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From Forest Nursery Notes, Winter 2010

**37. © Regional genetic variation in three native grasses in northern California.**  
Kitzmilller, J. H. Native Plants Journal 10(3):263-280. 2009.



## Regional genetic variation in three native grasses in northern California

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### ABSTRACT

Germination, growth, and flowering traits varied widely in a common-garden nursery environment and expressed coarse-textured geographic patterns among Plumas National Forest seed sources of 3 native grasses (Poaceae): blue wildrye (*Elymus glaucus* Buckley ssp. *glaucus*, California brome (*Bromus carinatus* Hook. & Arn. var. *carinatus*), and Orcutt's brome (*B. orcuttianus* Vasey). Seed zones are justified to partition the geographic variation in grasses on the Plumas National Forest because: 1) adaptive traits varied significantly with geographic surrogates for climate and photoperiod; 2) a coarse-textured geographic and topographic pattern overshadowed microsite variation; and 3) paired (proximal) sources were more similar to one another than more distal sources, all of which indicated selection may have contributed to population differentiation. Each species displayed a different geographic pattern, but *Bromus* species were most similar. Low-elevation southwestern sources of *B. carinatus* had earlier and higher germination and slightly higher shoot dry weight, while high-elevation northern lots had later and lower germination and dry weight. Southern sources of *B. orcuttianus* produced more flowers and germinated earlier than northern sources. *Elymus glaucus* from lower-elevation and more eastern sources, where summer drought is most pronounced, had higher dry weight and flowers.

Kitzmiller JH. 2009. Regional genetic variation in three native grasses in northern California. *Native Plants Journal* 10(3):263–280.

### KEY WORDS

geographic variation, seed transfer zones, adaptive traits, *Elymus glaucus*, *Bromus carinatus*, *Bromus orcuttianus*

### NOMENCLATURE

USDA NRCS (2007)

**N**ative perennial grasses are important for the conservation and restoration of native forests and grasslands. Habitats in California's Sierra Nevada have historically been degraded by overgrazing, unnatural fire regimes, invasive exotics, mining, and increasing urbanization. Recent restoration efforts have improved habitats, stabilized soils, and protected meadows and riparian areas, but serious problems remain. For example, native perennial grasses (Poaceae) have been displaced by exotic annuals such as yellow starthistle (*Centaurea solstitialis* L. [Asteraceae]) in the foothill grasslands and oak woodlands, and cheatgrass (*Bromus tectorum* L. [Poaceae]) in the east-side sagebrush-steppe (Sierra Nevada Ecosystem Project 1996). Both species decrease biodiversity, and cheatgrass increases highly combustible fuels and fire frequency. In post-fire emergencies, the common practice of seeding aggressive exotics does provide immediate soil protection and vegetative cover; but over the long term, these exotics could persist, invade, compete, and alter natural plant succession. The