Lower Colorado River Multi-Species Conservation Program

Balancing Resource Use and Conservation

Monitoring of the MacNeill's Sootywing Skipper and its Habitats

2018 Annual Report

March 2019

Work conducted under LCR MSCP Work Task F06

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

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Arizona Game and Fish Department
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Other Interested Parties Participant Group

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Colorado River Board of California
Bard Water District
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Lower Colorado River Multi-Species Conservation Program

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ACRONYMS AND ABBREVIATIONS

CVCA	Cibola Valley Conservation Area
ha	hectare(s)
LCR MSCP	Lower Colorado River Multi-Species Conservation Program
MEFF	mobile electronic field form
n	sample size
PVER	Palo Verde Ecological Reserve
PWCA	Pretty Water Conservation Area
RH	relative humidity

Symbols

%	percent
±	plus or minus

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EXECUTIVE SUMMARY

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 five locations along the Lower Colorado River Valley. Evidence of sootywings was found at all five locations within the Palo Verde Ecological Reserve, Cibola Valley Conservation Area, and the Pretty Water Conservation Area, with eggs detected at three locations and adults detected at all locations. The highest number of detections occurred at the Pretty Water Conservation Area, with four detections during the April survey.

INTRODUCTION

The MacNeill's sootywing skipper (*Pholisora gracielae = Hesperopsis gracielae* [MacNeill]) (hereafter sootywing), is a small (wingspan 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*) (Wiesenborn and Pratt 2008). A variety of other plant species are used for nectar by adult sootywings (Wiesenborn and Pratt 2010). Alkali 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 (http://www.lcrmscp.gov/general_program.html). Information contained within this report concerns sootywing presence in honey mesquite(*Prosopis glandulosa*) plots containing quailbush 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

A mobile electronic field form (MEFF) for data collection was developed by the LCR MSCP. Data were collected on an iPhone running ArcGIS Survey123 software and downloaded and processed by the LCR MSCP using ArcGIS Online.

Selected monitoring sites all contained quailbush and were generally associated with conservation areas. Along with measures of quailbush size, lushness, and soil moisture at the plant base, sootywing habitat data collection included floral (nectar) metrics and honey and screwbean mesquite (*Prosopis pubescens*) presence. General quailbush habitat and qualitatively noted leaf size and density were also noted.

During sootywing monitoring in areas densely populated by quailbush, information was collected on five quailbush, randomly selected by time (timer set at 5 minutes). When quailbush were sparse, information was collected at each quailbush encountered until the five quailbush limit was reached. Sites were surveyed beginning in April and continued until the first sootywing detection or through August. Once sootywings were encountered in an area, surveys were stopped for that location. The set stopping time allowed for selection of a quailbush dependent only upon the previous path taken through the habitat. The

walk was not truly random because the route through the environment was directed by the density of quailbush and the presence of nectar plants. Quailbush 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 (percent saturation relative to field capacity) was measured with a Campbell Scientific HydroSense II soil-water sensor. Two people spent a total of 5 minutes searching each selected quailbush for sootywing eggs and caterpillars. After quailbush characteristics and immature sootywing observations were completed, timing for the next stop was initiated. Any adult sootywings that were encountered were also enumerated. Identification of various life stages of sootywings utilized information in Nelson et al. (2015).

If eggs or caterpillars were found at additional quailbush during a survey, information was also collected at these supplementary plants. Quailbush damage associated with presumptive larval sootywings and invertebrates other than sootywings were also noted. The timing of monitoring was designed 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.

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: If three separate plant species all had abundant flowers, the plot score would be 15. This index favors both floral abundance and diversity of flower sources. The presence of honey and screwbean mesquite was documented at the end of each survey.

Windspeed (kilometers per hour), air temperature (degrees Fahrenheit), relative humidity (RH), and lux were collected at the start and end of each sampling occasion. Windspeed was measured with a Kestral 3000 Wind Meter Anemometer Meter (±3% accuracy) and recorded on the Beaufort scale (an empirical measure of wind strength ranging from calm [force 0] to hurricane [force 12]). 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 probemeter (resolution of 1 Lux with 5% accuracy). Temperature and RH were also recorded each time an adult sootywing was detected.

Behaviors of detected adult skippers 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 paler and more mottled forewings, and typically by a larger body size compared to males.

STUDY AREAS

Monitoring of both adult and immature stages of 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.)

