Lower Colorado River Multi-Species Conservation Program

Balancing Resource Use and Conservation

Imperial Ponds Conservation Area
2010 Final Annual Report

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

October 2011

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National Park Service
Bureau of Land Management
Bureau of Indian Affairs
Western Area Power Administration

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Lower Colorado River
Multi-Species Conservation Program

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ACRONYMS AND ABBREVIATIONS

AF	acre-feet
BLRA	California black rail
FY	fiscal year
gpm	gallons per minute
hp	horsepower
IMA	Intensive Management Area
INWR	Imperial National Wildlife Refuge
IPCA	Imperial Ponds Conservation Area
LCR	lower Colorado River
LCR MSCP	Lower Colorado River Multi-Species Conservation Program
m	meter(s)
m^2	square meters
mm	millimeter(s)
Reclamation	Bureau of Reclamation
SWFL	Southwestern willow flycatcher
USFWS	U.S. Fish and Wildlife Service

Symbols

%	percent

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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 (50-year) 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). Most covered species are state and/or federally listed special status species. The Bureau of Reclamation (Reclamation) is the entity responsible for implementing the LCR MSCP over the 50-year term of the program. A steering committee currently consisting of 56 entities has been formed, as described in the LCR MSCP Funding and Management Agreement, to provide input and oversight functions to support LCR MSCP implementation.

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 that are planned for cottonwood-willow development. The project is within the 360-acre "Intensive Management Area" (IMA), which is an area devoted to active management for numerous species, including wetlands/marsh, backwaters, cottonwood/willow, and seasonal wetlands for migratory waterfowl.

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

SITE INFORMATION

Purpose

This annual report will provide information pertaining to the development and maintenance of riparian habitat and summarized monitoring reports/results that would influence the adaptive management plan. The purpose of IPCA is to create a mosaic of habitats, including backwaters, marsh, and riparian, for listed LCR MSCP species within Reach 5 of the Colorado River. The six ponds that constitute the 80 acres of backwater will be dedicated and managed for native fishes. The 34 acres of cottonwood-willow will be established on fill material from the pond

excavation. Field 18 has been regraded and planted to benefit marsh species using information gathered from Field 16 and is currently managed for California black rail (BLRA).

Location/Description

IPCA is located on the Imperial National Wildlife Refuge (INWR) approximately 30 miles north of Yuma, Arizona, to the east of the Colorado River (River Mile 59). The project area is within the IMA and consists of fields, marshes, and six ponds that are managed for riparian obligate bird species, waterfowl, marsh birds, native fish, and other wildlife. The entire IMA is restricted from public access (figure 1).

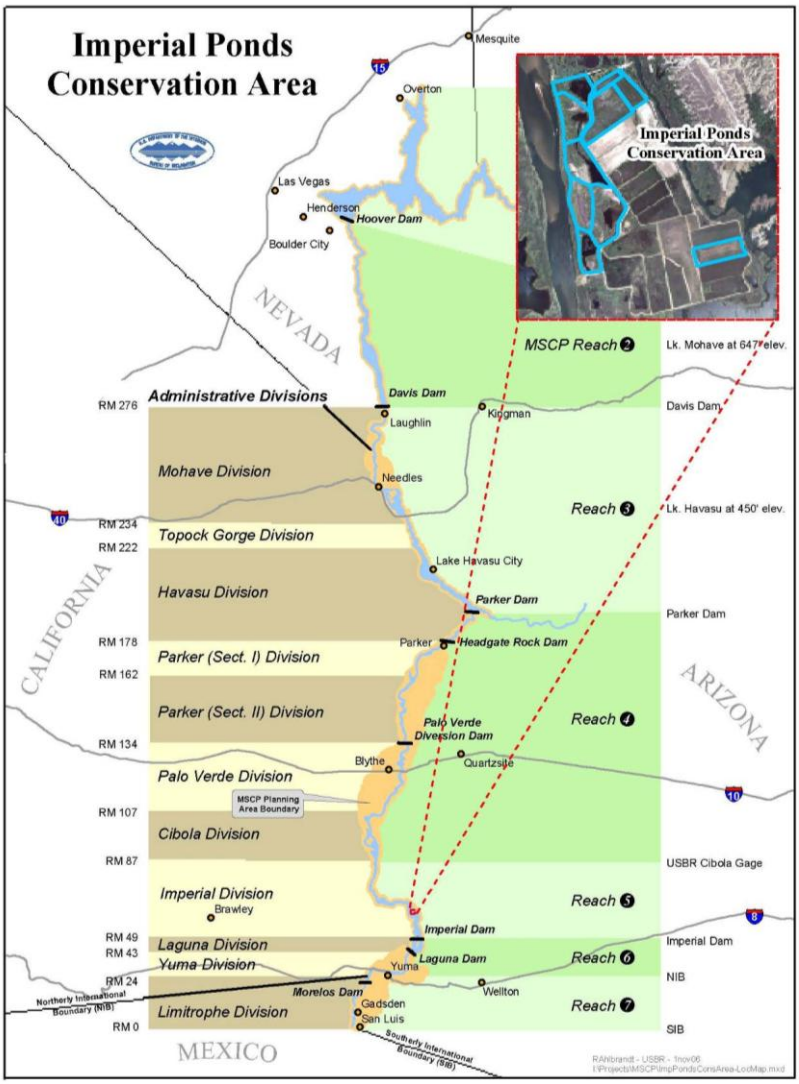

Figure 1.—Imperial Ponds Conservation Area location.

Land Ownership

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

Water

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

Agreement

The Land Use Agreement for IPCA, finalized in May 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.

An Interagency Agreement was finalized in April 2009 between Reclamation and INWR. This agreement defines the roles and responsibilities of both agencies related to operation and maintenance of the land cover for IPCA.

CURRENT YEAR HABITAT CREATION ACTIVITIES

Backwater Habitat Creation Activities and Status

Planting

Planting around Ponds1, 2, 3, 5, and 6 began on October 4, 2010, by contractor Fred Philips Consulting, LLC, with a labor crew of 10 laborers and 1 foreman (figure 2). The crew installed 30,772 plants along the shorelines, working a total of 800 hours over a 10-day period to compete the planting outlined in the contract. Planting numbers for the individual ponds are listed below in tables 1–5.

Figure 2.—Plantings around ponds.

