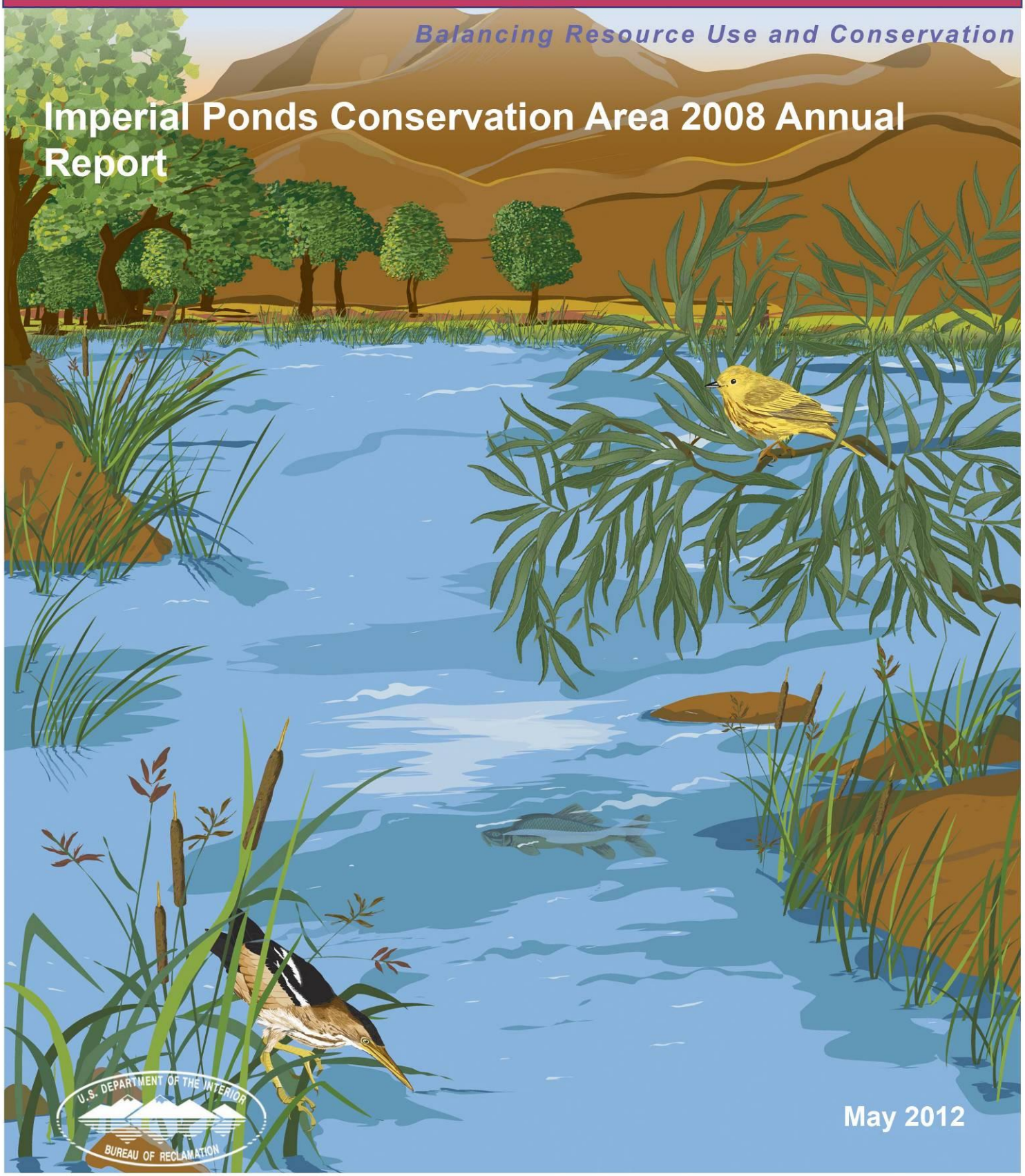
Lower Colorado River Multi-Species Conservation Program

Balancing Resource Use and Conservation

Imperial Ponds Conservation Area 2008 Annual Report



May 2012

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Lower Colorado River Multi-Species Conservation Program

Imperial Ponds Conservation Area 2008 Annual Report

Lower Colorado River
Multi-Species Conservation Program
Bureau of Reclamation
Lower Colorado Region
Boulder City, Nevada
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1.0 Background

The Lower Colorado River Multi-Species Conservation Program (LCR MSCP) is a partnership of Federal and non-Federal stakeholders responding to the need to balance the use of lower Colorado River (LCR) water resources and the conservation of native species and their habitats in compliance with the Endangered Species Act. This is a long-term plan to conserve at least 26 species along the LCR from Lake Mead to the Southerly International Boundary with Mexico through the implementation of a Habitat Conservation Plan (HCP). Most covered species are state and/or federally listed special status species. The Bureau of Reclamation (Reclamation) is the implementing agency of the LCR MSCP over the 50-year term of the program with 50% of the program funding being provided by non-federal partners.

The Imperial Ponds Conservation Area (IPCA) encompasses a total project footprint of 132 acres, consisting of 80 acres of isolated backwaters, 12 acres of managed marsh, and 34 acres of fields which are planned for cottonwood-willow development. The project is within the 360 acre Intensive Management Area (IMA) inside the Imperial National Wildlife Refuge (INWR), consisting of wetlands/marsh, backwaters, cottonwood-willow, and seasonal wetlands. The goal of the IMA is to devote active management for numerous species, including for migratory waterfowl.

The ponds portion of the IPCA was originally known as the DU2 Ponds. Initiation began during the mid-1990s as a partnership effort between the U.S. Fish and Wildlife Service (USFWS), Reclamation, and Ducks Unlimited. In 2005, the ponds, fields, and wetlands/marsh were incorporated into the LCR MSCP and renamed the Imperial Ponds Conservation Area (Reclamation 2005). Site preparations for restoration of the ponds and marsh area were initiated in 2005, excavation of the ponds began in 2006, and construction and restoration of the ponds and marsh area was completed in 2007 and 2008.

