Lower Colorado River Multi-Species Conservation Program

Balancing Resource Use and Conservation

Monitoring of the MacNeill's Sootywing Skipper and its Habitats

2016 Annual Report

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

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Work conducted under LCR MSCP Work Task F6

Lower Colorado River Multi-Species Conservation Program Steering Committee Members

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National Park Service
Bureau of Land Management
Bureau of Indian Affairs
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Lower Colorado River
Multi-Species Conservation Program

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ACRONYMS AND ABBREVIATIONS

BBCA	Big Bend Conservation Area
BLCA	Beal Lake Conservation Area
Cibola NWR	Cibola National Wildlife Refuge
CVCA	Cibola Valley Conservation Area
ha	hectare(s)
HMM	Hart Mine Marsh
km	kilometer(s)
LCR MSCP	Lower Colorado River Multi-Species Conservation Program
NWR	National Wildlife Refuge
PVER	Palo Verde Ecological Reserve
RH	relative humidity
sootywing	MacNeill's sootywing skipper (*Pholisora gracielae* = *Hesperopsis gracielae* [MacNeill])

Symbols

%	percent
±	plus or minus
n	sample size

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ABSTRACT

Early and adult life stages of the MacNeill's sootywing skipper (*Pholisora gracielae = Hesperopsis gracielae* [MacNeill]) (hereafter sootywing), a small skipper butterfly, were searched for at eight locations along the Lower Colorado River Valley. Evidence of sootywings was found at seven locations. The highest number of detections occurred at the Cibola Valley Conservation Area, with 17 detections during the March survey. Eggs were found at seven locations, and caterpillars were found at the Cibola Valley Conservation Area. No evidence of sootywings was found at the Big Bend Conservation Area. This site has few, small quailbush (*Atriplex lentiformis*), which may explain the lack of sootywing detections, as larvae can only complete development on this shrub.

INTRODUCTION

The MacNeill's sootywing skipper (*Pholisora gracielae = Hesperopsis gracielae* [MacNeill]) (hereafter sootywing) is a small (wingspan of 0.79 to 1.25 inches, 20 to 32 millimeters), dark-colored skipper butterfly endemic to the lower Colorado River system (Pratt and Wiesenborn 2011). Larvae of the sootywing can only complete development on quailbush (*Atriplex lentiformis*). A variety of other plant species are used for nectar by adult sootywings (Wiesenborn and Pratt 2010). Heliotrope (*Heliotropium curassavicum*) and western purslane (*Sesuvium verrucosum*) are considered important nectar sources for sootywing habitat creation (Wiesenborn and Pratt 2010).

This skipper is the only invertebrate covered by the Lower Colorado River Multi-Species Conservation Program (LCR MSCP). The LCR MSCP is expected to facilitate a balance between anthropogenic use of Colorado River resources and the conservation of native species and their habitats (https://www.lcrmscp.gov/ general_program.html). Information contained within this report concerns sootywing presence at quailbush plots in LCR MSCP conservation areas. Quailbush attributes at various locations were examined as well as associations with early life stage sootywings. Nectar plant presence was also studied because of its assumed importance in maintaining sootywing populations.

METHODS

Potential habitats for sootywings were surveyed for the presence of sootywing eggs, caterpillars, and adults, and habitat conditions were recorded. Selected monitoring sites all contained quailbush and were generally associated with conservation areas. Sites were monitored in April, May, and June 2015.

Five quailbush at each monitoring site were selected. Biologists collected data at the first quailbush near the survey start point. After data collection at that point, they walked for 5 minutes through the site. When 5 minutes passed, the biologists stopped walking and selected the closest quailbush. This was the second monitoring point. This method was repeated until the presence of sootywings and habitat conditions were recorded at five quailbush. The set stopping time allowed for data to be collected throughout the plot. The sampling locations within the plot were not truly random because the route walked through the environment was directed by the density of the quailbush and honey mesquite (*Prosopis glandulosa*), which can be impassible, and the presence of nectar plants. The timing of monitoring was designed so as to avoid the hottest times of the day (approximately 1:00 to 3:00 p.m.). Previous monitoring (e.g., Pratt and

Wiesenborn 2009; Nelson et al. 2015) suggests that adult sootywings are difficult to find during the warmest time of day perhaps because they are avoiding activity and seeking shade within quailbush.

Quailbush at each monitoring point were measured for height, width (nearest 0.1 foot), and an estimated percentage of dry or absent leaves (an indicator of plant lushness, visually agreed upon by two observers). Soil moisture at the base of each plant was also measured. Moisture (% saturation relative to field capacity) was measured with a Kelway soil moisture tester, Model HB-2. Estimates of sootywing habitat quality also included floral (nectar) measurements. Floral abundance by plant species in the immediate environment was qualitatively noted, where 0 = none, 1 = scarce (flowers rarely encountered), 3 = common (flowers often observed), and 5 = abundant (floral abundance unlikely to be limiting). The floral index consisted of the sum of the value recorded for each plant species; therefore, if 3 separate plant species all had abundant flowers, the plot score would be 15. This index favors both floral abundance and the diversity of flower sources.