Objectives for the shoreline plantings included:

- Limiting encroachment of phragmites (*Phragmites australis*) and saltcedar
- Controlling shoreline erosion
- Providing forage and cover for cotton rat
- Maintaining wind circulation for pond water quality
- Encouraging an integrated mosaic of aquatic, wetland, and riparian habitat types

Table 1.—Pond 1 planting summary

Pond 1 planting summary	Total area (square feet)	Total plants	Plants installed
Salt grass – 6 inches on center	4,356	5,716	5,824
Alkali sacaton – Cluster plantings of three	3,502	3,001	3,080
Honey mesquite – 150 feet on center	7,388	9	9
Common threesquare bulrush – 6 inches on center	812	1,624	1,680
Seep willow – 6 feet on center	1,932	81	81
Coyote willow – 6 feet on center	2,436	68	68

Table 2.—Pond 2 planting summary

Pond 2 planting summary	Total area (square feet)	Total plants	Plants installed
Salt grass – 6 inches on center	3,460	4,673	4,760
Alkali sacaton – Cluster plantings of three	2,243	2,243	2,296
Honey mesquite – 150 feet on center	5,260	10	10

Table 3.—Pond 3 planting summary

Pond 3 planting summary	Total area (square feet)	Total plants	Plants installed
Salt grass – 6 inches on center	2,158	4,316	4,368
Honey mesquite – 150 feet on center	1,626	6	6
Common threesquare bulrush – 6 inches on center	532	1064	1,120
Coyote willow – 6 feet on center	1,596	44	68

Table 4.—Pond 5 planting summary

Pond 5 planting summary	Total area (square feet)	Total plants	Plants installed
Salt grass – 6 inches on center	3,320	6,479	6,552
Alkali sacaton – Cluster plantings of three	206	177	224
Honey mesquite – 150 feet on center	3,114	21	44

Table 5.—Pond 6 planting summary

Pond 6 planting summary	Total area (square feet)	Total plants	Plants installed
Salt grass – 6 inches on center	2,700	329	336
Alkali sacaton – Cluster plantings of three	288	247	280
Honey mesquite – 150 foot on center	804	0	0
Common threesquare bulrush – 6 inches on center	402	0	0
Coyote willow – 6 foot on center	1,206	0	0

Management of Existing Habitat

Construction of six spawning beds was completed in Pond 1. This effort was to support the creation of native fish habitat. The design of these spawning beds was intended to evaluate the use of geotextiles as a vegetation barrier, a prototype gradation of gravels and rock, and site fidelity of razorback suckers to a particular spawning location (figure 3).

Figure 3.—Pond 1 spawning bed construction.

Staff gages were purchased and installed throughout the site to monitor and manage water levels in the ponds (figure 4). A series of surveyed benchmarks were placed in 2009 as reference points for positioning the staff gages relative to actual elevations. Data loggers, consisting of water quality multi-probes and pressure transducers, were purchased in fiscal year (FY) 2010. The water quality multi-probes were installed in the ponds to record hourly temperature, pH, dissolved oxygen, and specific

Figure 4.—Staff gauge.

conductivity. Pressure transducers are scheduled to be installed in the ponds during FY11, which will record hourly water elevations. In the future, this instrumentation is planned to tie into a data telemetry system.

Planting areas around Ponds 1, 2, 3, and 5 were fitted with supplemental irrigation to increase survivorship. Each irrigation area was installed with its own individual pump to eliminate cross contamination of fish larvae. Irrigation is scheduled for two times a week for 5 to 6 hours. Irrigation will continue through the summer, at which time the plants should be established in the ground water table.

Cottonwood-Willow Habitat Creation Activities and Status

Site Preparations

Soil mapping and sampling of the future cottonwood-willow field areas to evaluate salt concentrations and nutrient levels was performed in February. Results indicate that soil depths below 6 inches remain highly saline and unsuitable for planting. Fertilizing of the riparian fields continues during the fall and spring, with a high nitrogen fertilizer and humic acid, to help mobilize salts and facilitate salt flushing.

Marsh Habitat Creation Activities and Status

Management of Existing Habitat

Staff gages were purchased and installed throughout the site to monitor and manage water levels in the marsh units. A series of surveyed benchmarks were placed in 2009 as reference points for positioning the staff gages relative to actual elevations. Data loggers, consisting of water quality multi-probes and pressure transducers, were purchased in FY10. In FY10, water quality multi-probes were installed in the ponds to record hourly temperature, pH, dissolved oxygen, and specific conductivity. Pressure transducers are scheduled to be installed in the ponds during FY11, which will record hourly water elevations. In the future, this instrumentation is planned to tie into a data telemetry system.

Irrigation

Fresh water is supplied from the inlet to Martinez Lake by two separate pump systems. A 75-horsepower (hp) pump is used to irrigate a majority of the IMA, including the future riparian area and 18 acres of marsh. A 200-hp pump is used to supply water to the Imperial Ponds. To minimize the risks of introducing non-native fish into the Imperial Ponds system, the 200-hp pump utilizes an integrated wedge-wire screen constructed of 0.02 inch mesh Z-alloy equipped with a compressed-air back-flush. Water is conveyed through a 24-inch pipe to a manifold system from which each pond has its own inlet pipe. Although the pump is capable of up to 8,000 gallons per minute (gpm), the system's maximum capacity is 6,000 gpm to allow delivery of approximately 1,000 gpm to each pond.

An evaluation of the wedge-wire screen system on the 200-hp pump supplying the ponds was conducted. The preliminary results found that eggs and larvae of the smallest size class of non-native fishes (those with eggs less than 1 millimeter [mm] in diameter) were entrained through the screen in nearly all the samples taken, which raised concern over continued use of the screened pump to supply

the ponds without additional filtering. Additionally, pH levels in two of the ponds during mid-summer exceeded an action level of 9.0, which was quickly resolved by pumping from the groundwater well. Since the summer of 2009, water supply to the ponds has been exclusively via the 1,500-gpm well pump to reduce the risk of introducing non-native fish larvae into the ponds as well as to manage pH.

Irrigation to the planting areas on Ponds 1, 2, 3, and 5 is accomplished using individual pumps providing water from the ponds to the plants. Irrigation occurs onsite two times weekly and will continue until the end of summer. After that time, the root systems of the plants should reach the water table and support themselves.

In 2010, IPCA used a total of 1,981 AF for irrigation to the ponds, Field 18, and riparian area. Monthly averages and individual water usage for the habitat types are shown below in table 6.

Table 6.—2010 Imperial Ponds water use

Monthly totals	Imperial Ponds total (AF)	Field 18 total (AF)	Fields total (AF)	MSCP total (AF)
January	103.38	28.77	0.00	132.14
February	71.21	36.20	0.00	107.41
March	26.56	56.22	0.00	82.78
April	89.54	35.03	52.03	176.59
May	83.49	54.62	0.00	138.11
June	107.69	522.08	11.15	640.92
July	154.21	55.02	0.00	209.23
August	73.90	75.63	12.01	161.54
September	95.92	37.25	0.00	133.18
October	40.83	44.25	12.00	97.08
November	15.87	27.75	0.00	43.62
December	27.26	21.71	9.12	58.09
Average by month	74.15	82.88	8.02	165.06
Totals	889.86	994.54	96.30	1,980.70

MONITORING

In 2010, no new major construction took place, and monitoring continued in the ponds and in Field 18. Riparian and terrestrial vegetation was planted along the margins of the ponds in 2010. All monitoring efforts at Field 18 were conducted by Dr. Courtney Conway and his field crew as part of a collaborative research project supported by Reclamation. The complications with the hydrological monitoring equipment in Field 18 that occurred in 2009 have been resolved, and much more data are now available on conditions of both of the marsh fields (Fields 16 and 18). Monitoring of the Imperial Ponds was conducted by various Reclamation and USFWS personnel and by Marsh and Associates under a contract funded by Reclamation.

