

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

FY13 Estimate	FY13 Actual Obligations	Cumulative Expenditures Through FY13	FY14 Approved Estimate	FY15 Proposed Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate
\$200,000	\$180,759.55	\$398,759.13	\$200,000	\$0	\$0	\$0

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**Start Date:** FY10

**Expected Duration:** FY14

**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:** 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:** The soil amendment Lassenite Pozzolan was identified as a possible product for improving water retention and irrigation practices of sandy soils after a review of soil amendments and their associated costs, availability, and water retention capabilities. 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. Application demonstrations are being conducted on site at the Beal Restoration Site, where sandy soil conditions exist.

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.

**Previous Activities:** In 2007, under Work Task G3, a literature and product search was conducted to gather information on soil amendments for use in habitat restoration projects. This information was provided in a report finalized in 2007. In 2008-2009, additional information was gathered on Lassenite Pozzolan and a 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. Laboratory testing showed the product was useful in increasing water movement and moisture retention.

A contract was awarded in February 2012 to begin a study to further test the soil amendment under field conditions at Beal Lake Riparian Restoration at Havasu NWR. In FY12, an experimental design and study plan was finalized. The contractor collected sufficient Goodding's willow seed for hydroseeding of eight acres, grew and planted 179 Fremont cottonwood deep pots to establish a windbreak around the study site in preparation for hydroseeding, and began preparations for field clearing, construction, and maintenance.

**FY13 Accomplishments:** The fields were irrigated several times to remove salts, followed by clearing of existing vegetation, tilling, leveling and furrowing. An irrigation ditch was placed along one side of each field and additional rock was placed around the irrigation valve to direct water for furrow irrigation. Instrumentation was installed for continuous soil moisture and irrigation monitoring. The fields were hydroseeded in April 2013. Monitoring of vegetation and soil moisture was conducted throughout the year.

Vegetation monitoring results showed that willow seed germination was not significantly improved by high percentages of Lassenite added to the soils. However, the data does show that soil surface moisture between irrigation events is retained longer between irrigations in plots with at least 25% of Lassenite.

**FY14 Activities:** A final report will be prepared describing the activities since the beginning of the project. The project will be completed in FY14.

**Proposed FY15 Activities:** Close in FY14.

**Pertinent Reports:** *The 2013 Annual Report* will be posted on the LCR MSCP website.