



Lower Colorado River Multi-Species Conservation Program

Balancing Resource Use and Conservation

Post-Development and System-Wide Monitoring of Rodent Populations

2018 Annual Report



May 2019

Work conducted under LCR MSCP Work Tasks D10 and F03

Lower Colorado River Multi-Species Conservation Program Steering Committee Members

Federal Participant Group

Bureau of Reclamation
U.S. Fish and Wildlife Service
National Park Service
Bureau of Land Management
Bureau of Indian Affairs
Western Area Power Administration

Arizona Participant Group

Arizona Department of Water Resources
Arizona Electric Power Cooperative, Inc.
Arizona Game and Fish Department
Arizona Power Authority
Central Arizona Water Conservation District
Cibola Valley Irrigation and Drainage District
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City of Lake Havasu City
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Mohave Valley Irrigation and Drainage District
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Salt River Project Agricultural Improvement and Power District
Unit "B" Irrigation and Drainage District
Wellton-Mohawk Irrigation and Drainage District
Yuma County Water Users' Association
Yuma Irrigation District
Yuma Mesa Irrigation and Drainage District

Other Interested Parties Participant Group

QuadState Local Governments Authority
Desert Wildlife Unlimited

California Participant Group

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City of Needles
Coachella Valley Water District
Colorado River Board of California
Bard Water District
Imperial Irrigation District
Los Angeles Department of Water and Power
Palo Verde Irrigation District
San Diego County Water Authority
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The Metropolitan Water District of Southern California

Nevada Participant Group

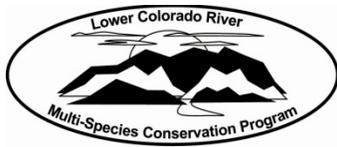
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Lower Colorado River RC&D Area, Inc.
The Nature Conservancy



Lower Colorado River Multi-Species Conservation Program

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ACRONYMS AND ABBREVIATIONS

Cibola NWR	Cibola National Wildlife Refuge
km	kilometer(s)
LCR	lower Colorado River
LCR MSCP	Lower Colorado River Multi-Species Conservation Program
MEFF	mobile electronic field form

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ABSTRACT

The Bureau of Reclamation is the lead agency for the Lower Colorado River Multi-Species Conservation Program (LCR MSCP). Implementing the LCR MSCP will create at least 8,132 acres of new habitat (5,940 acres of Fremont cottonwood-Goodding's willow [*Populus fremontii-Salix gooddingii*], 1,320 acres of honey mesquite [*Prosopis glandulosa*], 512 acres of marsh, and 360 acres of backwater) for 27 covered species, including the Colorado River cotton rat (*Sigmodon arizonae plenus*) and Yuma hispid cotton rat (*Sigmodon hispidus eremicus*). The *sobrinus* subspecies of the desert pocket mouse (*Chaetodipus penicillatus*) is being evaluated to determine if it should be added as a covered species.

The presence of Colorado River cotton rats, Yuma hispid cotton rats, and desert pocket mice at existing habitat along the lower Colorado River and at LCR MSCP conservation areas was monitored under Work Task D10 (System Monitoring of Rodent Populations) and Work Task F3 (Small Mammal Colonialization of Conservation Areas). Trapping was conducted in eight conservation areas and one system-wide site during fiscal year 2018. Twenty-three Colorado River cotton rat captures were recorded at conservation areas (Palo Verde Ecological Reserve and Hart Mine Marsh), and none were captured during system-wide surveys. Eight Yuma hispid cotton rats were captured in conservation areas (Yuma East Wetlands and Hunters Hole), and none were captured during system-wide surveys. Twenty-two desert pocket mice were captured in conservation areas (Beal Lake Conservation Area, Palo Verde Ecological Reserve, and Laguna Division Conservation Area), and none were captured during system-wide surveys. A genetic analysis was not conducted, so it is unknown if these mice were of the *sobrinus* subspecies, which is thought to be restricted to southeast Nevada, northwestern Arizona, and extreme southwestern Utah.

INTRODUCTION

The Lower Colorado River Multi-Species Conservation Program (LCR MSCP) is a partnership of Federal and non-Federal stakeholders that was created to respond 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. It is a long-term (50-year) plan to conserve at least 27 species along the LCR from Lake Mead to the Southerly International Boundary with Mexico through implementation of a Habitat Conservation Plan. Implementation of the LCR MSCP began in October 2005. Implementing the LCR MSCP will create at least 8,132 acres of new habitat (5,940 acres of Fremont cottonwood-Goodding's willow [*Populus fremontii-Salix gooddingii*] [hereafter cottonwood-willow], 1,320 acres of honey mesquite [*Prosopis glandulosa*], 512 acres of marsh, and 360 acres of backwater).

Twenty-six Federal or State-listed candidate and sensitive species and their associated habitats, ranging from aquatic and wetland habitats to riparian and upland areas, are covered under the LCR MSCP. These include the Colorado River cotton rat (*Sigmodon arizonae plenus*) and Yuma hispid cotton rat (*Sigmodon hispidus eremicus*). The *sobrinus* subspecies of the desert pocket mouse (*Chaetodipus penicillatus*) is being evaluated to determine if it should be added as a covered species.

Within the LCR MSCP habitat creation goals, 125 acres of habitat are to be created for the Colorado River cotton rat, and 76 acres are to be created for the Yuma hispid cotton rat. It is currently believed that the ranges of these two cotton rat species do not overlap. Those captured south of the Trigo and Chocolate Mountains in the area of the Imperial National Wildlife Refuge and south of the Yuma, Arizona, area to date are Yuma hispid cotton rats. Those captured north of the aforementioned mountain ranges to date are Colorado River cotton rats. The northernmost historic records of Colorado River cotton rats are from an area just south of Laughlin, Nevada (Bradley 1966; Hall 1946). Colorado River cotton rats were captured in 2012 at the Big Bend Conservation Area, marking the first record of the species in Nevada since 1966.

Desert pocket mice occur in creosote bush (*Larrea tridentata*) and xeric riparian communities of the Southwest, from Baja California, Mexico in the South and southeastern California, southern Nevada, and extreme southwestern Utah in the North. The range of the *sobrinus* subspecies is not well documented, but it is believed to be within Clark County, Nevada, and may be present farther south. The desert pocket mice caught during the 2017 small mammal surveys were not evaluated to determine whether or not they were of the *sobrinus* subspecies.

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The Bureau of Reclamation is increasing its understanding of restoration science through an adaptive management approach; therefore, monitoring of habitat creation/restoration sites is crucial. Species presence at existing habitat along the LCR and at LCR MSCP conservation areas is being monitored under Work Task D10 (System Monitoring of Rodent Populations) and Work Task F3 (Small Mammal Colonialization of Conservation Areas). In addition, Work Task C27 (Small Mammal Population Studies) was conducted to identify distribution, genetics, and habitat requirements, and to establish monitoring protocols for the covered small mammal species.

METHODS

Sherman live traps (3 x 3.75 x 12 inches) were placed non-randomly in areas with the highest likelihood of encountering the cotton rat species, which generally consist of a dense understory of grasses and/or shrubs alongside or beneath an overhead cover of forbs and low-growing woody species (Work Task C27) (Goertz 1964). In general, if the overall trapping area is fairly homogenous, with appropriately dense vegetation structure, the trapping grid begins on a corner or edge. If a distinctly denser vegetation area is found within an otherwise more open area, the trapping grid will begin in the denser habitat patch. These surveys are focused on determining the presence of cotton rat species. All other captures are incidental to the main focus, and the methods were not designed to estimate abundance; therefore, the numbers of individuals of each species (including Colorado River cotton rats and Yuma hispid cotton rats) reported here are rough indices that do not provide reliable means of analyzing population trends.

Sherman live traps are triggered by an animal stepping on a pressure plate that then closes a trap door behind it. Traps were baited with a mixture of oats, peanut butter, and vanilla. A small handful of cotton was also added to each trap to provide insulating cover for any animal trapped overnight. The traps were set 1 to 2 hours before sunset and pulled within 1 to 2 hours of sunrise during the warmer months to minimize heating of the traps during the trapping period.

When the habitat patch allowed, traps were set out in a grid of at least three transects approximately 50 feet (15 meters) apart. Each transect consisted of at least five trap stations spaced approximately 33 feet (10 meters) apart. Trap spacing is estimated with pacing and is not measured exactly; it may vary if the more densely vegetated areas are dispersed across the trapping area.

When the habitat patch with the highest density vegetation was more linear, transects were not set in a grid system. If only a single linear stretch of habitat was trapped, a single transect was set along the edge of the habitat patch. This usually meant that the transect was much longer than in the typical grid system (15 or more trap stations).

The approximate location of each trap was recorded using either a Trimble Juno Global Positioning System unit running a mobile electronic field form (MEFF) using the software Terrasync, or an Apple Iphone 6 with ArcGIS Survey123 software installed, and the traps were collected the following morning. Each transect was labeled by a letter, and each trap was numbered. For example, the first trap station of the first transect of a grid would be labeled A-1, and if there were two traps at that location, they were designated as trap A-1-a and A-1-b. Data were entered electronically on the Global Positioning System unit using the MEFF.

Captured animals were either viewed inside the trap or transferred into a clear plastic bag and identified to species. The animals were identified using the Mammals of California field guide (Jameson and Peeters 2004), the Kays and Wilson field guide (2002), and the expertise of LCR MSCP personnel that had more than 3 years of experience conducting surveys. Cotton rats were given an age class based on three general size classes (juvenile, subadult, and adult). The age classes of the cotton rats were determined based on the general size of an individual using the experience of LCR MSCP personnel present during the survey. Gender was also determined for cotton rats. All other species were only given an age class of either juvenile or adult, and gender was not determined. Measurements were taken, if needed, for identification. A MEFF was used to record information on all animals captured, whether they were marked, where in the grid they were captured, the location of the grid, and what the dominant ground cover vegetation was in the trapping area. All animals were released back into the trapping area once identification was made. Traps in which an animal had been captured were washed in a bleach water solution and then rinsed in plain water and set out to dry after each trapping day.