Habitat Monitoring

Shoreline Plantings of the Imperial Ponds

In October 2010, Reclamation contracted with Fred Phillips Consulting, LLC, to plant native vegetation along the shoreline of the Imperial Ponds. This was done to improve bank line stabilization and preclude the establishment of less desirable *Phragmites*. Excluding *Phragmites*and planting more desirable marsh plant species lowers maintenance costs associated with removal of *Phragmites* while preventing the bank line from eroding. The following information comes directly from the report of the planting effort from Fred Phillips Consulting, LLC:

> Commencing October 4, 2010, a labor crew of ten people and one foreman installed 30,772 plants along the shorelines of the ponds at the Imperial Ponds Conservation Area. All planting areas were properly installed with the number of plants directed by the contract with the exception of planting Plan #3 on Pond 6. This area was deemed inappropriate for planting prior to installation by representatives at the Bureau of Reclamation and Fred Phillips Consulting. The work was transferred to an early action installation of sandbar willow (*Salix exigua*) poles on April 22, 2010. Sandbar willow poles were planted along established areas on Pond 1 and Pond 2.
>
> Planting areas on Ponds 1, 2, 3, and 5 are receiving supplemental irrigation to increase the survivorship of the installed vegetation. Due to concerns regarding cross-contamination of fish larvae, each irrigation area was installed with its own individual pump. The pumps are remaining on site. Irrigation will occur on site two times a week for the next sixteen weeks.

Imperial Ponds

Vegetation that has established itself along the perimeter of each of the ponds was observed on November 4, 2010. A visual estimation was made of the percentage of the perimeter of each pond that was covered in vegetation. The vegetation along the margins of each pond was comprised of either *Phragmites* or southern cattail (*Typha domingensis*), and the percentage that each species comprised of all the vegetation around each pond was also estimated visually.

Pond 1 has vegetation along approximately 90 percent (%) of the perimeter. The vegetation along the perimeter is composed of approximately 50% *Phragmites* and 50% cattail. Pond 2 has vegetation along 75% of the perimeter. The vegetation along the perimeter is composed of approximately 60% cattail and 40% *Phragmites*. Pond 3 has approximately 60% of the perimeter covered in vegetation. The vegetation along the perimeter is composed of roughly 60% *Phragmites* and 40% cattail. There are two hummocks in Pond 3, and the smaller of the two is covered primarily in hardstem bulrush (*Schoenoplectus acutus*). The larger hummock is covered in an even mix of cattail and hardstem bulrush. Pond 4 has 95% of the perimeter covered in vegetation. Approximately 80% of the vegetation is composed of *Phragmites*, and the other 20% is cattail. There is one hummock in Pond 4 that is covered in *Phragmites*. Pond 5 has vegetation along 90% of the perimeter. The vegetation along the perimeter is composed of approximately 50% cattail and 50% *Phragmites*. In Pond 5 are two large areas of cattail found in the middle of the pond. Pond 6 has 70% of the perimeter covered in vegetation that is very sparse in places compared to the other ponds. The vegetation along the perimeter is composed of approximately 90% *Phragmites* and 10% cattail.

Photographic Record

Mosaic photos for each pond were taken in October 2010 and are shown below on figures 5–10. Following the general photographic record is the photo point series that shows all the photos taken from photo points established in 2008 to document vegetation growth and change along the margins of all six of the Imperial Ponds. Photos taken in 2009 and 2010 were taken at the same point, located using a Global Positioning System. Each photo was taken at the same compass bearing. Figures 11–28 are photos from 2008 and are shown side by side with photos taken in 2009 and 2010. The photos were taken in the last week of March or the first week of April each year.

Figure 5.—Pond 1.

Figure 6.—Pond 2.

Figure 7.—Pond 3.

Figure 8.—Pond 4.

Figure 9.—Pond 5.

Figure 10.—Pond 6.

Photo points from Imperial Ponds. Photos from 2008–2010 are compared side to side.

2008 **2009** **2010**

Figure 11.—Photo Point 1A, Pond 1.

2008 **2009** **2010**

Figure 12.—Photo Point 1B, Pond 1.

2008 **2009** **2010**

Figure 13.—Photo Point 2A, Pond 1.

2008 2009 2010

Figure 14.—Photo Point 2B, Pond 2.

2008 2009 2010

Figure 15.—Photo Point 2C, Pond 2.

2008 2009 2010

Figure 16.—Photo Point 3A, Pond 3.

2008 **2009** **2010**

Figure 17.—Photo Point 3B, Pond 3.

2008 **2009** **2010**

Figure 18.—Photo Point 4A, Pond 3.

2008 **2009** **2010**

Figure 19.—Photo Point 4B, Pond 5.

2008 2009 2010

Figure 20.—Photo Point 4C, Pond 5.

2008 2009 2010

Figure 21.—Photo Point 4D, Pond 5.

2008 2009 2010

Figure 22.—Photo Point 5A, Pond 4.

2008 **2009** **2010**

Figure 23.—Photo Point 5B, Pond 4.

2008 **2009** **2010**

Figure 24.—Photo Point 6A, Pond 5.

2008 **2009** **2010**

Figure 25.—Photo Point 6B, Pond 6.

2008 2009 2010

Figure 26.—Photo Point 6C, Pond 6.

2008 2009 2010

Figure 27.—Photo Point 6D, Pond 6.

2008 2009 2010

Figure 28.—Photo Point 6E, Pond 6.

Marsh

A series of permanent sampling locations were established in a 30-meter (m) grid pattern in Fields 16 (56 points) and 18 (58 points), and a trail network was developed to access each point. At each point, vegetation was sampled and the water depth was measured approximately once a month during the breeding season (March–July) and approximately every other month during the non-breeding season (August–February) between July 2008 and July 2010. The number of standing live and standing dead stems of each plant species was counted within a 0.25-square-meter (m^2) plot at each point during each visit. The minimum, maximum, and mean height of each plant species was also measured, and the density and height of fallen dead vegetation within each 0.25 m^2 plot was quantified.

