

Sandberg Bluegrass (*Poa secunda*)

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Given the grandeur and diversity of Oregon's flora, why would anyone choose to highlight a lowly grass? Oregon has its pitcher plants, lilies, a plethora of endemic milkvetches, and enough truly spectacular plants to knock the socks off any botanist. Why a grass, and a little one at that?

But, I offer no apology. To paraphrase Aldo Leopold, and his oft-quoted verse paying homage to *Draba verna*, Sandberg bluegrass is a small plant that does its job well. It's not flashy. There are no societies it can call its own. Its visage will likely never appear on the cover of a magazine. Sandberg bluegrass just goes about quietly doing its job, and for that, it deserves recognition.

Taxonomy: It's Complicated

First, there must be a common understanding as to the true identity of this subject plant. The current, generally accepted name is *Poa secunda* J. Presl, otherwise known as Sandberg bluegrass (USDA 2011). Other common names are one-sided bluegrass and secund bluegrass. Also, please note that to most it is known as Sandberg bluegrass, not Sandberg's.

This plant, at one time known as *Poa sandbergii*, was named after Swedish botanist J. H. Sandberg, who collected it near Lewiston, Idaho, in 1892. Between 1886 and 1893 Sandberg worked for the U.S. Dept. of Agriculture collecting plants in the western US, including Idaho and Washington (HUH 2011). In 1893 he assisted John Leiberger in a plant inventory of the Columbia Basin in Washington (Walker 2000).

Wait. If it was once known as *Poa sandbergii*, why is it now *P. secunda*? This is a good time to talk about type specimens.

In botany (and zoology), every species name is based upon one particular specimen – the “reference” specimen upon which the scientific description is written. Since different people may have unwittingly collected and described the same plant at different times



A typical Sandberg bluegrass plant, pre-anthesis. Purplish tinted spikelets arise from a short tuft of basal leaves. Photo from above the North Fork of the Crooked River, Crook County, taken May 7, 2010 by Ron Halvorson.

and from different geographic locations, it's normal to have more than one name published for the same taxon. As time goes on, these synonyms are discovered. What then? What is the real name of a species in question when there are several seemingly correct names in common usage?

The basic rule established by the International Code of Botanical Nomenclature (ICBN) is that the earliest published name trumps all other names, and the collection upon which that

name is based is called the type specimen. As long as taxonomists strive to understand the status of species, synonyms will continue to be exposed and renamed, and this is why the name of our subject bluegrass has changed from time to time.

Sandberg's collection in 1892 (*Poa sandbergii*) was predated by an 1806 collection made in Idaho by Merriwether Lewis (Reveal 2001). This collection became known as *Poa canbyi*. However, there was an even earlier collection in 1790 by Bohemian botanist and South American Naturalist Thaddaus Haenke (1761-1817), from the "mountains of Chile." Some question the origin of this type, thinking that it could actually be from California (MBG 2011). Nevertheless, it was this collection that another Bohemian botanist Jan Svatopluk Presl (1791-1849) used to describe *Poa secunda* in 1830. This is the earliest published name and is why Sandberg bluegrass is *Poa secunda*, at least for now.

This is where it gets even more interesting.

Back in the day, as a young, impressionable range conservationist with the Bureau of Land Management, I made it my responsibility to know the vegetation I was working with. I distinctly remember trying to key out a mid-sized bunchgrass with the old *Manual of the Higher Plants of Oregon* by Morton Peck. I couldn't get it to go to anything but *Poa secunda*, even though it was twice the size of the little plants I knew and loved. I finally decided that it was a Sandberg bluegrass on steroids.

Before long, I became aware of other, similar bluegrasses that called central Oregon home, including pine bluegrass (*Poa scabrella*), Canby's bluegrass (*P. canbyi*), Nevada bluegrass (*P. nevadensis*), alkali bluegrass (*P. juncifolia*), slender bluegrass (*P. gracillima*), and big bluegrass (*P. ampla*). This was all well and good, but it was of little help to me. The floras seemed so ambiguous I never really knew what I had in hand. Once in a while I was sure of a pine or alkali bluegrass, but that was about it.

It turns out I was not alone.