Two people spent a total of 5 minutes searching each selected quailbush for sootywing eggs and caterpillars. Any adult sootywings that were encountered were also enumerated. Identification of various life stages of sootywings utilized information in Nelson et al. (2015). Behaviors of detected adult sootywings were recorded as flying, perching, basking (wings open), nectaring (probing of flower with proboscis), puddling, mating, and ovipositing. A sootywing's sex was also recorded when distinguished; females are identified by their paler and more mottled forewings and typically have a larger body size compared to males. After quailbush characteristics and sootywing observations were completed, timing for the next monitoring point was initiated. Quailbush were flagged after sampling to avoid resampling on future visits. If, during a survey, eggs or caterpillars were found at additional quailbush, information was also collected at these supplementary plants. Quailbush damage associated with presumptive larval sootywings and invertebrates other than sootywings was also noted (http://www.lcrmscp.gov/images/species/macneills_sootywing/macneills_sootywing_05.jpg). The presence of honey mesquite was documented at the end of each survey.

Windspeed (miles per hour), air temperature (degrees Fahrenheit), relative humidity (RH), and lux were collected at the start and end of each sampling occasion. The windspeed was measured with a Kestral 3000 Wind Anemometer Meter (±3% accuracy). The air temperature and RH were measured with a hand-held Extech Easy View 20 Hydro-Thermometer (RH range 10 to 95% with 0.1% resolution and basic accuracy of ±3% [30 to 95% RH] and ±5% [105 to 30% RH]). Lux was measured with a hand-held Extech 401025 light probe meter (resolution of 1 lux with 5% accuracy). The temperature and RH were also recorded each time an adult sootywing was detected.

A mobile electronic field form developed by the LCR MSCP was used for data collection. Data were collected on a Trimble Global Positioning System unit running Terrasync software and downloaded and processed using Pathfinder Office Professional. Instructions for utilizing the mobile electronic field form is documented in the LCR MSCP Mobile Electronic Field Form Guidebook – Sootywing (LCR MSCP 2015).

STUDY AREAS

Monitoring of both adult and immature stages of MacNeill's sootywings occurred at plots containing quailbush in LCR MSCP conservation areas. Sites and location codes (derived from the LCR MSCP Mobile Electronic Field Form Guidebook – Sootywing [LCR MSCP 2015]) are presented in table 1.

Table 1.—Sites sampled for adult and immature stages of sootywings
(Sites are arranged upstream to downstream along the Colorado River Valley)

Site	Location Code	Global Positioning System		Comments
		Easting	Northing	
Big Bend Conservation Area	BBCA	714288.93	3887085.296	Few quailbush
Beal Lake Conservation Area	BLCA	726260.62	385920.616	Dense quailbush at edge of plantings
Palo Verde Ecological Reserve	PVER Phase 1	728974.528	3730591.496	Also sampled in 2014 and 2015
	PVER Phase 4	730592.71	3730969.831	
	PVER Phase 6	7310115.075	3732493.033	
Cibola Valley Conservation Area	CVCA Phase 4	714214.433	368934.46	
Cibola National Wildlife Refuge (Crane Roost)	Cibola NWR (Crane Roost)	715384.458	3694125.891	Large quailbush at edge of plantings
Hart Mine Marsh	HMM	717893.425	3685896.337	Also sampled in 2014 and 2015

Big Bend Conservation Area

The Big Bend Conservation Area is located in Nevada 5 miles (8 kilometers [km]) south of Laughlin, Nevada, along the Needles Highway (figure 1). The site is within Reach 3. The site includes 15 acres of backwater as well as 15 acres of habitat comprised of a marshy strip of cattails (*Typha* spp.) leading into a drier strip of arrowweed (*Pluchea sericea*) and baccharis (*Baccharis salicifolia*). The upland mesquite portion of the property has 15 acres planted with honey mesquite and screwbean mesquite (*Prosopis pubescens*).

