



Lower Colorado River Multi-Species Conservation Program

Balancing Resource Use and Conservation

Post-Development Monitoring of Rodent Populations

2020 Annual Report



January 2021

Work conducted under LCR MSCP Work Task F3

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

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Arizona Game and Fish Department
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Central Arizona Water Conservation District
Cibola Valley Irrigation and Drainage District
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Yuma Irrigation District
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Desert Wildlife Unlimited

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Bard Water District
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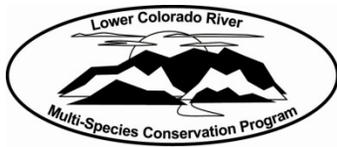
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RECLAMATION

Lower Colorado River Multi-Species Conservation Program

Post-Development Monitoring of Rodent Populations

2020 Annual Report

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**Lower Colorado River
Multi-Species Conservation Program
Bureau of Reclamation
Lower Colorado Basin
Boulder City, Nevada
<http://www.lcrmscp.gov>**

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ACRONYMS AND ABBREVIATIONS

Cibola NWR	Cibola National Wildlife Refuge
FY	fiscal year
km	kilometer(s)
LCR	lower Colorado River
LCR MSCP	Lower Colorado River Multi-Species Conservation Program
Nature Trail	Cibola National Wildlife Refuge Unit #1 Conservation Area Nature Trail

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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 LCR MSCP conservation areas was monitored at five conservation areas under Work Task F3 (Small Mammal Colonialization of Conservation Areas) during fiscal year 2020. In total, 10 Colorado River cotton rat captures were recorded at the following conservation areas: Cibola National Wildlife Refuge Unit #1 Conservation Area (3), Palo Verde Ecological Reserve (5), and Hart Mine Marsh (2). In total, eight Yuma hispid cotton rats were captured at Yuma East Wetlands (seven) and Hunters Hole (one). One desert pocket mouse was captured at Hunters Hole. A genetic analysis was not conducted on the desert pocket mouse, so it is unknown if it was 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-seven 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 these mountain ranges are considered to be 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 (Mantooth and Best 2005). 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 (Mantooth and Best 2005). The desert pocket mice caught during the 2020 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 LCR MSCP conservation areas is being monitored under Work Task F3 (Small Mammal Colonialization of Conservation Areas). In addition, species presence at existing habitat along the LCR was monitored under Work Task D10 (System Monitoring of Rodent Populations), and 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, trapping is conducted in areas with appropriately dense ground vegetation structure. If a distinctly denser vegetation area is found within an otherwise more open area, the trapping grid begins in the denser habitat patch. These surveys were focused on determining the presence of the cotton rat species. All other captures were 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 a Bad Elf GNSS Surveyor paired with an Apple iPhone 6 or iPad Mini 4 with ArcGIS Online and 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 a mobile electronic field form.

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 (2002) field guide, 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, 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. The gender of the cotton rats was also determined. 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 mobile electronic field form was used to record information on all animals captured, where they were captured, the location of the traps, 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, rinsed in plain water, and then set out to dry after each trapping session.

STUDY AREAS

Trapping was conducted in the following five LCR MSCP conservation areas within Reaches 4–7 (figure 1).

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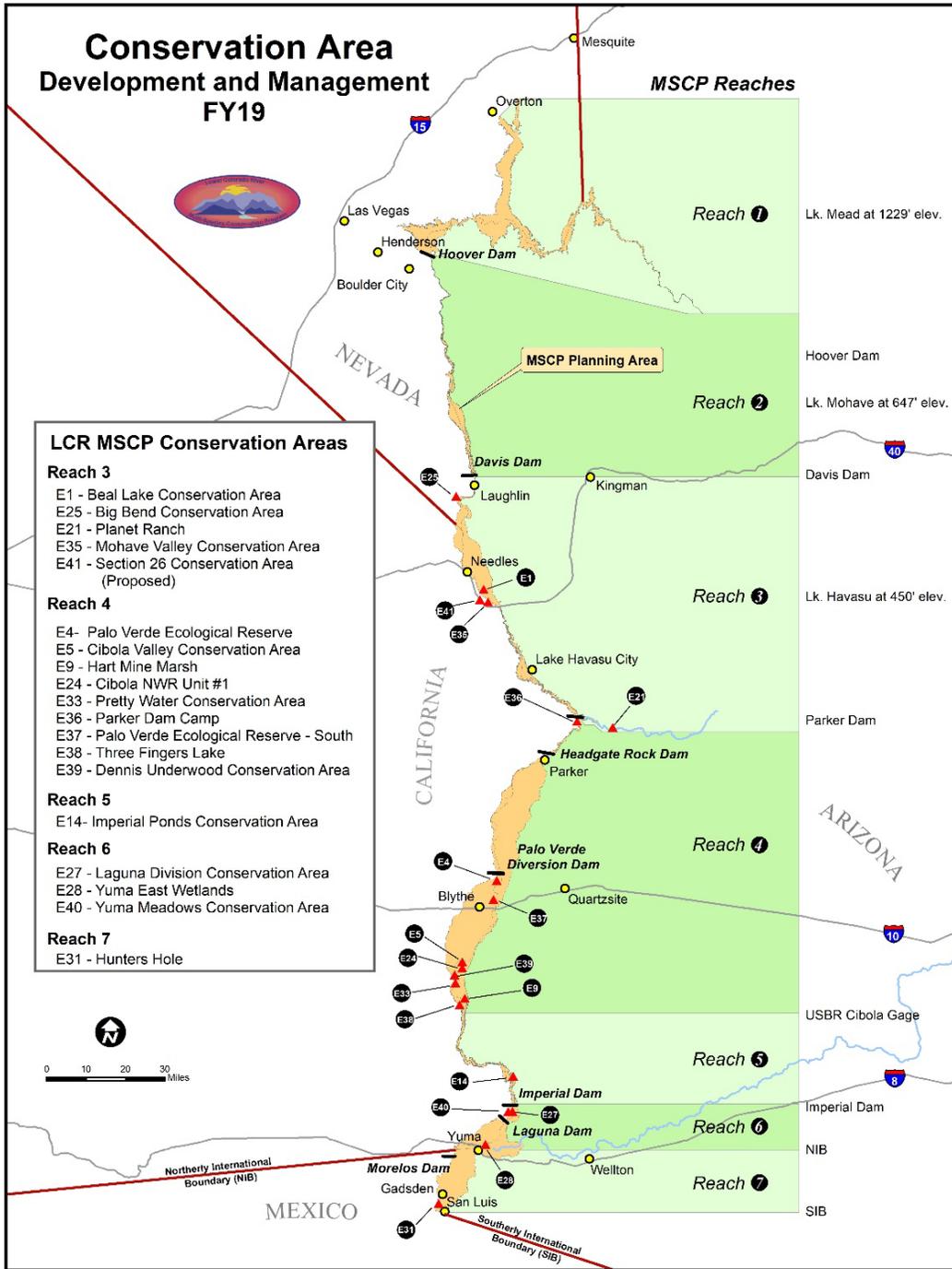


