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Publication Brief for Resource Managers

Release:	Contacts:	Phone:	Email and web page:
March 2007	Dr. Todd C. Esque	702-564-4506	todd_esque@usgs.gov http://www.werc.usgs.gov/lasvegas/esque.asp

Las Vegas Field Station, USGS Western Ecological Research Center, 160 N. Stephanie, Henderson, NV 89074

Joshua Tree Seed Dispersal by Seed-Caching Rodents

The Joshua tree is a distinctive and charismatic plant of the Mojave Desert. Although the floral biology and seed production of Joshua tree are well understood, the fate of Joshua tree seeds has not previously been studied. Two traits of some yuccas, including Joshua trees — indehiscent pods and large seeds — led researchers at the USGS and the University of Nevada, Reno, to test the hypothesis that Joshua trees are dispersed by seed-caching rodents that remove the seeds directly from pods. Their results were published in *Ecoscience.*

The researchers individually numbered and radioactively labeled Joshua tree seeds and followed their fates at five source plants in Potosi Wash in the Spring Mountains, about 50 km southwest of Las Vegas, Clark County, Nevada. Seeds were labeled with scandium (a gamma-emitting radionuclide with a half-life of 83.8 days), which does not pass through the food chain, decays to non-toxic, non-radioactive titanium, and appears harmless to rodents and seeds.

Rodents made a mean of 30.6 caches, usually within 30 m of the base of source plants. Caches contained a mean of 5.2 seeds buried 3-30 mm deep. A variety of rodent species appears to have prepared the caches. When the researchers resurveyed the areas later in the fall, they found that rodents had made 50 new (secondary) caches from seeds they had taken from the original (primary) caches. Combining both primary and secondary caches, rodents placed nearly equal numbers of caches under shrubs, near the edge of shrubs, and in the open. Caches were usually near or under blackbrush, ephedra, lycium, or creosote bush, the most abundant shrubs at the study site.

Only 3 of the Joshua tree seeds (0.4%) remained in caches until they germinated in the spring and established seedlings. Because many seeds were moved from their original cache site and probably recached, the estimate of establishment from natural caches is likely to be an underestimate of true seedling establishment. Some of the recached seeds were probably carried farther from the source plant, suggesting that maximum seed dispersal distances were probably greater than the mean maximum distance of 30 m recorded for primary caches.

Joshua tree produces seeds in indehiscent pods or capsules, which rodents dismantle to harvest seeds. Because there is no other known means of seed dispersal, it is possible that the Joshua tree-rodent seed dispersal interaction is an obligate mutualism for the plant.

Management Implications:

- Available information suggests that seeds that are not harvested by seed-caching rodents probably have no chance of establishing a seedling.
- The recaching of seeds has important consequences for seed dispersal; as seeds are dispersed from original caches they may be moved farther from the original source plant, split into additional caches, and moved to a greater variety of habitats.
- Although more research is needed, the indehiscent nature of Joshua tree fruits and the lack of an alternative means of seed dispersal suggest that seed-caching rodents may be required for Joshua tree seed dispersal.

Vander Wall, S. B., T. Esque, D. Haines, M. Garnett, B. A. Waitman. 2006. Joshua tree (Yucca brevifolia) *seeds are dispersed by seed-caching rodents. Ecoscience 13:539–543.*