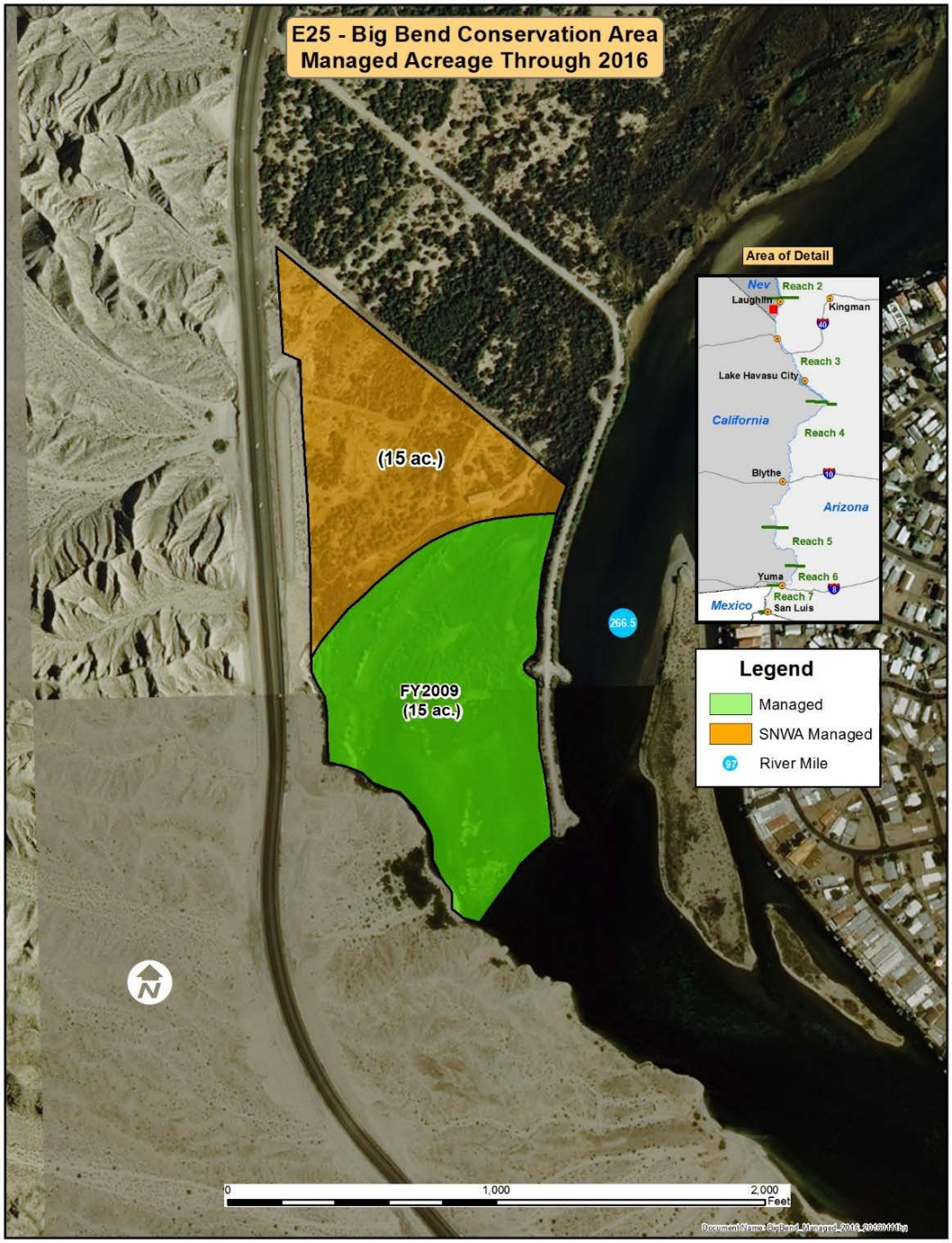
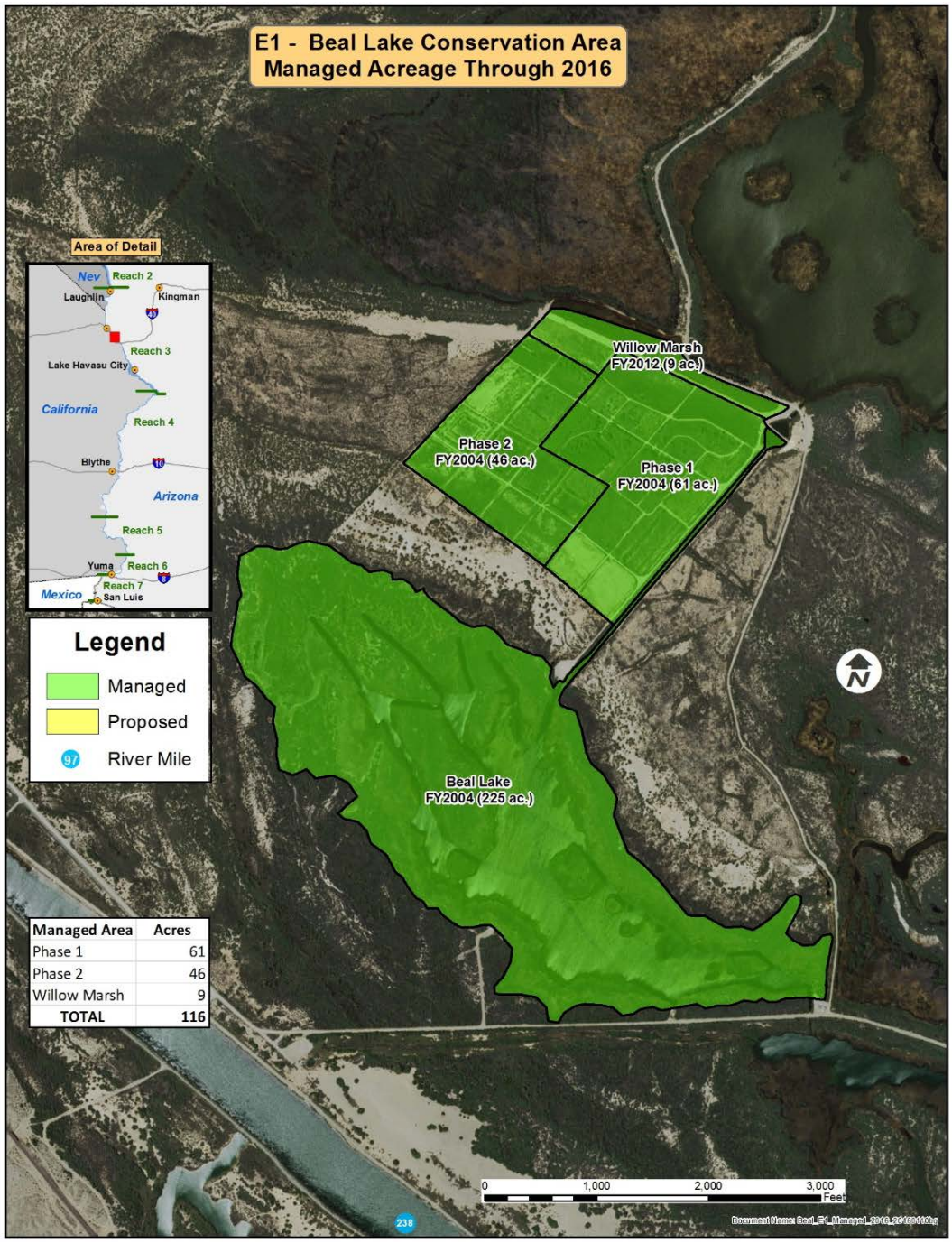