Figure 1.—LCR MSCP conservation areas.

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 habitat was planted in nine different phases, with one phase planted every year through 2014. There are currently 950 cottonwood-willow acres planted and 78 acres of honey mesquite (figure 2).

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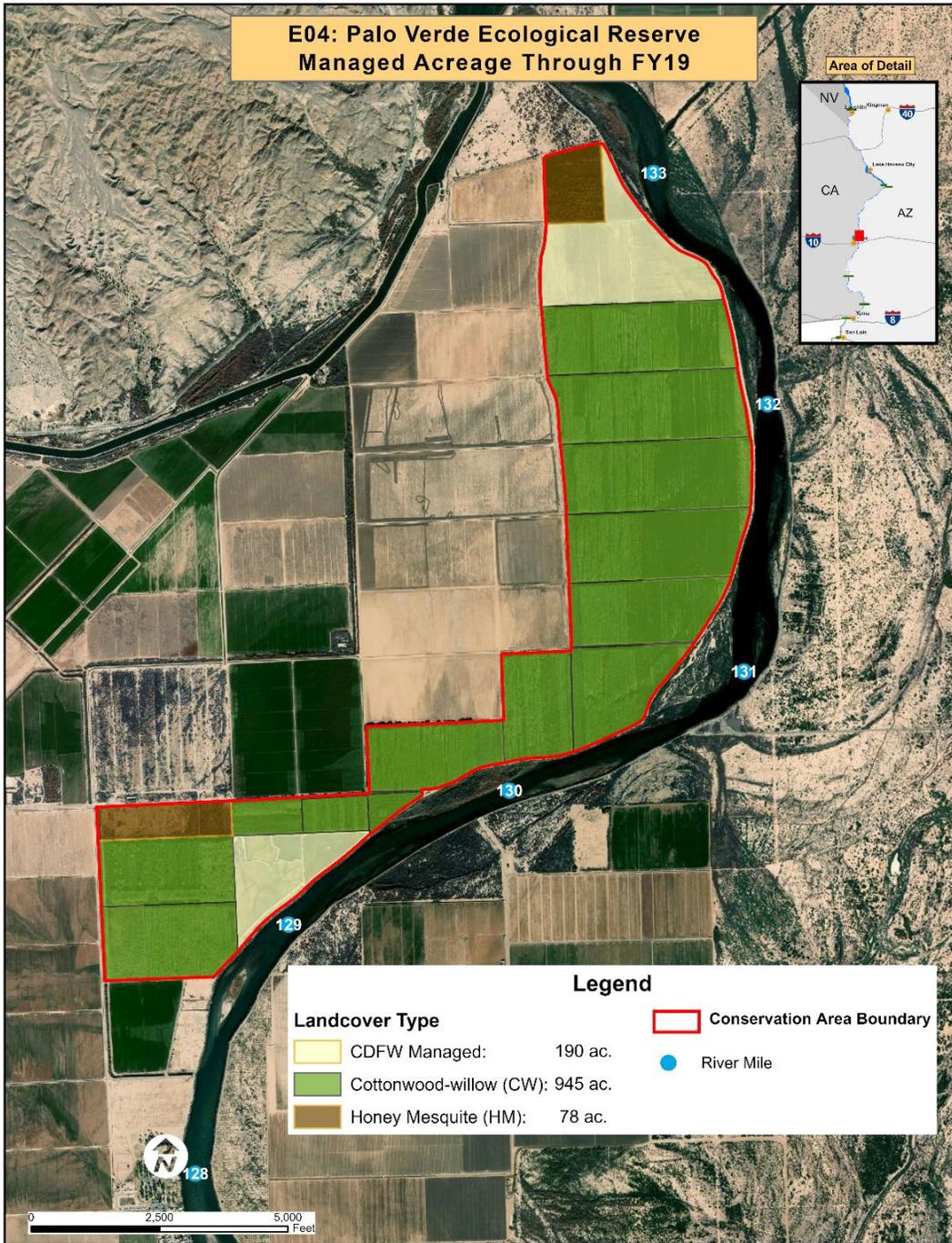


Figure 2.—Palo Verde Ecological Reserve managed acreage through FY19.

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 3). The Lower Hippy Fire area was planted with 96 acres of cottonwood-willow habitat in fiscal year 2016. There are emergent grasses throughout the area.

