

Work Task C42: Experiments and Demonstration of Soil Amendments for Use in Restoration Sites

FY12 Estimate	FY12 Actual Obligations	Cumulative Expenditures Through FY12	FY13 Approved Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate	FY16 Proposed Estimate
\$200,000	\$118,748.43	\$253,475.76	\$200,000	\$200,000	\$200,000	\$0

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Start Date: FY10

Expected Duration: FY15

Long-term Goal: To determine and demonstrate the feasibility of soil amendments to improve restored habitat and management options for irrigation of habitat restoration sites.

Conservation Measures: MRM1 (WIFL, YBCU, ELOW, SUTA, GIWO, GIFL, VEFL, YWAR, BEVI)

Location: Reclamation's Denver TSC laboratory for controlled experiments and possible sites for large demonstrations including the Beal Restoration Site on Havasu NWR.

Purpose: The purpose of this study is to explore the use of soil amendments, alternative site preparation, and irrigation methods to 1) maintain moist soils and/or standing water within habitats created for the southwestern willow flycatcher and 2) improve germination of willow seed. Habitat conditions for other covered species will also be improved by maintenance of moist soil conditions. Improving low quality soils will also improve water conservation and lower irrigation costs. This work will parallel species habitat and hydrology studies. This information will be used by project managers during site preparation and by land managers to create and maintain habitat with enough standing water and/or moist soils to replicate the structural characteristics of vegetation and microclimate found at occupied flycatcher habitat.

Connections with Other Work Tasks (past and future): Initial literature search and laboratory studies were conducted under G3. A seed feasibility study was conducted under E24 and outcomes from that research will be used in conjunction with the soil amendment to determine if the amendment will bolster willow production from seed..

Project Description: After a review of soil amendments and their associated costs, availability, and water retention capabilities, a product called Lassenite Pozzolan was identified as the most feasible and appropriate product for improving water retention and irrigation practices of sandy soils. Although the material has been tested for use on golf courses in desert environments, there are several differences in the use proposed by

Reclamation that require further examination. Depending on results from these controlled experiments, application demonstrations will be conducted on site at the Beal Restoration Site, where sandy soil conditions exist. Other demonstration areas may be identified in the future.

One application is planting willow seeds with the Lassenite to determine whether better results from direct seeding can be accomplished. Seeding will be combined with different concentrations of Lassenite to determine the most efficient and cost-effective means of optimizing seed germination and production in sandy locations.

Previous Activities: In 2007, under Work Task G3, a preliminary literature and product search was conducted to gather information on soil amendments for use in habitat restoration projects. In 2008-2009, additional information was gathered on Lassenite Pozzolan and a complete study proposal was written. In FY10, laboratory work was completed to test the feasibility of this product for restoration purposes including movement of product through soil profile, application rates and soil moisture retention, and facilitation of water movement.

FY12 Activities: A field study was formulated to further test the soil amendment under field conditions at Beal Lake Riparian Restoration at Havasu NWR. The purpose of the field study is to determine if the addition of Lassenite Pozzolan to sandy soils has a positive effect on germination, survival, and growth of dense willow habitat from seed. The Field study describes how smaller plots will be treated with higher percentages of Lassenite to determine if the product increases soil moisture retention between irrigations. Both dense willows and moist soils are required by nesting southwestern willow flycatchers.

Two fields in the Beal Riparian Area that have not produced the desired habitat quality in previous efforts will be used for the study. Seed was collected and stored following procedures outlined in previous reports (E8). Cottonwood poles were planted to the water table around the perimeter of each field to decrease the establishment of windborne seed.

FY13 Activities: The fields will undergo soil testing for salinity, weed seed-bed reduction, and irrigation to remove salts, if needed. Final site preparation will include clearing of existing vegetation, tilling, leveling and furrowing the fields. An irrigation ditch will be placed along one side of each field and additional rock will be placed around the irrigation valve to direct water for furrow irrigation. Instrumentation will be installed for continuous soil moisture and irrigation monitoring. Seeds collected in 2012 will be planted in April.

Proposed FY14 Activities: The site will be monitored for vegetation growth and survival, soil moisture, and soil salinity throughout FY14. The data will be analyzed and an annual report will be written.

Pertinent Reports: The report, *Laboratory Testing of Lassenite Pozzolan for Use as a Soil Amendment at Habitat Restoration Sites*, is posted on the LCR MSCP website.