras from which it was compiled. Until the eagerly-anticipated new flora of Oregon is published, this compact disk stands as the most up-to-date and complete flora of Oregon. For this, and for the color photograph for every species, *Plants of Oregon* is a most useful resource. Photo quality varies from outstanding to mediocre and some are herbarium specimens. The producers have updated the nomenclature as much as possible, providing synonyms for species with recent name changes and building them into the program.

This is not a traditional dichotomous key. Those who are long accustomed to using traditional keys can expect a major learning curve as they adjust to this multiple access, interactive program, which is definitely a different approach to identifying unknown plants. (But I suspect that it is the "wave of the future.") With practice and familiarity with the menu of characters, the process becomes easier, for one learns which characters are most useful in particular cases and in what order to select them. I found it a useful exercise to start with a known plant and watch how the list of potential candidates dwindled as I selected specific attributes, and also to notice how the ever-narrowing list varied depending on the order of selecting attributes. You also must be careful when selecting from among a range of close choices for some characters, for an inadvertent wrong choice can eliminate your species. Once your species is dropped, it will not come back even if you enter other correct characters for that taxon.

An attribute of this keying process is that the shrinking list of potential candidates can remain quite a mix of genera, even down to a very species, unlike a traditional key which guides you to progresssively smaller sets of more closely related taxa until you reach the destination. This is an interesting experience and not at all a bad thing. It prompts you to think about the relations between characters and genera. When the list of remaining possibilities is manageably short, a quick look at the species photographs may lead to a clear identification, or at least allow you to eliminate additional species. Of course a problem arises if none of the pictures looks like your specimen. When this happens, a quick click on the little paintbrush icon clears all previous choices so you can start the process again!

Identification is faster if you select the family first, which substantially limits the possibilities. This strategy opens a nice feature of the program, the special family/genus menus, which explore in detail distinctive attributes of some large families or tribes. Experienced botanists will find these especially handy for quickly narrowing the possibilities for large families, such as Asteraceae. Novices will also find these special menus useful, for

they provide guidance among the choices that need be made. Another nice feature, especially for newcomers, is the "*A*" icon that offers a list of suggested attributes from which to choose, at any step along the way, for distinguishing among remaining species in the search. Thus the program serves as an excellent learning tool for the inexperienced person who wishes to identify plants to species and to understand the qualities that are important for distinguishing among families, genera, or species.

In summary, *Plants of Oregon* is a worthy addition to any botanist's arsenal of plant-identifying resources. I am glad I bought this program. Although I am still learning how to use it and am more comfortable with old familiar ways, I am finding that the program gives me correct answers, despite my doubts. I'm still working on switching my old mind into a new mindset. It can be done. Try it yourself. – *Jim Duncan*, Siskiyou Chapter

Flora of Mount Rainier National Park

by David Biek. 2000. 506 pages. Keys, line drawings, color photo insert, glossary, and index. ISBN 0-87071-470-8. Oregon State University Press, $29.95, paper.

This is the first comprehensive flora of Mount Rainier National Park since 1938 (George Neville Jones's *The Flowering Plants and Ferns of Mount Rainier*), and well worth carrying on any trip to 'the Mountain' as Biek calls it. He uses this moniker to convey "awe and familiarity, respect and pride." I can't imagine a hiking trip there without this gem in my backpack. A compact, illustrated flora is priceless for a National Park: prohibition against collecting specimens doesn't dampen my curiosity in the least. Regional floras narrow the field of possibilities and reduce the time needed to identify plants. The illustration that accompanies each description is icing on the cake. We've seen these line drawings by Jeane R. Janish before, in *Vascular Plants of the Pacific Northwest*, but that doesn't diminish their accuracy or beauty. Biek's thorough researching of the flora is reflected not only in the list of taxa (871 species, subspecies, and varieties), but also in his appendices which list both "plants added to the flora" and "doubtful and excluded species." No plant is included on the basis that it is "expected to occur" in the Park, a convention in some floras that only leads to confusion and misinformation. In contrast, Biek lists locations where each taxa is known to occur, with emphasis on accessible places.

Park visitors who have time to sit in a comfortable, scenic spot and read a bit will appreciate Biek's summaries of topography, climate, plant communities and vegetation zones, plant geography and distribution, weeds, rare plants, and early botanical exploration of Mount Rainier. At the risk of offending the photographer, the color photos of the center insert don't contribute significantly to the volume. The photos lack a scale, and on the whole do not show sufficient detail to distinguish the subject from related species. However, readers who identify plants by flipping through color photos may find them useful.