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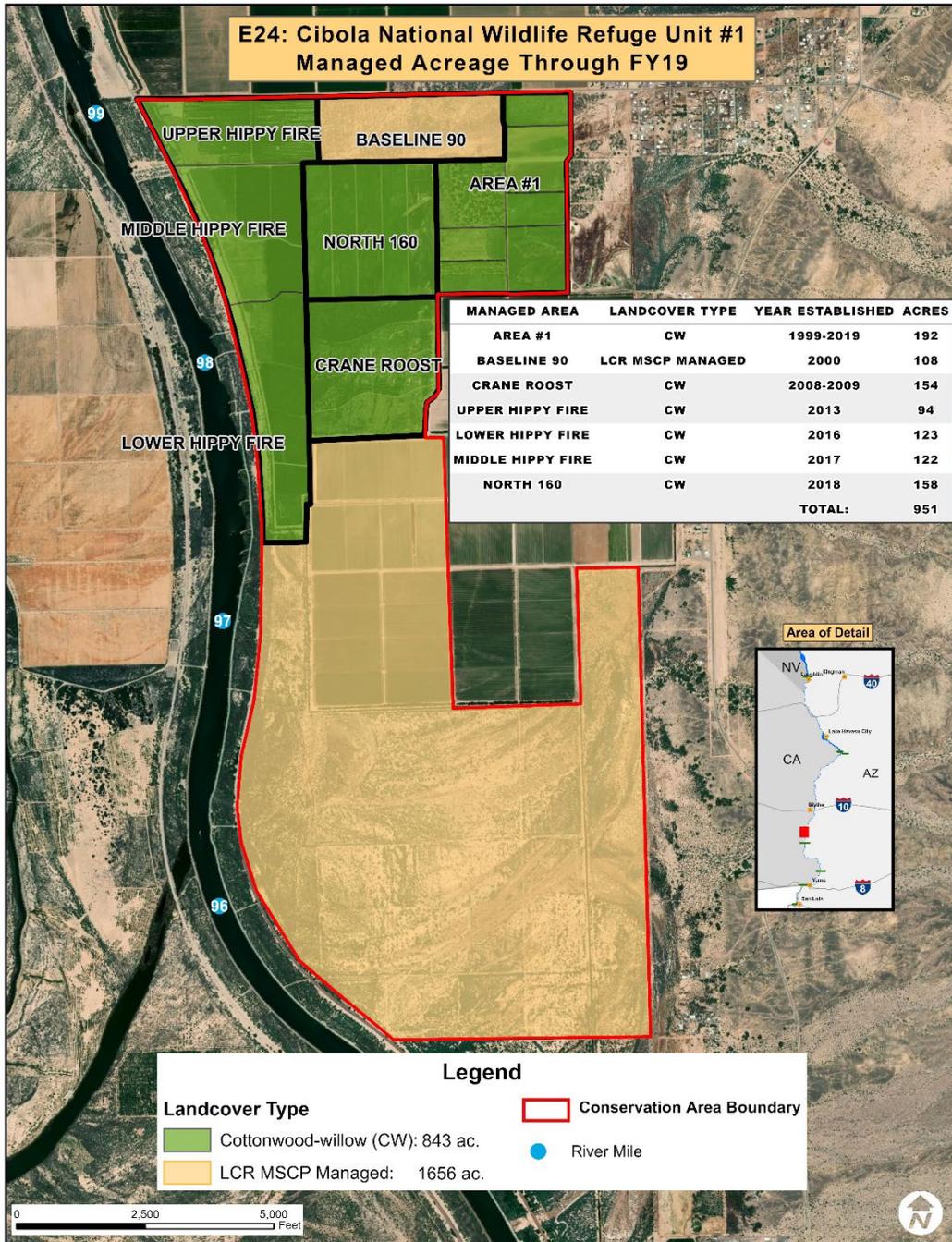


Figure 3.—Cibola National Wildlife Refuge Unit #1 Conservation Area managed acreage through FY19.

Hart Mine Marsh

Hart Mine Marsh is located on the southern part of the U.S. Fish and Wildlife Service's Cibola NWR in Arizona (figure 4). 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 as a LCR MSCP conservation area and are being managed to partially fulfill the marsh habitat creation goals of the program. 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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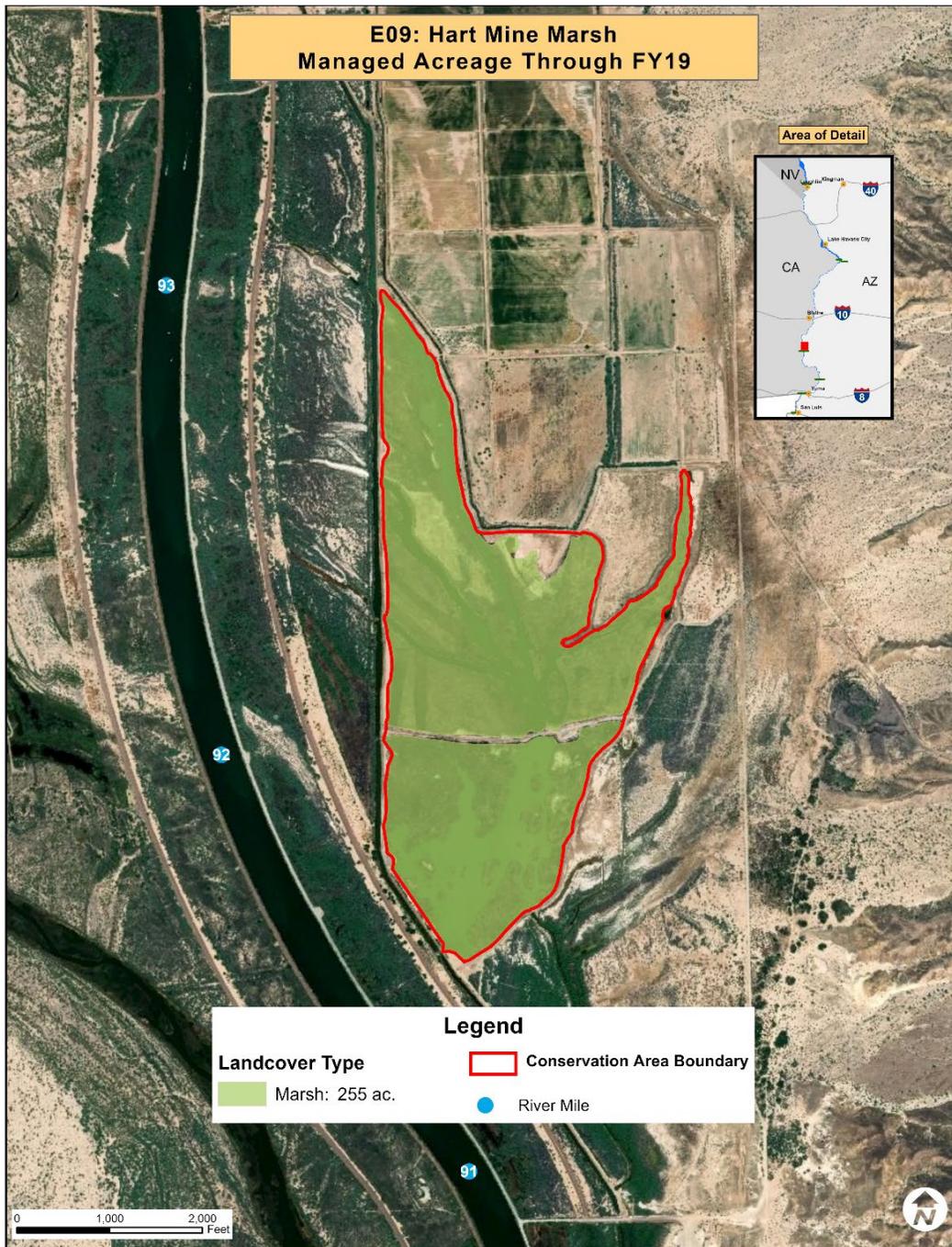


