

Work Task E8: Seed Feasibility Study

FY06 Estimates	FY06 Actual	Cumulative Accomplishment Through FY06	FY07 Approved Estimate	FY08 Proposed Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate
\$150,000	\$488,610	\$492,610	\$160,000	\$65,000	\$210,000	\$0

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Start Date: FY05

Expected Duration: FY09

Long-term Goal: Restoration Research

Conservation Measures: WIFL1, WRBA2, WYBA3, CRCR2, YHCR2, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, and SUTA1

Location: Reach 4, Cibola NWR, one-half mile east of River Mile 97, AZ

Purpose: This research project documents the feasibility of establishing native riparian habitat (cottonwood, willow, and other native groundcovers and shrubs) from seed to potentially increase the cost effectiveness and quality of future habitat creation projects.

Connections with Other Work Tasks (past and future): Beginning in FY09, operation and maintenance costs for this work task will be included in Cibola NWR Unit 1 (E24).

Project Description: Through a series of laboratory and field experiments, this study will document the necessary steps involved in using seed to create dense mosaics of native riparian land covers. Steps in the process include seed collection, storage, treatment, planting, germination, and seedling growth and survival. Using seeds in lieu of, or in conjunction with, cuttings may be feasible if it involves less labor, is more cost effective, or preserves the genetic diversity of the riparian habitat created under the LCR MSCP. The amount of nonnative to native vegetation resulting from using seed for restoration will also be an important factor in determining the feasibility of this method. The preferred outcome of this study will be a series of protocols developed from careful documentation, which can be used to create native riparian habitat. Reclamation has entered into a 5-year land use agreement with the USFWS to conduct restoration research in Unit 1 at Cibola NWR.

Previous Activities: N/A

FY06 Accomplishments: Fremont cottonwood, coyote willow, and Goodding's willow seeds were collected from Cibola NWR, and a series of greenhouse and laboratory experiments determined germination rates, growth, and survival, as affected by seed collection, storage, seed treatment, planting method, planting density, soil type, irrigation, and soil treatments. Seeds of

these species that were dried, cleaned of all fibrous material, and kept at 70°F continued to germinate at high rates 8-10 weeks after collection. Seeds that were dried, cleaned of all fibrous material, and stored in a freezer have maintained a germination rate of at least 80% up to 28 weeks after collection. Previously reported data on longevity of cottonwood and willow seeds indicated that seeds remain viable for only 1-5 weeks after collection. This new information will greatly improve the logistics of using seed in restoration projects.

Tests conducted in the greenhouse indicated high-density seeding of cottonwood and willow had successful growth and survivorship in the presence of natives and nonnatives in the soil transported from Cibola NWR. Shrub seeds had a lower success rate in competition with non-targets present in the seed bank.

Expenditures in FY06 were significantly higher than anticipated as all 3 years of the contract were awarded rather than an annual obligation, which results in lower obligations in FY07 and possibly FY08.

FY07 Activities: As planned, small test plots will be planted on-site at Cibola NWR to measure and document numerous variables that may affect successful germination, growth, and survival of seeded riparian species under more natural, existing conditions. However, this phase of the study will be conducted with modifications based on results of greenhouse testing. Germination tests will continue as long as seeds remain viable. Testing of additional shrub species will be conducted in the greenhouse to determine salinity tolerance and germination/survival requirements. These shrubs are being examined for use in restoration activities because not all soils on the LCR can support cottonwood, willow, and mesquite. Unless a native plant is established, saltcedar and other invasive plants will take its place. Additional seed collection, processing of seed, testing of seed dispersal techniques, and testing of irrigation techniques will be included in this phase of the research. The small-scale test plot study results will help determine the optimum seed treatment, seed application, seeding rate, seed placement (relative to other seeds in the plot) and initial irrigation treatment. Results of this phase will subsequently provide Reclamation with initial engineering cost estimates for riparian habitat restoration using seed. Expenditures in FY07 are anticipated to be less than \$60,000 as the award for year 1 of the study was obligated in FY06.

Proposed FY08 Activities: Results from 2006 and 2007 will determine the exact planting plan for large test plots at CNWR in 2008. Expenditures in FY08 are anticipated to be less than \$65,000 as the award for year 2 of the study was obligated in FY06.

Pertinent Reports: *Year 1 Research Plan, Feasibility Study using Native Seeds in Restoration, July 17, 2006; Technical Proposal, Feasibility Study using Native Seeds in Restoration, and the 2006 annual report, Feasibility Study using Native Seeds in Restoration, will be posted to the LCR MSCP Web site.*