Figure 1.—Big Bend Conservation Area managed acreage through 2016.

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 (figure 2). The site is within Reach 3. It is a two-phase habitat creation project that was initiated in spring 2003. The site was planted with Fremont cottonwood (*Populus fremontii*), Goodding's willow (*Salix gooddingii*), coyote willow (*Salix exigua*), honey mesquite, and screwbean mesquite. Currently, the site contains areas of all these tree species. Arrowweed and some baccharis (*Baccharis* spp.) have begun to fill in the open areas and edges of most of the plots in the site.



Managed Area	Acres
Phase 1	61
Phase 2	46
Willow Marsh	9
TOTAL	**116**

Figure 2.—Beal Lake Conservation Area managed acreage through 2016.

Cibola Valley Conservation Area

The Cibola Valley Conservation Area is located in Arizona adjacent to the Colorado River, about 15 miles (24 km) south of Blythe, California (figure 3). The site is within Reach 4. It will encompass about 1,235 acres (500 hectares [ha]) when completed. Three phases include Fremont cottonwood, Gooding's willow, coyote willow, and other riparian plant species. Phase 1 was planted in spring 2006 and contains a 22-acre (9 ha) nursery and a 64-acre (26 ha) area of Fremont cottonwood-Goodding's willow (hereafter cottonwood-willow) habitat. Phase 3 was planted in spring 2007 and contains over 80 acres (32 ha) of cottonwood-willow planted in different combinations (figure 3). Phase 3 also includes 11 acres (4.5 ha) of mule fat (*Baccharis salicifolia*) mixed with some cottonwood and willow. Phase 2 was planted in spring 2008. Most of Phase 2 is planted with cottonwood-willow habitat, with one small area of honey mesquite and quailbush. Phase 4 was planted in 2009 with honey mesquite and quailbush. Phase 5 was planted in 2010 with 71 acres (28.7 ha) of honey mesquite and quailbush. Phase 6 was planted in 2011 with 89 acres (36 ha) of honey mesquite.