Figure 4.—Hart Mine Marsh managed acreage through FY19.

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 183 acres of cottonwood-willow habitat, 94 acres of marsh habitat, and 103 acres of honey mesquite habitat (figure 5).

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 variety of shrub and grass species necessary for Yuma hispid cotton rat colonization. In 2018, a large fire swept through a portion of the cottonwood-willow habitat, clearing much of the grasses inhabited by Yuma hispid cotton rats.

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Figure 5.—Yuma East Wetlands managed acreage through FY19.

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 cottonwood-willow habitat (figure 6) consisting of cottonwood-willow and honey mesquite. A number of fires have occurred at Hunters Hole throughout the years. The effect of these fires, in combination with increased shading of the ground by the tree canopy, has reduced the amount of suitable habitat available for cotton rats.

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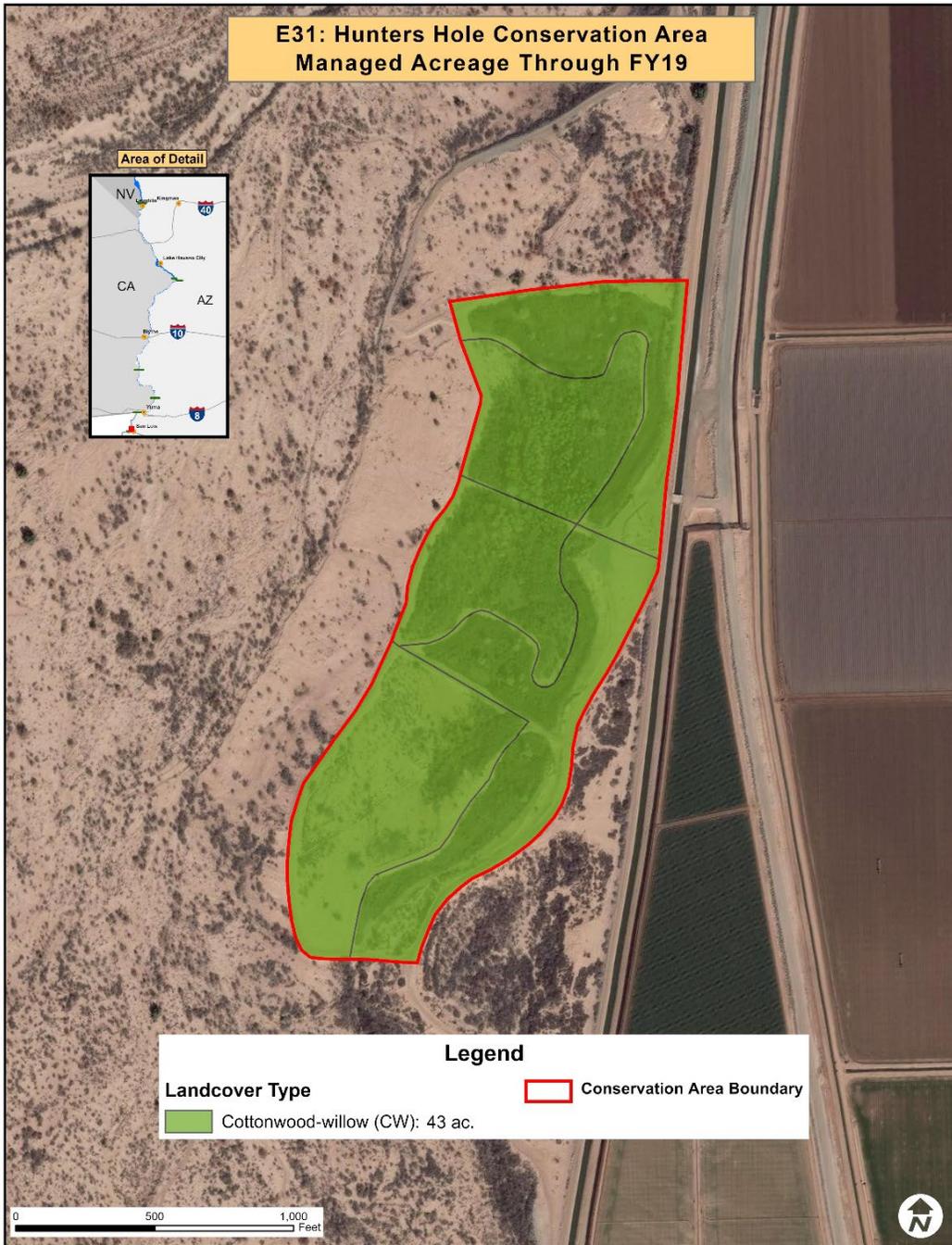