Biek employs a convention in his keys that I have not encountered elsewhere: a double numbering system for backing up through the key in order to correct an error discovered when your plant doesn't match the description and drawing at the end. – *Cindy Roché*, Siskiyou Chapter

Winter Twigs

by Helen M. Gilkey and Patricia L. Packard. 2001. 128 pages, glossary. ISBN: 0-87071-530-5. Oregon State University Press, $19.95, paper.

In bright February sunshine–two days after the great Oregon wind storm–nine botanists field tested the recently updated version of *Winter Twigs* by Gilkey and Packard, reissued by Oregon State University Press.

For a number of years I had asked OSU Press to consider reprinting the guide which is sub-titled *A Wintertime Key to Deciduous Trees and Shrubs of Northwest Oregon and Western Washington.* Last year permission was obtained from Dr. Packard, the surviving author, to revise this much-loved work which first appeared in 1962 and was long out of print.

Oregon Flora Project botanists Scott Sundberg and Ken Chambers carefully reviewed and fully revised the plant nomenclature and synonymy for the new book. Names were changed for 22 of the 79 included taxa to reflect present taxonomic understanding. The work retains its very useful introductory material, glossary, comprehensive keys, full descriptions, and beautiful line drawings by Dr. Packard. The bright and attractive new cover features a twig photo by Michael Hartman of Eugene.

Nine of us assembled for a workshop at the Mount Pisgah Arboretum in Eugene-Springfield to field test the revised work. All the participants had experience with keys and botanical terminology but were not necessarily familiar with twig characteristics. After a day of identification, our conclusion was that the drawings and descriptions are excellent and extremely helpful. As always, I encouraged folks to annotate their books with personal observations and thumbnail sketches.

We found the keys relatively easy to follow, although some of the key characteristics may be difficult for beginners to interpret. Especially troublesome was counting bundle scars in some species, determining whether or not a leaf scar was covered by a membrane, whether or not certain buds were naked or scaly, and whether pith was angled. But, in general, as we became more familiar with the terminology, we successfully identified most of the twigs we encountered.

Sharp-eyed participants noted a couple of minor mistakes: On page 17 there is an error in the numbering of key leads 43a and 43b (the latter is printed as 44b); on page 83 the family name Araliaceae is misspelled. Another reviewer has pointed out that the book treats 16 families and 79 species, not the 17 families and 82 species promised on the back cover. These small flaws in no way prevented us from having a wonderful day getting familiar with this lovely little book and enjoying the clear February weather.

In closing, I enthusiastically applaud Oregon State University Press for becoming Oregon's major publisher of botanical works. In addition to the books reviewed here, recent outstanding publications include: *Botanical Exploration of the Trans-Mississippi West 1790-1850* by McKelvey (1991), *Macrolichens of the Pacific Northwest* by McCune and Geiser (1997), *Flora of Steens Mountain* by Don Mansfield (1999), *Plants of the Oregon Coastal Dunes* by Wiedemann et al. (1999), and *A Flora of Glacier National Park, Montana* by Peter Lesica (2002).

– *Rhoda Love*, Emerald Chapter

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Members of the Native Plant Society of Oregon and others are invited to submit articles, book reviews, artwork, poetry, cartoons, and photographs for publication in KALMIOPSIS. All materials submitted should pertain to Oregon's vegetation and flora. Acceptance will be based on suitability (articles dealing with formal nomenclatural proposals or of a highly technical nature are not acceptable).

Contributors of articles should submit one hard copy of a double-spaced manuscript accompanied by an electronic copy of the file (PC in Word, or a Text or Rich Text Format File; indicate name of Program and Version in the accompanying cover letter). Computer facilities are available for use at libraries and printing or word-processing businesses. Please do not submit text material without electronic copy.

Contributions without accompanying manuscripts, such as art, cartoons, or photos, also are welcomed.

Send all submissions to KALMIOPSIS EDITORS, or e-mail KALMIOPSIS EDITORS to request an electronic submission. (Specific instructions for submission of photographs, figures, and tables will be sent to contributor upon request or after article has been accepted for publication.)

Please feel free to contact KALMIOPSIS EDITORS for further information, or to inquire if an article is suitable for publication in this journal.

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