Olney's threesquare (*Schoenoplectus americanus*) dominated Field 16, but southern cattail (*Typha domingensis*) and phragmites (*Phragmites australis*) were also common (figure 29). The proportion and density of each species in Field 16 remained relatively constant throughout the study period (figure 29). Common threesquare (*Schoenoplectus pungens*) dominated Field 18, but Olney's threesquare, river bulrush (*Bolboschoenus fluviatilis*), southern cattail, and *Phragmites* were also common throughout the field (figures 29 and 30). Neither river bulrush nor southern cattail was planted in Field 18. However, it was not surprising to see southern cattail become established in Field 18 because it is common in adjacent fields. In contrast, river bulrush is rare in wetlands on the lower Colorado River, and hence, it is suspected that river bulrush was introduced to Field 18 via a contaminated nursery plug used to plant one of the other species. Hardstem bulrush was present in one small patch in the eastern edge of the field (where it was planted), but was not captured by the vegetation surveys. Creeping/desert spikerush was only present in two patches in Field 18 despite being planted in many of the shallow areas of the field; however, the areal extent of spikerush was similar to what was planted (figure 29). Field 18 was surveyed to have proportional areas where each plant species was present as laid out in the planting plan and at three time periods throughout the study (figure 31). The area was determined based on presence/absence models created from point measurements of vegetation density. Proportions and density of each species remained relatively constant throughout the study period. However, the vegetative cover of each species increased throughout the study period as stems matured and therefore became larger. The lack of mature vegetation also explains why stem counts are significantly lower in Field 16 (a mature marsh) when compared to Field 18 (figures 29 and 30).

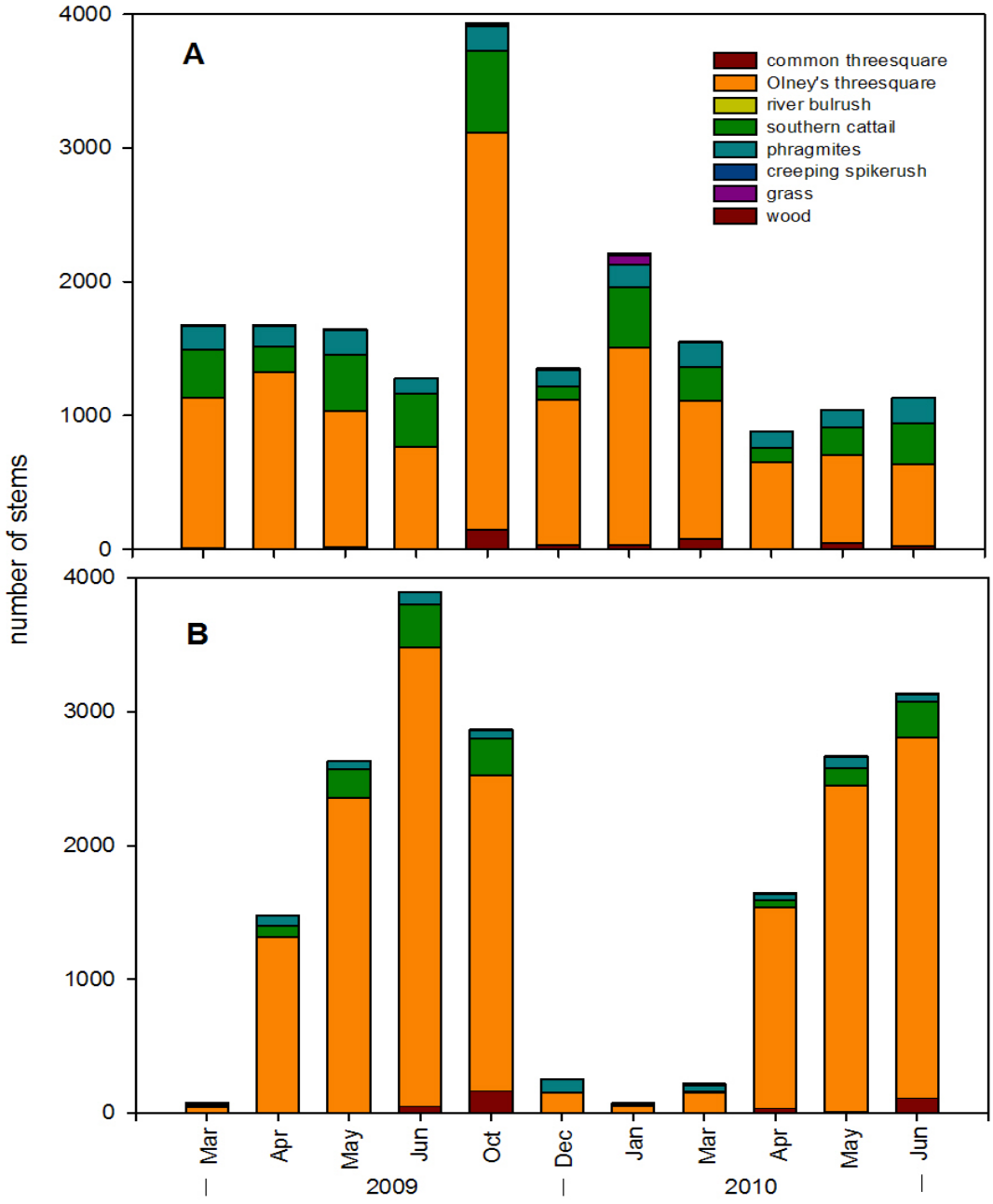

Figure 29.—Standing dead (A) and live (B) stem density within 0.25 m^2 of 56 survey points in Field 16.