STUDY AREAS

Trapping was conducted in eight LCR MSCP conservation areas and one system-wide survey site within Reaches 2–7 (figure 1).

LCR MSCP Conservation Areas

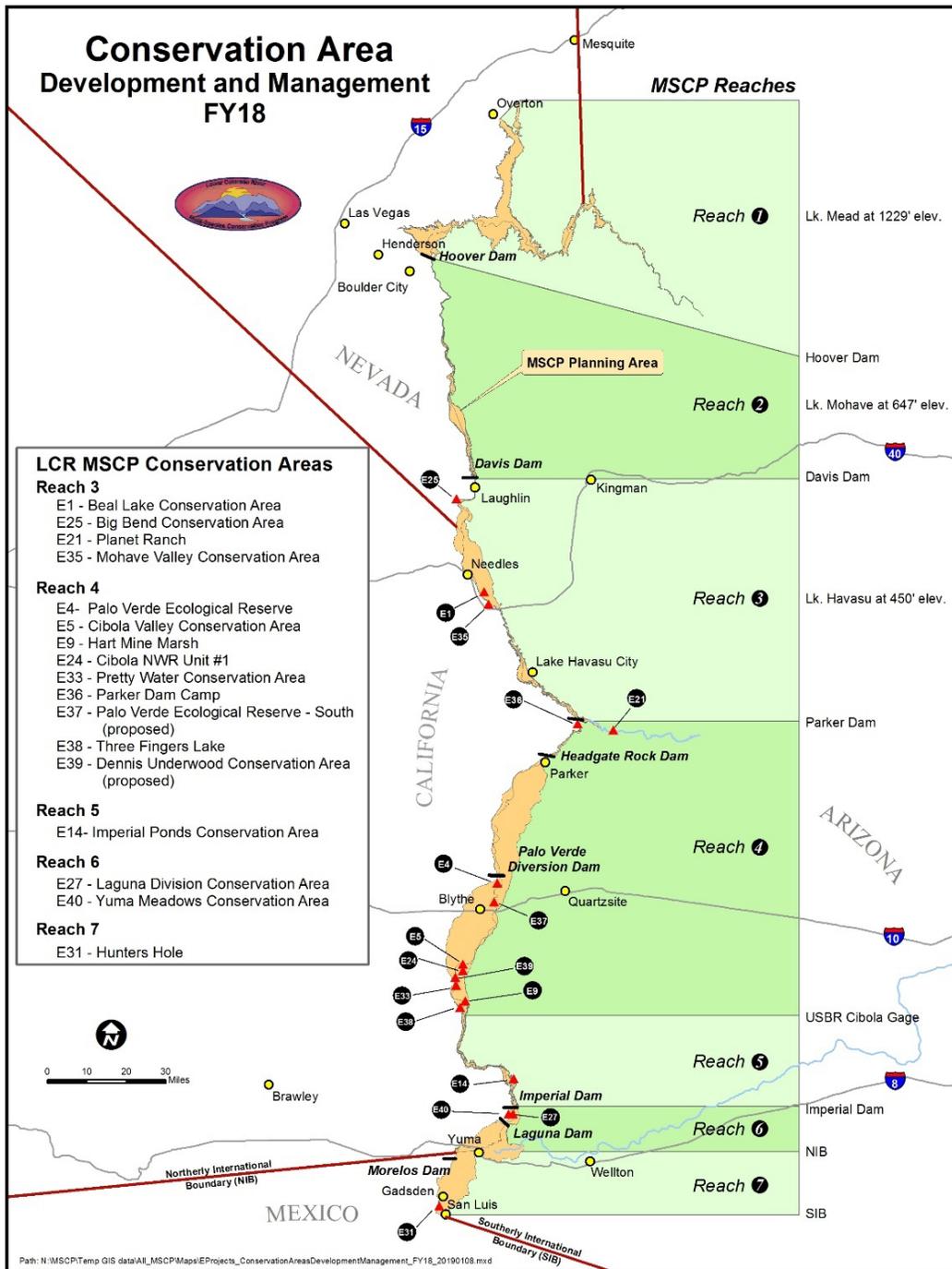


Figure 1.—LCR MSCP conservation areas.

Beal Lake Conservation Area

The Beal Lake Conservation Area is 100 acres adjacent to Beal Lake and Topock Marsh, inside the Havasu National Wildlife Refuge on the Arizona side of the Colorado River (see figure 1). The site is within Reach 3. It is a two-phase habitat creation project that was initiated in spring 2003 (figure 2). The site was planted with Fremont cottonwood, Goodding's willow, coyote willow (*Salix exigua*), honey mesquite, and screwbean mesquite (*Prosopis pubescens*). Arrowweed (*Pluchea sericea*) and some baccharis (*Baccharis* spp.) have begun to fill in the open areas and edges of most of the plots in the site.

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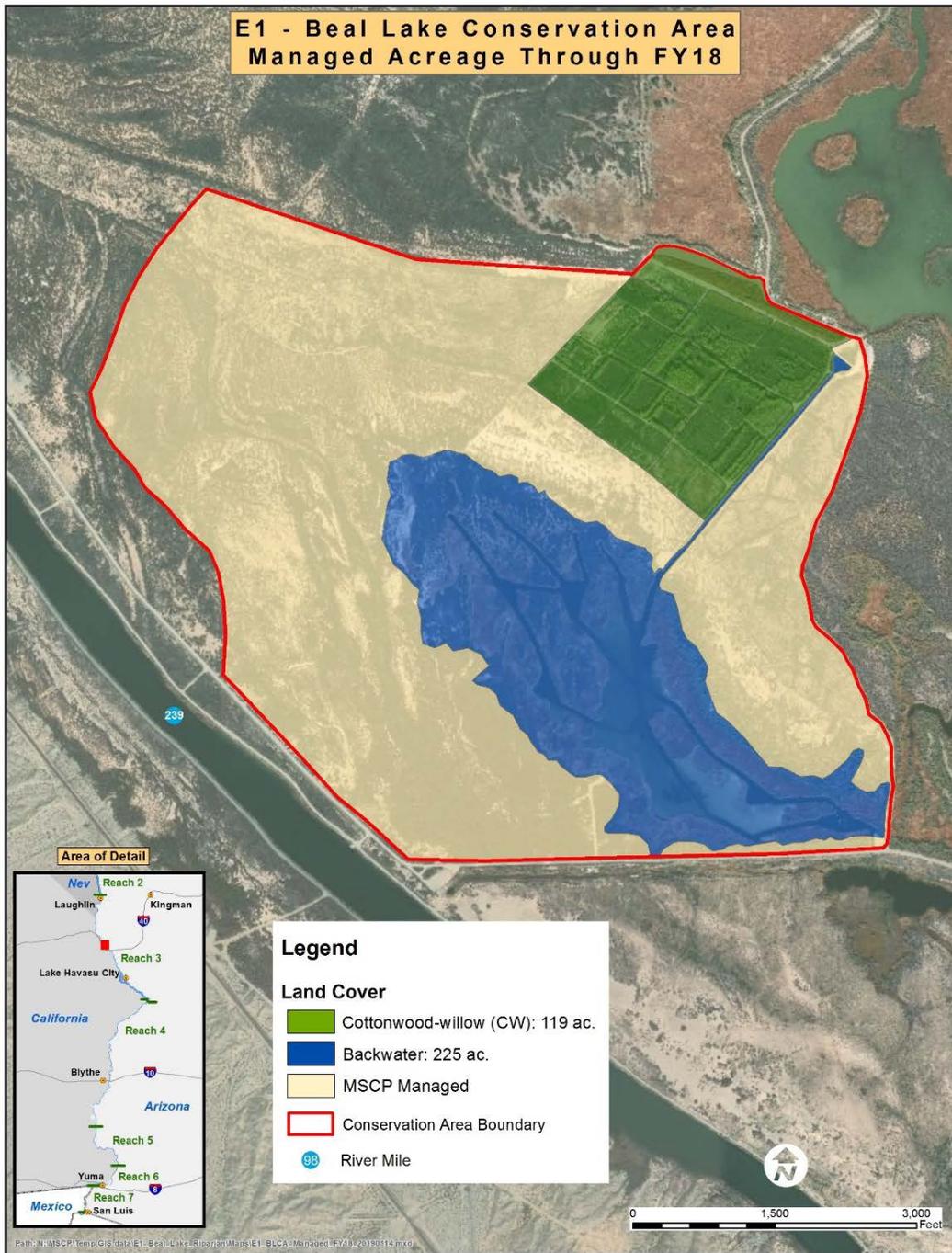


Figure 2.—Beal Lake Conservation Area managed acreage through fiscal year 2018.

Palo Verde Ecological Preserve

The Palo Verde Ecological Preserve is a conservation area located 5 miles (8 kilometers [km]) north of Blythe, California, along the California side of the Colorado River (see figure 1). The site is within Reach 4. It encompasses 1,300 acres. The acreages are separated into nine different phases, with one phase planted every year through 2014 (figure 3). In spring 2006, a 31-acre nursery (Phase 1) was planted. In spring 2007, Phase 2 was planted with 80 acres of Fremont cottonwood, Goodding's willow, coyote willow, and other riparian plants. Phase 3 was planted in spring 2008 and is also planted with cottonwood-willow habitat types. Phase 4 was planted in 2009 and contains mostly cottonwood-willow with one plot of honey mesquite and a mix of native grasses. Phases 5, 6, and 7 were planted in 2010, 2011, and 2012, respectively, with cottonwood-willow habitat. Phase 8 was planted in 2013 with 38 acres of honey mesquite and quailbush (*Atriplex lentiformis*) habitat.

