

Artemisia papposa

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INTRODUCTORY

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Photo by James L. Reveal @ USDA-NRCS PLANTS Database

AUTHORSHIP AND CITATION:

Meyer, Rachelle. 2009. *Artemisia papposa*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <http://www.fs.fed.us/database/feis/> [2009, October 29].

FEIS ABBREVIATION:

ARTPAP

NRCS PLANT CODE [[50](#)]:

ARPA16

COMMON NAMES:

Owyhee sagebrush
fuzzy sagebrush

TAXONOMY:

The scientific name of Owyhee sagebrush is *Artemisia papposa* S. F. Blake & Cronquist (Asteraceae) [[14](#),[17](#),[23](#),[27](#),[28](#)].

SYNONYMS:

None

LIFE FORM:

Shrub
Shrub-forb

FEDERAL LEGAL STATUS:

None

OTHER STATUS:

Information on state- and province-level protection status of plants in the United States and Canada is available at [NatureServe](#).

DISTRIBUTION AND OCCURRENCE

SPECIES: *Artemisia papposa*

- [GENERAL DISTRIBUTION](#)
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GENERAL DISTRIBUTION:

Owyhee sagebrush has a limited distribution in southern Idaho and adjacent Oregon and Nevada [[13,19,26,27,43](#)]. It occurs in Malheur County in southeastern Oregon [[10,14](#)], southwestern and south-central Idaho [[14,23,42](#)], and Elko [[14,28,36](#)] and possibly Humboldt [[36](#)] counties in northern Nevada. [Plants Database](#) provides a distributional map of Owyhee sagebrush.

HABITAT TYPES AND PLANT COMMUNITIES:

Owyhee sagebrush occurs in sagebrush steppe [[11](#)], meadows [[14,36,38](#)], alkaline flats, and sagebrush-juniper slopes [[38](#)]. Owyhee sagebrush-dominated shrub communities [[26,37](#)] are restricted in extent [[49](#)]. Species occurring in Owyhee sagebrush communities in southern Idaho included thymeleaf and mat buckwheats (*Eriogonum thymoides* and *E. caespitosum*, respectively), lava aster (*Ionactis alpina*), whip pussytoes (*Antennaria flagellaris*), onespoke danthonia (*Danthonia unispicata*), western needlegrass (*Achnatherum occidentale* ssp. *occidentale*), and barestem biscuitroot (*Lomatium nudicaule*) [[42](#)]. Sandberg bluegrass (*Poa secunda*) was one of only a few species that occurred in an Owyhee sagebrush community in southeastern Oregon [[24](#)]. Sandberg bluegrass and Wasatch desertparsley (*Lomatium bicolor* var. *leptocarpum*) were the most prominent associates in an Owyhee sagebrush ephemeral wetland community in southwestern Idaho [[37](#)]. Owyhee sagebrush was observed in a low sagebrush (*Artemisia arbuscula*) community with Hooker's balsamroot (*Balsamorhiza hookeri*), Idaho fescue (*Festuca idahoensis*), and hollyleaf clover (*Trifolium gymnocarpon*) in Owyhee County, Idaho [[20](#)]. It occurred on a silver sagebrush (*Artemisia cana*)-dominated site with alkali sagebrush (*Artemisia arbuscula* subsp. *longiloba*) in southern Idaho [[42](#)]. Owyhee sagebrush was reported in intermittent drainage ways of an area in Camas County, Idaho dominated primarily by alkali sagebrush (USDI Bureau of Land Management and USDA Soil Conservation Service 1976 cited in [[35](#)]). Species associated with the Owyhee Uplands that may occur on sites with Owyhee sagebrush include thymeleaf buckwheat, Hooker's balsamroot, Cusick's beardtongue (*Penstemon cusickii*), and narrowleaf mock goldenweed (*Stenotus stenophyllus*) [[47](#)].