2.0 Site Information

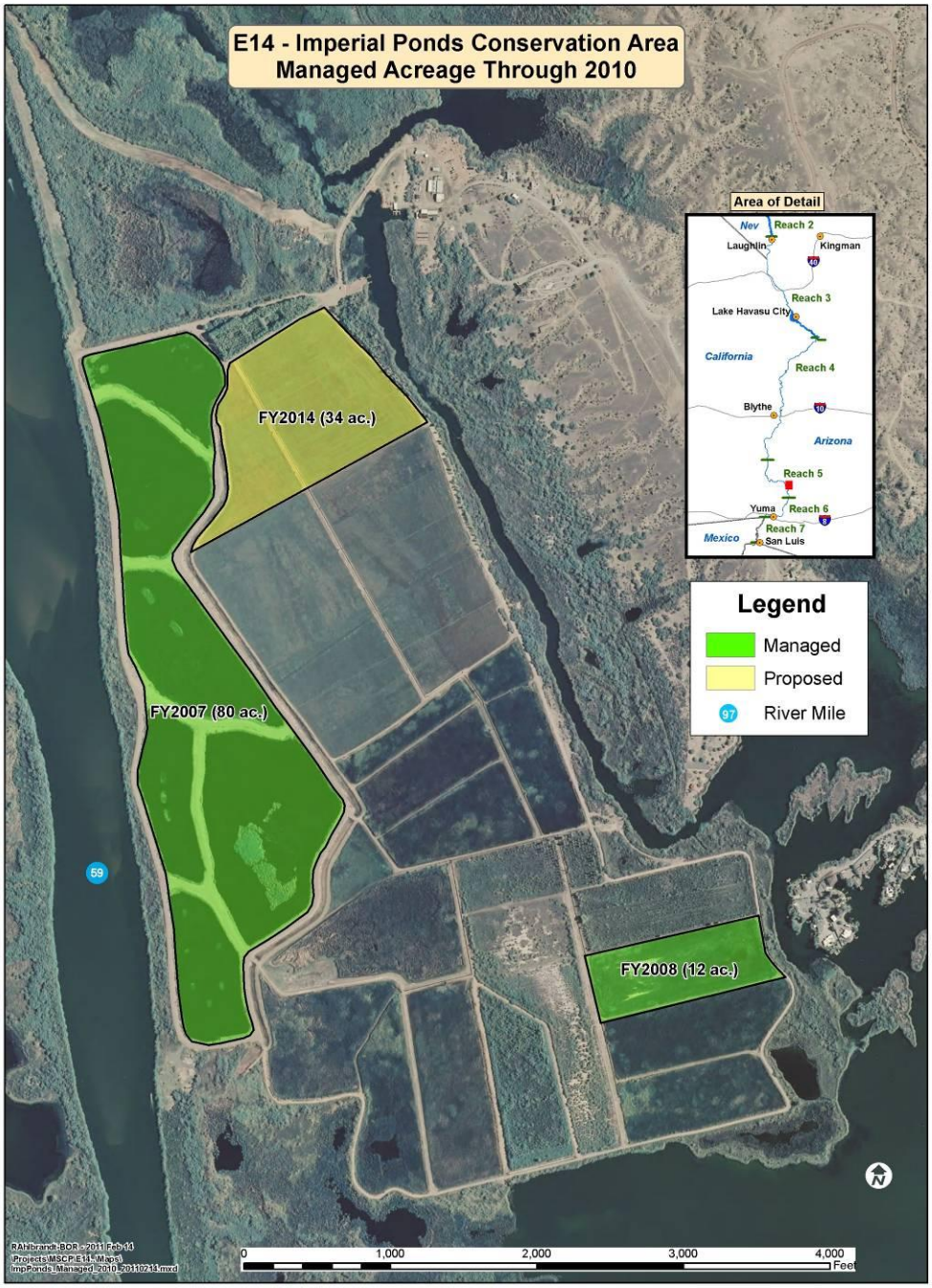
2.1 Purpose

This annual report is designed to provide information pertaining to the construction and maintenance activities for the IPCA. The purpose of this conservation area is to create a mosaic of habitats including backwaters, marsh, and riparian for listed LCR MSCP species within Reach 5 of the Colorado River (Figure 1).

The purpose of IPCA is to create three habitat mosaics for the benefit of LCR MSCP covered species. These habitats goals consist of the six independent ponds (Imperial Ponds) that constitute the 80 acres of backwater to be dedicated and managed for the

razorback sucker (*Xyrauchen texanus*) (RASU) and the bonytail (*Gila cypha*) (BONY), 34 acres cottonwood-willow ripaian habitat for the benefit of yellow-billed cuckoo (*Coccyzus americanus occidentalis*) (YBCU) and the southwestern willow flycatcher (*Empidonax trailii extimus*) (SWFL), and marsh habitat (Field 18) to be regraded and planted for the benefit of marsh species using information gathered from Field 16, which is currently managed for California black rail (*Laterallus jamaicensis*) (BLRA).

Figure 1: Habitat Goals

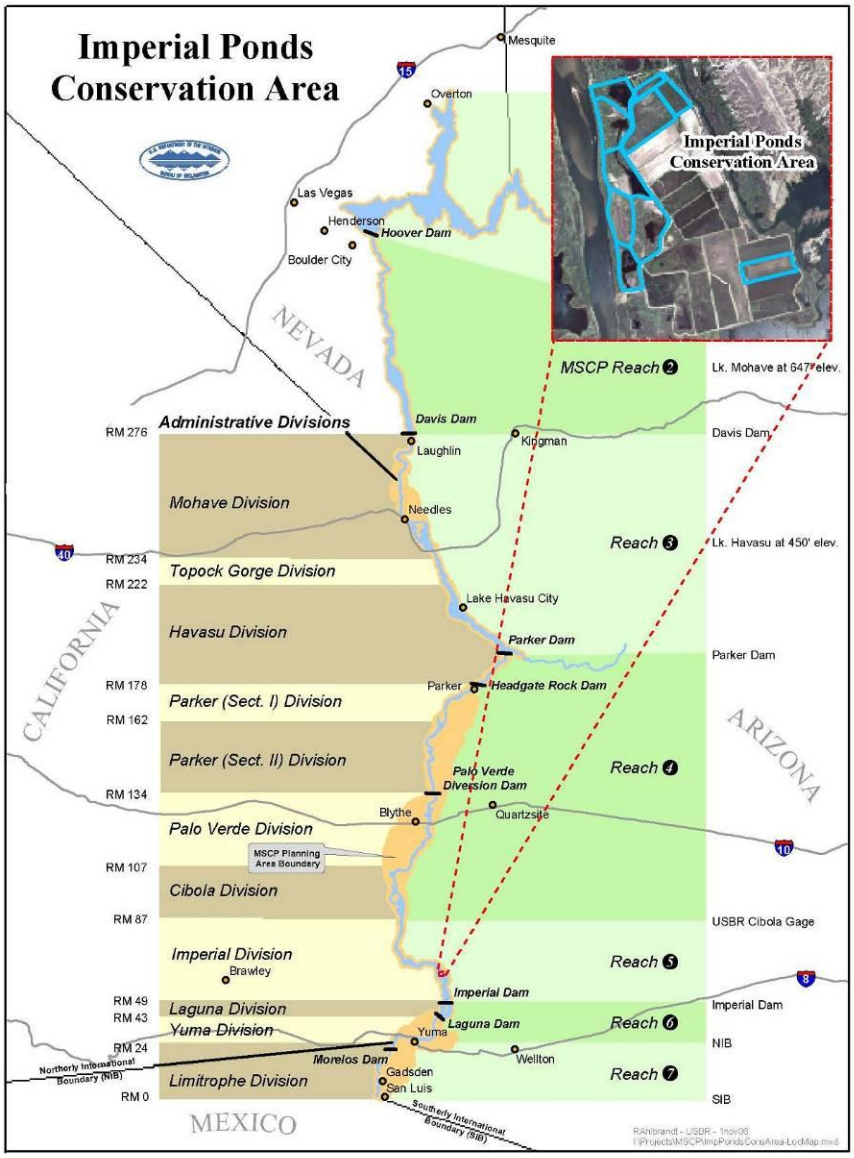


This report includes Appendices A and B, which provide more detail on the conceptual and preliminary designs, pre-existing site conditions, site designs, grading plans, and as-built surveys and photographs of constructed areas from 2005 to 2008.

2.2 Location/Description

The IPCA is located on INWR to the east of the Colorado River, near River Mile 59, just north of Martinez Lake (Figure 2). The project area is managed for riparian obligate bird species, waterfowl, marsh birds, native fish, and other wildlife.

Figure 2: Imperial Ponds Conservation Area Location



2.3 Land Ownership

The INWR is owned and managed by the USFWS, encompassing 25,765 acres along the LCR. The INWR was established on February 14, 1941 by Executive Order 8685 as a refuge and breeding ground for migratory birds and other wildlife.

2.4 Water

The INWR has a water entitlement granted by the 1964 Supreme Court Decree in *Arizona v. California* and by Secretarial reservation. The Decree and reservation allow INWR annual water quantities reasonably necessary to fulfill the purposes of INWR, not to exceed 28,000 acre-feet of water diverted from the mainstream, or 23,000 acre-feet of consumptive use of mainstream water, whichever is less, with a priority date of February 14, 1941. The INWR has agreed to make Colorado River water available to the LCR MSCP, for maintaining adequate supply/quality in ponds, irrigation of cottonwood-willow land cover types, and marsh created under the Imperial Ponds Conservation Area Restoration Development Plan (Reclamation 2008).

2.5 Agreements

The Land Use Agreement for IPCA, finalized on May 3, 2007, recognizes Reclamation's and USFWS's commitment to work together and assure the land and water resources will be available for the 50-year term of the LCR MSCP. This agreement defines the roles and responsibilities of both agencies related to operations and maintenance of the land cover.

3.0 Habitat Creation Activities: 2005-2008

The following section discusses habitat creation activities occuring from Fall 2005 through the end of the fiscal year in 2008 (FY08).

As the project habitat creation activities commenced through the site, the intended designs and plans were adjusted based on site conditions and other requirements. Brief descriptions are incorportated in the sections below and designs are described in Appendix A.

3.1 Backwater Habitat Creation Activities and Status

Six isolated, independently managed ponds, and associated water management infrastructure were constructed in 2005, based on conceptual designs by Reclamation.

