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50. © Seedling population size and microhabitat association in *Lupinus oreganus*, a threatened plant of western Oregon grasslands. Severns, P. M. Native Plants Journal 9(3):358-365. 2008.



Seedling population size
and microhabitat association in

Lupinus oreganus

A. Heller var. kincaidii C.P. Sm. (Fabaceae)



Photos by Paul M Severns

a threatened plant of
western Oregon
grasslands

| Paul M Severns

ABSTRACT

Lupinus oreganus A. Heller var. *kincaidii* C.P. Sm. (Fabaceae) is a federally listed Threatened, endemic, perennial species of western Oregon grasslands and is the primary host plant for the Endangered Fender's blue butterfly (*Plebejus icarioides fenderi* Macy [Lepidoptera: Lycaenidae]). For effective conservation and restoration, determining the habitat characteristics that are related to natural seed germination is necessary, yet unknown, for Kincaid's lupine. In 6 populations of Kincaid's lupine, generally < 1% of the estimated seed cohort became seedlings the following year, and pre-dispersal seed predation by weevil (*Tychius lineellus* Le Conte [Coleoptera: Curculionidae]) larvae can substantially reduce the estimated seedling population size. The likelihood of seedling presence increased with a decreasing amount of thatch but no relationship between lupine plant density and seedling likelihood was detected. Kincaid's lupine seedlings were found in habitats with ample exposure to light, such as beds of moss and in areas of grass < 10 cm (4 in) tall. Land managers may encourage larger germinant populations of Kincaid's lupine by decreasing the amount of thatch; controlling the abundance of exotic, rhizomatous grasses; and targeting habitats with short-stature bunch grasses for restoration (seed sowing).

Severns PM. 2008. Seedling population size and microhabitat association in *Lupinus oreganus* A. Heller var. *kincaidii* C.P. Sm. (Fabaceae), a threatened plant of western Oregon grasslands. *Native Plants Journal* 9(3):358–365.

KEY WORDS

Willamette Valley, seed germination, herbivory, seed rain, pre-dispersal seed predation, invasive plants

NOMENCLATURE

Plants: USDA NRCS (2008)

Butterfly: Pelham (2008)

Insects: ITIS (2008)

Chances for effective conservation, preservation, and restoration of rare plant species are increased by information about life stages that limit population growth (Schemske and others 1994). Habitat conditions often affect the survival and abundance of plant species. Quantifying habitat conditions related to germination and seedling establishment enhances restoration planning because they provide targets for initial site selection and future management. Habitat conditions that suppress natural recruitment will result either in repeated planting events at the same site, which is inefficient and functions as a sink for seeds, resources, and money, or in improper site choice, which may ultimately result in restoration site abandonment. It is clearly more beneficial to invest restoration effort into sites with habitat characteristics known to favor natural recruitment, rather than making a guess at site suitability without any *a priori* knowledge of which habitat characteristics are detrimental and (or) beneficial to the focal species.

For *Lupinus oreganus* A. Heller var. *kincaidii* C.P. Sm. (Fabaceae), Kincaid's lupine, a federally listed Threatened plant of western Oregon grasslands and the primary host plant for the federally listed Endangered Fender's blue butterfly (*Plebejus icarioides fenderi* Macy [Lepidoptera: Lycaenidae]), several factors affecting population growth have been identified. Although Kincaid's lupine is self-compatible (Severns and Lewis 2007), pollinators are necessary for fruit set (Kaye 1999); and inbreeding reduces the number of seeds produced per ovule within fruits (Severns 2003a). Some evidence suggests that inbreeding depression limits progeny vigor through reductions in the proportion of filled seeds (Severns 2003a), germination rate of seeds (Kaye and Kuykendall 2001), and perhaps the survival and establishment of seedlings (Severns 2003b). Compounding the genetic and pollinator barriers to sexual reproduction, Kincaid's lupine is not known to be capable of asexual propagation, despite estimated rhizomatous growth to 10 m (33 ft) in length (Wilson