Although Owyhee sagebrush shrublands generally have low cover of biological soil crust [[5,26](#)], unattached lichens in the genus *Dermotocarpon* occur on sites with Owyhee sagebrush [[26,45](#)]. Sandberg bluegrass, whip pussytoes, and stiff sagebrush (*Artemisia rigida*) are also associated with these sites [[45](#)]. The cyanobacterium *Nostoc* has been collected from Owyhee sagebrush sites in Idaho [[26](#)].

BOTANICAL AND ECOLOGICAL CHARACTERISTICS

SPECIES: *Artemisia papposa*

- [GENERAL BOTANICAL CHARACTERISTICS](#)
- [SEASONAL DEVELOPMENT](#)
- [REGENERATION PROCESSES](#)
- [SITE CHARACTERISTICS](#)
- [SUCCESSIONAL STATUS](#)



Photo by James L. Reveal @ USDA-NRCS PLANTS Database

GENERAL BOTANICAL CHARACTERISTICS:

Botanical description: This description covers characteristics that may be relevant to fire ecology and is not meant for identification. Keys for identification are available (e.g., [[14,23,28](#)]).

Owyhee sagebrush is a deciduous [[43](#)] native perennial subshrub [[14,27](#)] generally 4 to 20 inches (10-50 cm) in height [[13,14,18,23,36,43](#)]. The woody base ranges from 2 to 6 inches (5-15 cm) tall [[14](#)], and the annual flowering branches are typically 4 to 8 inches (10-20 cm) long [[13,14](#)]. The leaves are 10 to 35 mm long [[13,14,23](#)] and lobed [[14,23,28,43](#)]. The raceme inflorescences have 4 to 14 flower heads on erect peduncles [[13,14,23](#)], with a disk from 3 to 6 mm wide [[13](#)]. The fruits are achenes [[14,34](#)]. Owyhee sagebrush fruits have a short pappus [[14,18,28,36](#)], which is atypical of sagebrush species (*Artemisia* spp.) in this region [[36](#)]. Rosentreter (personal communication [[44](#)]) has observed that Owyhee sagebrush seeds are rather large for *Artemisia* and are similar in size to seeds of stiff sagebrush. Root depth is apparently about 4 to 6 inches (10-15 cm)(personal communication [[31](#)]). According to a fact sheet published by the Nevada Natural Heritage Program, Owyhee sagebrush is long lived [[36](#)], which is typical for sagebrush species [[34](#)].

Raunkiaer [[40](#)] life form:

[Chamaephyte](#)

SEASONAL DEVELOPMENT:

Owyhee sagebrush flowers from May [[13,23](#)] to July [[14,36](#)] and timing of germination has not been reported. According to a review, sagebrush species typically flower in autumn and germinate in winter or early spring [[34](#)]. Because Owyhee sagebrush is atypical in timing of flowering, it is probably also atypical in timing of germination or has mechanisms that prevent summer germination. Budsage (*Picrothamnus desertorum*), a small shrub that flowers in spring and has a close affinity to the *Artemisia* genus [[14](#)], has seeds that ripen in early summer and germinate the

following spring. Its seeds rarely germinate in summer because of high temperatures (Meyer and Kitchen unpublished data cited in [34]) and are generally stratified by a cold, moist period [34]. Rosentreter observed Owyhee sagebrush seeds germinate in 2 to 4 days and notes that it is easy to grow (personal communication [44]).

REGENERATION PROCESSES:

As of 2009, only limited information was available on Owyhee sagebrush regeneration processes. Most of the following information is based on observations of sagebrushes in general. Although the Owyhee sagebrush subgenus, *Artemisia*, has pistillate ray flowers and perfect disc flowers [33], Owyhee sagebrush has been described as having rayless flower heads [36] or pistillate "outer" or "marginal" flowers and perfect inner flowers [13,14]; all are potentially fertile [14]. Flowers of species in the *Artemisia* genus are wind pollinated [17,34], and seeds are dispersed by wind [46,56] and water [3]. Sagebrush seeds are often viable for 2 to 3 years in storage (Stevens and others 1981 cited in [34]). If stored at temperatures below 50 °F (10 °C) and moisture contents of 6% to 8%, viability of sagebrush seeds may be extended to around 5 years [34]. Several ecological characteristics of sagebrush species, including Owyhee sagebrush, were ranked in a study of the relationships between species traits and genome size. The study ranked Owyhee sagebrush as having "medium" seed production and "slow" growth [18]. Other Owyhee sagebrush characteristics described by Garcia and others [18] are referred to in relevant sections of this review. As of 2009, no information on typical germination rates of Owyhee sagebrush seeds is available. The lack of any observations of vegetative regeneration or associated structures suggests that Owyhee sagebrush is unlikely to reproduce vegetatively.