When the topic is *Poa secunda*, terms such as "highly variable" (Rawlins 2006) and "phase of this complex species" (Reveal 2001) abound in the literature. Even former Oregonian Robert Soreng, now a noted authority on grasses at the US National Herbarium, calls Sandberg bluegrass "a wickedly complex species" (Soreng, pers. comm., 2011). Up to 45 different species have been described within this complex at one time or another (Ceska 2005).

The source of the confusion is that Sandberg bluegrass produces seed both sexually and asexually (without pollination). Sandberg bluegrass normally reproduces by apomixis, the asexual breeding system (Howard 1997), but it outcrosses often enough to create new variations that are uniform not only morphologically but ecologically (Wilson, pers. comm.). Many of these variants have been treated as species in the past, but in reality, intermediates can be found between all of them (Wilson, pers. comm.). Hence, it's often impossible to tell exactly what you have.

As a result, many taxonomists have synonymized (lumped) several heretofore separate taxa into one: *Poa secunda*. Some current treatments further separate *P. secunda* into two morphologically different forms, subsp. *juncifolia* and subsp. *secunda*. Although this seems like radical new work to many botanists (for some, blasphemy), it has been in process for nearly 60 years (Soreng, pers. comm.), and is the tack taken in the upcoming Flora of Oregon (Wilson, pers. comm.). In the splitter's camp, some maintain that unique phenotypes exist and that they should



Line drawing of Sandberg bluegrass by Agnes Chase that appeared in A.S. Hitchcock's *Manual of the Grasses of the United States*, as *Poa scabrella*, which is now a synonym for *Poa secunda* subsp. *secunda*.

remain separate to help define ecological sites, to predict the performance of revegetation efforts, and to assist in making other land management decisions (Tilley *et al.* 2011).

In the Flora of Oregon, *Poa secunda* ssp. *juncifolia* will include the more robust variants, which usually occupy moister and sometimes more saline habitats than ssp. *secunda*. In Oregon, this includes the former *P. ampla* (big bluegrass), *P. juncifolia* (alkali bluegrass) and *P. nevadensis* (Nevada bluegrass) as some of the synonyms.

Those who were able to successfully separate *P. canbyi* (Canby's bluegrass), *P. gracillima* (Pacific bluegrass), *P. sandbergii* (Sandberg bluegrass) and *P. scabrella* (pine bluegrass) will have to be content with calling all of them *P. secunda* ssp. *secunda*. These are the mostly shorter plants found in the drier, more upland sites.

To summarize: a *Poa* by any other name is *secunda*, and some of us are thankful.

Note: Although the subject of this paper is *Poa secunda* in its broadest sense, please be aware that this author's experience has been mostly limited to the arid lands east of the Cascade



Nevada bluegrass (*Poa nevadensis*) has been submerged into *Poa secunda* subsp. *juncifolia*. Illustration by Jeanne R. Janish from *Vascular Plants of the Pacific Northwest*, used by permission from the University of Washington Press.

Mountains in Oregon. Therefore, portions of the discussion, either intentionally or unintentionally, will tend to favor the smaller members of ssp. *secunda*.

Distinguishing Characters

Sandberg bluegrass is a cool-season, perennial bunchgrass, growing from 6 to 48 inches tall. The basal leaves are in tiny to robust tufts up to 8 inches tall and up to 12 inches in diameter. The leaf blades are somewhat narrow, usually no wider than ¼ inch and can be flat, folded, or rounded, soon-withering or persisting after maturity. There are usually up to two flowering stems per plant, with narrow, erect, usually contracted inflorescences that are short, but can be as long as 10 inches. The inflorescences open somewhat during anthesis (flowering), and can contain more than 100 spikelets. The spikelets are often purple tinged, and the entire plant acquires a reddish coloration as it ages (see photo inside back cover).

A Cosmopolitan Species, Both Geographically and Ecologically

In North America, *Poa secunda* occurs from southeastern Alaska across southern Canada as far as the Gaspé Peninsula, and then south through the western and Great Plains states to northwest Mexico. Widely disjunct populations also occur in Chile and Argentina, but it is infrequent there (Soreng, pers. comm.).



The USDA Agricultural Research Service looked to the Sandberg bluegrass complex for grasses to stabilize soil and provide wildlife cover. From left to right, Sherman big bluegrass, Canby bluegrass, Sandberg bluegrass, and Nevada bluegrass. Illustration by Lucretia B. Hamilton, published in USDA SCS Agriculture Handbook No. 339 (1968).