Site	Location code	Global Positioning System		Comments
		Easting	Northing	
Palo Verde Ecological Reserve Phase 1	PVER-1	728992.083	3730607.212	Large amount of dead quailbush in center of plot
Cibola Valley Conservation Area	CVCA 04	717019.225	3698618.633	
	CVCA 05	715007.221	3698952.067	
	CVCA 06	715001.871	3699175.972	
Pretty Water Conservation Area	PWCA	713084.010	3689453.210	Sparse quailbush

Palo Verde Ecological Reserve

The Palo Verde Ecological Reserve is a conservation area located about 5 miles (8 kilometers) north of Blythe, California, along the California side of the Colorado River (figure 1). The site is within Reach 4 and encompasses 1,300 acres (526 hectares [ha]). The acreages are separated into eight different phases, with one phase planted every year through 2014. In spring 2006, a 61-acre (25-ha) nursery (Phase 1) was planted. In spring 2007, Phase 2 was planted with 80 acres (32 ha) of Fremont cottonwood (*Populus fremontii*), Goodding's willow (*Salix gooddingii*), and other riparian plants. Phase 3 was planted in spring 2008 and is also planted with Fremont cottonwood-Goodding's willow (hereafter 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 (15 ha) of honey mesquite and alkali sacaton (*Sporobolus airoides).* The area surveyed in Phase 1 consisted of honey mesquite and quailbush of varying densities (figure 2), and encompassed both lush and completely dessicated quailbush.

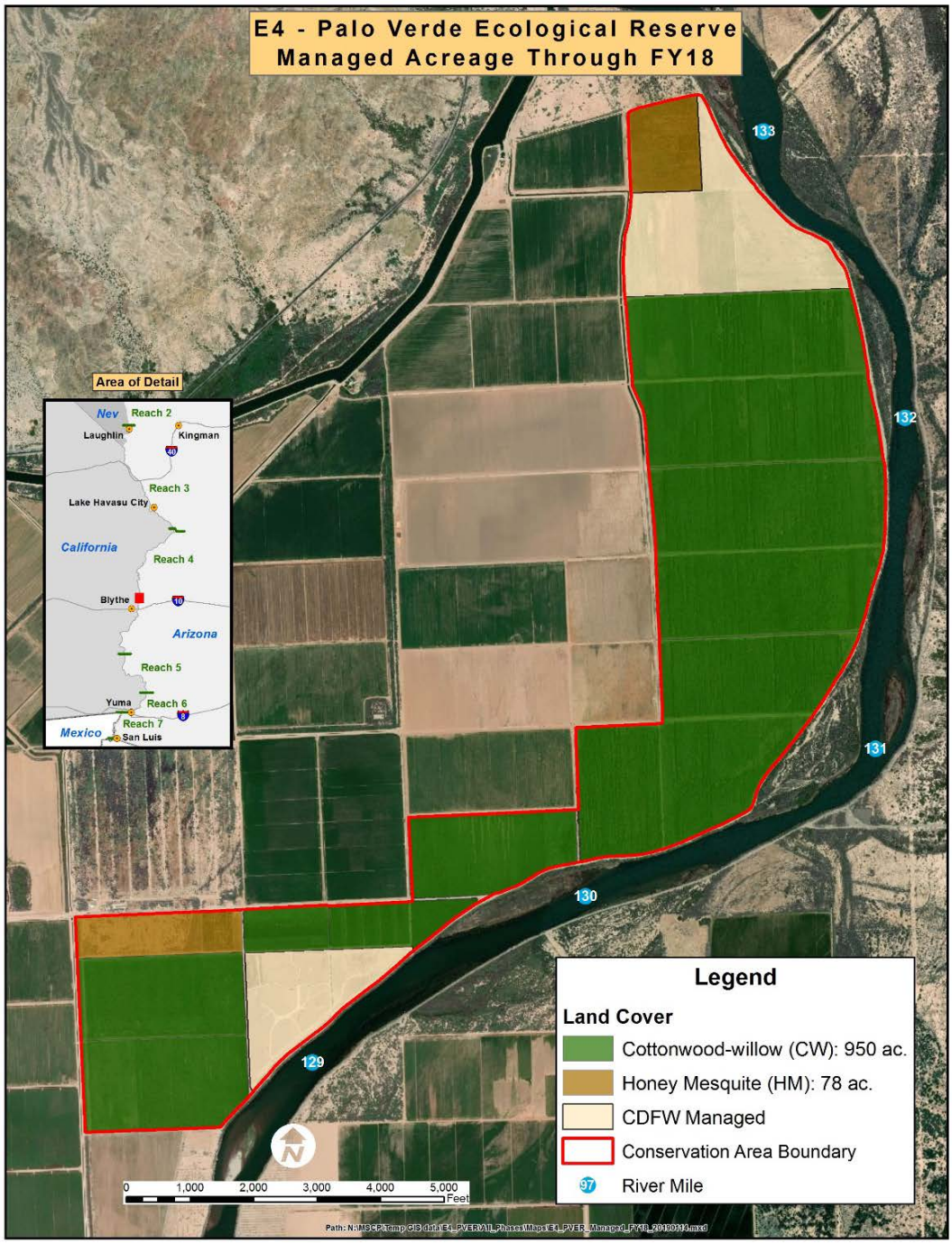


Figure 1.—Palo Verde Ecological Reserve managed acreage through fiscal year 2018.