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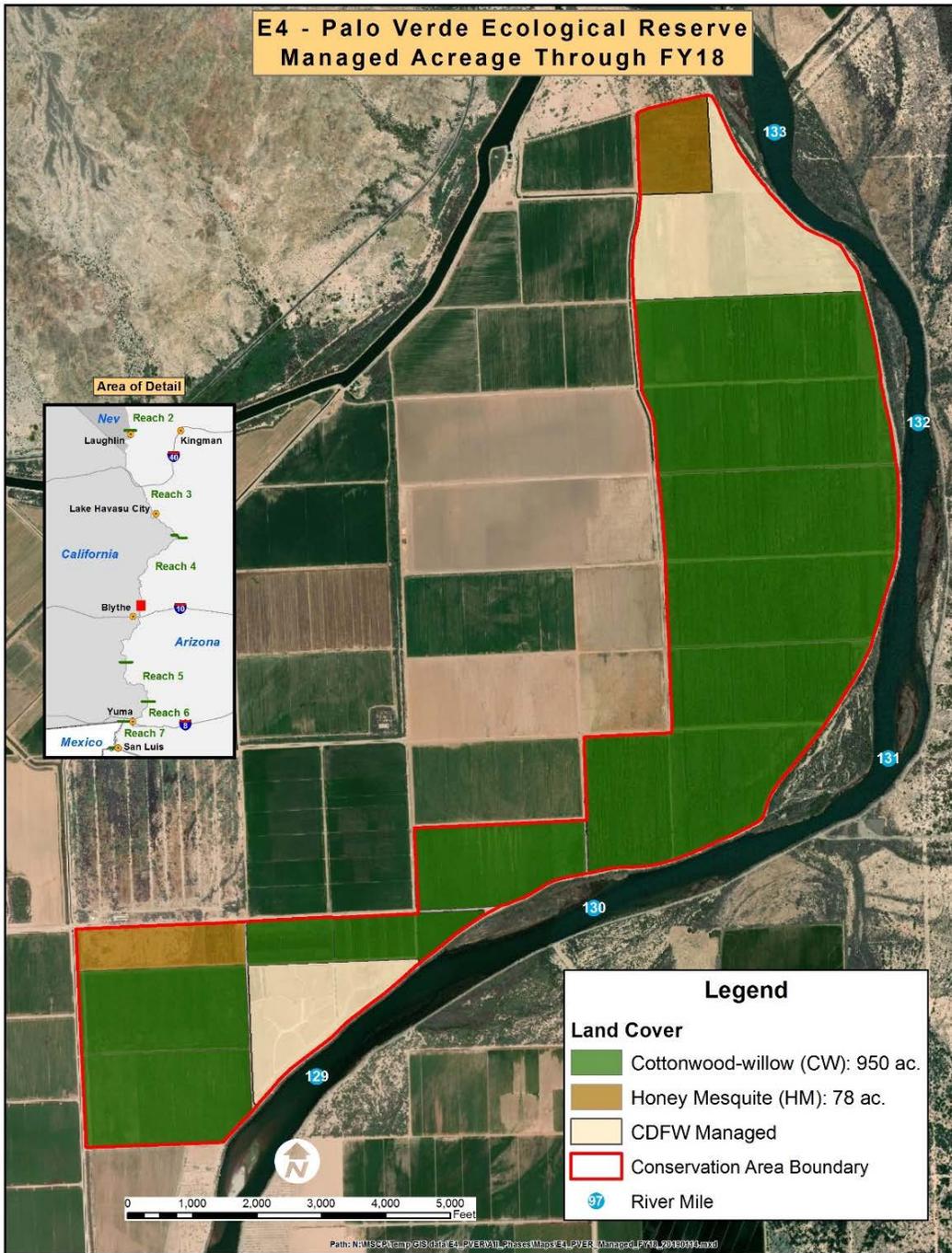


Figure 3.—Palo Verde Ecological Reserve managed acreage through fiscal year 2018.

Cibola National Wildlife Refuge Unit #1 Conservation Area

The Cibola National Wildlife Refuge (Cibola NWR) is located approximately 30 miles (48 km) south of Blythe, California, along 12 miles (19 km) of the LCR in Arizona and California (see figure 1). The site is within Reach 4. The Cibola NWR is divided into six management units, of which the Cibola National Wildlife Refuge Unit #1 Conservation Area comprises approximately 949 acres (figure 4). The Lower Hippy Fire area was planted in fiscal year 2016 with 96 acres of cottonwood-willow habitat. There are emergent grasses throughout the area, as the cottonwood canopy cover has not shaded the ground out yet.

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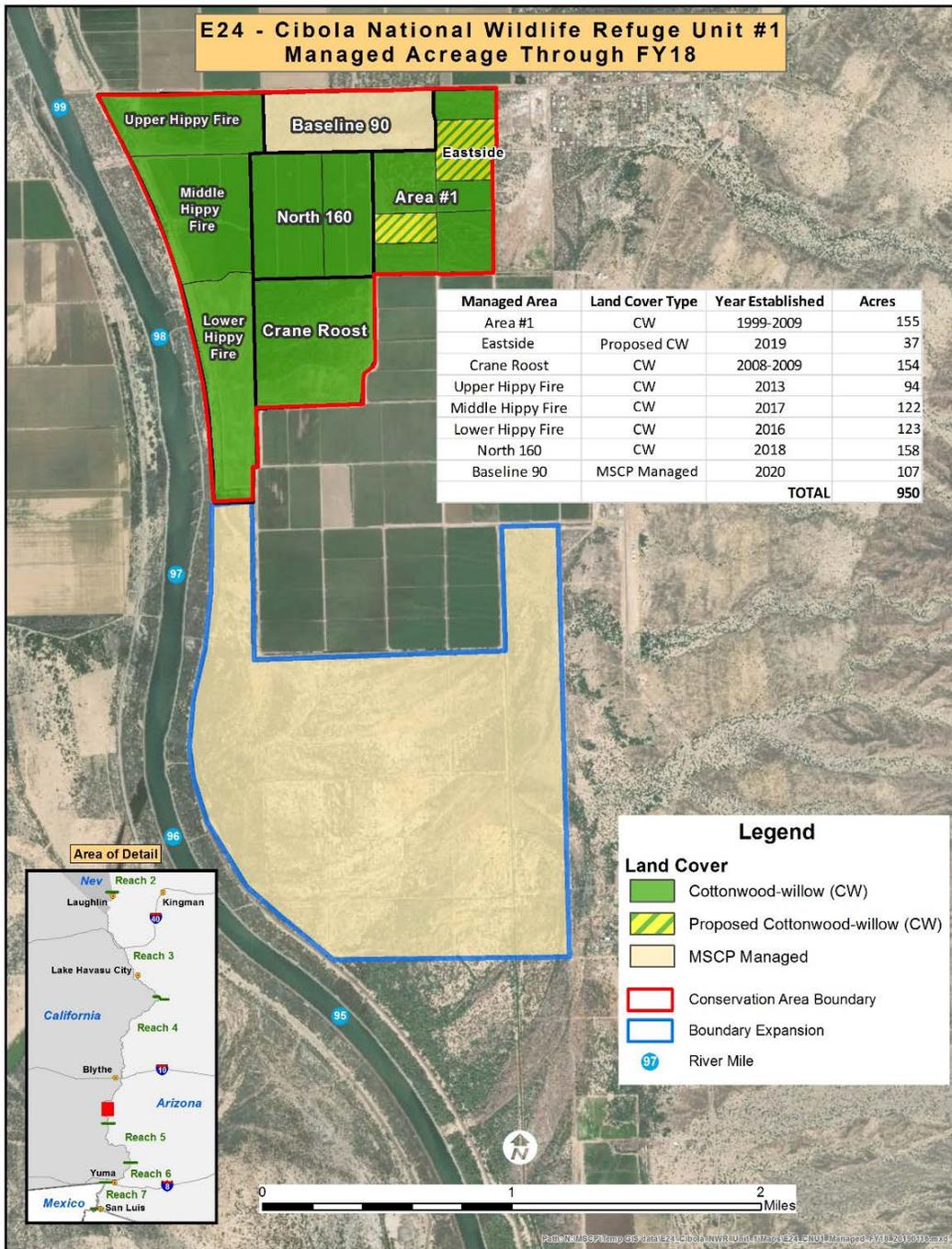


Figure 4.—Cibola National Wildlife Refuge Unit #1 Conservation Area managed acreage through fiscal year 2018.

Hart Mine Marsh

The Hart Mine Marsh Wetland Complex is located on the southern part of the U.S. Fish and Wildlife Service's Cibola NWR in Arizona (figure 5). It makes up the lower part of the management area defined as Unit 2 by the Cibola NWR. Approximately 255 acres of the 893-acre site have been restored and are being managed to partially fulfill the marsh habitat creation goals of the LCR MSCP and have been designated as a LCR MSCP conservation area. The remaining 515 acres with wetland potential are managed for U.S. Fish and Wildlife Service specific goals but are intended to be additive to the wetland complex's habitat mosaic.