Its ecological breadth rivals its geographical one. It can be found in saline and alkaline meadows, chaparral, foothill woodland, grasslands, sagebrush scrub, dry meadows, and even in sub-alpine situations up to 12,500 ft. in elevation, where annual precipitation averages 8 to 20 inches. Soils vary from rich clays and loams to harsh sands, serpentines, and scablands. Within the United States, it can be found in 16 BLM physiographic regions, more than 20 ecoregions, 80 rangeland cover types, and 33 SAF cover types (Howard 1997, Stannard 2005, Hogan 2010, Ceska 2005).

In Oregon, Sandberg bluegrass has been documented from a variety of sites ranging from near sea level to alpine (9,800 ft. elevation), including dry, rocky ridges, bottomland, damp meadows, spruce forest, grassland, sagebrush, western juniper, ponderosa pine, alpine ridges and slopes. Although more common east of the Cascades, it is claimed by all but six Oregon counties: Columbia, Lincoln, Polk, Tillamook, Washington and Yamhill. Clatsop County escaped this northwestern cluster since Sandberg bluegrass has been documented from Saddle and Sugarloaf mountains (OFP 2011).

In eastern Oregon, Sandberg bluegrass is the characteristic grass of the scablands, whose rocky, shallow soil is usually dominated by stiff sagebrush (*Artemisia rigida*), but it occurs in many other situations as well. Data collected as part of the BLM's Ecological Site Inventory shows that Sandberg bluegrass is not just the most common grass, but it is the most common plant (highest frequency) recorded during many years of survey in eastern Oregon (Horn, pers. comm., 2008).

A Year in the Life of a Sandberg Bluegrass Plant

In eastern Oregon, where Sandberg bluegrass is most common, you can tell spring has arrived where you see those little clumps of grass beginning to green on the otherwise brown hillsides of winter. This grass is one of the first native plants to start growing (Stannard 2005), taking advantage of the early moisture and favorable temperatures of early March. Of course, the timing of all phenological stages varies by habitat, elevation, and other factors.

Soils dry quickly in eastern Oregon, so Sandberg bluegrass must complete its reproductive cycle in short order. By May it has flowered and perhaps set seed. In most years, a significant amount of seed is produced; about half of it viable (Howard 1997). By late June, after it has colored its surroundings with a decidedly-reddish tint, all that remains is a sad, dry, little tuft of brittle leaves. Now it waits.

While most perennial grasses east of the Cascades lie dormant throughout the fall and winter until the following spring, Sandberg

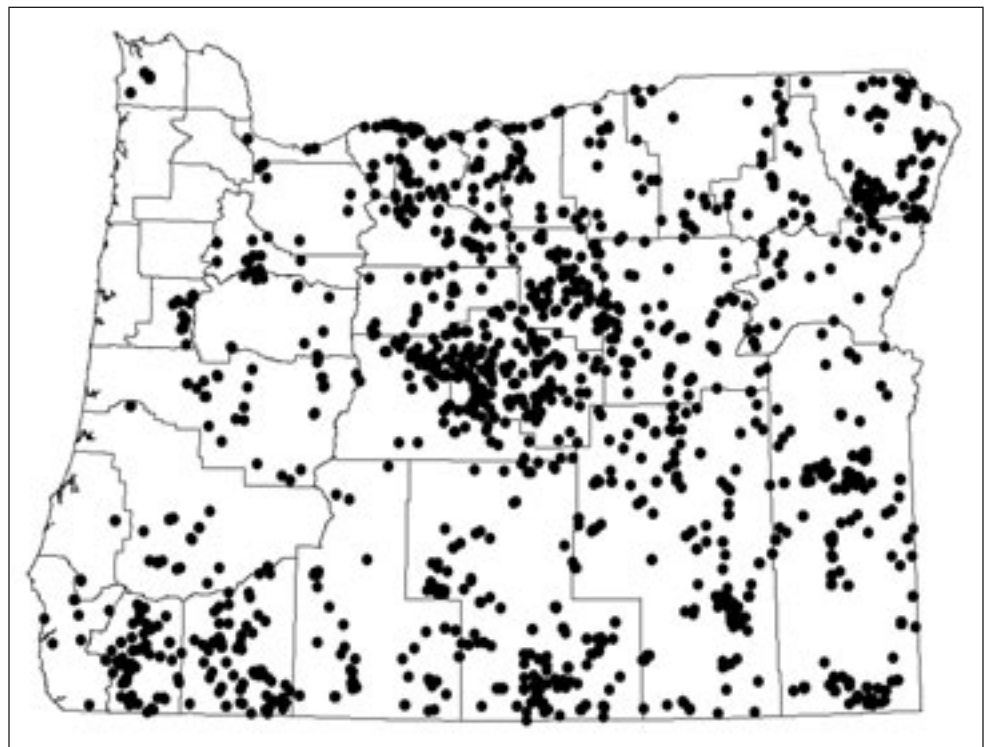
bluegrass revives after the first fall rains. They don't have to be soaking rains (light showers will do) and the leaves begin new growth almost immediately. Sandberg bluegrass will actively grow throughout October and November until winter sets in and daytime temperatures are too low. Along with April and May, midwinter is a period of maximum leaf height for *Poa secunda* (Howard 1997).