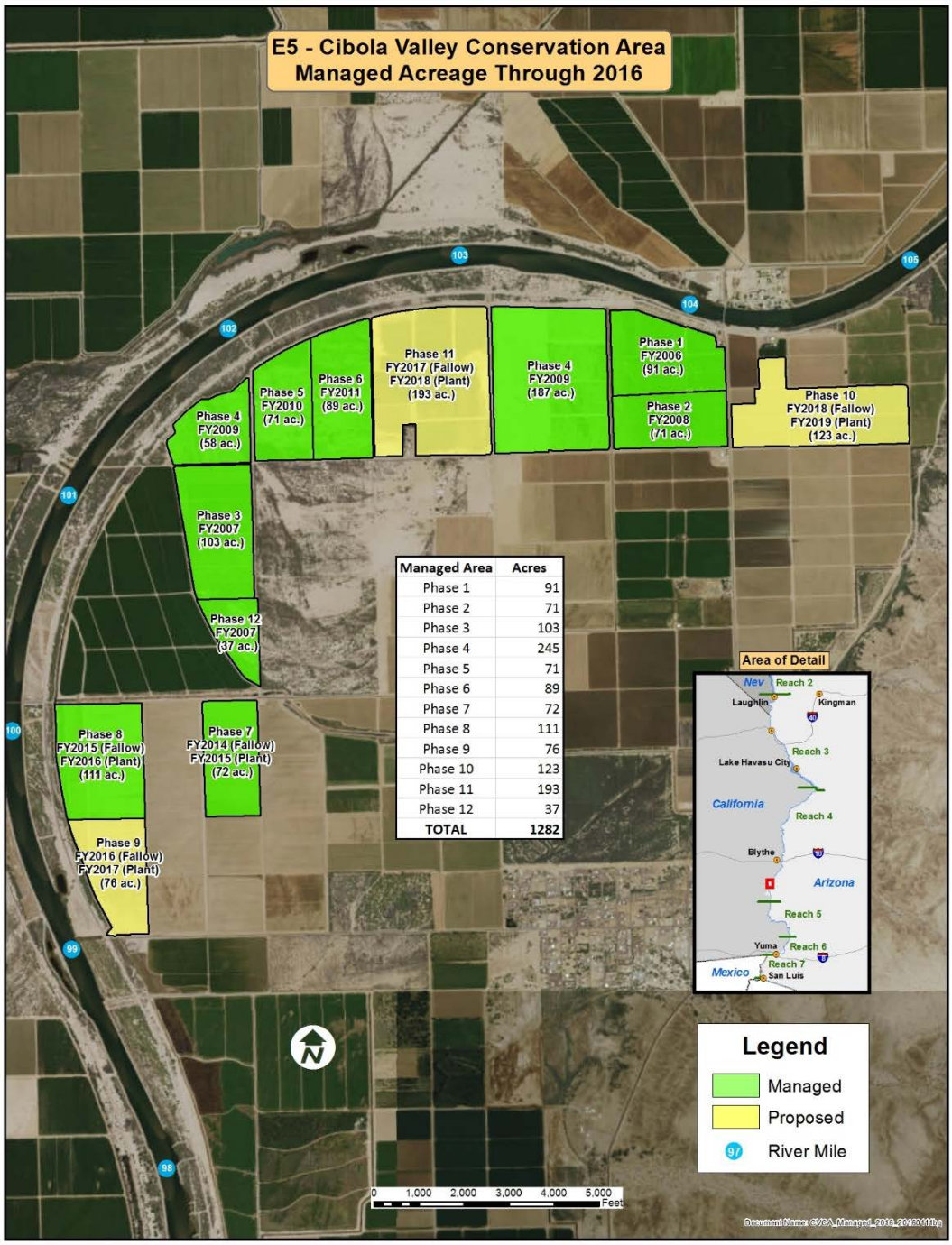


Figure 3.—Cibola Valley Conservation Area managed acreage through 2016.

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 lower Colorado River in Arizona and California (figure 4). 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 Nature Trail was planted in 1999 with 34 acres of cottonwood-willow and honey mesquite habitat. The central portion of the site is a mix of dense Johnsongrass (*Sorghum halepense*) and baccharis (*Baccharis* spp.). The Cottonwood Genetics field was planted in 2007 with Fremont cottonwood as part of a Northern Arizona University study. It has a sparse canopy structure, and dense patches of Johnsongrass have come into the open areas.