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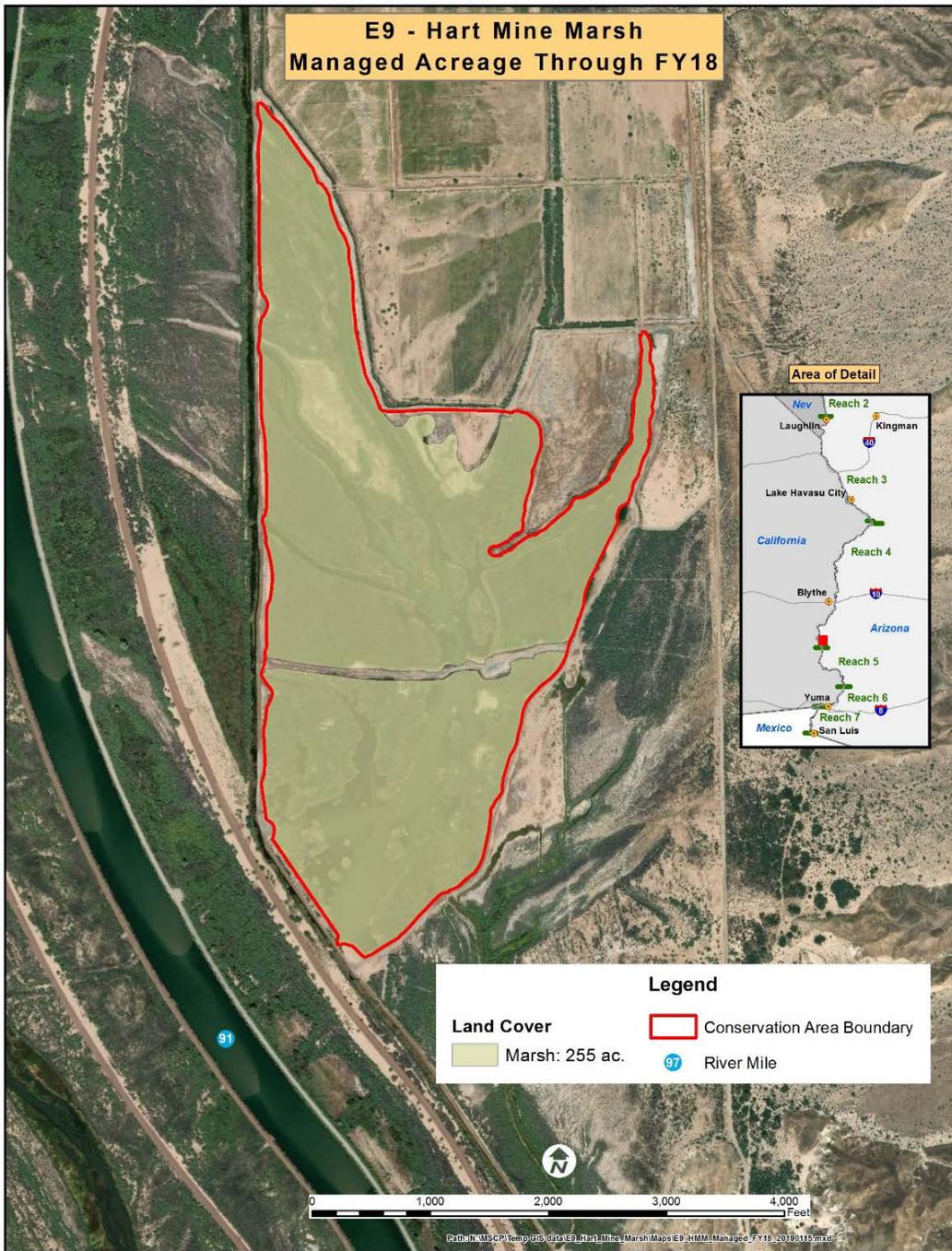


Figure 5.—Hart Mine Marsh managed acreage through fiscal year 2018.

Laguna Division Conservation Area

The Laguna Division Conservation Area is located 20 miles north of Yuma, Arizona, between Imperial Dam and Laguna Dam. The site is within Reach 6. It covers 1,100 acres, straddling the California/Arizona State boundary. The Laguna Division Conservation Area comprises approximately 200 acres of open water and marsh, 430 acres of cottonwood-willow, and 400 acres of honey mesquite habitat (figure 6). Planting was completed in 2016.

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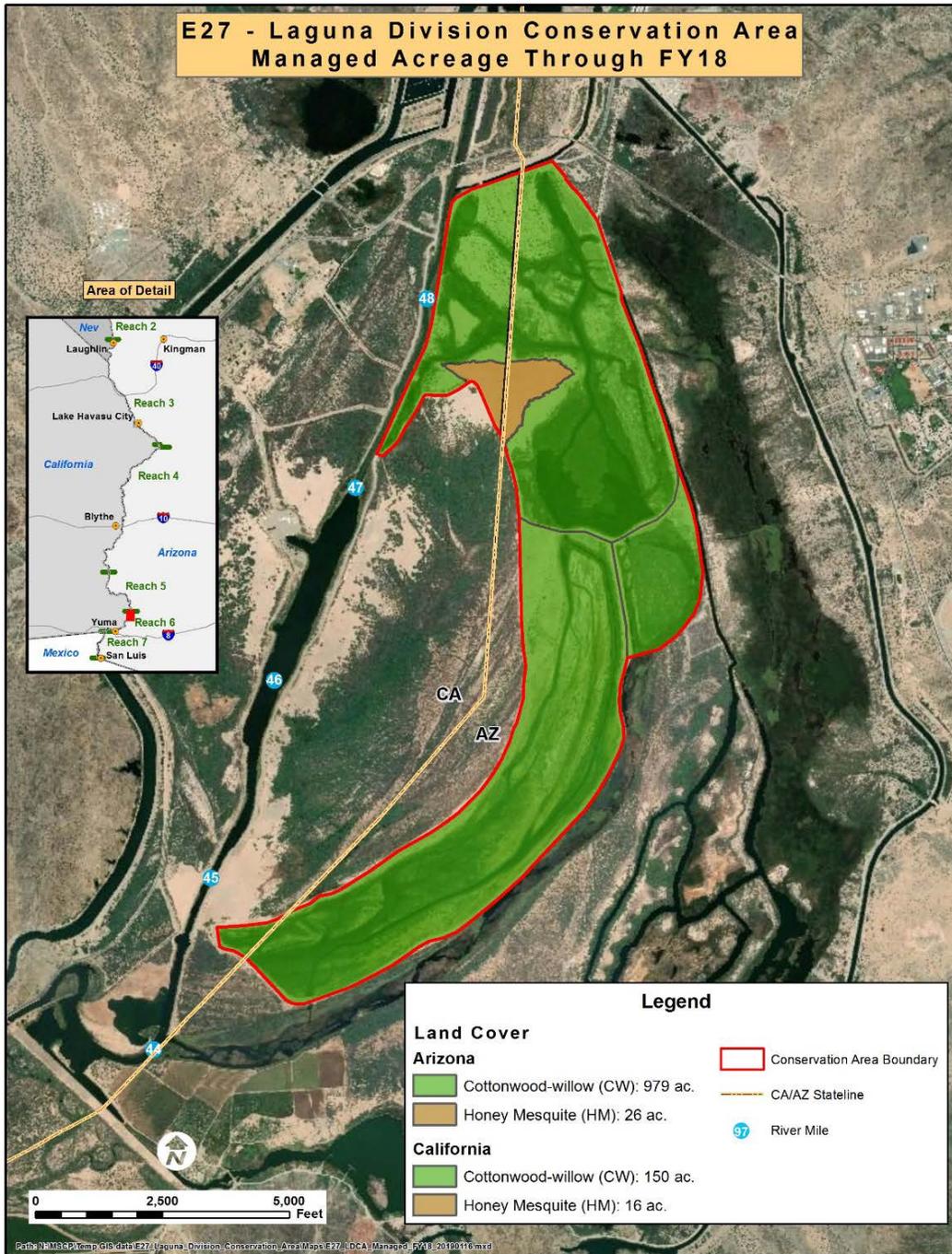


Figure 6.—Laguna Division Conservation Area managed acreage through fiscal year 2018.

Yuma East Wetlands

Yuma East Wetlands is a 392-acre conservation area consisting of lands owned by the Quechan Indian Tribe, city of Yuma, and the Arizona Game and Fish Department. The site is within Reach 6. The site is located within the city of Yuma, Arizona (see figure 1). Habitat restoration activities began in Yuma East Wetlands in 2004. The majority of the planting took place in 2009, including 115 acres of cottonwood-willow habitat, 102 acres of marsh habitat, and 175 acres of honey mesquite habitat (figure 7). In 2013, the LCR MSCP entered into partnership with the Quechan Indian Tribe, city of Yuma, Arizona Game and Fish Commission, and the Yuma Crossing National Heritage Area to support the long-term management of the site. In 2014, the bankline portion of the site was cleared of invasive vegetation and replanted with native vegetation. The site contains many open canopy areas that allow for a healthy variety of shrub and grass species necessary for Yuma hispid cotton rat colonization.

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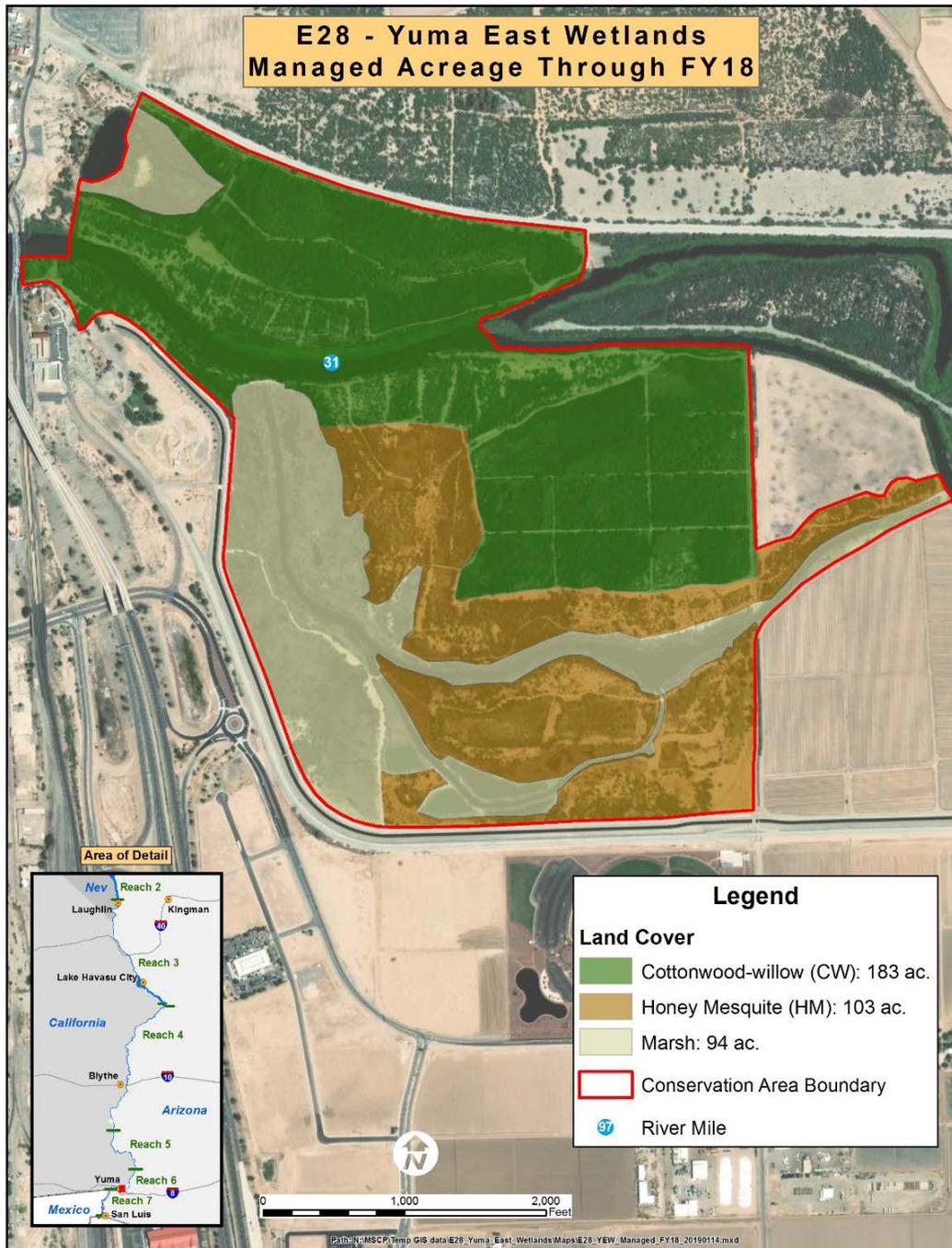


Figure 7.—Yuma East Wetlands managed acreage through fiscal year 2018.