Response to Disturbance and Competition

Plants of the Sandberg bluegrass complex have extensive, deep penetrating, coarse, fibrous roots that make them drought tolerant and resistant to grazing and trampling, and hence, fairly resilient to disturbance (Tilley *et al.* 2011). Most of the work done in this respect has been within sagebrush steppe communities, and here, due to its low stature and root structure, *Poa secunda* persists in spite of past grazing practices (Stannard 2005). Early on it was noted that on the "public domain" lands of the West, overgrazing had killed out most of the native bunchgrasses except for Sandberg bluegrass (USDA 1937).

Sandberg bluegrass is not harmed by fire and generally increases in response to wildfire, in part because it usually is completely dormant when most fires occur (Howard 1997). In one study of the effects of a spring fire, although Sandberg bluegrass didn't resprout the first season after burning, by the second it had, even increasing in size and vigor (Rau *et al.* 2008).

While it tends to persist with fire and/or grazing, Sandberg bluegrass is not shade tolerant. It normally occurs in open sun to partial shade, and where fire is absent, it may be shaded out by sagebrush. It's also likely that it can be shaded out in any plant community in which it occurs, such as in open forestland (Howard 1997).



Distribution of *Poa secunda* in Oregon, including both observations and specimens. Map courtesy of the Oregon Flora Project Plant Atlas, 2011.

In some habitats Sandberg bluegrass is considered an early-successional species that tolerates some of the disturbances that eliminate larger bunchgrasses, and has the ability to compete with some of the exotic annuals, such as cheatgrass (*Bromus tectorum*) (Davies and Svejcar 2008). One advantage may be that the phenology of its growth is similar to that of cheatgrass: starting early and maturing quickly. After fire, it can outcompete cheatgrass, at least for a time (USU 2010).

One would think this would hold true for another vigorous exotic competitor, medusahead (*Taeniatherum caput-medusae*). Similar to cheatgrass, this species starts and matures early. However, medusahead invasion has been shown to actually reduce the cover and density of Sandberg bluegrass as much or more than the larger bunchgrasses. Additionally, if a thatch of dead medusahead builds up (its high silica content resists decomposition), there could be a shading effect on Sandberg bluegrass as well (Davies 2008).

In Praise of Our Bluegrass

All plants have their place, and Sandberg bluegrass is no exception. From a forage standpoint, for both livestock and wildlife, it ranks among the most important of range grasses (USDA 1937). It is drought tolerant and persists, regardless of annual weather patterns (Howard 1997). As one of the first grasses to mature, it provides

an early source of protein for grazing animals, but its palatability is soon reduced. A crude protein (CP) content of 24% is common during its period of lush growth, but by the end of June, it can be as low as 5% (Bedell 2008). However, in the late fall and winter, when other native species are at their protein-lowest, Sandberg bluegrass can have a CP content of up to 16%, after it re-greens following fall precipitation (Ganskopp and Bohnert 2001), and is a choice winter forage for elk. The taller forms of *Poa secunda*, segregated as ssp. *juncifolia*, tend to mature later and produce more usable forage later in the season.