3.1.1 Site Preparations

Starting in December of 2005, the four pre-existing DU2 ponds were dewatered to assist with salvage efforts of stocked RASU in Pond 1. Numerous trailer-mounted trash pumps were used to drain Pond 1, as fishery biologists conducted a series of capture efforts which yielded 1,130 RASU. The recovered fish were tagged with a Passive Integrated Transresponder (Pit-Tag), and then released into Martinez Lake.

Following the fish harvests, a trench was excavated to connect all of the ponds, and two large dewatering pumps were installed (Figure 3). These pumps were used as needed to lower groundwater levels to allow land-based heavy equipment to operate within the dewatered ponds.

Figure 3: Dewatering pump

In May of 2006, a fourth salvage effort was made after several fish were observed at the southern end of the site. This yielded an additional 30 RASU, which were Pit-Tagged, and stocked into the Colorado River. A summary of the number of RASU harvested is shown in Table 1.

Table 1: RASU harvested from the DU2 Ponds, prior to excavation of the Imperial Ponds. (Source: USFWS Technical Memoranda 2/01/2006 and 5/03/2006).

Date	Number of razorback suckers harvested	Average size (TL, mm)	Release location
Dec 19-20, 2005	398	344 mm	Martinez Lake
Jan 17-20, 2005	539	345 mm	Martinez Lake
Jan 23-26, 2005	193	345 mm	Martinez Lake
May 2, 2006	30	275-545	Colorado River, adjacent to Imperial Ponds
Total	1160		

A prescribed fire was conducted around the ponds in March of 2006, by USFWS, to reduce the biomass of vegetation which would have to be removed from the site (Figure 4). This burn was successful, and did not spread beyond the targeted areas. Extensive

volumes of vegetation remained onsite post-burn and 1,088 cubic yards of vegetative biomass was incorporated into the excavated soils, which was hauled to the nearby riparian habitat area to be used as fill.

Figure 4: USFWS fire personnel conducting prescribed burn at Imperial Ponds. Photo: USFWS

An existing concrete irrigation canal, which serviced the fields within the fill area, was removed and hauled to a local landfill (Figure 5). In total, 2,570 cubic yards of concrete were removed from the site. To ensure INWR was able to continue with normal operations during construction, a portable irrigation pump system was installed, and operated until the new concrete irrigation canal system was completed, in April 2008.

Figure 5: Pre-existing concrete irrigation canal system.

3.1.2 Construction

3.1.2.1 Hummocks

Thirteen hummocks, planting beds for emergent vegetation, were constructed in all the ponds except Pond 5 (Figure 6). The target elevation for the hummocks was 185 ft above mean sea level (AMSL), which would allow them to be 1 foot underwater. Due to variable soil conditions, however, their actual elevations varied slightly once complete.

Figure 6: Constructed Hummocks in Pond 4.

3.1.2.2 Substrate Materials

A variety of substrates were placed into all the ponds for pond and fish habitat improvements. The 3-inch rock was used as a road base around the ponds, and on boat ramps. Gravel, sometimes mixed with 3-inch rock, was placed on the hummocks for stability and spawning material. Riprap was placed along the western pond shorelines for stability and cover for BONY (Figure 7) based on recommendations from Mueller (2006). Table 2 summarizes the quantities of gravel, 3-inch rock, and riprap that were imported during the construction of the ponds.

Figure 7: Rip-rap placed along Pond 4.

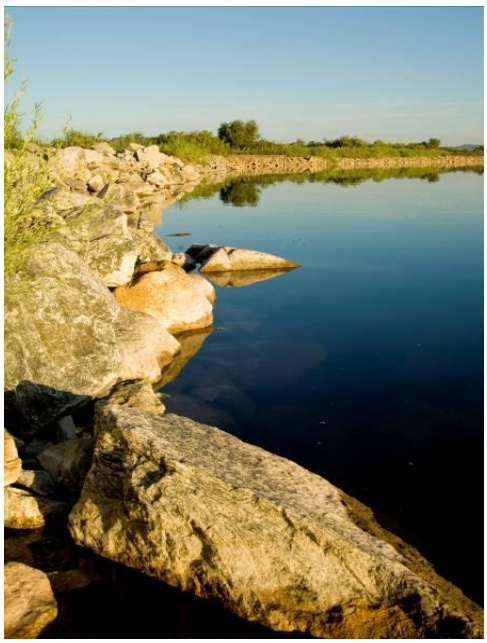


Table 2: Quantities of rock materials imported for roads and pond substrate enhancements.

	Rip Rap (yds^3)	3-inch (yds^3)	Gravel (yds^3)
Pond 1	810	880	470
Pond 2	780	30	70
Pond 3	610	140	1,060
Pond 4	120	0	1,020
Pond 5	840	230	870
Pond 6	80	0	80
TOTALS	3,240	1,280	3,570

3.1.2.3 Fish Collection Kettles

An attempt was made to create Fish Collection Kettles to assist in fish harvests by concentrating fish in one area. Design location of these kettles was at the deepest area in the ponds, near the boat ramp and pond outflow drains.

Currently Pond 2, and to a lesser extent Pond 5, continue to have deep holes existing near the boat ramp and drainage outflow pipes. In Ponds 3, 4, and 6, however, difficulties with handling and shaping the excavated materials made construction of the kettles difficult. Settling of material occurred in the months following the pond's construction and the excavated contours along the pond bottoms were filled. A bathymetry survey in November 2007, showed effectively no kettles could be distinguished in ponds 1 and 3-6.

3.1.2.4 Boat Ramps/Staging Area

A gravel-covered boat ramp and staging area was constructed at each pond (Figure 8). As water management practices were refined during the first year, pond water levels fluctuated greatly. Bankline that was still not riprapped was sloped steeply to limit encroachment of emergent vegetation. As a result of both the fluctuating water levels and the steeply graded slopes, some settling and sloughing occurred. Sloughing caused some of the boat ramps to become tilted, which required minor regrading in the summer of 2008.

Figure 8: Boat Ramp at Pond 6.

3.1.2.5 Pump and Airburst Systems

A pump platform was built along the Martinez Lake inflow channel to provide fresh water exclusively for the ponds. A product-cooled pump was installed with a design capacity of 6,000-plus gallons per minute (gpm). Water is pumped through a copper nickel alloy, cylindrical wedge-wire screen system (Figure 9). The screen system was selected based on recent research showing prevention of particles greater than 0.5 mm, or roughly the same size of non-native fish eggs and larvae (Normandeau and Associates 2006 Karchesky and McDonald 2007).

Figure 9: Wedge-wire screen installation in July 2007.

The system is equipped with an integrated airburst system, which backblows pressurized air through the screen slots to remove accumulated particles and reduce the need for manual cleaning of the system. Both the pump and airburst system operate on a user-programmable schedule, which can be adjusted to meet specific management objectives. To date, this system has been effective in eliminating the need for additional screen maintenance and cleaning.

A backup irrigation system to the ponds was created by integrating an existing 1,500 gpm well into the water supply. Both the water temperature and pH of the well are comparable to the LCR and can be used to augment unfavorable conditions in the ponds. Additionally, the well can be used during spawning periods of non-native fish to minimize the risk of introductions.

Several thousand feet of irrigation pipe was installed to create a pipe manifold system (Figure 10). A 24-inch main line conveys water from the pump and well systems to the ponds. Water then passes through a series of 18- and 12-inch pipes to the individual ponds. The system is adjusted manually at each pond to individually regulate flows as needed. Water levels are monitored using staff gauges. Total recorded flows during system testing exceeded 8,500 gpm; however, typical maximum flows for operations are 6,000 gpm.

Figure 10: Water supply pipe installation.

Flowmeters were installed at the inlet structure of each pond to measure instantaneous and total water flow (Figure 11). This data assists with water level management of the ponds and with annual water use reporting requirements. The user can measure and adjust real-time flow rates into each pond, as well as track water inflows over time.

Figure 11: Typical flowmeter, installed at each pond inlet.

Each pond is equipped with an individual outflow pipe structure, which empties into a drainage ditch. Each outlet drain can be opened or closed by with a simple valve. These outlet drains do not enable significant gravity drainage out of the ponds; however, they do enable flushing out stagnant water. Completely draining a pond requires mobilization of large dewatering pumps, as was the case during site preparations for construction.