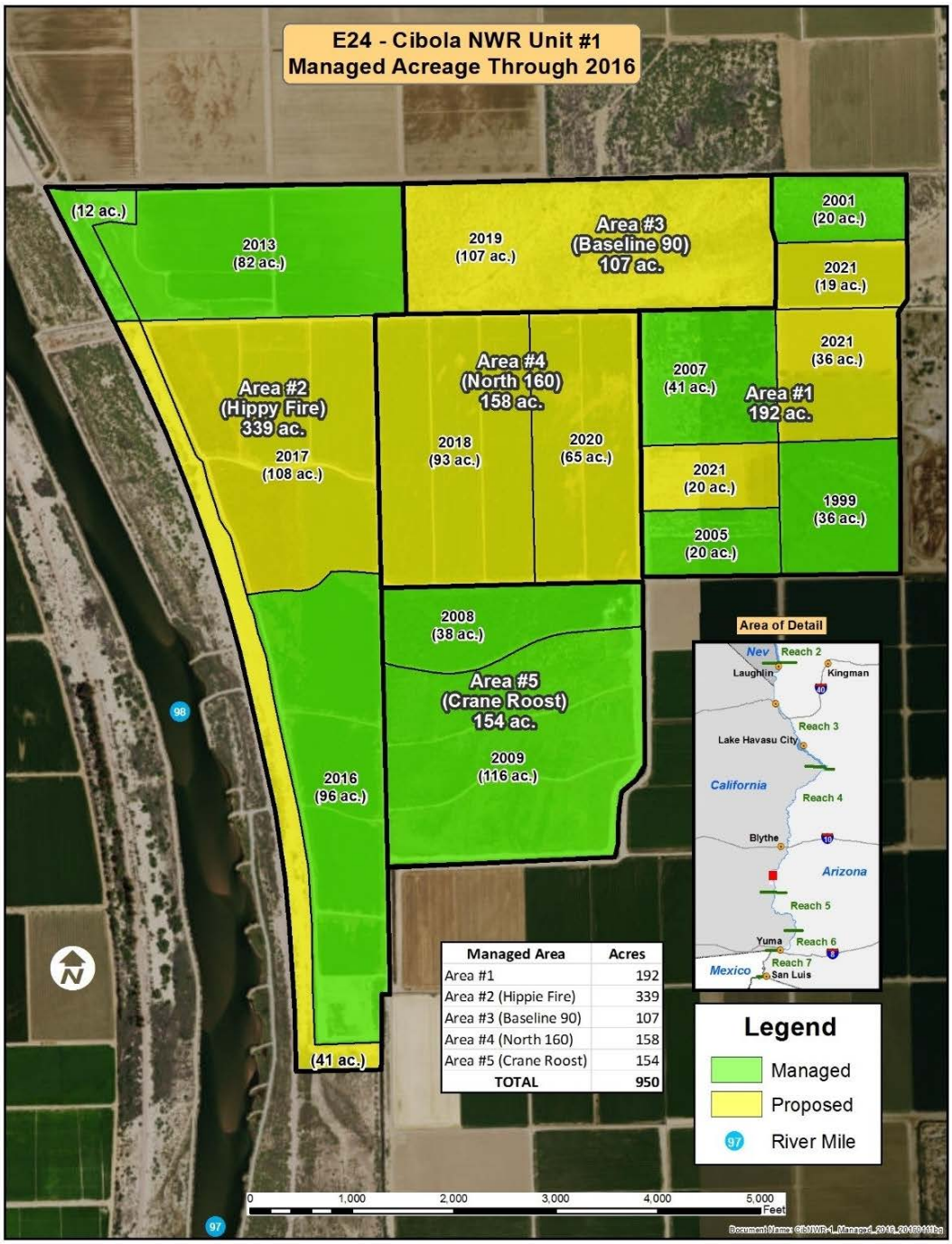


Figure 4.—Cibola National Wildlife Refuge Unit #1 Conservation Area managed acreage through 2016.

Hart Mine Marsh

Hart Mine Marsh is located in the Cibola NWR, approximately 22 miles (35 km) south of Blythe, California. It contains 163 acres of a decadent marsh restored between 2009 and 2011. The site is located at the southern limit of Reach 4 (figure 5). The vegetation consists of southern cattail (*Typha domingensis*), chairmaker's bulrush (*Schoenoplectus americanus*), California bulrush (*Schoenoplectus californicus*), common spikerush (*Eleocharis palustris*), softstem bulrush (*Schoenoplectus tabernaemontani*), and inland saltgrass (*Distichlis spicata*) with quailbush and honey mesquite.