Commercial strains of subspecies *juncifolia* have been developed for erosion control and soil stabilization. Through federal breeding programs, the native big bluegrass type of Sandberg bluegrass has been released as several cultivars. “Sherman” big bluegrass has been in use in the Pacific Northwest for decades. Originally collected from near Moro, Oregon, in 1932, it was released to the public in 1945. Since then, it has been used extensively for soil conservation, livestock forage, and wildlife habitat, including upland game bird nesting (USDA-NRCS undated). Another popular cultivar is “Canbar,” genetic offspring from Canby bluegrass. It serves a similar niche as “Sherman,” but does well in higher precipitation zones (Tilley *et al.* 2011). Alaska has even gotten in on the act with its 1989 release of “Service” big bluegrass, named after Robert W. Service, famous “bard of the Yukon.” Like the others, it is useful

for erosion control, revegetation and other landscape projects (Hunt and Wright 2007). Even those forms within *P. secunda* ssp. *secunda*, although smaller, are used in restoration projects as part of native seed mixes (Tilley *et al.* 2011).

It’s interesting to note that researchers from the 1930s to the 1950s studied *Poa secunda* extensively with the hope of breeding a super grass. Their plan was to use apomixis to fix variations, and then they would select the hardiest of them, hoping for a variety that would breed true. Lots of hybrids were produced, but none became the sought-after super grass (Soreng, pers. comm.).

Locally, Sandberg bluegrass performs a unique and important function: habitat for the rare woven-spore lichen (*Texosporium sancti-jacobi*). Found at only a handful of locations in Washington, Oregon, California and Idaho, this lichen depends on organic matter as its substrate, and mainly grows on dead clumps of *Poa secunda*, along with small mammal dung (CWNP 2010).

Given its diminutive stature, short leaves, and relatively small seed, it would be understandable that Sandberg bluegrass would have had minimal value as an ethnobotanical resource. However, there is one report that its seeds were used for food by the Goshute Indians, a tribe of the Shoshone nation in the Great Basin (Chamberlin 1911).

Conclusion

Sandberg bluegrass is a vital member of Oregon’s native flora. It’s a tough little tussock and serves as the native bunchgrasses’ last line of defense against



Poa secunda has periods of active leaf growth even during late fall and early winter. Photo taken November 25, 2010, at Ochoco Viewpoint State Park, Crook County, Oregon, by Ron Halvorson.

exotic annuals. It also fills an important niche of providing early- and late-season protein for grazing animals, and its cultivars have been used successfully in revegetation and restoration efforts for more than 60 years.

A dense stand of flowering *Poa secunda* is a wonder to behold, even if you have to get down on your hands and knees to appreciate it.

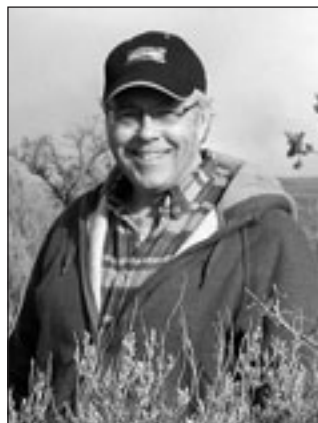
Acknowledgements

I would like to thank Ed Horn, a recently-retired soil scientist from the Bureau of Land Management, for a conversation we had in 2008. Ed spent the majority of his long career conducting soil and vegetation inventories throughout central and eastern Oregon. He came to me one day and asked, "I bet you can't guess the most common plant in all of our surveys?" The answer: Sandberg bluegrass. His comment provided the inspiration for choosing *Poa secunda* as the subject for this article in the first place. Second, Robert Soreng, of the National Museum of Natural History at the Smithsonian, and an expert in the *Poa secunda* complex, provided great insight into the complexities of this little plant, as well as some pertinent taxonomic history. I hope he never figured out that I didn't know what I was doing. Finally, Barbara Wilson who, with the Carex Working Group, is responsible for the Poaceae treatment in the upcoming Flora of Oregon, provided a current description of Sandberg bluegrass and helped to make sense of the reasons this grass is so complex.

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he would do working in range management, and in 1985 he was converted to a Natural Resource Specialist. From then until his retirement in 2008 he was primarily responsible for the botany program in the Prineville District (and loved it!). Ron remains in Prineville with Gayle, his wife of almost 40 years.