SITE CHARACTERISTICS:

Characteristic Owyhee sagebrush sites are open [13,23] and occur at mid-elevations in shallow, ephemeral wet soils [24,26,42]. These conditions occur on large plateaus [24,37,43], in shallow depressions, adjacent to intermittent water courses [35,37,49], in rocky swales [14,24], moist clay bottoms [36], and mud flats [14]. Sites are generally cool [43] with dry summers [19,43]. Some Owyhee sagebrush communities occur on exposed sites subject to frost heaving [45]. Communities are sparsely vegetated [13,23,37].

Elevation: Owyhee sagebrush occurs on mid-elevation sites ranging from 4,000 [26,42] to 6,900 feet (1,220-2,100 m) [14]. In Idaho it occurs at elevations up to about 6,500 feet (1,950 m) [26,42]. In Blaine and Elmore Counties of Idaho, Owyhee sagebrush typically occurs above 5,500 feet (1,680 m) and below 7,000 feet (2,130 m), between Wyoming big sagebrush (*Artemisia tridentata* subsp. *wyomingensis*) and mountain big sagebrush (*A. tridentata* subsp. *vaseyana*) communities (personal communication [31]). It was collected in Elmore County, Idaho, at 5,500 feet (1,680 m) [18] and observed in Owyhee County, Idaho, at 5,720 feet (1,740 m) [20]. A fact sheet lists Owyhee sagebrush occurring from 6,300 to 6,700 feet (1,920-2,042 m) in Nevada [36], while a flora of the Intermountain West notes its occurrence from 4,600 to 6,900 feet (1,400-2,100 m) [14].

Soil: Characteristic Owyhee sagebrush sites have shallow [24,26,42], stony [20,26,42] soils over basalt bedrock [26,42] and are ephemeral saturated or flooded [24,26,42,49]. Examples include poorly drained basalt tables with skeletal soils [43] and the shallow and poorly drained soils in rocky swales of "biscuit and swale" patterned ground [24]. Topography and/or frozen soil limits drainage in winter and spring, resulting in saturated or flooded soils. By summer, Owyhee sagebrush communities are dry [19,43]. Shallow soils of Owyhee sagebrush sites are similar to low sagebrush sites [43], specifically those of gray low sagebrush (*A. arbuscula* subsp. *arbuscula*) and alkali sagebrush (personal communication [31]), except that Owyhee sagebrush communities are restricted to sites with "very shallow to almost no soil over the skeletal basalt" [43]. Owyhee sagebrush has also been observed in heavy clay soils [26,42]. In southwestern Idaho, scattered individuals occurred in a silver sagebrush community on deep alluvium of heavy clay with poor drainage [42]. Owyhee sagebrush is fairly tolerant of alkaline [13,14,23] and saline [18] soils.

Climate: Average annual temperatures in regions where Owyhee sagebrush may occur range from 35 °F (2 °C) in the Owyhee Uplands to 58 °F (13 °C) in the Snake River Plain. Average annual temperatures in southern Idaho range from 37 °F to 52 °F (2.8-11.1 °C) [26]. Annual temperatures in the Owyhee Uplands are slightly cooler, averaging 35 °F to 45 °F (2-8 °C) [11]. On the Snake River Plain annual temperatures are warmer, averaging 40 °F to 58 °F (4-13 °C) [12]. The growing season on the Owyhee Uplands is typically from 90 to 120 days but may be less than 60 days at high elevations [11]. On the Snake River Plain the growing season ranges from 60 to 165 days, with sites in the east or at high elevations having shorter growing seasons than those in the west or at low elevations [12].