Figure 6.—Hunters Hole managed acreage through FY19.

RESULTS

Palo Verde Ecological Reserve

This site consists of multiple planting phases with a variety of habitat types. Phases 4 and 8 were trapped because they contain a grass and/or shrub component. Phase 4 was planted with honey mesquite and quailbush (*Atriplex lentiformis*) and is now intermixed with Bermudagrass (*Cynodon dactylon*) and other grasses and forbs. Phase 8 was planted with honey mesquite in 2013. Trapping occurred in Phases 4 and 8 (figure 7) over 2 nights. Spring 2020 trapping sessions produced zero Colorado River cotton rats in Phase 4 and five Colorado River cotton rats in Phase 8 (tables 1 and 2).

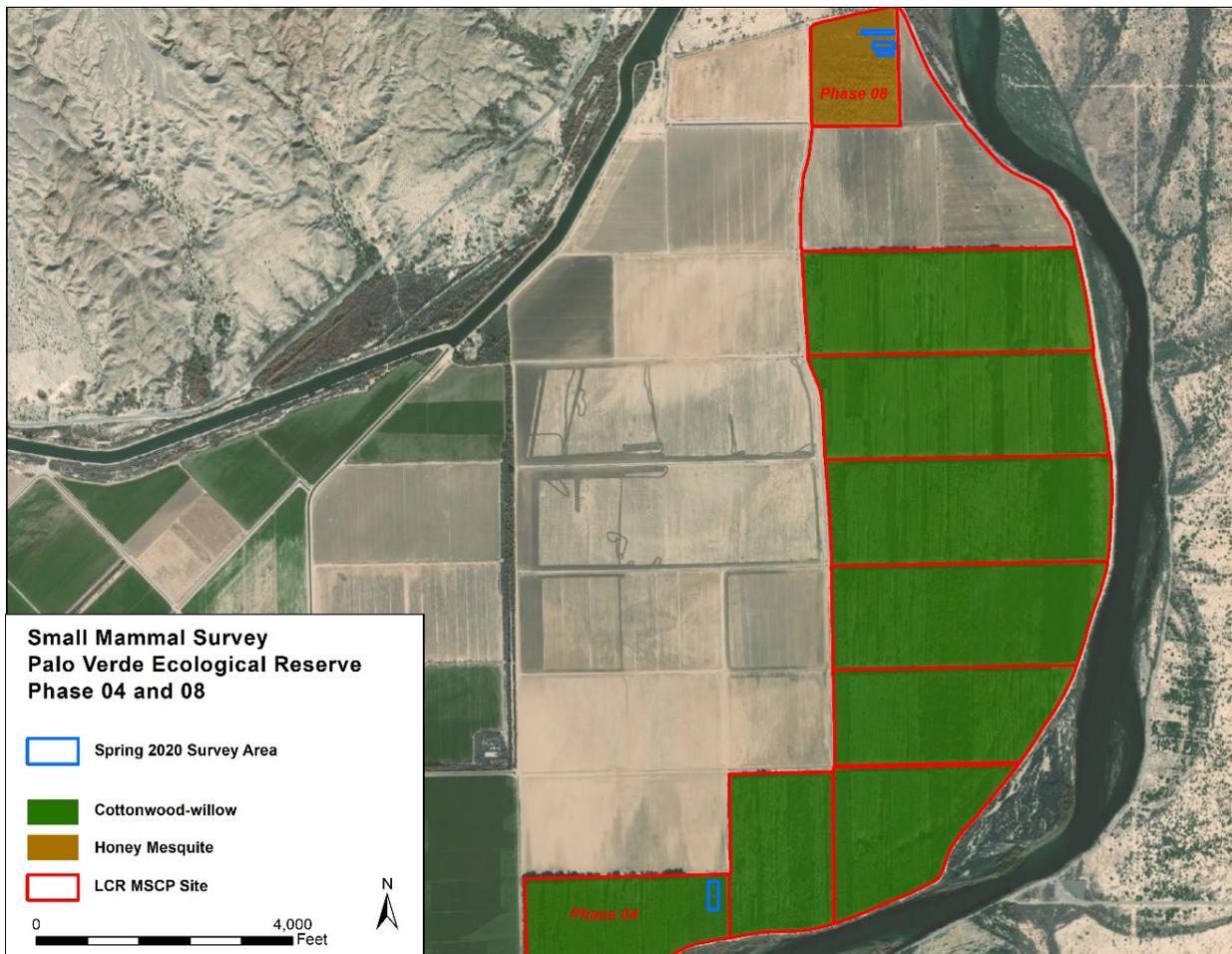


Figure 7.—Palo Verde Ecological Reserve trapping areas.