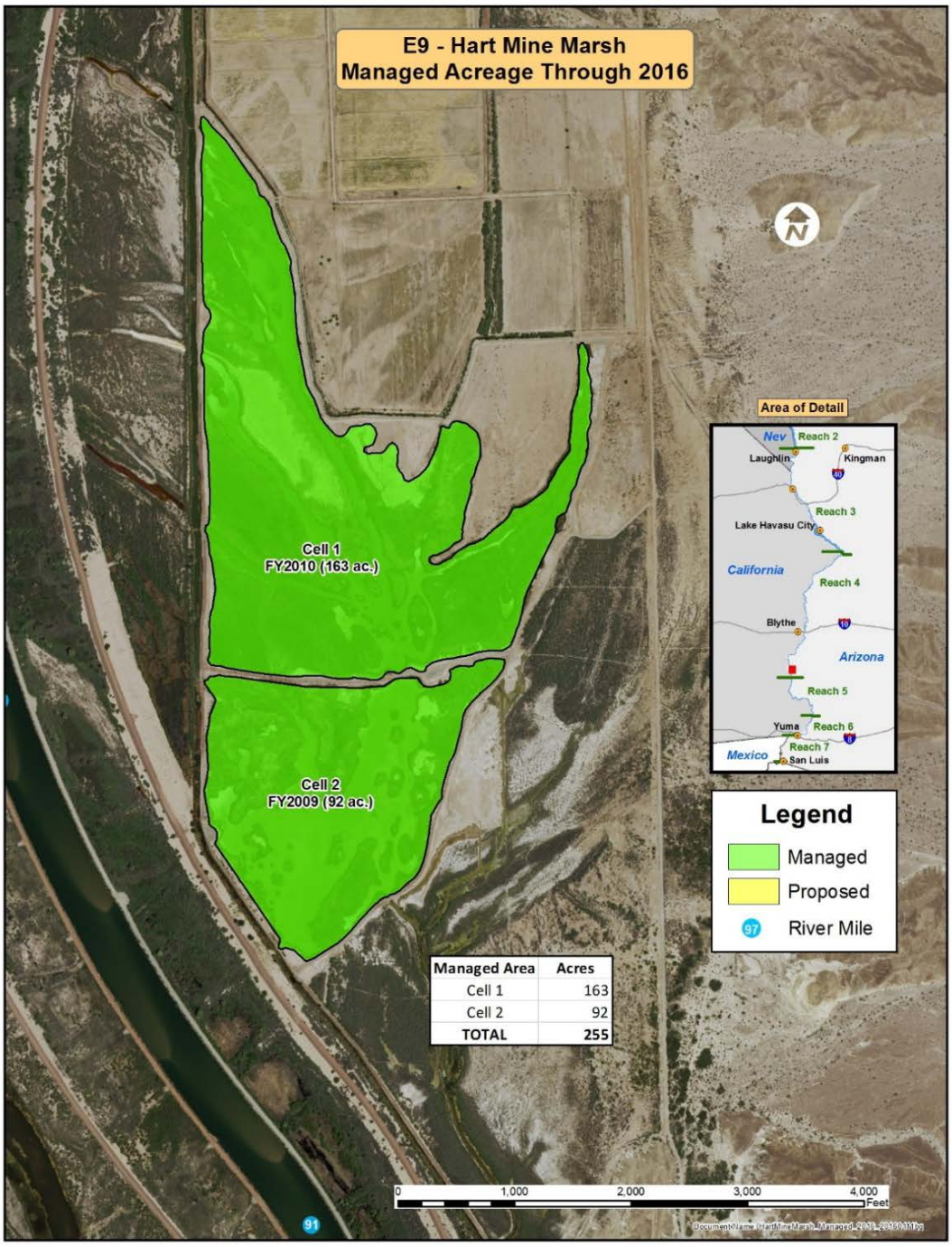


Figure 5.—Hart Mine Marsh managed acreage through 2016.

Palo Verde Ecological Reserve

The Palo Verde Ecological Reserve is a conservation area located about 5 miles (8 km) north of Blythe, California, along the California side of the Colorado River (figure 6). The site is within Reach 4. It encompasses 1,300 acres. The acreages are separated into eight different phases, with one phase planted every year through 2014 (figure 6). In spring 2006, a 61-acre nursery (Phase 1) was planted. In spring 2007, Phase 2 was planted with 80 acres of cottonwood, 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, quailbush, and a mix of native grasses. Phases 5, 6, and 7 were planted in 2010, 2011, and 2012 with cottonwood-willow habitat. Phase 8 was planted in 2013 with 38 acres of honey mesquite and alkali sacaton (*Sporobolus airoides*).

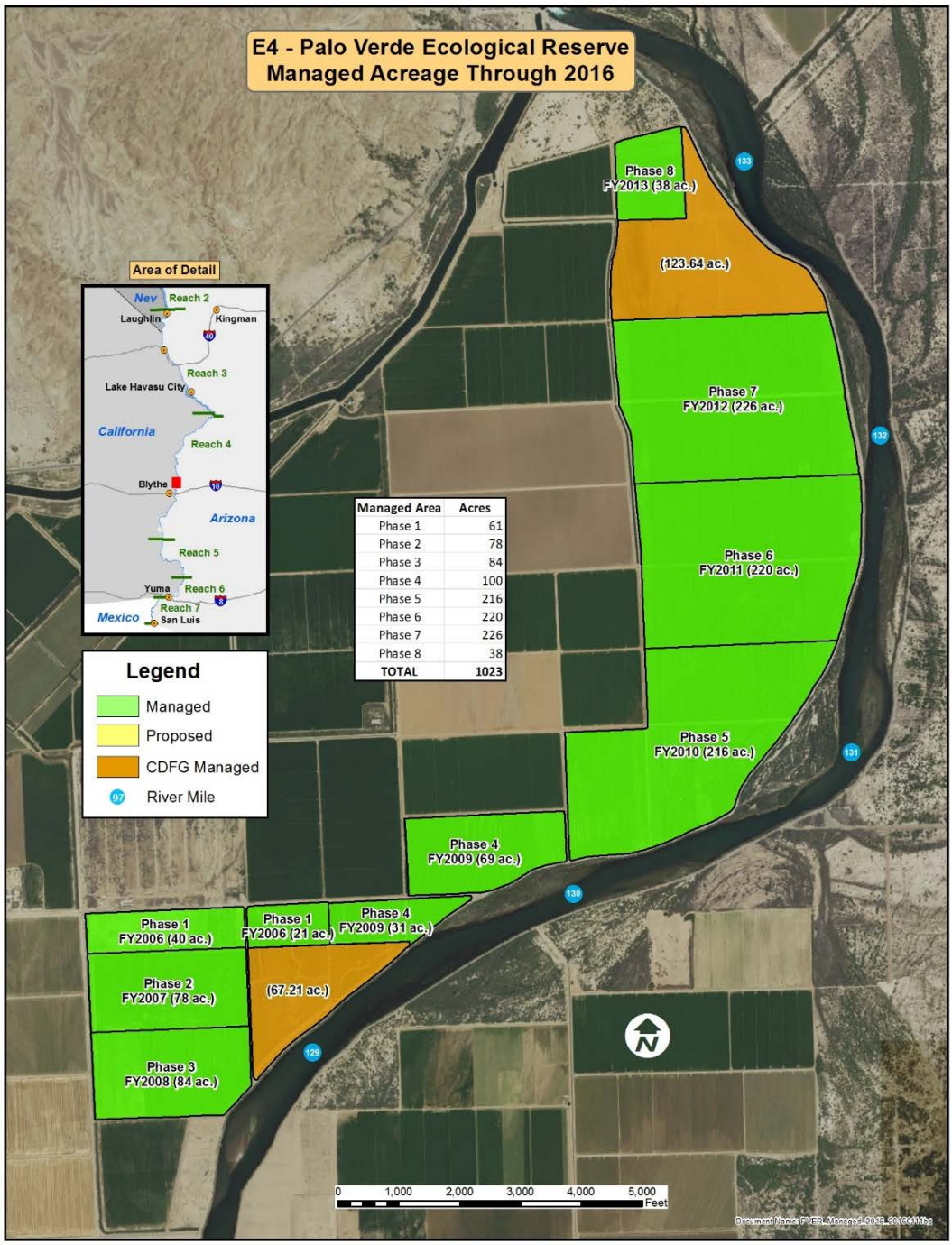


Figure 6.—Palo Verde Ecological Reserve managed acreage through 2016.