3.1.2.6 Drainage Ditch

An integrated drainage ditch was constructed to carry drain water from each of the ponds to the wetlands area south of the site. This drainage system was constructed as a large earthen ditch, excavated to the approximate level of the water table, and adjacent to the ponds.

3.1.3 Planting

3.1.3.1 Hummocks

The hummocks were planted on June 3, 2008 with 5,500 plugs of hardstem bulrush (*Scirpus acutus*), which was delivered on May 31, 2008. Table 3 summarizes the quantity of bulrush plugs that were planted on each hummock per pond. Pond levels were allowed to recede prior to the planting to expose the hummocks. An open deck boat was used to transport the plants and crew to the hummocks. The planting of hummocks was completed in one day.

Table 3: Number of hardstem bulrush plugs per hummock planted at Imperial Ponds.

Pond #	# of Hummocks	Plants/hummocks	Total plants/pond
1	1	400	400
2	1	500	500
3	2	500	1,000
4	3	400	1,200
5	0	0	0
6	6	400	2,400
	Total plugs planted		5,500

In addition to planting the hummocks, 150 cattail clumps were transplanted on the southern shorelines of Pond 1 from nearby marsh units, at 10 foot spacing on June 8, 2008. Following the early June planting, all of the ponds were filled to their target full-pool elevation of 186 ft AMSL (Figure 12).

Figure 12: Imperial Ponds following completion of excavation

3.1.3.2 Drainage Ditch

After construction, the drainage ditch was planted with over 728 poles from native plant species. Species included: Goodding's willow (*Salix gooddingii*), coyote willow *(Salix exigua)*, and Freemont cottonwood (*Populus fremontii*). Poles were planted with the intent to colonize with three-square bulrush after planting.

The poles were harvested from the Cibola Valley Conservation Area (CVCA) nursery near Cibola, Arizona on February 6 and 8, 2008 by approximately 10 INWR volunteers and three chainsaw operators. The poles were soaked in either trash cans or in the ponds for six to eight days prior to planting (Figure 13). Holes were augured in advance using a CAT skidsteer and 24-inch augur, at 10-ft spacing. The pattern of the planting was intended to place the coyote willow near the bottom of the ditch, Goodding's willow at mid-ditch, and the Fremont cottonwood close to the top of the ditch as described in Table 4. The entire planting effort was completed in six hours using 10 volunteers and two crew leaders.

Figure 13: Willow pole preparation.

Table 4: Pole planting data for Imperial Ponds drainage ditch. February 13, 2008.

Plant Common Name	Plant Species	Number	Storage Method	Cut Date	Planting Date	Planted (ft above ditch bottom, 184 ft ASL)
coyote willow	*Salix exigua*	529	7 covered trash cans/water & rooting hormone	2/6/2008	2/13/2008	just above ditch bottom
Goodding's willow	*Salix gooddingii*	100	soaked on pond 2 boat ramp	2/8/2008	2/13/2008	2 feet above ditch bottom
Freemont cottonwood	*Populus fremontii*	99	soaked on pond 1 boat ramp	2/8/2008	2/13/2008	4 feet above ditch bottom

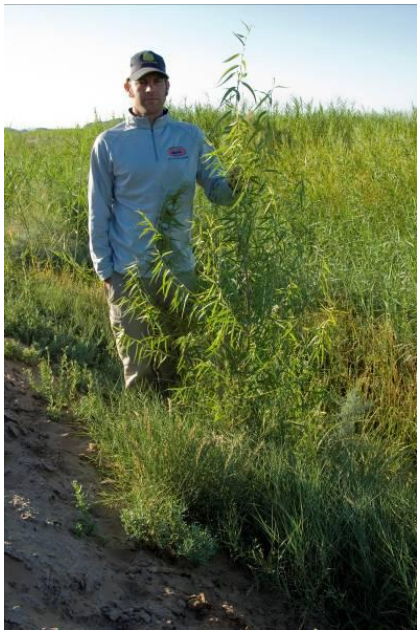
Within weeks of planting, the vast majority of the poles began sprouting buds, and then leaves, indicating a high degree of success (Figure 14). No effort was made to quantify the success rate of this planting; however, very few poles could be located that did not initially survive.

Figure 14: Willow pole one month after planting.

During early to mid-summer, many of the poles began to die, meanwhile common reed (*Phragmites* spp.) and saltcedar (*Tamarix ramossisima*) rapidly colonized most of the slopes of the ditch. The bottom wetted area became thoroughly colonized by cattail (*Typha* spp.) and common three-square bulrush.

Currently, some willow and cottonwood poles persist. It is unknown how many have survived, because of the thick cover of reeds that dominates the ditch slopes. Coyote willows, planted closest to the water table, appear to have been more successful than either Goodding's willows or Freemont cottonwoods (Figure 15).

Figure 15: Surviving coyote willow along drainage ditch.



3.1.4 Management of Existing Habitat

3.1.4.1 Fishery Management

Fiscal Year 2008 was the first year for fisheries management activities at the Imperial Ponds. Work for the year consisted of awarding the research contract, initiating a Fishery Coordination Team, and the initial stocking of RASU and BONY (Figure 16).

Figure 16: Imperial Ponds native fish stocking.

The fishery research grant was awarded to determine whether specific design features such as riprap shoreline, placement of hummocks, and depth profile contribute to the success of ponds in supporting life cycle completion of native fishes. The first year of the project was devoted to development of suitable techniques to efficiently and effectively assess habitat use by different life stages of each species and to acquire baseline information on habitat use, water chemistry, food availability, and the natural development of constructed habitats while determining the necessity of renovation for ponds contaminated by nonnative fishes.

A fishery coordination team was initiated in September of 2007, and comprises the numerous stakeholders for the project. The team members include LCR MSCP, USFWS (INWR, Fisheries Resource Office, and Ecological Services), Arizona State University, Arizona Game and Fish, and a native fish biologist. The team has quarterly informational meetings to discuss successes and failures and make interactive recommendations to further the overall goals of the project.

3.1.4.2 Water Management

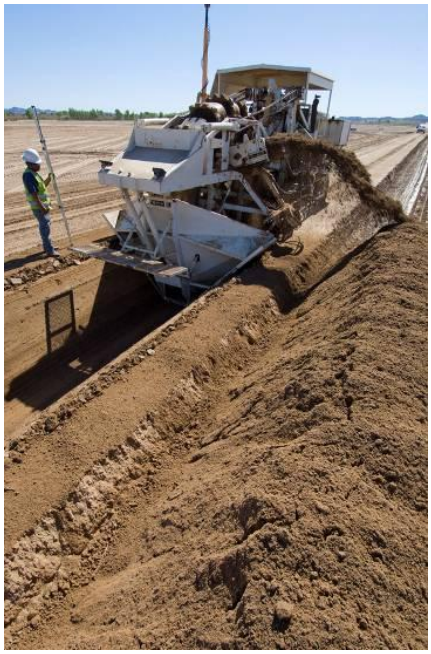
During the summer of 2008, the automation system for the ponds was operated. This was done to maintain adequate water quality from mid-June through September. Ponds 1-4, which were stocked with native fish, received 1,000 to 1,200 gpm each, from approximately 12:30 a.m. to 7:30 a.m. Water levels in all of the ponds were monitored weekly, and inflows were adjusted to maintain a target elevation of 186 ft. When ponds 1-4 exceeded this target elevation, flows were redistributed to provide inflows to ponds 5 and 6 to fill to the target elevation of 186 ft. Midway through the summer it was determined that the ponds could be operated adequately by operating the system less than seven hours per day, at which point the system was adjusted to run from 2:30 a.m. to 7:30 a.m.

3.2 Cottonwood-Willow Habitat Creation Activities and Status

To provide an economical fill location and improve drainage in the riparian fields, the 506,858 cubic yards of excavated material from the ponds was spread across approximately 100 acres of adjacent land (Figure 17). This fill placement raised the fields by an average of 3.5 ft, moving the depth to groundwater from less than 1 ft to approximately 4.5 ft. In addition to enhancing the fields, a new irrigation system was constructed (Figure 18).

Figure 17: Aerial view of project site, showing fill location prior to new irrigation system construction and field leveling.

Figure 18: Construction of the new irrigation canal system.