Hunters Hole

Hunters Hole is a conservation area located near the community of San Luis, 18 miles (29 km) south of Yuma, Arizona (see figure 1). The site is within Reach 7. It was added to the LCR MSCP in 2011. The site was planted in spring 2012 with approximately 44 acres of habitat (figure 8) consisting of cottonwood-willow, honey mesquite, and marsh. It has had a number of fires throughout the years, which periodically open up the habitat for a dense layer of grasses to grow in before being shaded out by canopy regrowth.

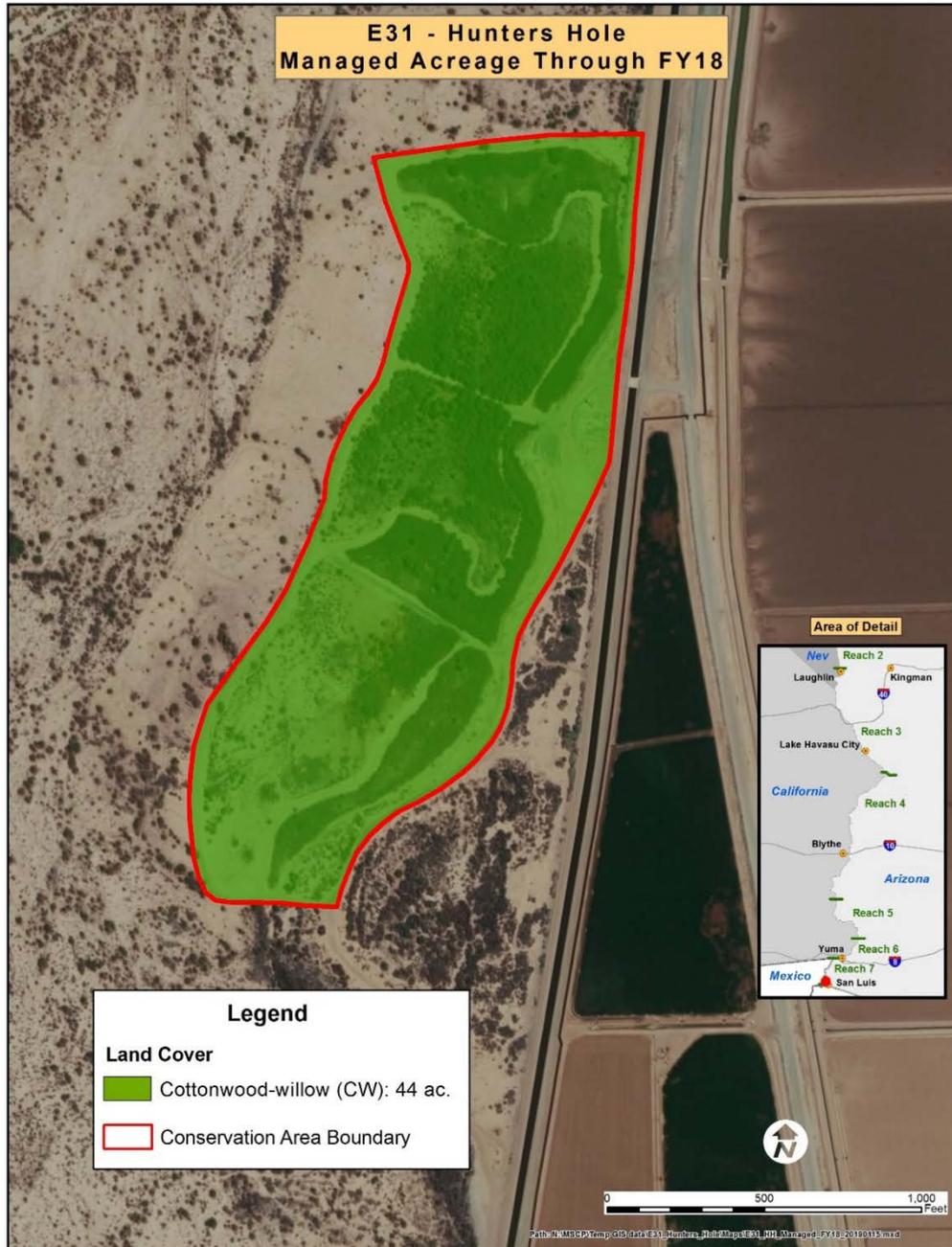


Figure 8.—Hunters Hole managed acreage through fiscal year 2018.

System-Wide Location

The lone system-wide trapping area this year was located on an island approximately 0.7 mile from the Picacho State Recreation Area and 23.3 miles north of Yuma, Arizona. The site was selected because it exhibited the structure

type similar to sites that have been successful trapping locations. The island is covered in cattails (*Typha* sp.) and grasses with some shrubs on the dryer portions, similar to what was seen/trapped at Hart Mine Marsh.

RESULTS

Conservation Areas

Beal Lake Conservation Area

Trapping occurred in three fields within the Beal Lake Conservation Area. Field F was trapped within a narrow patch of arrowweed and patches of various grass species that are a potentially suitable structure for Colorado River cotton rats (figure 9). In recent years, the patch has narrowed, becoming increasingly dominated by arrowweed. Field EE was trapped in an area of sparse saltcedar (*Tamarix ramosissima*) and a layer of Bermudagrass (*Cynodon dactylon*) ground cover. The recently planted willow marsh area (Field NN) was trapped along the edge of cattails and Bermudagrass. Fall 2017 trapping resulted in the capture of no Colorado River cotton rats and four desert pocket mice over 2 nights in Field F (table 1) and no LCR MSCP rodent species over 2 nights in Field NN (table 2). Spring 2018 trapping resulted in the capture of no Colorado River cotton rats and three desert pocket mice over 2 nights in Fields EE and NN (tables 2 and 3).

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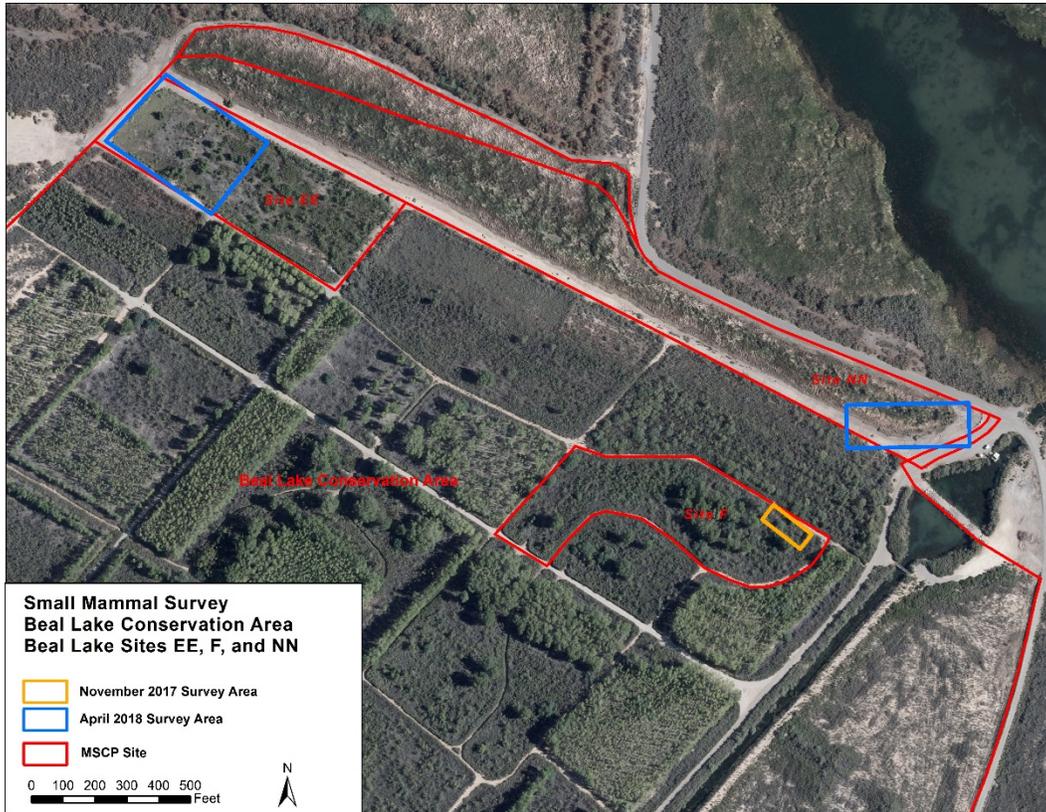


Figure 9.—Beal Lake Conservation Area trapping areas.