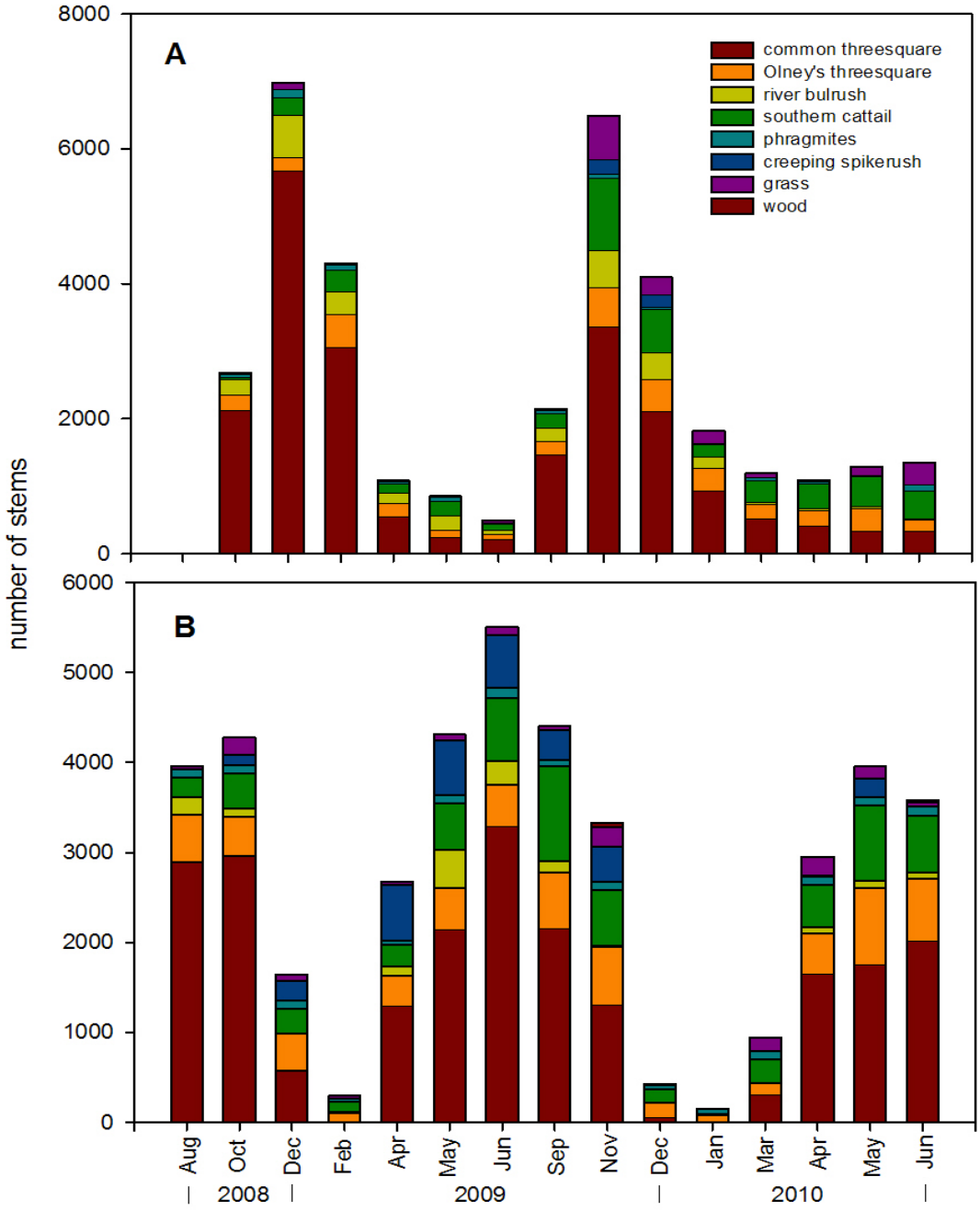

Figure 30.—Standing dead (A) and live (B) stem density within 0.25 m^2 of 58 survey points in Field 18.

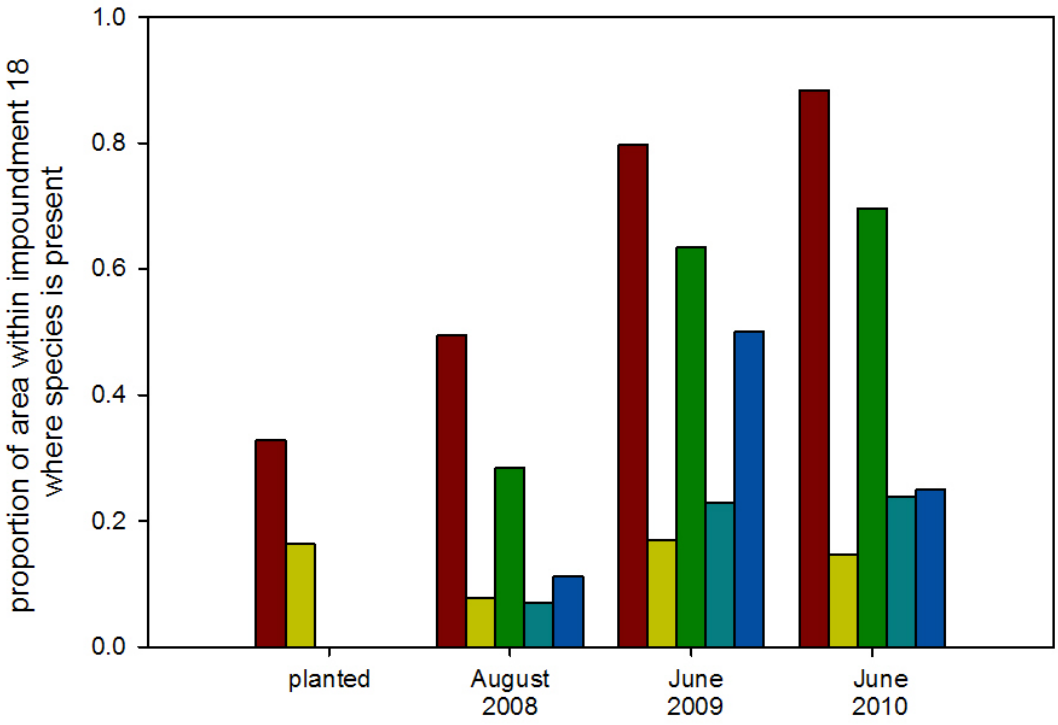

Figure 31.—Plant species presence in Field 18.

Cottonwood-Willow

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

Species Monitoring

Fish

A third year of fish monitoring took place at the ponds in 2010. The primary focus was to monitor habitat use of razorback sucker (*Xyrauchen texanus*) and recruitment of razorback sucker and bonytail (*Gila elegans*). Razorback sucker persisted without evident mortality in Ponds 2, 4, and 6. Habitat preference appears to shift season to season and is not consistent among the three ponds. However, during the summer, fish have been found to prefer deep open areas of water.

Larval razorback sucker have been collected in low numbers from Ponds 2, 4, and 6. Pond 2 is the only pond containing bonytail. Only one larval bonytail was collected; however, observations of young bonytail from the 2008 recruitment class verify their existence.

Ponds 1 and 3 were both renovated in 2010 and have not been re-stocked with bonytail or razorback sucker. A single treatment of rotenone was used, consisting of two applications, to assist with pond renovations. No fish species has been detected since the renovation of Pond 3. Western mosquitofish (*Gambusia affinis*) have since been detected in Pond 1. The remaining Ponds 2, 4, 5, and 6 all have a suite of non-native fish: bluegill (*Lepomis macrochirus*), common carp (*Cyprinus carpio*), Western mosquitofish, redear sunfish (*Lepomis microlophus*), threadfin shad (*Dorosoma petenense*), warmouth (*Lepomis gulosus*), and black crappie (*Pomoxis nigromaculatus*). These species occur in one or more of the ponds. In Pond 2, a striped bass (*Morone saxatilis*) was captured and removed. This was an isolated case, and no additional striped bass have been detected.

Pond 5 has never received native fish and is currently only monitored for water quality. Water quality is monitored in all six ponds, generally remaining within the established thresholds. During June–August, the pH was near or above the threshold (pH < 9.0).

Marsh Bird Surveys

The National Marsh Bird Monitoring Protocol (Conway 2008 was used to conduct standardized surveys for marsh birds during the 2009 and 2010 breeding season, and the location of each marsh bird detected during the surveys was mapped. Water depth was determined at the time of each bird survey using bathymetric models of each field and the average well depth during the time of the survey (figure 32). Water depth was determined within 15 m of each site of a black rail detection and 30 random sites that were not occupied by black rails. The number of sites sampled is shown above each water depth on figure 32. Surveys were conducted on 15 survey points spaced 50 m apart on the periphery of Field 16 and 9 survey points spaced 100 m apart on the periphery of Field 18. There were 11 surveys completed in Field 16 in both 2009 and 2010 (table 7). A maximum of three and seven black rails were detected in Field 16 in 2009 and 2010, respectively. A total of 7 surveys were completed in Field 18 in 2009 and 11 surveys in 2010 (table 7). A maximum of three and five black rails were detected in Field 16 in 2009 and 2010, respectively. The first black rails (three) were detected in Field 18 on April 20, 2009. Yuma clapper rails and western least bitterns were also detected in both fields (table 7). Clapper rails and least bitterns were first detected in Field 18 on March 26, 2009, and on July 31, 2008 (an incidental observation during a vegetation survey), respectively.

