

Artemisia rothrockii Gray.
ASTERACEAE

rothrock sagebrush

Synonyms: *Artemisia tridentata* ssp. *rothrockii* Hall & Clements
Artemisia tridentata var. *rothrockii* McMinn



General Description.—Rothrock sagebrush, also known as timberline sagebrush, is a low, aromatic, evergreen shrub, spreading to ascending from a narrow trunk, 20 to 60 cm tall. Bark is gray to dark grayish brown, becoming fibrous with age. Young twigs are densely tomentose. Leaves are dark green, narrowly cuneate, ranging from 0.5 to 2 cm long and 0.2 to 1.5 cm wide. Vegetative leaves are three-toothed but, leaves on flowering stalks are generally entire. Young leaves are canescent, becoming glabrous with age (Shultz 1993).

Range.—Rothrock sagebrush is native and endemic to California. It occurs at high elevations in the Sierra Nevada and the White and San Bernardino Mountains. This species is commonly found in the southern Sierra Nevada on the Kern Plateau, at Monache Meadows, Big Meadows, Ramshaw Meadows, Templeton Meadows, and Mulkey Meadow. It is also found at Mono Pass, Tuolumne Pass and Mount Dana in Tuolumne County, Angora Peak, and near Fallen Leaf Lake in El Dorado County (McMinn 1951). Its northernmost extent is Placer County (Sawyer and Keeler-Wolf 1995).

Ecology.—Rothrock sagebrush generally vegetates well-drained, gravelly soils on the margins of montane meadows from 2,000 to 3,500 m. In the southern Sierra Nevada, evidence suggests rothrock sagebrush was historically limited to dry soils in the areas between the meadows and surrounding slopes of lodgepole or red fir forest but has expanded into mesic meadows since the

onset of livestock grazing in the 1850's (Ratliff 1985, Odion and others 1988, Dull 1995). Grazing and trampling along stream banks are proposed to have caused channel incision and an associated lowering of the water table in the adjacent meadow (Kattelmann and Embury 1996, Kirchner and others 1998, Knapp and Mathews 1996, USDA Forest Service 1998, 2000). While more often found on drier soils, rothrock sagebrush appears to be tolerant of very high soil moisture as individuals survive periods of standing water following spring snowmelt (Berlow and others 2002). Additionally, in a pot experiment, rothrock sagebrush seedlings showed 100 percent survival after 2 weeks and over 60 percent survival after 4 weeks of complete immersion in flowing water (Swartz, Berlow and D'Antonio unpublished data). The highest potential germination and seedling growth rates were observed in mesic, rather than xeric, meadow habitat. However, in these areas micro-site availability and seed dispersal limit establishment, with seedlings preferentially associated with small soil disturbances within 0.5 m of a seed source (Berlow and others 2002).

Reproduction.—Flowers develop on narrow inflorescences. Heads are sessile to short-peduncled, 3 to 5 mm in diameter. Phyllaries (involucre bracts) occur in two series. Both series are shiny with wide margins. The outer phyllaries are canescent with acute tips, whereas the inner phyllaries are elliptic and only sparsely tomentose. Discoid flowers (ray florets are absent) have between eight and 20 fertile florets. Seeds are small and resinous, ranging from 0.8 to 2 mm, with pappus present on outer seeds (Shultz 1993). Inflorescences begin development in late spring. Flowering takes place at the end of the growing season in early to late fall, and seed dispersal begins soon after. Seeds are primarily wind dispersed and do not appear to travel far, as seedlings tend to be aggregated within 0.5 m of adult shrubs (Berlow and others 2002). Germination occurs immediately following spring snow-melt. Rothrock sagebrush does not form a large soil seedbank (Reynolds unpublished data). An average sized adult plant can produce over 5000 seeds (Reynolds unpublished data). However, field germination rates are low (< 1

percent), and seed viability appears to decline rapidly after 1 year (Berlow and others 2002, and unpublished data).

Growth and Management.—The growing season for rothrock sagebrush in montane habitats is relatively short, beginning in early spring and continuing until the soil moisture is depleted in late summer. Under mesic conditions, rothrock sagebrush can begin flowering within 5 years of establishment (Berlow and others 2002). While age to senescence is unknown, individuals up to 40 years old have been documented by counting growth rings (Bauer and others 2002). Rates of increase in stem diameter have been observed to vary between 0.10 to 0.14 mm/year. Faster growth rates were found in microhabitats characterized by moist surface soil and a shallow water table, suggesting that this woody species can use similar water sources as herbaceous species (Bauer and others 2002, Berlow and others 2003). Rothrock sagebrush seedlings are not palatable to livestock or native grazers, which may contribute to their encroachment into intensively grazed meadows. While large areas of sagebrush expansion are associated with stream incision, rothrock sagebrush also has the demonstrated potential to invade un-incised, mesic meadow habitat given the presence of exposed soil and a nearby seed supply (Berlow and others 2002). Thus, on a large scale, preventing further stream incision is critical to slowing sagebrush invasion. Within mesic meadow habitat, removal of scattered individual shrubs that serve as local seed sources may be the most effective way to prevent rapid expansion into un-incised areas.

Benefits.—Rothrock sagebrush contributes to the diversity of California's montane plant communities. It stabilizes sandy soil on the slopes of meadow fringes and provides habitat for a variety of birds and small mammals.

References

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