3.2.1 Site Preparations

From April 2007 to January 2008 the fields were disked to control encroachment by common reeds and saltcedar. In January 2008, a contract was awarded to level the fields

and construct the new irrigation system. From January to April 2008, the contractors graded and leveled the fields, and constructed the irrigation system (Figure 19).

Figure 19: Aerial view of graded fields.

3.2.2 Planting

During the summer of 2008, the newly leveled fields were planted with Japanese millet (*Echinochola crusgalli*) to begin the processes of soil conditioning and salt flushing, as well as to provide a food source for migratory waterfowl. By fall, Japenese millet had become established at a low density, with high amounts of *Phragmites*, requiring the refuge to replow and disk the fields in an attempt to re-establish a suitable winter cover crop to provide food for wintering waterfowl, while conditioning the soils for future plantings. In October of 2008, ryegrass was seeded at 30 lbs/acre over 90 acres. Future planting of 34 acres for the LCR MSCP within the 100 acres is scheduled for cottonwood-willow in spring of 2014.

3.3 Marsh Habitat Creation Activities and Status

In partial fulfillment of the LCR MSCP's habitat creation requirements to create 130 acres of marsh habitat for the BLRA, Field 18 was converted from a terrestrial field to a marsh unit. With secondary uses by other marsh bird species.

Prior to restoration, Field 18 was a 12-acre unmanaged field at the southeast end of the IMA. The vegetation at Field 18 was sparsely covered in saltcedar, common reed, and a small number of previously planted mesquites and cottonwoods (Figure 20).

Figure 20: Field 18 Pre-Planting Site Conditions. June 7, 2006.

Without irrigation, the water table at Field 18 is typically within 12 to 18 inches below ground, but may be influenced by seepage from the adjacent marsh fields. Water is supplied by an irrigation ditch to the west, which also serves the adjacent marsh fields.

The objectives for the design and management of Field 18 were intended to 1) closely replicate conditions, which are believed to promote suitable BLRA habitat conditions in Fields 16, and 2) design the unit to further our understanding of how to best develop suitable habitat conditions for the BLRA.

3.3.1 Site Preparations

The design for Field 18 was to maintain a gentle relief of one foot over the length of the field, while maximizing the transitional area between standing water and dry ground. The primary purpose of the slope was to establish a depth gradient, such that under the current irrigation cycles, some portion of the field should always provide shallow (up to 1 inch), transitional habitat between the deeper pool and dry ground (Figure 21). The secondary purpose of the slope was to facilitate water movement across the field. The specific layout of the elevation contours were selected to balance the need to maintain areas of shallow standing water, with a design that would promote efficient water movement across and throughout the field.

Figure 21: Preliminary contouring plan for Field 18.

To achieve the final design, survey data were collected in September 2007. A site-grading plan was prepared for Field 18, and completed the earth work for the site, under the direction of the LCR MSCP.

All earth work in Field 18 was completed between January 2008 and February 2008 due to sensitive wildlife requirements. Existing vegetation was cleared, chipped, and disked-in with the exception of selected native trees that were mapped and flagged to remain in place, to the extent practicable.

3.3.2 Planting

Prior to the planting effort, Reclamation staff flagged the field in June 2008, using a preloaded Trimble GPS unit to delineate the different planting zones. Zones were chosen based on topography and the hydrologic requirements of each plant type. Outer boundaries of each designated plant species polygon were flagged with colors corresponding to the planting plan (i.e., orange polygon, orange flagging), which was matched to color-coded paint marks on each plant tray.

The planting of Field 18 took place from May 2008 through June 2008, using a youth conservation planting crew. The total of 36,678 wetlands plants delivered on-site were inventoried and inspected by Reclamation staff.

Numerous trays of the Olney's three-square bulrush (*Scirpus olneyii*) arrived in poor conditions, but were planted anyway. To compensate for the poor condition, the nursery provided an additional 4,000 plugs of Olney's three-square bulrush, which were planted in October 2008 by another youth conservation crew. Table 5 describes the plant species planted in Field 18.

Table 5: Plant species established in Field 18.

Plant Common Name	Plant Species Name	Preferred Hydrology	Total Area (ft^2)	Total Plugs	Spacing (ft-center)
coyote willow	*Salix exigua*	seasonal flooding	131,523	1,500	90
common spikerush/desert spikerush	*Eleocharis palustris/Eleocharis parishii*	moist soil - 4 in	104,544	4,500	23
common three-square/Olney's threesquare	*Schoenoplectus americanus/ Scirpus olneyii*	moist soil - 12 in	209,088	30,000	7
hardstem bulrush	*Scirpus acutus*	moist soil - 36 in	8,712	2,178	4
Total Plants				38,178	

During most of the planting effort, half of the field was approximately 12 to 16 inches at the lowest contour. In higher contours, the water level ranged from a few inches to 6 inches. To assist with the dewatering efforts, a portable dewatering pump was used to decrease water level in the lower contours. Planting was initiated at the higher contour working towards the lowest, allowing dewatering to occur. The pump was operated until the completion of planting in June 2008.

3.3.3 Management of Existing Habitat

3.3.3.1 Soil Management

During the clearing and grading of Field 18, all existing vegetation was chipped and disked in-place, leaving behind biomass to be incorporated into the soils. No further soil manipulations were conducted prior to planting.

3.3.3.2 Habitat Management

Field 18 was irrigated immediately after contouring and leveling was completed. The marsh is irrigated two to three times per week, with the goal of maintaining relatively static, shallow water depths, which BLRA are believed to require.

3.4 Irrigation

Table 6 details the quantities of water in acre-feet (AF) applied by month to IPCA during 2008.

Table 6: Water Use Reported for IPCA, 2008.

Monthly Total	Imperial Ponds	Imperial Ponds	Field 18	Field 18	Fields	Fields	MSCP Total
	Total (AF)	(AF/AC*MONTH)	Total (AF)	(AF/AC*MONTH)	Total (AF)	(AF/AC*MONTH)	Total (AF)
January	0.00	0.00	0.00	0.00	0.00	0.00	0.00
February	146.27	1.83	12.85	1.07	0.00	0.00	159.12
March	125.69	1.57	5.43	0.45	0.00	0.00	131.12
April	211.66	2.65	2.62	0.22	0.00	0.00	214.28
May	0.00	0.00	8.94	0.75	0.00	0.00	8.94
June	84.92	1.06	18.54	1.55	0.00	0.00	103.46
July	0.00	0.00	0.00	0.00	0.00	0.00	0.00
August	193.97	2.42	9.40	0.78	43.68	1.28	247.05
September	58.47	0.73	14.88	1.24	106.74	3.14	180.09
October	61.83	0.77	10.31	0.86	0.00	0.00	72.14
November	0	0.00	8.45	0.70	6.6	0.19	15.05
December	0	0.00	1.76	0.15	0.00	0.00	1.76
AVERAGE BY MONTH	73.57	0.92	7.77	0.65	13.09	0.38	94.42
TOTAL	882.81		93.18		157.02		1,133.01

4.0 Monitoring

4.1 Habitat Monitoring

During the spring and summer of 2008, water levels fluctuated between the ponds, resulting in some of the hummocks becoming exposed. This desiccation allowed some colonization of common reed. At this time, plant species, composition, or density have not been quantified on the hummocks, which contain a mixture of bulrush, cattails, and common reed. Because the hummocks are continually inundated, it is expected that the reeds will die back and the bulrush will continue to expand, eventually covering the hummocks completely with bulrush and cattails.

The photographic record (below) demonstrates what vegetation has developed in and along the margins of the ponds. Some native vegetation is emerging on the hummocks located in the center of ponds 3 and 4 where several species of bulrush were planted. Ponds 5 and 6 still have large sections of cattails that were present before construction began and remain in the ponds. Two small patches (less than 5 meters in length and 1 meter in width) of cattails have developed on the margins of ponds 1 and 2. Most of the vegetation that has filled in the banks of the ponds is Phragmites, which covers approximately 50% of the bank lines of ponds 1, 2, 3, and 4. Phragmites is considered an invasive species and may be removed at a future date.

Figures 22-24 were taken in October 2008 from a helicopter and demonstrate the development of some vegetation along the shores of the ponds and some vegetation on the hummocks.

Figure 22: View of all the ponds, Pond 6 is the nearest pond and Pond 1 is the farthest.