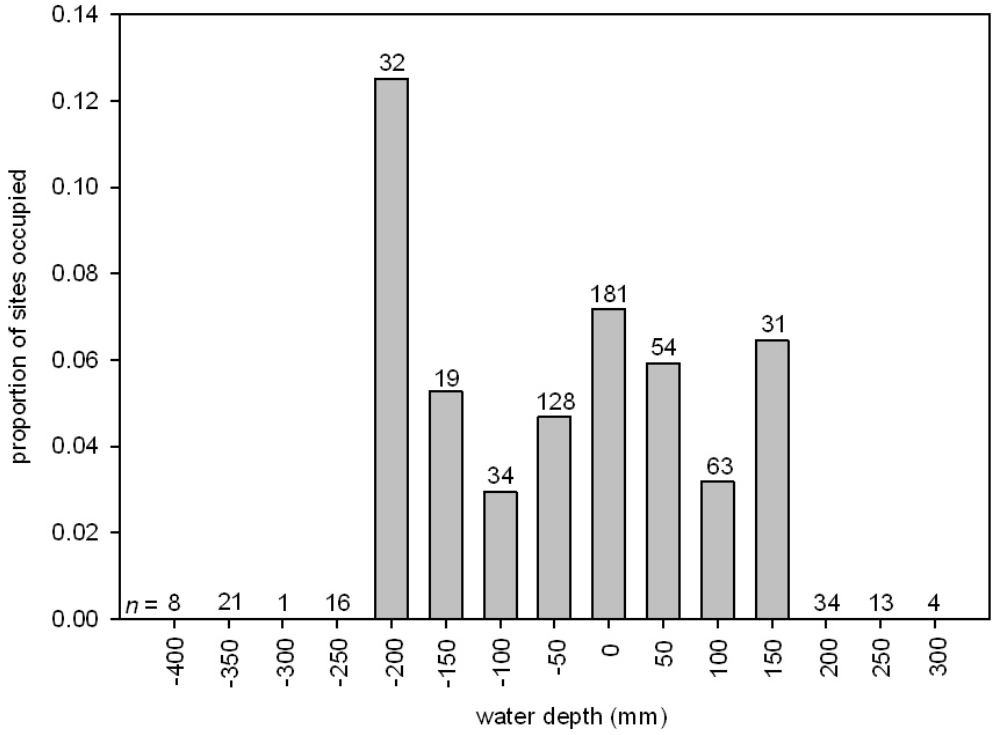

Figure 32.—Proportion of sites occupied by black rails in Fields 16 and 18 in relation to water depth throughout each field.

Hydrology and Topography

Fields 16 and 18.—Water depth models were created to represent the water depth in 1-m cells throughout Fields 16 and 18 during the time of each of the bird surveys. The models were created based on the average well depth at the time of the survey and a bathymetric model of each field. The average water depths were determined within 15 m of each mapped black rail location during the time of the survey. The average water depth was also determined during the time of the survey within 15 m of approximately 30 random points per bird survey date. A 15-m buffer around each random point did not overlap the 15-m buffer around each black rail point, and random points did not overlap each other by more than 50%. The random points represented water conditions available to, but unused by, black rails during each survey. It was assumed that black rails would track the ideal water depth within each of the fields as the water depths within the fields changed. Using this assumption, a higher proportion of black rails was assumed to be in particular water depths than would be given the distribution of water depths throughout each field.

Table 7.—Number of focal species detected on marsh bird surveys in Fields 16 and 18

Date	Impoundment 16 (Number of birds detected)			Date	Impoundment 18 (Number of birds detected)		
	BLRA	CLRA	LEBI		BLRA	CLRA	LEBI
20-Feb-09	0	10	1	26-Mar-09	0	1	0
17-Mar-09	0	2	0	13-Apr-09	0	1	0
19-Mar-09	0	9	0	28-Apr-09	0	1	0
09-Apr-09	0	21	0	14-May-09	0	2	0
20-Apr-09	3	11	3	25-May-09	0	3	0
24-Apr-09	1	8	0	15-Jun-09	0	2	0
01-May-09	1	4	0	07-Jul-09	3	0	1
12-May-09	0	12	0	12-Mar-10	0	3	0
25-May-09	0	1	0	30-Mar-10	2	7	1
11-Jun-09	0	0	0	31-Mar-10	2	4	2
06-Jul-09	2	5	1	15-Apr-10	1	13	1
02-Mar-10	0	16	0	30-Apr-10	1	5	2
23-Mar-10	0	1	0	14-May-10	3	1	0
24-Mar-10	0	8	1	24-May-10	2	8	1
05-Apr-10	2	5	0	08-Jun-10	2	2	0
16-Apr-10	1	2	1	28-Jun-10	4	3	0
03-May-10	2	11	1	13-Jul-10	5	1	1
17-May-10	4	6	1	26-Jul-10	3	0	1
28-May-10	7	8	0				
16-Jun-10	2	0	0				
12-Jul-10	5	2	0				
27-Jul-10	4	2	0				

Black rails were detected in water ranging in depth from -182–161 mm. A high proportion of black rails were detected in areas with water levels below 0 (i.e., saturated soils) relative to the conditions available in each field. These results suggest that black rails may prefer drier marshes than has been suggested by many studies. Indeed, black rails appeared to prefer marshes that are only intermittently flooded to keep the soil moist and the vegetation healthy.

The average daily water levels (blue line) in Fields 16 and 18 are shown below on figures 33 and 34. Depths were averaged from 54 and 55 water monitoring wells (respectively) installed throughout the fields, and black rail counts were taken during bird surveys (red stars). Indicators represent (A) the time at which