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Table 1.—Beal Lake Conservation Area Field F captures

Species	Fall 2017 (November 16–17, 2017)
Colorado river cotton rat (<i>Sigmodon arizonae plenus</i>)	0
Desert pocket mouse (<i>Chaetodipus penicillatus</i> sp.)	4
Cactus mouse (<i>Peromyscus eremicus</i>)	14
White-throated wood rat (<i>Neotoma albigula</i>)	2
Total captures	20
Traps/nights	40/2

Table 2.—Beal Lake Conservation Area Field NN captures

Species	Fall 2017 (November 16–17, 2017)	Spring 2018 (April 17–18, 2018)
Colorado river cotton rat (<i>Sigmodon arizonae plenus</i>)	0	0
Desert pocket mouse (<i>Chaetodipus penicillatus</i> sp.)	0	1
Total captures	0	1
Traps/nights	40/2	40/2

Table 3.—Beal Lake Conservation Area Field EE captures

Species	Spring 2018 (April 17–18, 2018)
Colorado river cotton rat (<i>Sigmodon arizonae plenus</i>)	0
Desert pocket mouse (<i>Chaetodipus penicillatus</i> sp.)	2
Cactus mouse (<i>Peromyscus eremicus</i>)	3
Total captures	5
Traps/nights	60/2

Palo Verde Ecological Reserve

This site consists of multiple planting phases with a variety of habitat types. All of the areas trapped contained a grass and/or shrub component. Phases 4, 7, and 8 were trapped. Phase 4 was planted with honey mesquite and quailbush and is now intermixed with Bermudagrass and other grasses and forbs. Phase 7 was planted with the cottonwood-willow land cover type in 2012. Phase 8 was planted with honey mesquite in 2013. Trapping occurred in Phase 4 (figure 10), Phase 7 (figure 11), and Phase 8 (figure 12) over 2 nights. Fall 2017 trapping sessions produced two Colorado River cotton rat and four desert pocket mouse captures. The cotton rat captures occurred in Phase 4 (table 4). No cotton rats or desert pocket mice were recorded in Phases 7 or 8 (tables 5 and 6).

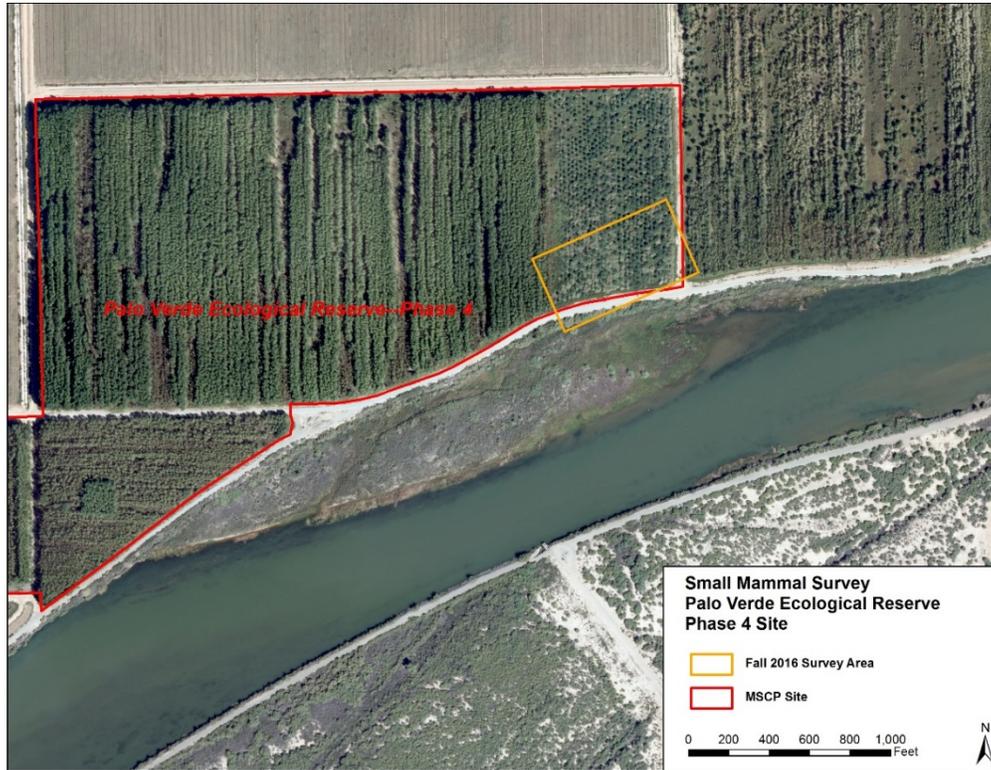


Figure 10.—Palo Verde Ecological Reserve Phase 4 trapping areas.

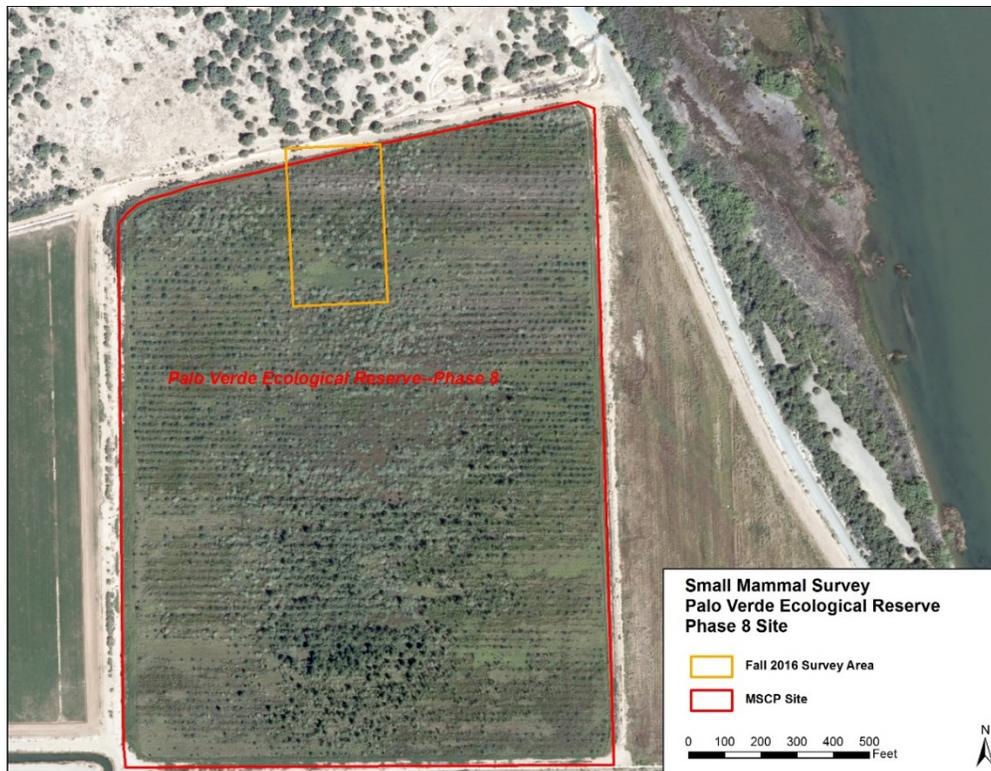


Figure 11.—Palo Verde Ecological Reserve Phase 8 trapping areas.

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Table 4.—Palo Verde Ecological Reserve Phase 4 captures

Species	Fall 2017 (November 14–15, 2017)
Colorado river cotton rat (<i>Sigmodon arizonae plenus</i>)	2
Desert pocket mouse (<i>Chaetodipus penicillatus</i> sp.)	4
Cactus mouse (<i>Peromyscus eremicus</i>)	27
White-throated wood rat (<i>Neotoma albigula</i>)	2
Total captures	35

Table 5.—Palo Verde Ecological Reserve Phase 7 captures

Species	Fall 2017 (November 14–15, 2017)
Colorado river cotton rat (<i>Sigmodon arizonae plenus</i>)	0
Desert pocket mouse (<i>Chaetodipus penicillatus</i> sp.)	0
House mouse (<i>Mus musculus</i>)	2
Total captures	2
Traps/nights	40/2

Table 6.—Palo Verde Ecological Reserve Phase 8 captures

Species	Fall 2017 (November 14–15, 2017)
Colorado river cotton rat (<i>Sigmodon arizonae plenus</i>)	0
Desert pocket mouse (<i>Chaetodipus penicillatus</i> sp.)	0
Cactus mouse (<i>Peromyscus eremicus</i>)	11
Deer mouse (<i>Peromyscus maniculatus</i>)	2
Harvest mouse (<i>Reithrodontomys megalotis</i>)	1
Total captures	14
Traps/nights	40/2

Cibola National Wildlife Refuge Unit #1 Conservation Area

Surveys within the Cibola National Wildlife Refuge Unit #1 Conservation Area occurred in the lower Hippy Fire section amongst some young cottonwoods and emergent Bermudagrass (figure 12). No Colorado River cotton rats or desert pocket mice were captured over 2 nights of trapping in spring 2018 (table 7).

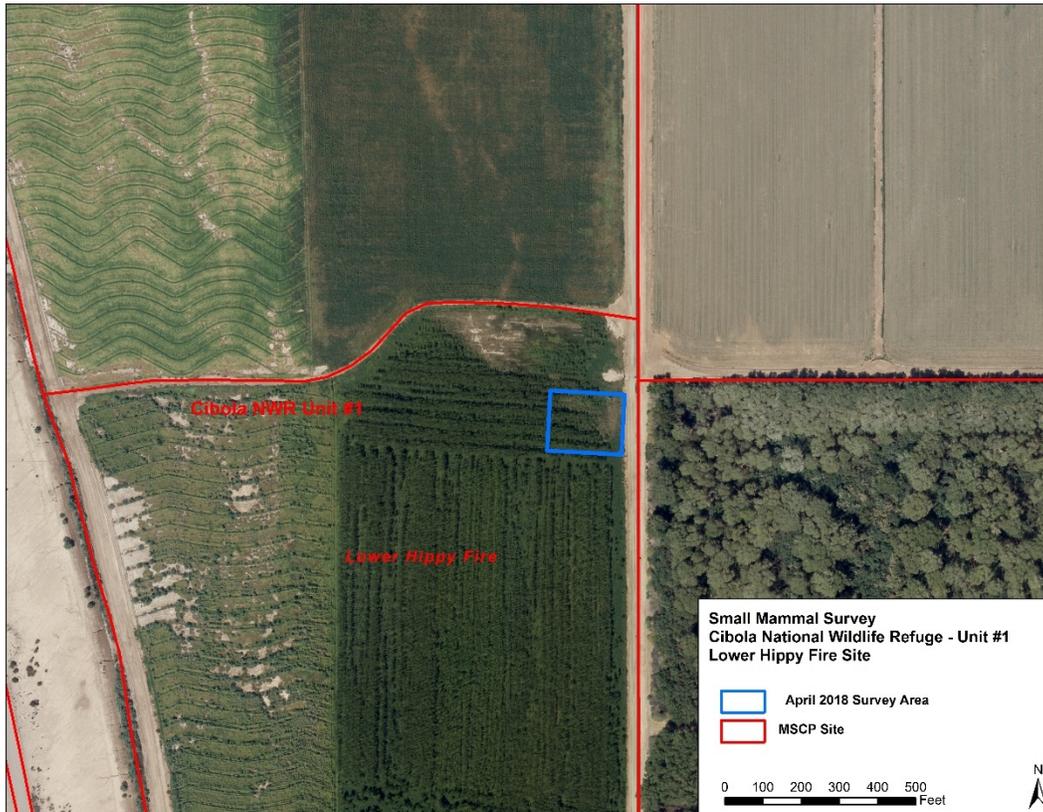


Figure 12.—Cibola National Wildlife Refuge Unit #1 Conservation Area trapping areas.