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Table 1.—Palo Verde Ecological Reserve Phase 4 captures

Species	Spring 2020 (March 5–6, 2020)
Colorado river cotton rat (<i>Sigmodon arizonae plenus</i>)	0
Deermouse (<i>Peromyscus maniculatus</i>)	1
Cactus mouse (<i>Peromyscus eremicus</i>)	32
White-throated wood rat (<i>Neotoma albigula</i>)	1
Total captures	34
Traps/nights	40/2

Table 2.—Palo Verde Ecological Reserve Phase 8 captures

Species	Spring 2020 (March 5–6, 2020)
Colorado river cotton rat (<i>Sigmodon arizonae plenus</i>)	5
Desert pocket mouse (<i>Chaetodipus penicillatus</i> sp.)	0
Cactus mouse (<i>Peromyscus eremicus</i>)	55
Deer mouse (<i>Peromyscus maniculatus</i>)	7
White-throated wood rat (<i>Neotoma albigula</i>)	1
Total captures	68
Traps/nights	60/2

Cibola National Wildlife Refuge Unit #1 Conservation Area

Surveys within the Cibola National Wildlife Refuge Unit #1 Conservation Area occurred in the Cibola National Wildlife Refuge Unit #1 Conservation Area Nature Trail (Nature Trail) and the Cottonwood Genetics fields (figure 8). Trapping in the Nature Trail occurred in an area in the middle of the site dominated by Johnsongrass (*Sorghum halepense*) and *Baccharis* spp. Trapping in the Cottonwood Genetics field occurred in an area primarily composed of Johnsongrass, with cottonwood trees at the edges of the transects. Three Colorado River cotton rats and no desert pocket mice were captured over 2 nights of trapping in spring 2020 in the Nature Trail (table 3).

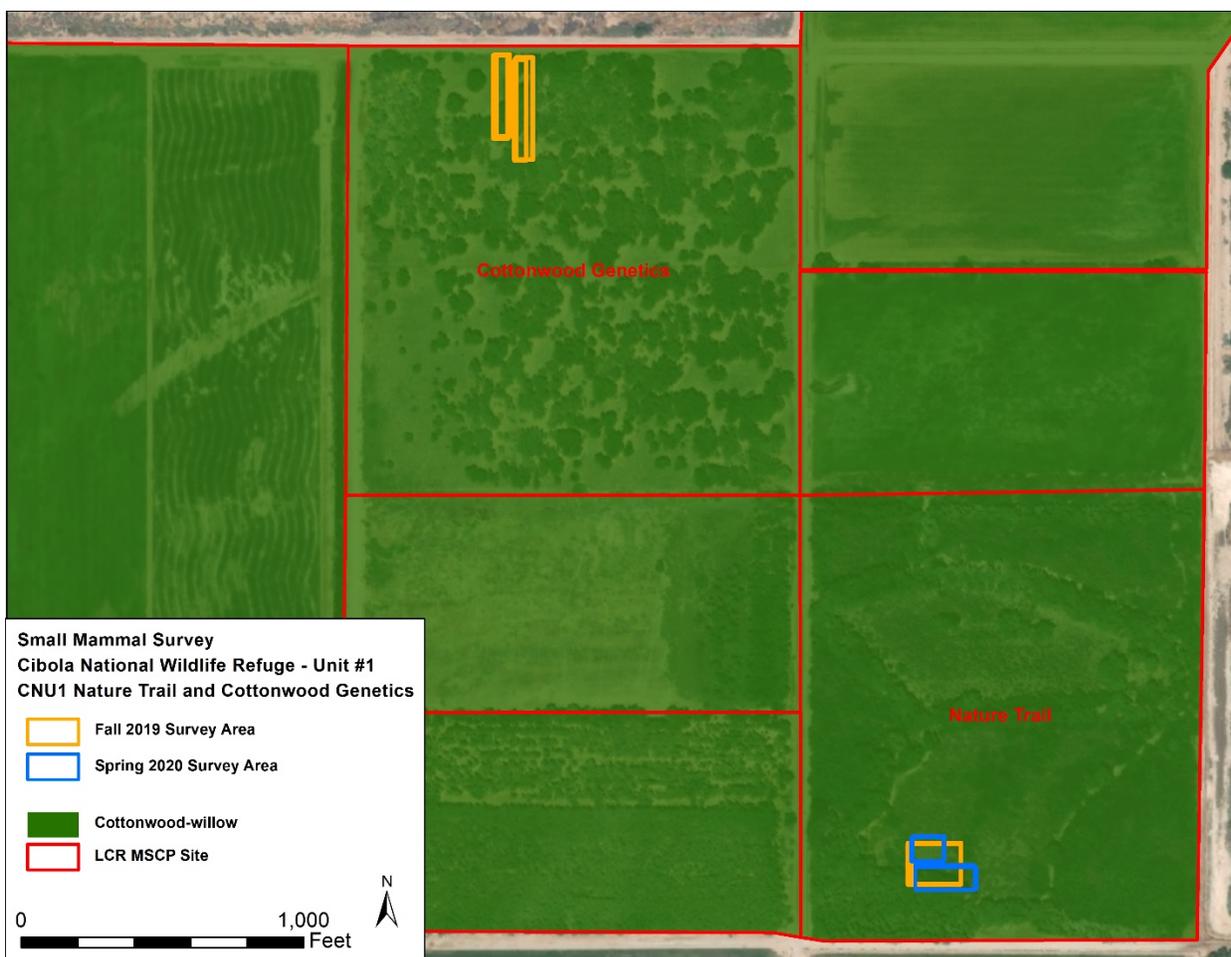


Figure 8.—Cibola National Wildlife Refuge Unit #1 Conservation Area trapping areas.