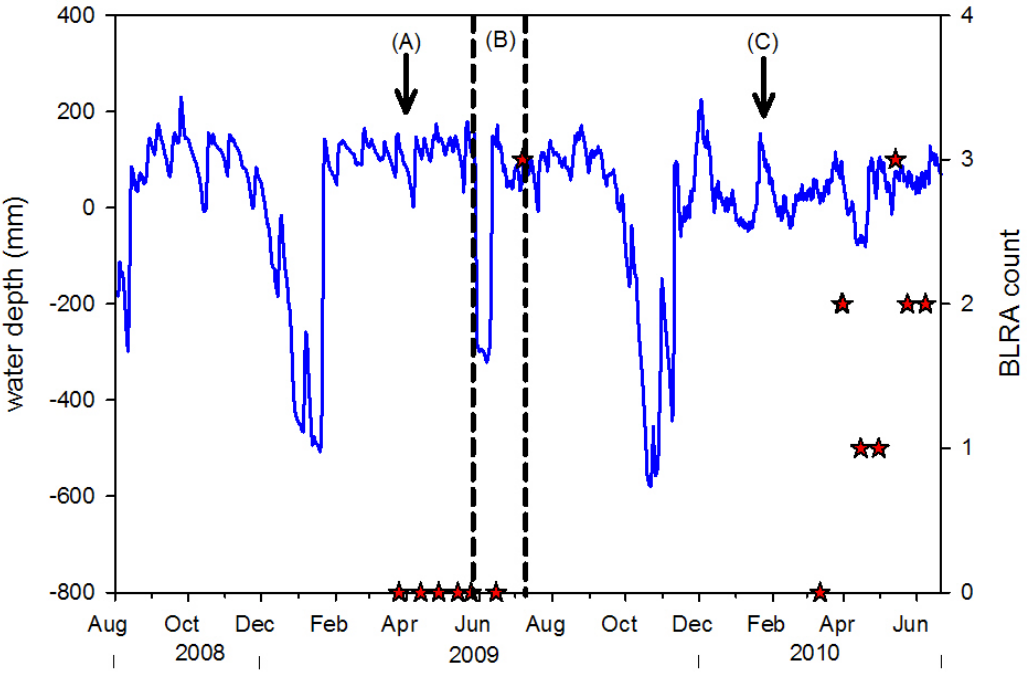

Figure 33.—Average daily water level (blue line) in Field 16.

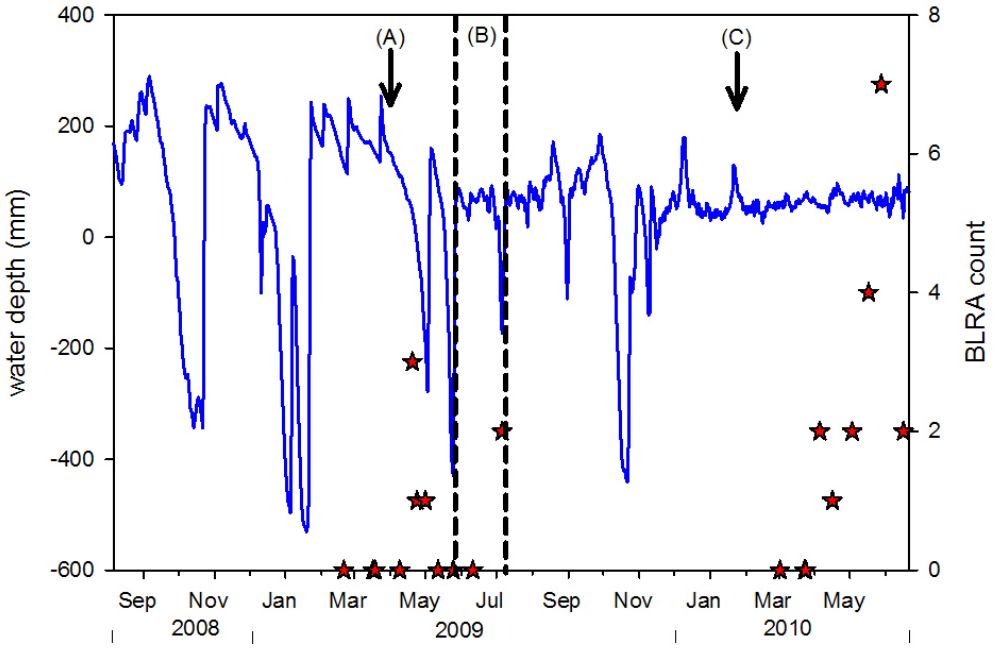

Figure 34.—Average daily water level for Field 18.

recommended water levels were first provided based on historic levels, (B) the period when the wells were removed for repair, and (C) the time at which the recommended water levels were revised based on habitat suitability modeling. The water measurements here are not comparable to staff gauge measurements.

Southwestern Willow Flycatcher Surveys

Surveys were conducted five call/playback surveys for Southwestern willow flycatcher (SWFL) (*Empidonax traillii extimus*) at both the Imperial Nursery and along the tamarisk-dominated vegetation north of Pond 1 along the river. Surveys were conducted from May through July during the SWFL breeding season. No SWFL were detected.

General Bird Surveys

The northern end of the IPCA was surveyed by the field crew from the Great Basin Bird Observatory as part of the system-wide bird monitoring effort for birds on the LCR. The area was surveyed twice, and all birds that were resident and had established a territory were mapped and counted according to the system-wide monitoring protocol (Great Basin Bird Observatory 2010). Biologists surveyed within 50 m of all points in the area to be searched and recorded riparian birds seen and heard. This survey serves as the pre-monitoring of bird use for the fields to be planted with riparian vegetation. A map of the area surveyed and the survey results are shown below on figures 35 and table 8. Three LCR MSCP covered species were found during the survey. The covered species included yellow warbler (*Dendroica petechia*), least bittern (*Ixobrychus exilis*), and summer tanager (*Piranga rubra*) (table 8).

Yellow-billed Cuckoo

Four surveys for yellow-billed cuckoo (*Coccyzus americanus*) were conducted during the summer of 2010 at the Imperial Nursery and the surrounding area. There were three survey detections in 2010 and one possible breeding pair. A possible breeding pair is defined as a pair of birds detected at least twice without other signs of breeding such as food carrying, nest with young, etc., being detected, which would confirm breeding.

Bat Monitoring

Anabat bat detectors were deployed across the site quarterly to determine bat activity across habitat types. Bat activity is expressed in call minutes, which indicate that a given species is present if it is recorded at least once within a 1-minute period. Table 9 lists the total number of call minutes of MSCP bat species for each year sampled in cottonwood and mesquite habitats combined across 4 years of monitoring. In 2010, three monitoring sites in mesquite habitat