RESULTS

Site and quailbush characteristics were varied across sites (tables 2 and 3). Sootywings were detected at all sites except the Big Bend Conservation Area (table 4). The Palo Verde Ecological Reserve had the most detections (table 4).

Table 2.—General quailbush characteristics and observed feeding damage

Location	Quailbush grove typology/irrigation history	Leaf size and density	Leaf damage	Insect damage
BBCA	Dispersed.	Small to normal-sized leaves of medium to high density.	Absent to heavy	Grasshopper feeding damage noted in July. Galls also present.
BLCA	Dispersed.	Normal-sized leaves of medium to high density.	Absent to scarce	None.
PVER Phase 1	Dispersed.	Small to normal-sized leaves of low to high density.	Absent to scarce	None.
PVER Phase 4	Planted in rows and irrigated.	Mostly normal-sized leaves of medium density.	Absent to light	None.
PVER Phase 6	Planted in rows and irrigated.	Small to normal-sized leaves of low to high density.	Absent to scarce	None.
CVCA Phase 4	Planted in rows. Irrigated in the past but not at the present time.	Small to normal-sized leaves of medium density in March, medium to high in July.	Absent to scarce in March, moderate in July	Grasshopper damage. Aphid damage noted on a single occasion.
Cibola NWR (Crane Roost)	Dispersed.	Small to normal-sized leaves of medium to high density.	Scarce to light	None.
HMM	Dispersed plants. Groundwater appears to be near the surface.	Normal-sized leaves of low to high density.	Absent to scarce	None.

Table 3.—Quailbush attributes at LCR MSCP conservation area locations
(Locations are arranged from upstream to downstream along the Colorado River Valley. Values are mean ± standard error (minimum – maximum)

Location code	Quailbush attributes			
	Height (feet)	Width (feet)	Plant dryness (%)	Soil moisture (%)
BBCA (n = 5)[1]	5.0 + 0.4 (6.0 – 8.0)	8.3 + 0.9 (6.3 – 11.0)	28.8 + 5.6 (5.0 – 60.0)	37.3 + 10.2 (5.0 – 100.0)
BLCA (n = 5)	7.0 + 0.4 (5.0 – 12.0)	10.6 + 2.5 (5.0 – 20.0)	14.0 + 1.9 (10.0 – 20.0)	100.0 + 0.0 (100.0 – 100.0)
PVER Phase 1 (n = 5)	8.3 + 1.2 (5.5 – 12.0)	12.9 + 3.2 (8.0 – 25.0)	30.0 + 13.4 (0.0 – 70.0)	3.0 + 1.2 (0.0 – 5.0)
PVER Phase 4 (n = 5)	8.2 + 1.1 (5.0 – 11.0)	10.2 + 1.7 (4.5 – 14.0)	19.0 + 3.7 (10.0 – 30.0)	69.0 + 19.0 (20.0 – 100.0)
PVER Phase 6 (n = 5)	4.3 + 1.0 (3.0 – 8.0)	6.3 + 0.7 (5.0 – 8.5)	18.0 + 8.9 (5.0 – 50.0)	100 + 0.0 (100.0 – 100.0)
CVCA Phase 4 (n = 12)	6.1 + 0.5 (3.0 – 9.0)	6.9 + 0.7 (4.0 – 10.0)	32.1 + 8.9 (5.0 – 100.0)	12.9 + 5.1 (0.0 – 60.0)
Cibola NWR (Crane Roost) (n = 5)	9.7 + 0.6 (8 – 12.0)	12.6 + 2.5 (9.0 – 22.0)	25.0 + 4.5 (15.0 – 40.0)	85.0 + 9.2 (60 – 100)
HMM (n = 6)	8.8 + 1.7 (5 – 16.0)	12.0 + 1.7 (6.0 – 18.0)	10.8 + 2.9 (5.0 – 20.0)	91.7+ 10.0 (50.0 – 100.0)

[1] Quailbush at this location were resampled each month because of a limited number of plants.

Table 4.—Numbers of immature and adult stages of sootywings found at LCR MSCP conservation area locations

(Locations are arranged from upstream to downstream along the Colorado River Valley.)

Location code	Month	Number of eggs	Number of caterpillars	Number of Adults	Total all stages and months
BBCA	April	0	0	0	0
	May	0	0	0	
	July	0	0	0	
BLCA	April	6	0	0	6
PVER Phase 1	March	4	0	10	14
PVER Phase 4	March	4	0	2	6
PVER Phase 6	March	2	0	2	4
CVCA Phase 4	March	9	0	8	23
	July[1]	4	2	0	
Cibola NWR (Crane Roost)	March	7	0	5	12
HMM	March	0	0	7	7

[1] A second survey was conducted at CVCA Phase 4 in July to enable biologists to look for caterpillars and to gain experience detecting that life stage.

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