Annual precipitation in regions where Owyhee sagebrush may occur ranges from a low of 5 inches (127 mm) in parts of the Snake River Plain [12] to 20 inches (508 mm) in southern Idaho [26]. In southwestern Idaho, an area where Owyhee sagebrush is fairly common, annual precipitation ranges from 7 to 15 inches (200-400 mm) [11,18]. Generally the western portion of Idaho receives most of this precipitation in winter, with less than 35% falling from April through September [26]. In the Owyhee Uplands of southwestern Idaho and adjacent Oregon, precipitation is fairly evenly distributed throughout the year but is lower from mid-summer to autumn. Thus summers are dry, with precipitation equaling about 20% of evaporation during the frost-free period [11]. Owyhee sagebrush's ability to tolerate drought was ranked as intermediate [18].

SUCCESSIONAL STATUS:

As of 2009, no information was available on Owyhee sagebrush's successional status. However, the specificity of characteristic habitat (see [Soil](#)), apparent long-lived nature of Owyhee sagebrush [36], and the tendency of other sagebrush species [4], including low sagebrush [51] and stiff sagebrush [15,25,41], to persist as edaphic climax communities, suggest that Owyhee sagebrush may form climax communities on suitable sites.

FIRE EFFECTS AND MANAGEMENT

SPECIES: [Artemisia papposa](#)

- [FIRE EFFECTS](#)
- [FUELS AND FIRE REGIMES](#)
- [FIRE MANAGEMENT CONSIDERATIONS](#)

FIRE EFFECTS:

As of 2009, there are no data on Owyhee sagebrush's immediate or long-term response to fire. There are no studies comparing abundance of Owyhee sagebrush either before and after fire or on burned and unburned sites. There are no reports of fire on sites with Owyhee sagebrush. The following discussion is inferred from the characteristics of sites with Owyhee sagebrush, the little available information on Owyhee sagebrush regeneration processes, and responses of other small sagebrush species that occur in sparse communities. FEIS reviews of several of these species are available including [low sagebrush](#), [black sagebrush](#) (*A. nova*), [stiff sagebrush](#), [pygmy sagebrush](#) (*A. pygmaea*), and [budsage](#).

Immediate fire effect on plant: Available information suggests that Owyhee sagebrush would likely be killed by fire. In a table of ecological characteristics, Owyhee sagebrush is listed as not layering or sprouting in response to fire [18]. Several other dwarf sagebrush species, such as low, black [8,9], and stiff sagebrushes [16], are sensitive to fire damage.

Postfire regeneration strategy [48]:

Shrub without [adventitious](#) buds and without a sprouting [root crown](#)

Possible:

[Initial off-site colonizer](#) (off site, initial community)

[Secondary colonizer](#) (on- or off-site seed sources)

Fire adaptations and plant response to fire:

Information available as of 2009 suggests that Owyhee sagebrush does not have morphological or other adaptations that would contribute to postfire survival [18]. On the Owyhee Uplands, fire typically results in replacement of late-seral species with grasses and forbs [11]. The duration of this change is not discussed. In a sagebrush-grass rangeland in the upper Snake River Plains of Idaho, mountain big sagebrush had not quite recovered to prefire levels 30 years following fire [22].

More research is needed on the optimal conditions for Owyhee sagebrush germination and establishment to determine

if recruitment is likely to occur on recently burned sites. Establishment of Owyhee sagebrush following fire is likely influenced by site conditions such as moisture availability. Low sagebrush recovery following fire may take 2 to 5 years when regeneration conditions are favorable [7]. In dry years, fire may have more long-term impacts because it could exacerbate drought stress [2,54].