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Table 3.—Cibola National Wildlife Refuge Unit #1 Nature Trail captures

Species	Fall 2019 (November 7–8, 2019)	Spring 2020 (March 3–4, 2020)
Colorado river cotton rat (<i>Sigmodon arizonae plenus</i>)	0	3
Desert pocket mouse (<i>Chaetodipus penicillatus</i> sp.)	0	0
White-throated wood rat (<i>Neotoma albigula</i>)	1	10
Cactus mouse (<i>Peromyscus eremicus</i>)	16	25
Harvest mouse (<i>Reithrodontomys megalotis</i>)	4	0
Deer mouse (<i>Peromyscus maniculatus</i>)	0	1
Total captures	21	39
Traps/nights	40/2	40/2

Table 4.—Cibola National Wildlife Refuge Unit #1 Cottonwood Genetics Field captures

Species	Fall 2019 (November 7–8, 2020)
Colorado river cotton rat (<i>Sigmodon arizonae plenus</i>)	0
Desert pocket mouse (<i>Chaetodipus penicillatus</i> sp.)	1
Cactus mouse (<i>Peromyscus eremicus</i>)	2
Harvest mouse (<i>Reithrodontomys megalotis</i>)	1
Total captures	4
Traps/nights	40/2

Hart Mine Marsh

Surveys at Hart Mine Marsh occurred in Cells 01 and 02 in three trapping grids set up in between arrowweed (*Pluchea sericea*) and cattails (*Typha* spp.)/ emergent grasses at the water's edge (figure 9). Two Colorado River cotton rats and no desert pocket mice were captured over 2 nights of trapping in spring 2020 (table 5).

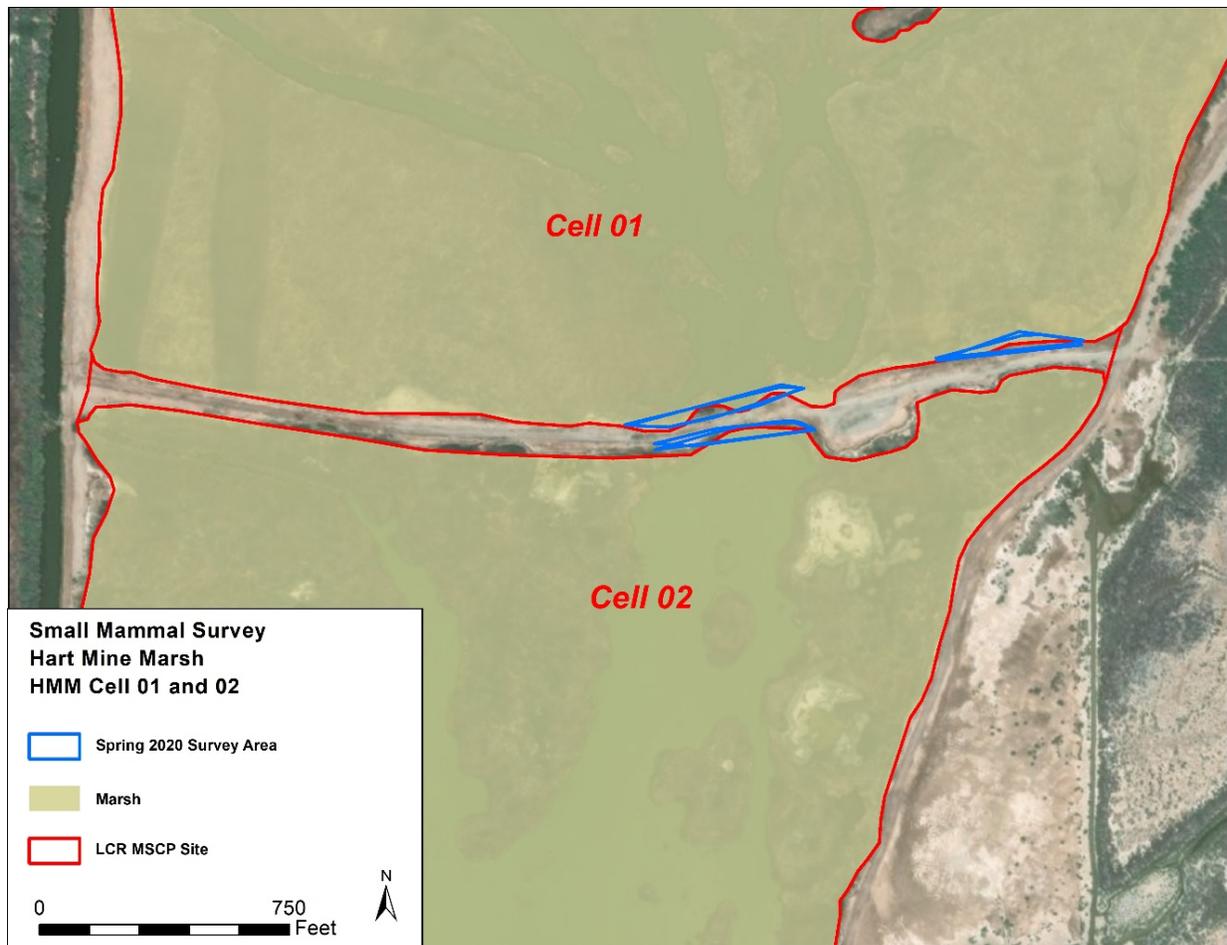


Figure 9.—Hart Mine Marsh trapping areas.

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Table 5.—Hart Mine Marsh captures

Species	Spring 2020 (March 3–4, 2020)
Colorado river cotton rat (<i>Sigmodon arizonae plenus</i>)	2
Deer mouse (<i>Peromyscus maniculatus</i>)	5
Cactus mouse (<i>Peromyscus eremicus</i>)	13
House mouse (<i>Mus musculus</i>)	1
Total captures	21
Traps/nights	60/2

Yuma East Wetlands

Surveys occurred in Zones I and J. The trapping area consisted of a mix of alkali sacaton (*Sporobolus airoides*), *Baccharis* spp., and some honey mesquite and cottonwood plantings (figure 10). Two nights of surveys in fall 2019 encountered seven Yuma hispid cotton rats and no desert pocket mice (tables 6 and 7).

