

Work Task E2: Beal Lake Native Fish

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
\$70,000	\$86,242.83	\$689,426.52	\$50,000	\$120,000	\$80,000	\$80,000

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Start Date: FY05

Expected Duration: FY55

Long-term Goal: Habitat creation

Conservation Measures: BONY2 and RASU2

Location: Reach 3, Arizona, Havasu NWR, one-half mile east of River Mile 237

Purpose: Reclamation maintains the backwater created for native fishes under the 1997 Biological Opinion (BO). Reclamation is simultaneously making improvements to the backwater and conducting restoration research at the site. Information from this research will be used to adaptively manage the backwater and increase efficiency and effectiveness in future backwater habitat creation projects.

Connections with Other Work Tasks (past and future): Monitoring of native fish is being addressed under F5. Portions of restoration research at Beal Lake are funded under G3.

Project Description: Beal Lake was approximately 225 acres of shallow, low-quality aquatic habitat that was dredged beginning in 2001 to create a functioning backwater dedicated to native fish. The Beal Lake restoration project is a continuation of the commitment to construct habitat for protected native fish under the 1997 BO. Continued maintenance and management of Beal Lake as well as research and development of the backwater as native fish habitat have been included in LCR MSCP activities.

Previous Activities: The costs of initial backwater creation, including dredging and isolating the backwater with a semi-permeable rock structure, were incurred prior to FY05 and implementation of the LCR MSCP. The restoration research and management of Beal Lake included the installation of a cylindrical wedge-wire screen system. Beal Lake was initially isolated from Topock Marsh with a passive rock filtration system. However, after several months of the system not allowing enough water to pass through the structure to compensate for the evaporative losses in Beal Lake, Reclamation decided to test a new technology that would supplement water flow into the lake and effectively

exclude life stages of nonnative fishes. A cylindrical wedge-wire screen system was selected because of its potentially easy maintenance and long-term performance.

Because cylindrical wedge-wire screen technology had never been used for this application, information was needed to estimate the hydraulic capacity of the system and its true exclusion capabilities. A two-phase investigation, including in situ hydraulic testing and a laboratory exclusion evaluation, was contracted to provide these data. Results from these studies have provided a clearer picture of how appropriate this technology is for this and future application.

A number of existing water control structures at Beal Lake were replaced during the screen system installation. The existing features were not adequately sized to supply the necessary water volume to the irrigation pump or to Beal Lake.

Additional improvements were made to allow for more effective management of water in Beal Lake: a water management system enabling large-scale water removal, water level control for fisheries management, and large-scale water circulation capabilities were installed. The system consists of a permanent platform, ramp, and discharge pipe that allows for the intermittent deployment of various pumps, depending on the specific management need. The water management system was successfully used to assist the irrigation pump in lowering the water level in Beal Lake for lake renovation (this process included pre-treatment fish salvage, chemical treatment of the water to kill remaining nonnative fish, post-detoxification sampling, and restocking with native fish). In addition, the system can be used to circulate water from the south end of Beal Lake and induce freshening flows into the lake from Topock Marsh to maintain adequate levels of water quality for native fish.

FY09 Accomplishments: On-site activities included monthly cleaning of the wedge-wire screens, opening and closing of water control structures, calibration of water elevation sensors, and visual inspection of the backwater. These tasks were coordinated with on-site activities associated with Beal Lake Riparian Restoration (E1) to avoid redundancy.

As projected and based on monitoring information, maintenance activities, and observations, an intensive inspection, cleaning, and evaluation of the screen system at Beal Lake was planned for FY09; however, scheduling with the maintenance crew pushed the event back to the first week of November 2009 when lake elevations were at a lower level.

Other expenditures in FY09 included continuation of the restoration research component at Beal Lake. Funding for restoration research in FY09 was supported by Adaptive Management Research Projects (G3). An in situ evaluation of this technology's effectiveness was conducted to determine exclusion potential and entrainment rates in a real-world application. These entrainment tests occurred in spring and summer of FY09 at the Imperial Ponds on Imperial NWR.

FY10 Activities: The intensive inspection, cleaning, and evaluation of the screen system at Beal Lake took place in November 2009, and entailed removing the screens, spraying out and inspecting the pipes, working the valves, and cleaning the screens in the maintenance yard where they could be hung, sprayed out, treated with muriatic acid, and rinsed. After cleaning and reinstalling the screens, the fourth pipe, which had been capped with blank flanges, was opened and a new set of screens were installed. Flow through the rock structure is now supplemented by flow through four pairs of screens instead of the previous three. Cleaning in conjunction with the installation of the fourth pair of screens was successful in providing the flow capacity necessary to transfer enough water through the system to allow for an equilibration of hydraulic head on either side of the rock structure during low evaporation months. However, higher evaporation rates occur in the summer months and they have not occurred yet.

Access ports were installed on the three pipes that previously had no opening from which to sample the inside of the pipe. Debris buildup against a downstream structure had caused flow to slow through the inlet canal to Beal Lake; to remedy this, the 24-inch pipes and a culvert box were removed and the canal was cleaned out.

Both screens and the system as a whole were evaluated for continued functionality. A report documenting the monthly cleaning and evaluation of the system is due to Reclamation by the end of the calendar year.

Long-term monitoring of the screen system's hydraulic performance will continue using the installed water level sensor system. This work task also covers the routine maintenance of the screen system and water level sensors, including manual cleaning of the screen system and periodic calibration and maintenance of the sensor system.

Water quality and fisheries monitoring activities will be coordinated with USFWS and are covered under F5. Coordination with resource agencies will continue to determine future operations and maintenance of existing features at Beal Lake.

Proposed FY11 Activities: Cleaning the screens monthly and monitoring the water levels on either side of the rock structure will continue. The budget has been increased to provide for replacement of the water control structure in Beal ditch that was removed in FY10 to allow for future rehabilitation of the rock/screen structure. If directed by adaptive management recommendations, a complete rehabilitation of the rock structure/screen system may be necessary or a new system may be constructed based on an improved design if the current system is deemed inadequate. These major construction activities would not be anticipated until at least FY12, and would require comprehensive designs and appropriate permitting before an estimate could be developed.

Pertinent Reports: *Evaluation of a Cylindrical Wedge-Wire Screen System at Beal Lake, Arizona, 2005*, and *Evaluation of a Cylindrical Wedge-Wire Screen System at Beal Lake, Arizona, 2006 Phase II Testing* are posted on the LCR MSCP Web site.