Table 7.—Cibola Valley Conservation Area Hippy Burn captures

Species	Spring 2018 (April 10–11, 2018)
Colorado river cotton rat (<i>Sigmodon arizonae plenus</i>)	0
Desert pocket mouse (<i>Chaetodipus penicillatus</i> sp.)	0
House mouse (<i>Mus musculus</i>)	4
Harvest mouse (<i>Reithrodontomys megalotis</i>)	1
Total captures	5
Traps/nights	80/2

Hart Mine Marsh

Surveys at Hart Mine Marsh occurred at the south side of Cell 01, in between arrowweed and some cattails/emergent grasses at the water's edge (figure 13). Twenty-one Colorado River cotton rats and 0 desert pocket mice were captured over 2 nights of trapping in spring 2018 (table 8).

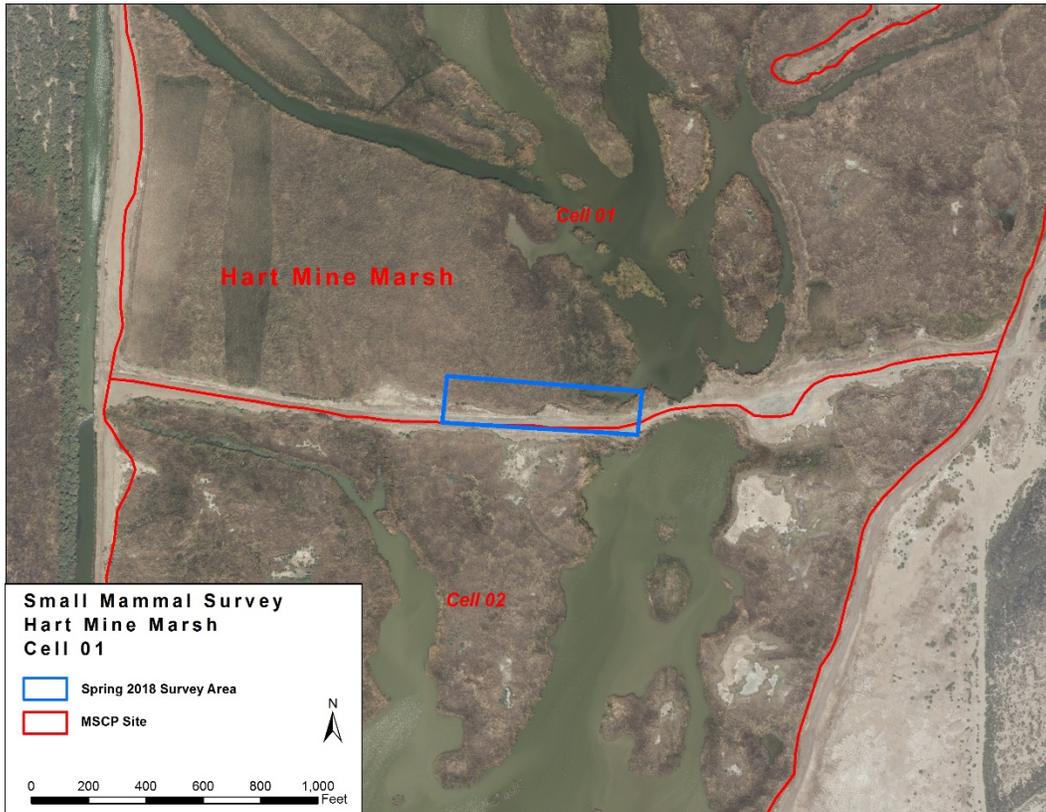


Figure 13.—Hart Mine Marsh trapping areas.

Table 8.—Hart Mine Marsh captures

Species	Spring 2018 (April 10–11, 2018)
Colorado river cotton rat (<i>Sigmodon arizonae plenus</i>)	21
Desert pocket mouse (<i>Chaetodipus penicillatus</i> sp.)	0
Harvest mouse (<i>Reithrodontomys megalotis</i>)	1
Total captures	22
Traps/nights	40/2

Laguna Division Conservation Area

Trapping occurred in two areas within the Laguna Division Conservation Area. Trapping areas were comprised of sparse alkali sacaton (*Sporobolus airoides*) and arrowweed (figures 14 and 15). Neither fall nor spring trapping sessions encountered any Yuma hispid cotton rats. One night of trapping in fall 2017 resulted in the capture of eight desert pocket mice (table 9), and 2 nights of trapping in spring 2018 resulted in the capture of three desert pocket mice.

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Figure 14.—Laguna Division Conservation Area fall 2017 survey area.

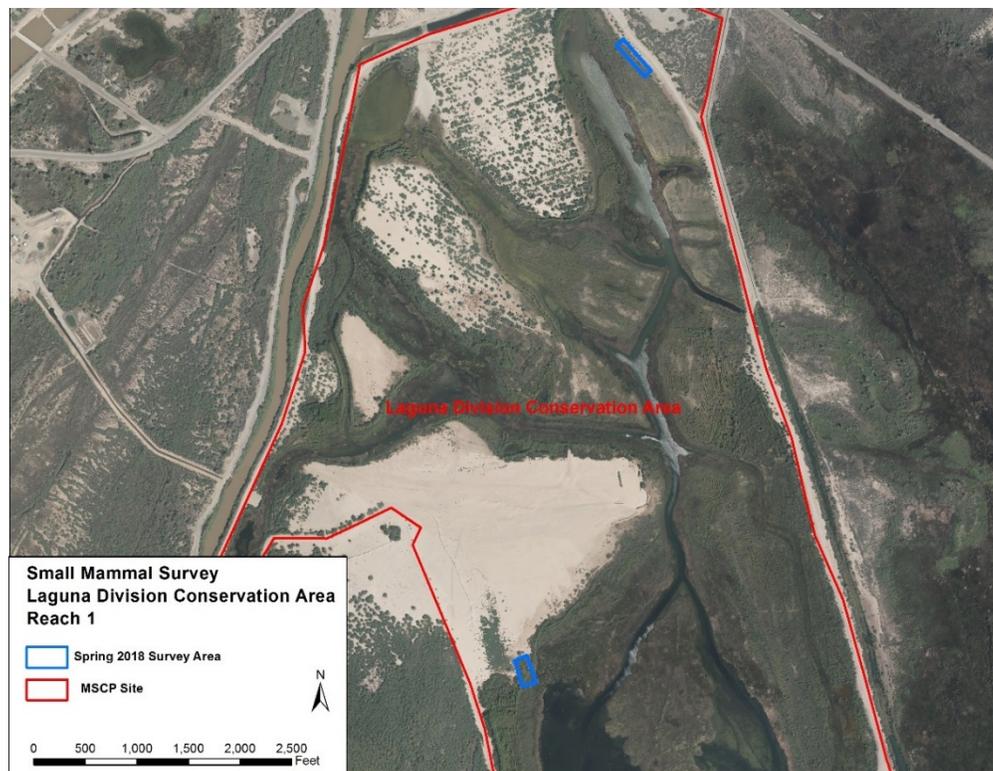


Figure 15.—Laguna Division Conservation Area spring 2018 survey area.

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Table 9.—Laguna Division Conservation Area captures

Species	Fall 2017 (October 24, 2017)	Spring 2018 (March 6–7, 2018)
Yuma hispid cotton rat (<i>Sigmodon hispidus eremicus</i>)	0	0
Desert pocket mouse (<i>Chaetodipus penicillatus</i> sp.)	8	3
Cactus mouse (<i>Peromyscus eremicus</i>)	0	14
Harvest mouse (<i>Reithrodontomys megalotis</i>)	1	1
Total captures	9	18
Traps/nights	40/1	80/2

Yuma East Wetlands

Surveys occurred in Cells I and J. The trapping area consisted of a mix of alkali sacaton, baccharis and some honey mesquite plantings (figures 16 and 17). Two nights of surveys in spring 2018 encountered four Yuma hispid cotton rats in Cell J (table 10) and three Yuma hispid cotton rats in Cell I (table 11). No desert pocket mice were encountered.