Figure 23: Pond 1 (farthest), Pond 2 (middle), and part of Pond 3 (nearest).

Figure 24: Pond 6 (nearest), Pond 5 (right), Pond 4 (left), Pond 3 (Upper left).

4.1.1 Marsh (Field 18)

4.1.1.1 Hydrology and Topography

Hydrologic monitoring began at Field 18 once construction was completed. Ecotone monitoring wells (Remote Data Systems inc.) were installed at INWR. A total of 115 wells were purchased to monitor the hydrolic regime in Field 16 and Field 18. Of the 115 wells, only 90 could be installed due to unfavorable conditions (rattlesnake encounters) in the marsh. Of the 90 installed, 21were installed in Field 16 and 69 in Field 18. Wells were installed between July and August of 2008 to monitor the hydrologic regime in each field. Methods for the wells installation came from *Installing Monitoring Wells/Piezometers in Wetlands* (Sprecher 2000). During the installation of the wells, monitoring personnel walked only on designated trails to limit impact on the vegetation. The wells were installed in a 30-m grid pattern. Wells were not installed in upland areas in the western portion of the marsh as BLRA are not likely to use these areas. The remaining wells are scheduled to be installed once the snake season is over.

4.1.1.2 Vegetation Monitoring

In Field 18, 69 monitoring wells were established and at each location, vegetation data were collected. Four surveys were conducted on June 1, June 22, July 31, and October 25, 2008. Live and dead stem density of each emergent plant species and the minimum,

maximum, and mean height of each species within a 0.5-meter square adjacent to each monitoring well were measured on each date. The percent cover within 15 meters of each well location was estimated and mapped and salinity and pH were measured adjacent to each well. These measurements will allow 1) the evaluation of the influence of the hydrologic regime on the growth of each wetland plant species, and 2) the evaluation of how the presence and density of each wetland plant species influences occupancy by rails. Appendix B illustrates the establishment of the vegetation in Field 18 over time using time series photographs of the field after the water was first added to the site. The data are still being compiled and analyzed at this time but will be included in next year's report.

Field 18 is currently dominated by California bulrush ; however, common three-square bulrush and southern cattail are also common throughout the field and are dominant or codominant on the southern portions of the field. Phragmites is sparse throughout the field, but is dominant in the northwestern edge and common on the extreme boundaries of the field. Phragmites was established throughout the field prior to beginning the work and therefore no attempt was made to control this invasive species. Saltcedar is also sparse on the extreme southern boundary of the field.

4.1.2 Cottonwood-Willow Monitoring

Because no cottonwood-willow land cover has been created yet, vegetation monitoring was not conducted. Other surveys were conducted within the existing cottonwood-willow land cover, adjacent to the new fields. Descriptions of these survey efforts are provided below.

4.2 Species Monitoring

4.2.1 Fish

Based on the recommendations of the fishery coordination team, the ponds were stocked with both RASU and BONY. Ponds 1 and 4 were each stocked with approximately 300 RASU from Willow Beach National Fish Hatchery in November 2007, and ponds 2 and 3 were each stocked with approximately 800 BONY from Achii Hanyo Fish Rearing Facility in December 2007. All fish were marked with a pit-tag and measured prior to release.

4.2.2 Marsh Bird Surveys

Surveys were conducted at IPCA as part of the marsh bird surveys conducted by refuge personnel. One survey was conducted per month in March, April, and May for a total of three surveys. No marsh birds were detected at the ponds. Yuma clapper rail (*Rallus longirostris*) (CLRA) and western least bittern (*Ixobrychus exilis hesperis*) (LEBI) were detected in nearby habitats, and BLRA were detected at Field 16.

Fields 16, 17, and 18 were monitored for hydrologic conditions, vegetation, and marsh bird use. This data will be used to help manage Field 18 so that it may produce conditions similar to those found in Field 16 where BLRA are present. All bird surveys were conducted using the standardized marsh bird protocol for North America (Conway 2008). The creation of Field 18 occurred near the end of the marsh bird breeding season and as a consequence no marsh birds were detected in Field 18 during bird surveys. However, some marsh birds were detected during vegetation monitoring of Field 18. Least bitterns were detected in the southwestern portion of Field 18 on July 31 and October 25. American bitterns were detected in Field 18 on October 25. Two to five CLRAs and two BLRAs were detected in Field 17 directly adjacent to Field 18 on numerous occasions.

4.2.3 Southwestern Willow Flycatcher Surveys

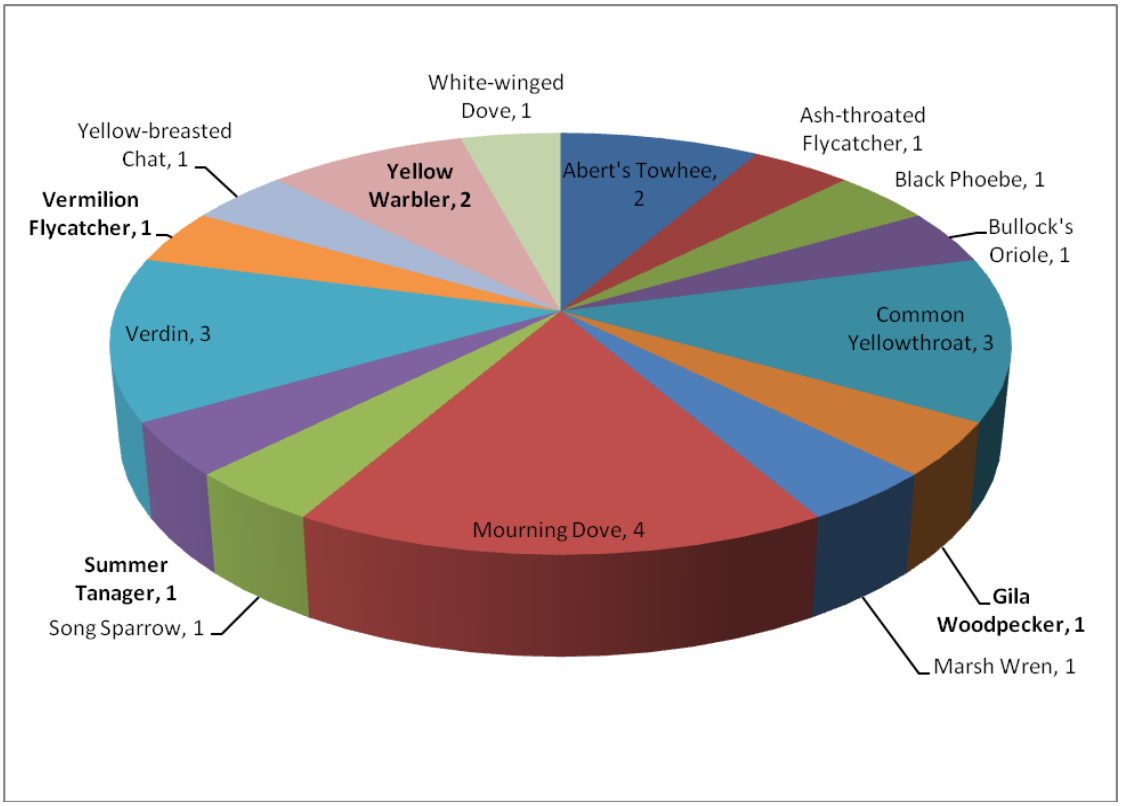
Call/playback surveys for SWFL were conducted at two locations north of and adjacent to the future cottonwood-willow habitat in the Imperial Nursery, within the INWR near IPCA. Surveys were conducted in the fringe of the Goodding's willow northwest of the Imperial Nursery and adjacent to the future cottonwood-willow habitat. No SWFL were detected at either site.

4.2.4 General Bird Surveys

A rapid survey of the future cottonwood-willow habitat was conducted, including the cottonwood-willow habitat in the Imperial Nursery. Because no habitat exists on the cottonwood-willow fields currently, surveys were carried out mainly in the Imperial Nursery and the area of Goodding's willow west of the fields. The methodology used to survey the area was the same as that used for system-wide bird surveys conducted along the LCR by Reclamation. Complete data for the LCR and more detailed methods and results will be available in the report, *System Monitoring for Riparian Obligate Avian Species (Work Task D6) and Avian Use of Restoration Sites (Work Task F2)* (GBBO 2008, in prep). For this report, a two- to three-hour area search is made of the site and all birds are recorded onto a map of the site and then tabulated into the number of birds detected, for each species. This data serves as prerestoration data and provides an idea of which species may colonize the created habitats once they are planted.