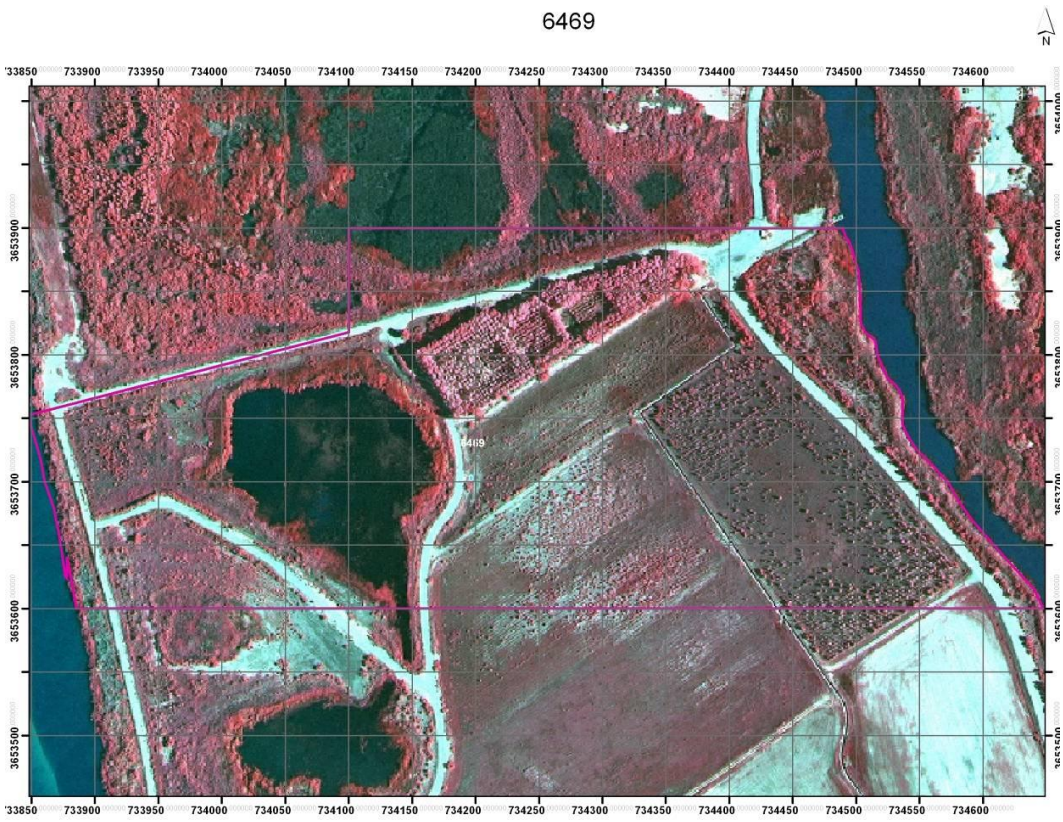

Figure 35.—Aerial photo of the rapid area search plot. (The area that was surveyed is outlined in purple.)

were added, contributing 23 minutes of a total of 42 minutes of yellow bat activity. The intermediate cottonwood sites have been monitored continuously from 2007 through 2010. There were 19 minutes of bat activity in this habitat type in 2010, indicating a substantial increase in yellow bat activity at the IPCA. In 2010, bat activity for the California leaf-nosed bat increased from the previous 3 years, mostly due to the addition of the mesquite monitoring sites. For a detailed analysis of this data, see the report *Post-Development Bat Monitoring of Habitat Creation Areas along the Lower Colorado River – 2010 Acoustic Surveys*.

Small Mammal Surveys

A total of 68 trap nights resulted in 2 *Sigmodon hispidus* being captured at Imperial Ponds. Trapping was conducted within the "cottonwood forest" (15 traps) and in the tract of habitat to the north of the road next to the cottonwoods (53 traps) in a dense mixture of *Phragmites, Prosopis pubescens*, *Pluchea*, *Typha*, and *Baccharis*. Both *Sigmodon hispidus* were captured in the mixture of plant species on the north side of the road.

Table 8.—Bird species with number of territories detected in rapid surveys of the IPCA
(LCR MSCP covered species are highlighted in grey)

Species	Number of territories
Abert's towhee	2
American coot	4
Black phoebe	1
Black-tailed gnatcatcher	1
Brown-crested flycatcher	1
Brown-headed cowbird	1
Bullock's oriole	1
Common yellowthroat	16
Eared grebe	3
Great-tailed grackle	6
Least bittern	2
Marsh wren	7
Mourning dove	11
Pied-billed grebe	1
Ruddy duck	5
Song sparrow	4
Sora	1
Summer tanager	1
Verdin	3
Western kingbird	1
Yellow warbler	1
Yellow-breasted chat	2
Yellow-headed blackbird	5

Table 9.—Total number of call minutes recorded for the four focal species at the IPCA for FY07 through FY10 in restoration habitats

Species	FY07	FY08	FY09	FY20	All years
Western red bat	1	0	8	8	9
Western yellow bat	0	4	6	42	10
California leaf-nosed bat	41	60	34	81	135
Townsend's big-eared bat	4	0	0	1	4
All other species	2,534	3,075	4,175	9,271	9,784
Total call minutes	2,580	3,139	4,223	9,403	9,942

In 2006, 75 total traps were set out at the cottonwood-willow nursery and an area across the road from the nursery, with a total of five small mammals captured. In 2007, a total of 297 traps (149 in March and 148 in October) were set out around the perimeter of most of the conservation area, and 60 rodents were captured. No cotton rats were captured in 2006, but six were captured in 2007 across the road from the nursery in a dense stand of vegetation dominated by common reed. One additional juvenile cotton rat was captured in the spring across the road from bare fields in a sparse mixture of common reed, arrowweed, and *Baccharis* spp. In 2008, 59 traps were set in the area where cotton rats had been captured in 2007. A total of 44 rodents were captured, including one cotton rat (table 10). No trapping was conducted in 2009. A total of seven species have been captured at Imperial.

Table 10.—Summary of all captures at Imperial

Species	2006	2007	2008	2010
Sigmodon hispidus	0	6	1	2
Peromyscus eremicus	4	34	37	8
Peromyscus maniculatus	0	1	0	0
Chaetodipus penicillatus	0	16	4	1
Neotoma albigula	0	2	0	3
Reithrodontomys megalotis	1	1	0	0
Mus musculus	0	0	2	1
Totals	5	60	44	15

MANAGEMENT

Wildfire Management

The USFWS will provide an appropriate management response on all wildfires that occur within the IPCA. The full range of suppression strategies is available to managers provided that selected options do not compromise firefighter and public safety, cost effectiveness, benefits, and values to be protected.

The suppression strategy on the IPCA is to minimize fire size. That strategy may utilize a range of tactics including direct attack, parallel attack, and indirect attack with hand crews, engines, aircraft, and/or heavy equipment. Burning out fire lines, enhancing a defensible boundary, backfiring from strategic barriers, using existing natural barriers or constructed barriers, cold-trailing, and other activities may accompany the more standard tactics. An initial action may be simply monitoring fire behavior while deciding which tactics would be most effective. All of these actions are employed with the intention of safely suppressing the wildfire with minimal overall costs and damage to resources.

Public Use

Currently, as well as prior to implementation of this project, the IMA, within which the Imperial Ponds are located, is closed to the general public. Although this site is closed, the 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. 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.

Law Enforcement

Law enforcement activities are performed primarily by the USFWS's law enforcement officer for for the Southwest Arizona National Refuges Complex (which includes Imperial, Cibola, and Kofa National Wildlife Refuges) under the program's site-specific Fire Management and Law Enforcement Strategy (LCR MSCP 2009). Additional local law enforcement assistance is available through the Arizona Game and Fish Department's Yuma Office, the Yuma County Sherrif's Office, and Bureau of Land Management's Yuma Office.

During this reporting period, no reportable law enforcement issues occurred at the site.

Invasive Plant Management

An ongoing effort to manage the spread of invasive weeds is performed as necessary by INWR as well as through the planting contractor.

Future Habitat Development

Future development within the 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.

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