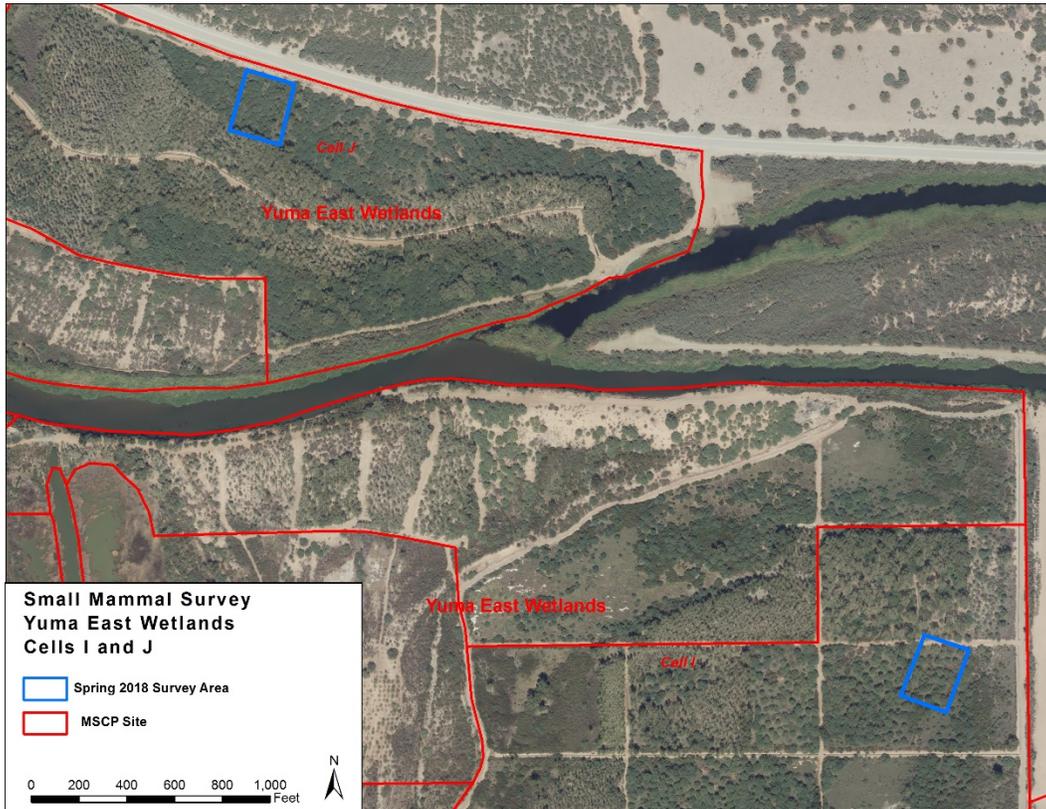


Figure 16.—Yuma East Wetlands spring 2018 trapping areas.

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Table 10.—Yuma East Wetlands Cell J captures

Species	Spring 2018 (March 7–8, 2018)
Yuma hispid cotton rat (<i>Sigmodon hispidus eremicus</i>)	4
Desert pocket mouse (<i>Chaetodipus penicillatus</i> sp.)	0
Cactus mouse (<i>Peromyscus eremicus</i>)	1
Total captures	5
Traps/nights	80/2

Table 11.—Yuma East Wetlands Cell I captures

Species	Spring 2018 (March 7–8, 2018)
Yuma hispid cotton rat (<i>Sigmodon hispidus eremicus</i>)	3
Desert pocket mouse (<i>Chaetodipus penicillatus</i> sp.)	0
Cactus mouse (<i>Peromyscus eremicus</i>)	9
Total captures	12
Traps/nights	80/2

Hunters Hole

Surveys occurred in Cell 02 over 1 night. The trapping areas were planted with Fremont cottonwood, Goodding's willow, coyote willow, and honey mesquite along with alkali sacaton and blue grama (*Bouteloua gracilis*) (figure 17). Both trapping areas were dominated by grasses, though trees are beginning to shade out the ground cover. Fall 2017 surveys produced no desert pocket mice and one Yuma hispid cotton rat (table 12).

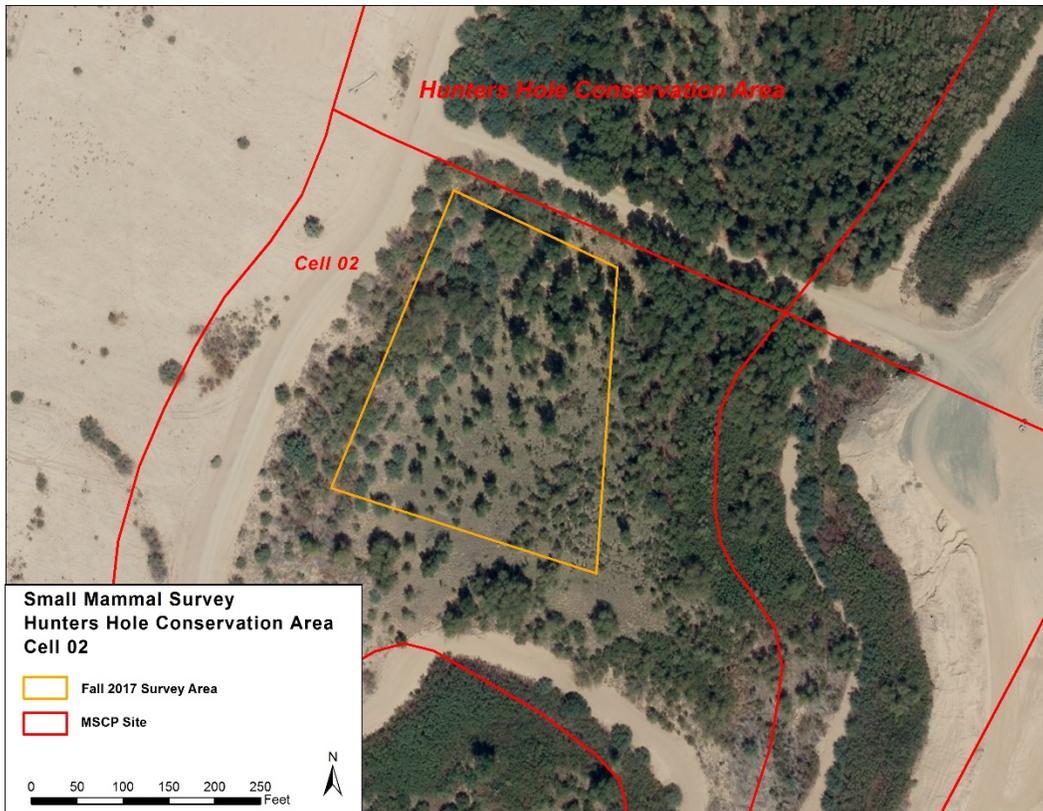


Figure 17.—Hunters Hole fall 2017 trapping areas.

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Table 12.—Hunters Hole captures

Species	Fall 2017 (October 25, 2017)
Desert pocket mouse (<i>Chaetodipus penicillatus</i> sp.)	0
Yuma hispid cotton rat (<i>Sigmodon hispidus eremicus</i>)	1
Cactus mouse (<i>Peromyscus eremicus</i>)	1
White-throated wood rat (<i>Neotoma albigula</i>)	1
Total captures	3
Traps/nights	80/1

System-Wide

Trapping occurred in an area of mixed cattails and shrubs (figure 18). One night of trapping on the island produced no desert pocket mice or Yuma hispid cotton rats (table 13). As the distribution lines between Colorado River cotton rats and Yuma hispid cotton rats are thought to be between the Cibola NWR and Imperial National Wildlife Refuge, it is uncertain what *Sigmodon* species would be encountered in this area.

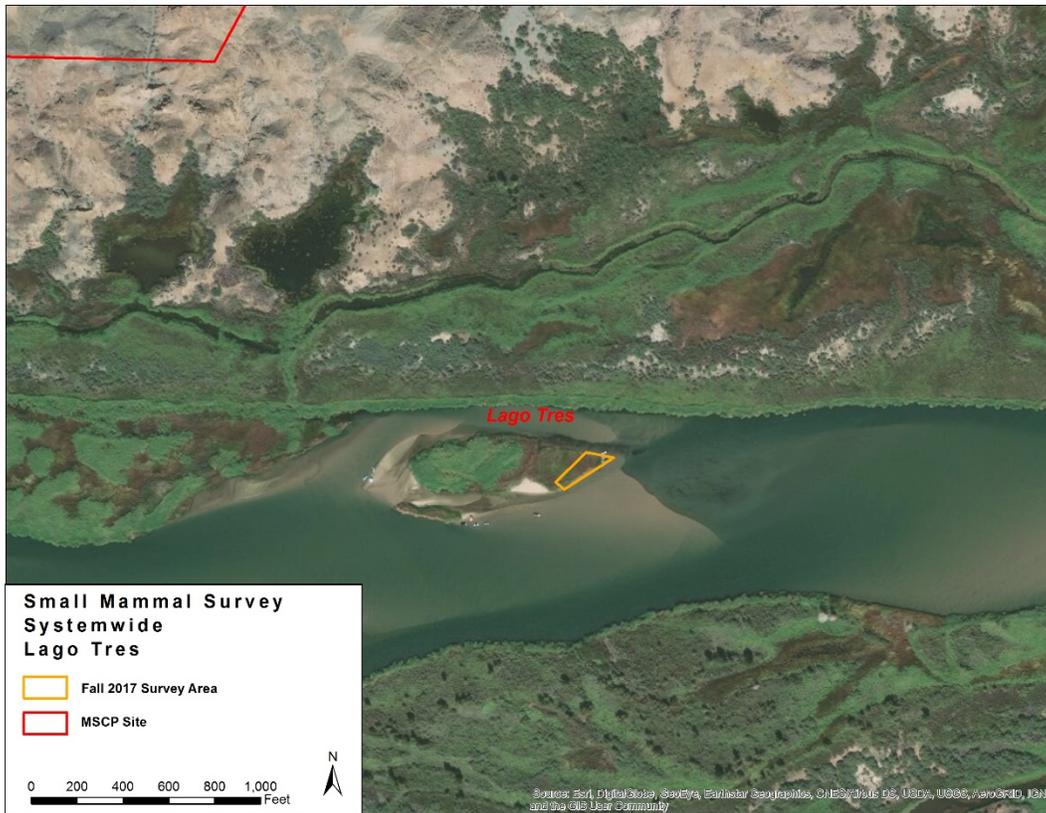


Figure 18.—System-wide fall 2017 trapping area.

Table 13.—System-wide trapping location captures

Species	Fall 2017 (October 26, 2017)
Desert pocket mouse (<i>Chaetodipus penicillatus</i> sp.)	0
Yuma hispid cotton rat (<i>Sigmodon hispidus eremicus</i>)	0
Total captures	0
Traps/nights	40/1

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