Fire characteristics, such as season and patchiness, are also likely to influence establishment of Owyhee sagebrush in recently burned sites. Fires during summer generally have more negative impacts on sagebrush communities than those in fall or early spring. This is mainly due to greater damage to herbaceous perennials and risk of erosion following summer fires [2,6,9,56]. Black sagebrush had not established on a site in Utah 2 years after a late July fire [52]. However, Bunting and others [9] report that late summer rains occasionally result in fall green-up of vegetation of the Owyhee Plateau and note that burning during such periods may cause more mortality than late summer burning, when plants are dormant. According the FEIS review of black sagebrush, short seed dispersal distance could lengthen recovery time in uniform burns compared to patchy burns. In general, sagebrush recruitment is regularly observed on sites of small-scale disturbances where there is little competition from adult plants or understory species [34].

FUELS AND FIRE REGIMES:

Fire is likely rare in Owyhee sagebrush communities due to a lack of fuel. Most of the cover in an Owyhee sagebrush ephemeral wetland community in southwestern Idaho was soil and gravel [37]. Sites with *Dermatocarpon* lichen, which is associated with Owyhee sagebrush, had sparse vegetation and litter [45]. Owyhee sagebrush has been observed to accumulate little standing biomass (personal communication [31]). This lack of fuel and the rarity of fire in other dwarf sagebrush communities with similar lack of fuels [2,6,9,16,56] suggest Owyhee sagebrush communities would have long fire-return intervals. Typically more than 600 to 700 pounds of herbaceous fuels per acre are necessary for fire to carry in sagebrush grasslands [2]. Thus, Owyhee sagebrush is most likely to experience fire in communities dominated by other species, such as silver sagebrush (personal communication [44]). See the [Fire Regime Table](#) for further information on fire regimes of vegetation communities in which Owyhee sagebrush may occur.

Dwarf sagebrush communities [1,2,9], including those dominated by Owyhee sagebrush (personal communication [44]), may serve as natural fire breaks. For instance, a low sagebrush community in Nevada did not burn on a hot day in mid-August despite wind speeds of up to 25 miles/hour (40.3 km/hour) [2]. Fire risk in dwarf sagebrush communities is likely to increase in years with above average production [9], or on sites invaded by annual grasses such as medusahead (*Taeniatherum caput-medusae*) [55] or cheatgrass (*Bromus tectorum*) [32]. Cheatgrass is a general concern in the Snake River Plain, where fire-return intervals decreased from 60 to 100 years to about 5 years following conversion of sagebrush steppe to annual grassland [53]. Grazing was of management concern in stiff and Owyhee sagebrush communities due to possible invasion of cheatgrass and the resulting increases in fire frequency [26]. For more information on changes in fuel loads in [low sagebrush](#) communities, see its FEIS review.

FIRE MANAGEMENT CONSIDERATIONS:

Owyhee sagebrush communities rarely burn due to a lack of fuels [37,45]. Therefore, they may serve as natural fire breaks. Fire is most likely to affect Owyhee sagebrush where it is not a dominant species (personal communication [44]), in years with above average productivity, and on sites where invasive annuals have established. High mortality of Owyhee sagebrush is expected following fire. Recovery time is unknown, as are the factors that have the greatest influence on recovery time. In general, sagebrush sites may need assessment following fire to determine whether steps should be taken to prevent establishment of invasive species [26].

Due to the difficulty of burning, the lack of noticeable increases in forage production following burning on generally unproductive sites [9], and the forage value of some dwarf sagebrushes [2,6,56], prescribed fires are generally not recommended in dwarf sagebrush communities. In addition, the openness of Owyhee sagebrush sites [13,23] and the occurrence of wind erosion in the Owyhee Uplands [11] suggest postfire erosion could pose a potential problem in some Owyhee sagebrush communities. However, Owyhee sagebrush occurs on sites with gentle topography and shallow soils, so the extent of erosion and its impacts on Owyhee sagebrush are uncertain. Guidelines for burning big sagebrush (*Artemisia tridentata*) communities to improve habitat diversity or forage production include limiting burning to sites with at least 600 to 700 pounds of fine fuels per acre [2], 30% sagebrush cover, and 20% herbaceous perennial cover [39,56]. This suggests that conditions appropriate for burning are unlikely to occur in Owyhee sagebrush sites.

