Work Task E13: McAllister Lake

FY16 Estimate	FY16 Actual Obligations	Cumulative Expenditures Through FY16	FY17 Approved Estimate	FY18 Proposed Estimate	FY19 Proposed Estimate	FY20 Proposed Estimate
$0	$0	$127,336.82	$50,000	$400,000	$400,000	$50,000

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Start Date: FY05 (closed in FY07; reopen in FY17)

Expected Duration: FY55

Long-Term Goal: Habitat creation

Conservation Measures: BONY2 and RASU2

Location: Reach 5, Imperial National Wildlife Refuge (Imperial NWR)

Purpose: To evaluate a method of water quality improvement and maintenance by dewatering McAllister Lake and inducing groundwater recharge to manage salinity

Connections with Other Work Tasks (Past and Future): Monitoring of native fishes is being addressed under Work Task F5.

Project Description: McAllister Lake is a shallow, approximately 40-acre, isolated flood plain lake located on the Imperial NWR. Management of the lake is a continuation of the commitment to construct habitat for native fishes under the 1997 Biological and Conference Opinion (BO). Continued maintenance and management obligations of McAllister Lake, as well as research and development of the backwater as native fish habitat, were subsumed by the LCR MSCP in 2005.

McAllister Lake was identified under Reasonable and Prudent Alternative Number 3 in the 1997 BO as a backwater to be developed and managed for native fishes. The intent is to make improvements to the backwater, including the design and construction of a pumping system to exchange water within the lake to manage salinity and other water quality parameters at levels suitable for supporting native fishes.

A pumping station will be placed on a constructed berm between McAllister Lake proper and the western lobe of the lake. The creation of this earthen berm would protect the lake proper section of McAllister Lake from potential river flooding

events. By using borrowed material from both McAllister Lake proper and the western lobe, an additional benefit of the construction of this earthen berm would be localized deepening in these pump-out areas. These deeper areas may, in turn, provide thermal refuge for native fishes. They could also potentially increase the subsurface hydraulic connection to the adjacent Colorado River, which could help to enhance water quality and water exchange efficiency. The excavation of these areas may also remove sediments with high biological oxygen demand, as identified by previous research, further improving water quality in both sections of the lake. The water exchange provided by the periodic operation of the pumping system may dampen accumulation rates of selenium within the lake. It is anticipated that operating a pumping system at this remote location will likely require installation of either a solar- or diesel-powered pumping system.

If the proposed development is not implemented and the pumping system is not installed due to incompatibilities with Imperial NWR missions, discussions with the U.S. Fish and Wildlife Service (USFWS), the Imperial NWR, and Refuge Complex Managers, as well as the USFWS Arizona Ecological Services Field Office, will commence. If it is decided that the work task should be closed, all commitments to McAllister Lake under the 1997 BO will have been satisfied. Likewise, if long-term development and management efforts at McAllister Lake prove to be ineffective in providing adequate conditions for supporting native fish populations, or result in regular management actions that are not sustainable or consistent with Imperial NWR missions, discussions may commence with the USFWS, the Imperial NWR, and Refuge Complex Managers as well as the USFWS Arizona Ecological Services Field Office. Again, if the work task is closed, based on the decisions from these discussions, all commitments to McAllister Lake under the 1997 BO will have been satisfied in accordance with the March 16, 2016, memorandum from the USFWS.

Previous Activities: The Bureau of Reclamation initiated a series of experimental pump-tests during FY03 and FY04, which dewatered the lake to about one-fourth of its normal volume. Before, during, and after these tests, a variety of environmental data were collected to measure the lake's response to the pumping and the consistency of the groundwater supply through the river aquifer. These pump tests were conducted from December 2002 through March 2004, during the fall and winter months only, to avoid potential impacts to Yuma clapper rails (*Rallus longirostris yumanensis* [also known as Yuma Ridgway's rail = *R. obsoletus yumanensis*]). The lake was left unmanaged during FY05. Monitoring was continued in order to assess how quickly the lake's water quality would degrade if pumping was stopped; the level of degradation would indicate the required pumping frequency needed to maintain sufficient water quality to support native fishes. After an approximately 18-month period with no pumping, salinity levels (measured as specific conductance) increased from approximately 4,000 to approximately 10,000 microsiemens per centimeter.