Four LCR MSCP species were detected in survey areas (Figure 25). This indicates a great deal of potential for expanding existing habitat and increasing numbers of LCR MSCP species once cottonwood-willow habitat is created.

Figure 25: Survey results for the rapid bird survey of the Imperial Nursery, and adjoining habitat to the northwest (LCR MSCP species are in bold; the scientific names for each species detected at the Imperial Conservation Area can be found in Appendix C).



4.2.5 Yellow-billed Cuckoo

Five YBCU surveys were conducted of the Imperial Nursery in 2008 and there were three YBCU detections at the site. Two YBCU were detected in June (survey period 2) and one YBCU was detected in July (survey period 3). The site was considered occupied during the 2008 field season, but nesting was not confirmed. The nearest occupied site was Yuma West Wetlands 33.8 km (21 miles) to the southwest.

4.2.6 Bat Monitoring

Acoustic bat surveys were conducted using Anabat II bat detectors coupled to zero-crossing analysis interface modules (ZCAIMs) and SD1 detectors (ZCAIM and detector combined in a single unit), as outlined by Brown (2006). Bat calls were recorded directly onto compact flash cards. Up to 12 units were deployed simultaneously in adjacent habitats and run continuously from dusk to dawn, recording all bat calls during an approximate ten hour period from dusk to dawn. Two nights were sampled in each restoration area either consecutively or within 4 days of the first sample night. Sampling was conducted quarterly during October 2007, and February, April, July 2008.

Four metrics are used to characterize bat use of the riparian restoration and adjacent habitats: total number of bat minutes for the 4 covered and evaluation species and 1 indicator species; mean number of bat minutes per site for all bat species; an index of relative bat activity, and mean number of bat minutes and standard errors for quarterly sampling for all riparian restoration and adjacent untreated habitat sites.

Only 1 Western red bat (*Lasiurus blossevillii*) (WRBA) minute was recorded passing over Pond 1 during the October sample period (Figure 26). In 2007 12 minutes of bat activity for the WRBA were recorded, most of which occurred at Pond 1 during April. This 2007 event may have recorded the passage of migrating red bats. Two Western yellow bat (*Lasiurus xanthinus*) (WYBA) minutes were recorded, 1 during February over Martinez Lake and 1 in a mature cottonwood stand in July (Figure 27). These contacts contrast sharply with 2007 when a total of 70 bat minutes were recorded at Pond 1 and Pond 5 during the April sampling period. It is possible that the 2007 sample coincided with migrating yellow bats passing through the area. Seven minutes of bat activity were recorded for the Pale Townsend's big-eared bat (*Corynorhinus townsendii pallescens*) (PTBB) in the mature cottonwood nursery during April (1 minute) and July (6 minutes). Three minutes were recorded over agriculture and saltcedar in July (Figure 28).

A total of 1,402 minutes were recorded for the California leaf-nosed bat (*Macrotus californicus*) (CLNB) (Figure 29). This far exceeds the number of minutes recorded for other six habitat creation areas. Beal Lake is the closest with only 341 minutes of activity. October and April saw the greatest amount of leaf-nose bat activity. All habitats were used, though sampling during a single night in April in an agricultural field (Field 1) resulted in 242 minutes of bat activity – a noteworthy level of activity. Bat activity during winter and summer were much lower. Interestingly, no activity was recorded over the ponds during summer – the same occurred during 2007 summer sampling. Leaf-nosed bats also utilize saltcedar habitats extensively. For example during an exploratory survey of a saltcedar stand in McAllister Wash, 69 minutes of activity were recorded during October.

Seasonal habitat use of riparian and adjacent habitats by the 4 covered and evaluation bat species and 1 indicator bat species for IPCA.

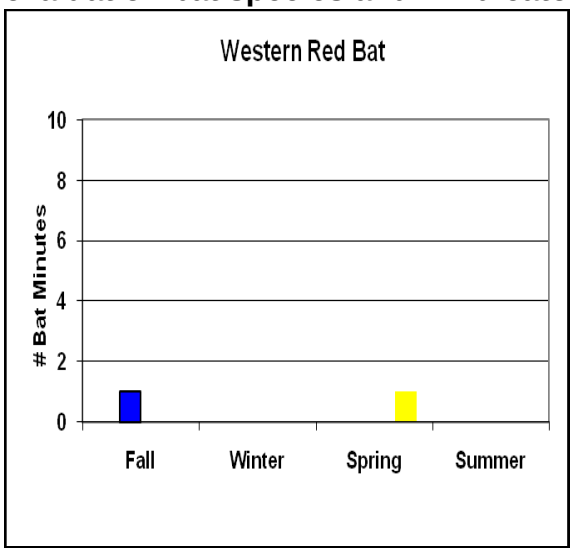


Figure 26: Western yellow bat.

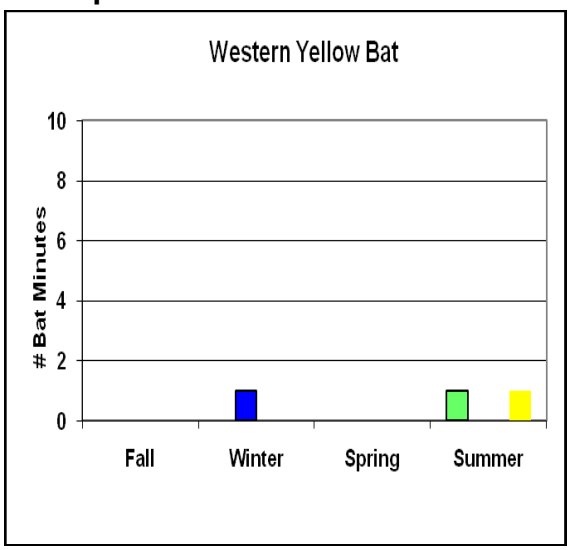


Figure 27: Western red bat.

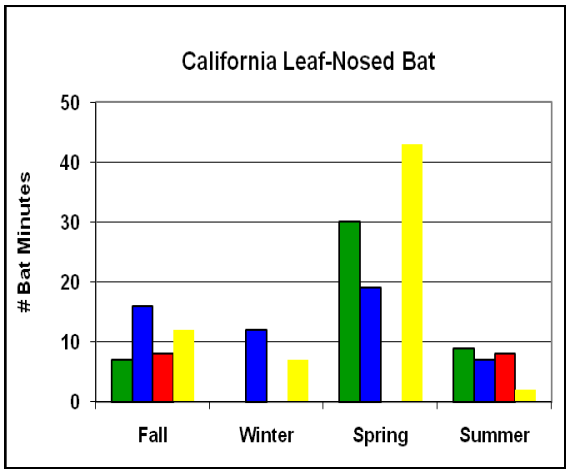


Figure 28: California leaf-nosed bat.

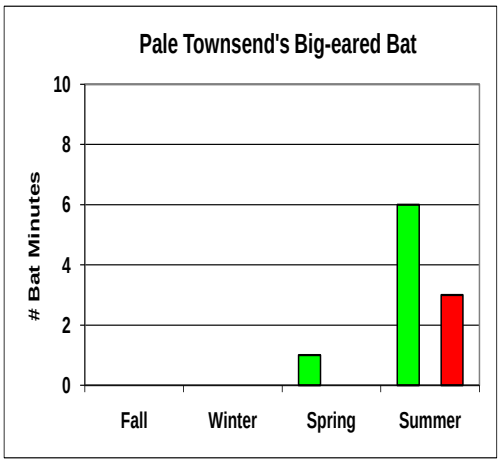
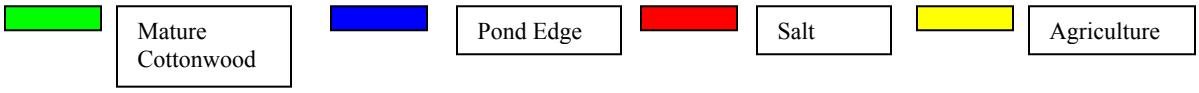


Figure 29: Pale Townsend's big-eared bat.