MANAGEMENT CONSIDERATIONS

SPECIES: [Artemisia papposa](#)

- [IMPORTANCE TO WILDLIFE AND LIVESTOCK](#)
- [VALUE FOR REHABILITATION OF DISTURBED SITES](#)
- [OTHER USES](#)
- [OTHER MANAGEMENT CONSIDERATIONS](#)

IMPORTANCE TO WILDLIFE AND LIVESTOCK:

Owyhee sagebrush leaves are generally unpalatable, while the mature flowering stalks are eaten by many wildlife species [43] and domestic sheep [42]. Horses have been observed eating Owyhee sagebrush leaves [43].

Cover value of Owyhee sagebrush is low. However, where Owyhee sagebrush communities are adjacent to big sagebrush they may provide strutting habitat and possibly limited forage for greater sage-grouse [19]

VALUE FOR REHABILITATION OF DISTURBED SITES:

No information is available on this topic.

OTHER USES:

No information is available on this topic.

OTHER MANAGEMENT CONSIDERATIONS:

The Owyhee Uplands are used for livestock grazing, farming, and recreation and are susceptible to water and wind erosion [11]. According to a review of biological soil crusts in *Artemisia* communities, management concerns in Owyhee sagebrush communities are the same as those in stiff sagebrush communities and include grazing that causes increased cover of cheatgrass and increased fire frequency (see [Fuels and Fire Regimes](#)) [26].

APPENDIX: FIRE REGIME TABLE

SPECIES: [Artemisia papposa](#)

The following table provides fire regime information on communities where Owyhee sagebrush may occur. Fire regimes in Owyhee sagebrush communities may be similar to black and low sagebrush communities due to similarities in structure, fuel loads, and productivity. Follow the links in the table to documents that provide more detailed information on these fire regimes.

Fire regime information on vegetation communities in which Owyhee sagebrush may occur. This information is taken from the LANDFIRE Rapid Assessment Vegetation Models [30], which were developed by local experts using available literature, local data, and/or expert opinion. This table summarizes fire regime characteristics for each plant community listed. The PDF file linked from each plant community name describes the model and synthesizes the knowledge available on vegetation composition, structure, and dynamics in that community. Cells are blank where information is not available in the Rapid Assessment Vegetation Model.

Great Basin	Northern and Central Rockies
-----------------------------	----------------------------------------------

Great Basin

- [Great Basin Shrubland](#)

Vegetation Community (Potential Natural Vegetation Group)	Fire severity*	Fire regime characteristics			
		Percent of fires	Mean interval (years)	Minimum interval (years)	Maximum interval (years)
Great Basin Shrubland					
Wyoming sagebrush steppe	Replacement	89%	92	30	120
	Mixed	11%	714	120	
Mountain big sagebrush	Replacement	100%	48	15	100
Black and low sagebrushes	Replacement	33%	243	100	
	Mixed	67%	119	75	140
Northern and Central Rockies					
<ul style="list-style-type: none"> Northern and Central Rockies Shrubland 					
Vegetation Community (Potential Natural Vegetation Group)	Fire severity*	Fire regime characteristics			
		Percent of fires	Mean interval (years)	Minimum interval (years)	Maximum interval (years)
Northern and Central Rockies Shrubland					
Wyoming big sagebrush	Replacement	63%	145	80	240
	Mixed	37%	250		
Low sagebrush shrubland	Replacement	100%	125	60	150
<p>*Fire Severities—</p> <p>Replacement: Any fire that causes greater than 75% top removal of a vegetation-fuel type, resulting in general replacement of existing vegetation; may or may not cause a lethal effect on the plants.</p> <p>Mixed: Any fire burning more than 5% of an area that does not qualify as a replacement, surface, or low-severity fire; includes mosaic and other fires that are intermediate in effects.</p> <p>Surface or low: Any fire that causes less than 25% upper layer replacement and/or removal in a vegetation-fuel class but burns 5% or more of the area [21,29].</p>					

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