



## *Webinar Brief for Resource Managers*

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# Restoring shrub-steppe after wildfire: Shrub planting as a viable tool in rehabilitation

*To Be Presented on 22 March 2016 by Heidi Newsome, Supervisory Wildlife Biologist, Mid-Columbia River National Refuge*

**Project Summary** (2-3 sentences): This presentation summarizes the information from multiple post-wildfire rehabilitation projects where planting seedling sagebrush was used as a restoration technique. The authors evaluate the performance (survival, health) and economic costs of container and bare-root stock based on operational plantings of more than 1.5 million seedlings across 2,200 ha. Plantings occurred between 2001 and 2007, and included 12 combinations of stock type, planting amendment, and planting year. Monitoring of 10,500 individual plants was conducted for up to 8 yr after planting. Our results indicate that outplanting is an ecologically and economically effective way of establishing Wyoming big sagebrush.

**Abstract** (250 word minimum): Finding ecologically and economically effective ways to establish matrix species is often critical for restoration success. Wyoming big sagebrush (*Artemisia tridentata* subsp. *wyomingensis*) historically dominated large areas of western North America, but has been extirpated from many areas by large wildfires; its re-establishment in these areas often requires active management. We evaluated the performance (survival, health) and economic costs of container and bare-root stock based on operational plantings of more than 1.5 million seedlings across 2 200 ha, and compared our plantings with 30 other plantings in which sagebrush survival was tracked for up to 5 yr. Plantings occurred between 2001 and 2007, and included 12 combinations of stock type, planting amendment, and

### Management Implications

- Outplanted seedlings can be a valuable tool in the establishment of Wyoming big sagebrush
- Development of high-quality shrub-steppe habitat with in-tact native understory vegetation and microbotic crusts favors planting over seeding
- Monitoring seedling survival and health in the first year after planting can provide insight into future stand conditions
- Planting can have a comparable cost when compared to seeding

planting year. We monitored 10 500 plants for up to 8 yr after planting. Survival to Year 3 averaged 21% and was higher for container stock (30%) than bare-root stock (17%). Survival did not differ among container stock plantings, whereas survival of bare-root stock was sometimes enhanced by a hydrogel dip before planting, but not by mycorrhizal amendments. Most mortality occurred during the first year after planting; this period is the greatest barrier to establishment of sagebrush stock. The proportion of healthy stock in Year 1 was positively related to subsequent survival to Year 3. Costs were minimized, and survival maximized, by planting container stock or bare-root stock with a hydrogel dip. Our results indicate that outplanting is an ecologically and economically effective way of establishing Wyoming big sagebrush. However, statistical analyses were limited by the fact that data about initial variables (stock quality, site conditions, weather) were often unrecorded and by the lack of a replicated experimental design. Sharing consistent data and using an experimental approach would help land managers and restoration practitioners maximize the success of outplanting efforts.

#### **Most Relevant References:**

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