The results from these investigations suggested that salinity levels could be reduced through pumping and subsequent induced subsurface recharge but that regular water management (flushing) of the lake would be necessary to maintain desired salinity ranges. Some additional concerns were raised regarding managing McAllister Lake for native fishes, including the detection of heavy metals (arsenic and mercury) and seasonal low levels of dissolved oxygen. In FY07, all development and research activities at the lake were suspended in order to assess newly initiated research pertaining to water quality thresholds for native fishes and to decide the value of additional proposed limnologic research investigations. The suspension of activity allowed time to develop a conceptual approach for the lake that would allow for potential mitigation of the challenges previously identified and to provide sustainable management options to benefit native fishes.

In FY15, sampling for arsenic, mercury, and selenium was conducted under Work Task C59. Samples of water, substrate, and biota were collected and analyzed to provide better resolution in suggesting the potential of bioaccumulation for native fishes stocked into McAllister Lake. The results were interpreted by the USFWS's Environmental Contaminants Office. The levels of selenium were elevated in mosquitofish (*Gambusia affinis*) tissue and will likely require a plan for long-term selenium monitoring. Concentrations of arsenic, mercury, and selenium in water and substrate were well below the Arizona water quality standards threshold for concern. Concentrations of arsenic and mercury in tissue samples were also well below the Arizona water quality standards threshold for concern.

The LCR MSCP and the USFWS Arizona Ecological Services Field Offices agreed that efforts to implement the proposed plan for restoration and management of McAllister Lake should move forward and that Work Task E13 should be reopened. Development will occur in a step-wise fashion in order to adequately consider the potential challenges of this site.

FY16 Accomplishments: This work task was reopened in FY17.

FY17 Activities: The LCR MSCP met with the USFWS (Imperial NWR and Refuge Complex Managers as well as the USFWS Arizona Ecological Services Field Office) for approval of the conceptual design and selection of a pumping station. The above-mentioned parties agreed on the conceptual design, but requested additional information prior to making a decision on a pumping station.

The LCR MSCP evaluated both solar- and diesel-driven pumping systems. The options addressed both a permanently installed continuous pumping system and a seasonal, removable pumping system. The continuous pumping system would remove water at a lower rate over a longer period of time, whereas the seasonal pumping system would pump at a higher rate for a shorter period of time. Both systems would target a water exchange of about 62 acre-feet. During the FY04

study, using a diesel-driven pump, this level of water exchange took about 49 hours. The solar system would be a low-rate pumping system requiring 22 to 47 days to remove the same volume of water. There was concern that the longer pumping schedule may not yield similar results as the FY03 and FY04 high flow studies. The USFWS requested testing a low-rate system prior to making a decision.

A diesel-driven pumping system will be in operation during January and February of FY17. In January of FY17, an initial drawdown of about 62 acre-feet will occur, followed by a 14-day recharge. A second drawdown will occur in January/February of FY17 to remove about 62 acre-feet of water or until reaching a water elevation where the pump is inoperable. Monitoring specific conductivity levels will occur prior to and following the drawdown.

Completion of an engineering design and shop drawings for the separation of the western lobe from the main body of McAllister Lake is expected. Environmental compliance and permitting will be initiated once the design is complete.

Obligations will be higher than anticipated due to testing a low-rate pumping system to inform the final decision on a pumping system.

Proposed FY18 Activities: Evaluation of a lower-rate dewatering method is anticipated. A diesel-driven pump will operate at a pumping volume of about 1,200 gallons per minute between 6 to 8 hours per day for about 40 days to simulate solar capabilities. Results will determine if a low- or high-exchange-rate pumping system or a combination of both is the best option at this site.

Construction activities will begin upon completion of the dewatering study, environmental compliance, and permitting.

Pertinent Reports: Annual reports will be posted on the LCR MSCP Web site upon completion.