Western Ecological Research Center

Publication Brief for Resource Managers

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Soil Reclamation in the Mojave Desert

Human-caused disturbance in the Mojave Desert has a long-lasting impact on soil and vegetation communities. In addition to the direct loss of vegetation, disrupted soil processes exacerbate the difficulty of plant establishment in an arid climate. Soil reclamation is a common technique used by resource managers to counteract negative effects of construction and mining activities. By collecting top soil before construction begins, storing that soil, and reapplying it once the project is complete, a manager's goal is to preserve an area's seed bank in its original soil, thereby improving chances of revegetation. While soil reclamation has been successful in other regions of the country and internationally, results have varied widely in the Mojave Desert.

In *Arid Land Research and Management*, USGS researchers recently published a study on the effectiveness of soil reclamation during five separate phases of construction on Lakeshore Scenic Drive in Lake Mead National Recreation Area. In the spring before each phase began, workers used bulldozers to single-strip the top 5-31 centimeters of soil. Collection depth depended on the bulldozer's ability to move through large rocks or cemented soil. Salvaged soil was then placed next to the road in piles that reached 2-3 meters in height and reapplied 4-6 months later with a backhoe.

Soils collected from the topsoil pile and the reapplied areas were grown out in a greenhouse, and the seedlings that germinated (inset) were counted and identified before they were removed. Photos by S. Scoles-Sciulla (greenhouse) and L. DeFalco (inset), USGS.

Management Implications:

- Mojave Desert seed reserves are concentrated in the top 2 centimeters of soil. Collection of soil to greater depths mixes seed reserves with seedless soil, leading to lower seed density and survival.
- Other methods, such as double-stripping, are more precise ways of collecting soil and may be better options for resource managers in arid climates.

Up to 7 years after construction ended, researchers recorded perennial cover, density, and species on recovering land. During the last construction phase they also sampled seed reserves from soils at each step of the reclamation process: collection, storage, and reapplication. The soils were tested for physical parameters, specifically temperature and moisture, while the seeds were tested in the greenhouse for viability.

Perennial cover in reapplication areas remained under 1% compared with 5% in surrounding undisturbed areas, regardless of how many years had passed since construction. Perennial density was also significantly lower. Seed viability tests showed that 86% of seed reserves were lost during the stage of soil collection alone. Seed reserves declined by an additional 7% during storage, possibly due to higher moisture content, and another 4% during reapplication.

Scoles-Sciulla, S. J. and L. A. DeFalco. 2009. Seed Reserves Diluted During Surface Soil Reclamation in Eastern Mojave Desert. Arid Land Research and Management 23:1-13. DOI: 10.1080/15324980802598698