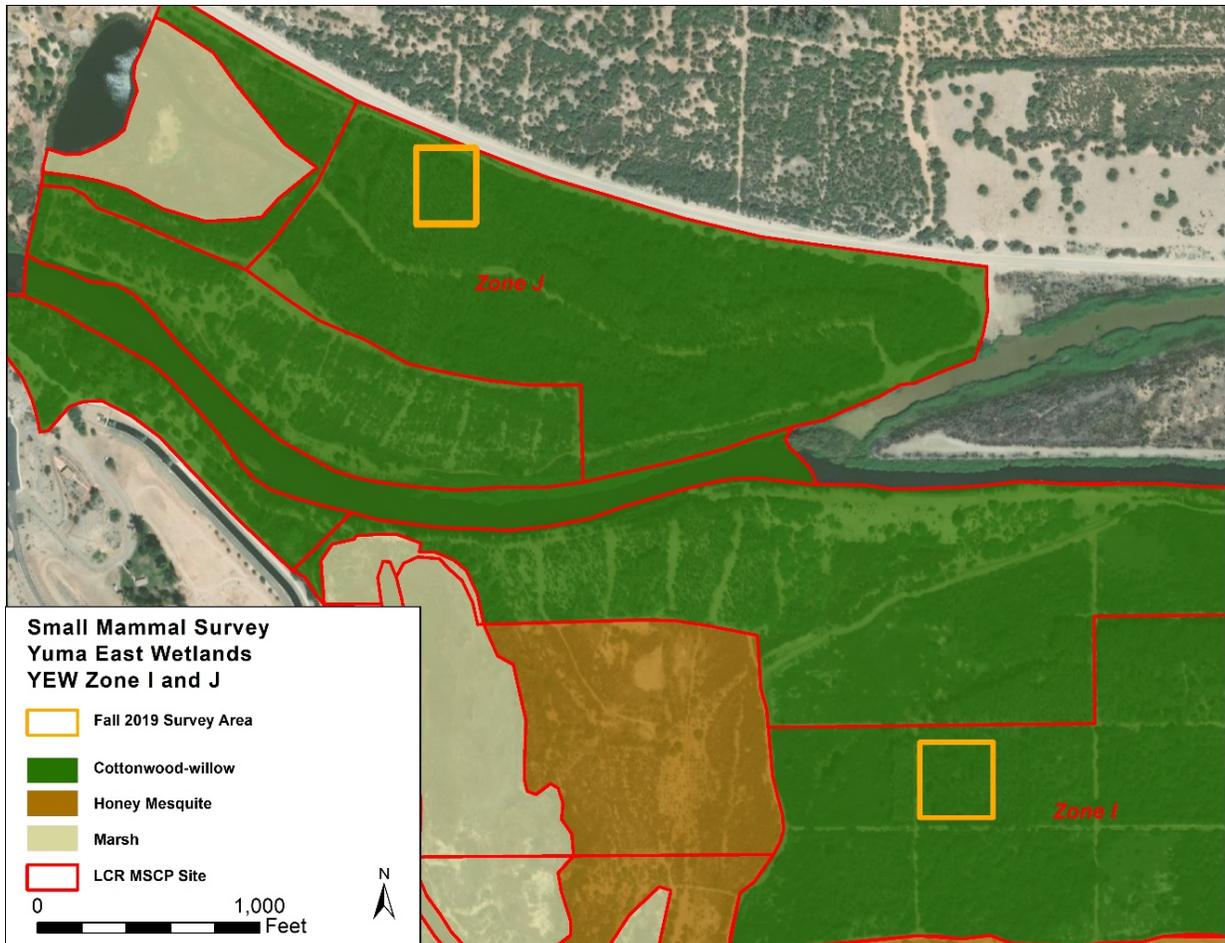


Figure 10.—Yuma East Wetlands trapping areas.

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Table 6.—Yuma East Wetlands Zone I captures

Species	Fall 2019 (December 12–13, 2019)
Yuma hispid cotton rat (<i>Sigmodon hispidus eremicus</i>)	1
Cactus mouse (<i>Peromyscus eremicus</i>)	1
Deer mouse (<i>Peromyscus maniculatus</i>)	2
Total captures	4
Traps/nights	60/2

Table 7.—Yuma East Wetlands Zone J captures

Species	Fall 2019 (December 12–13, 2019)
Yuma hispid cotton rat (<i>Sigmodon hispidus eremicus</i>)	6
House mouse (<i>Mus musculus</i>)	1
Cactus mouse (<i>Peromyscus eremicus</i>)	4
White-throated wood rat (<i>Neotoma albigula</i>)	1
Total captures	12
Traps/nights	60/2

Hunters Hole

Surveys occurred in Cells 02 and 03 over 2 nights each in fall 2019. The trapping areas were planted with Fremont cottonwood, Goodding's willow, coyote willow (*Salix exigua*), and honey mesquite along with alkali sacaton and blue grama (*Bouteloua gracilis*) (figure 11). Both trapping areas were dominated by grasses, though trees are beginning to shade out the ground cover. Fall 2019 surveys produced one Yuma hispid cotton rat and one desert pocket mouse (table 8).



Figure 11.—Hunters Hole trapping area.

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Table 8.—Hunters Hole captures

Species	Fall 2019 (December 10–11, 2019)
Yuma hispid cotton rat (<i>Sigmodon hispidus eremicus</i>)	1
House mouse (<i>Mus musculus</i>)	3
Cactus mouse (<i>Peromyscus eremicus</i>)	6
Desert pocket mouse (<i>Chaetodipus penicillatus</i> sp.)	1
Deer mouse (<i>Peromyscus maniculatus</i>)	4
Harvest mouse (<i>Reithrodontomys megalotis</i>)	2
Total captures	17

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