Legend:



4.2.6.1 Relative Bat Activity Index

An index of relative bat activity was developed for restoration and adjacent habitat sites at IPCA. The 45-55 KHz species group is the predominant species group in both categories. The western pipistrelle (*Pipistrellus hesperus*) had the second highest relative abundance for both restored and adjacent habitat categories. The CLNB was third in relative abundance and is fairly consistent between restored and adjacent habitat areas.

The 35 KHz species category only was recorded in the mature cottonwood habitats. The Pale Townsend's big-eared bat, Western red bat and Western yellow bat comprised extremely small portions of the overall bat community at IPCA. Table 7 and 8 demonstrate the relative bat activity throughout IPCA, as well as their names and designation codes.

Table 7: Relative bat activity index for treatment and habitat types in the Imperial Ponds Conservation Area.

Restoration Sites		Adjacent Habitat Sites	
Species/Species Groups	**%**	**Species/Species Groups**	**%**
45-55KHz	61.1	45-55KHz	57.2
Pahe	18.0	Pahe	26.4
25-30KHz	11.0	25-30KHz	10.6
Myve	4.7	Nyfe	2.5
Maca	3.2	Maca	1.5
Nyfe	1.1	20KHz	1.2
20KHz	0.6	Eupe	0.3
Eupe	0.2	Myve	0.2
Laci	0.0	Labl	0.0
Laxa	0.0	Laci	0.0
Nyma	0.0	Laxa	0.0
Coto	0.0	Coto	0.0
Labl	0.0	Nyma	0.0
	100%		100%

Table 8: Species and species group names for bats identified at habitat creation areas.

Common Name	Scientific Name	Species Code
Individual Species		
Pallid bat	*Antrozous pallidus*	Anpa
Townsend's big-eared bat	*Corynorhinus townsendii*	Coto
Western red bat	*Lasiurus blossevillii*	Labl
Yellow bat	*Lasiurus xanthinus*	Laxn
California leaf-nosed bat	*Macrotus californicus*	Maca
Hoary bat	*Lasiurus cinereus*	Laci
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	Nyfe
Mastiff bat	*Eumops perotis*	Eupe
Western pipistrelle	*Parastrellus hesperus*	Pahe
Cave Myotis	*Myotis velifer*	Myve

4.2.7 Small Mammal Surveys

In 2008 small mammal trapping was conducted as part of the system-wide surveys for *Sigmodon* spp. Traps were placed in the strip of *Phragmites* habitat adjacent to the future cottonwood-willow habitat. A total of 56 traps were placed and 44 animals were captured. One juvenile Yuma hispid cotton rat (*Sigmodon hispidus eremicus*) (YHCR) was captured. The rest of the captures consisted of the following species: Cactus mouse (*Peromyscus eremicus*) (Figure 30) 37 captures, desert pocket mouse (*Chaetodipus penicullatus*) 4 captures, and common house mouse (*Mus musculus*) 2 captures.

Figure 30: Cactus Mouse.

5.0 Management

5.1 Wildfire Management

During the reporting period, there were no wildfire management issues reported within IPCA.

5.2 Public Use

IPCA is currently closed to the general public. Closure is due to the project being within the IMA of INWR.

Although this site is closed, IPCA provides frequent opportunities for program outreach activities, both formally and informally. The site has become a regular stopping point for Reclamation's Colorado River tours, which expose numerous stakeholders and media outlets to habitat creation efforts being implemented by the LCR MSCP (Figure 34). The site is unique, in that it is easily accessible by both cars and by boats, providing

stakeholders with a unique opportunity to visit multiple habitat types within a close proximity of each other.

Several examples of such public outreach activities are shown in Figures 31 – 34. They activies conducted during the reporting period, included:

- Site dedication ceremony (November 2007)
- Water Education Foundation Tour (March 2008)
- Metropolitan Water District Tour (March 2008)

Figure 31: Imperial Ponds Conservation Area site dedication.

Figure 32: Water Education Foundation site tour.

Figure 33: Water Education Foundation bus tour of IPCA.

Figure 34: Metropolitan Water District river tour.

5.3 Law Enforcement

During the reporting period, there were no law enforcement issues reported within IPCA.

5.4 Invasive Plant Management

Encroachment of saltcedar and common reed. is a continuous challenge at the site, becoming established wherever open, relatively moist, non-vegetated ground exists, particularly along the pond shorelines and drainage ditch side slopes.
During October of 2008, youth conservation crews conducted cut-stump removal of saltcedar along the drainage ditch and pond shorelines. The method used for vegetation removal involved cutting down the trees with a chainsaw, followed by spray application of an herbicde to kill the stump (Figure 35).

Figure 35: Pile of removed saltcedar.

During the winter of 2008 and spring of 2009, mowing of the drainage ditch side slopes will begin, to address the phragmites encroachment, followed by application of herbicides to limit recolonization. Because some native vegetation remains, the herbicide application will be done selectively, to avoid impact to the native vegetation, as much as practical.

5.5 Future Habitat Development

Future development within IPCA includes creating 34 acres of cottonwood-willow habitat. Currently, soil mapping and sampling of the future cottonwood-willow field areas are being done to evaluate salt concentrations and nutrient levels. These results indicated moderately high salinity and nitrogen deficiencies in the soils. Fertilization in the fields, with a high nitrogen fertilizer (to increase nutrients) and humic acid to help mobilize salts and facilitate salt flushing, is ongoing. During future sampling, if favorable soil conditions are found, Reclamation will contract to rotate to a crop with salt tolerances comparable to cottonwood-willows to further test for adequate soil conditions. Planting of the riparian area with cottonwood-willow is not expected until after FY12.

6.0 Literature Cited

Conway, C.J. 2008. Standardized North American Marsh Bird Monitoring Protocols. Wildlife Research Report #2008-01. U.S. Geological Survey, Arizona Cooperative Fish and Wildlife Research Unit, Tucson, AZ.

Karchesky, C.M., and R.M. McDonald. 2007. Evaluation of a Cylindrical Wedge-wire Screen System at Beal Lake, Arizona, 2006, Phase II Testing. January 2007. Normandeau and Associates. Prepared for Bureau of Reclamation, contract number GS10F0319M. Stevenson, Washington.

Kesner, B.R. M.K. Fell, G Ley, and P.C. Marsh. 2008. Imperial Ponds Native Fish Project, Final Report October 2007-June 2008. A report issued to the Bureau of Reclamation in fulfillment of Agreement Number 08-FG-30-0001. Native Fish Lab, School of Life Sciences, Arizona State University, Tempe, AZ.

Lower Colorado River Multi-Species Conservation Program. 2008. Imperial Ponds Conservation Area, Restoration Development Plan. January 2008. Lower Colorado Region Multi-Species Conservation Program. Boulder City, Nevada.

Mueller, G.A. 2006. Ecology of Bonytail and Razorback Sucker and the Role of Off-channel Habitats in their Recovery. U.S. Geological Survey, Scientific Investigations Report 2006-5065. Denver, CO.

Normandeau and Associates. 2006. Evaluation of a Cylindrical Wedge-wire Screen System at Beal Lake, Arizona, 2005. Normandeau and Associates. Prepared for Bureau of Reclamation. Stevenson, WA. January 2006.

Reclamation. 2005. Imperial National Wildlife Refuge, Imperial Native Fish Habitat Reconstruction, Design Workshop, Final Report. July 11, 2005. Bureau of Reclamation. Boulder City, NV.

Reclamation. January 2006. Imperial National Wildlife Refuge Fish Pond Enhancement Program, Geotechnical and Geohydrological Findings, December 2005-January 2006. Bureau of Reclamation. Yuma, AZ.

Sprecher, S.W. 2000. Installing Monitoring Wells/Piezometers in Wetlands. ERDC TN-WRAP-00-02, U.S. Army Research and Development Center, Vicksburg, MS.

U.S. Fish and Wildlife Service. 2006. Summary Data for Salvage of Razorback Suckers from Pond 1 at Imperial National Wildlife Refuge (INWR). Technical Memorandum. Arizona Fishery Resources Office.

U.S. Fish and Wildlife Service. 2006. Additional Salvage Efforts at Imperial Ponds, Imperial National Wildlife Refuge. Technical memorandum. Arizona Fishery Resources Office.