Work Task E1:	**Beal Lake, Havasu National Wildlife Refuge**
Partners:	U.S. Fish and Wildlife Service (FWS) Bureau of Reclamation (Reclamation)
Points of Contact:	*Riparian.* Barbara Raulston, LC-2453 (702) 293-8788 *Native Fish.* Gregg Garnett, LC-2455 (702) 293-8644
Purpose:	*Riparian.* Establish and demonstrate restoration techniques (using areas covered by material from dredging of Beal Lake) with native riparian vegetation to create habitat for willow flycatchers, yellow-billed cuckoos, black rails and other LCR MSCP species of concern. Restoration techniques being evaluated include; hydroseeding, broadcast seeding, poles, and potted plants. *Native Fish.* Restoration research is being conducted, and habitat and management improvements are being made to the existing native fish refugium.
Conservation Measure:	Develop techniques in support of all covered species habitat creation requirements.
Long-term Goal:	*Riparian***.** Each field has been laser-leveled and can be flooded independently. This allows a wide range of restoration research tasks to be conducted and monitored. The information obtained from the seeding, planting, and flooding. Experiments at this site will be directly applicable to other restoration projects. The total estimated habitat expected to be established at the site is approximately 100 acres of cottonwood and willow, 100 acres of mesquite, and 5 acres of marsh. *Native Fish.* Fish screening research to investigate innovative passive fish barrier technology to protect native fish in a restored backwater refugia.
Location:	Adjacent to Beal Lake and Topock Marsh on Havasu National Wildlife Refuge (HNWR).
FY05 Estimate:	$543,000. Funding for in-house staff costs and contract services. The estimated *riparian* costs total $293,000. The estimated *native fish* costs total $250,000.
Project Description:	Beal Lake is located on Havasu National Wildlife Refuge in Needles, California, within the historic floodplain of the lower Colorado River. When completed, the project will include over 150 acres of cottonwood, willow and mesquite riparian habitat.

Beal Lake was approximately 225 acres of shallow, low quality aquatic habitat that was dredged to deepen it beginning in 2001. Dredge material was distributed over adjacent areas, to be planted at a later date with native vegetation.

Riparian. Establish and restore native riparian species on lands adjacent to the lake. Due to the size of the project the riparian component has been separated into 3 phases. Clearing, root plowing, leveling, and installation of an irrigation system for phase I and phase II has been completed.

Phase 1 (56 acres) of the project resulted in cottonwood and willow along with some naturally established arrowweed and saltcedar.

Phase 2 (50 acres) is partially planted with cottonwood, willow and mesquite; the remaining acres will be planted in 2005.

Phase 3 is approximately 80 acres and designs have been completed for the site to be leveled and fitted with irrigation infrastructure in the future. If completed, the site would be planted mostly with mesquite. Areas within all phases that contain saline soils will be planted with either mesquite or salt-tolerant shrubs and/or wetland plants such as bulrush, depending on salinity levels.

The irrigable fields are being used to evaluate various riparian establishment techniques such as; hydroseeding, hand seeding, poles, and potted plants. Reclamation is monitoring the fields and tracking the watering requirements which should provide guidance on future riparian establishment and management procedures.

Native Fish. Evaluate the use of passive fish screens combined with backwater management to cost effectively manage the backwater for native fish. Improvements to the existing backwater included minor dredging and the installation of wedge wire screen to augment flow through the existing semi-permeable rock filter. The cylindrical wedge-wire screen system was installed in Spring 2005. The system consists of two 18-inch diameter PVC pipes installed through the existing rock structure with cylindrical wedge-wire screens installed on each end of the pipes using standard flange connections. This essentially means that each pipe and screen combination will represent an independent system. An in-line valve was installed in each pipe to allow the pipe to be closed when necessary (ie. repair or replacement of screens, etc.).

The screens were custom fabricated and purchased from Johnson Screens using the simplified acquisition process (after a competitive bid). The screens are approximately three feet in diameter and approximately three feet long. They are constructed of Z-Alloy, an anti-biofouling nickel-copper alloy developed by Johnson Screens and are equipped with an internal diffuser and 3-inch air backwash system. The screen slot size is 0.6 mm (0.024 inches) and each screen has a capacity of 1,500 gpm. The procurement cost of each screen was approximately $10,000 and was not purchased by the LCR MSCP. Reclamation will evaluate the system after installation to determine the effectiveness and efficiency of the system with respect to screening capabilities, hydraulic performance, and maintenance requirements.