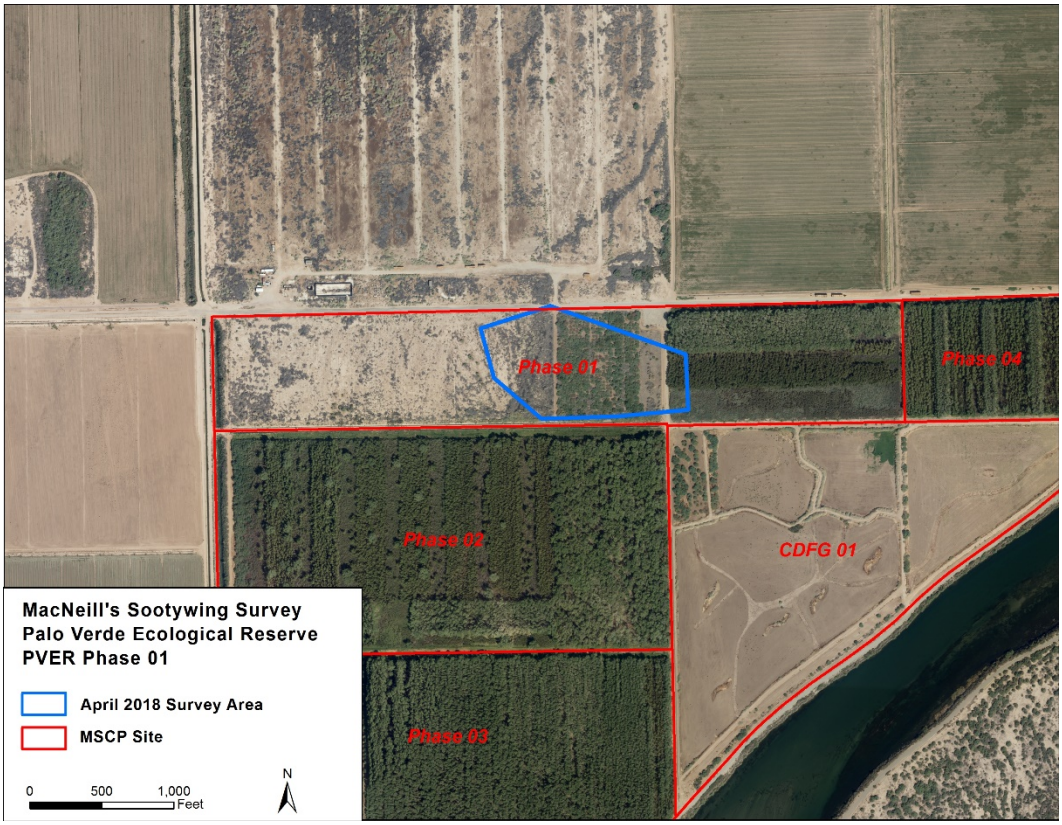


Figure 2.—Palo Verde Ecological Reserve survey area.

Cibola Valley Conservation Area

The Cibola Valley Conservation Area is located in Arizona adjacent to the Colorado River, about 15 miles (24 kilometers) south of Blythe, California (figure 3). The site is within Reach 4. It will encompass about 1,235 acres (500 ha) when completed. Three phases include Fremont cottonwood, Gooding's willow, coyote willow (*Salix exigua*), 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 cottonwood-willow habitat. Phase 3 was planted in spring 2007 and contains over 80 acres (32 ha) of cottonwood-willow planted in different combinations. Phase 3 also includes 11 acres (4 ha) of mule fat (*Baccharis salicifolia*) mixed with some Fremont cottonwoods and Goodding's willows. 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 (29 ha) of honey mesquite and quailbush. Phase 6 was planted in 2011 with 89 acres (36 ha) of honey mesquite. The areas surveyed in the Cibola Valley Conservation Area consisted of quailbush and honey mesquite planted in rows (figure 4).

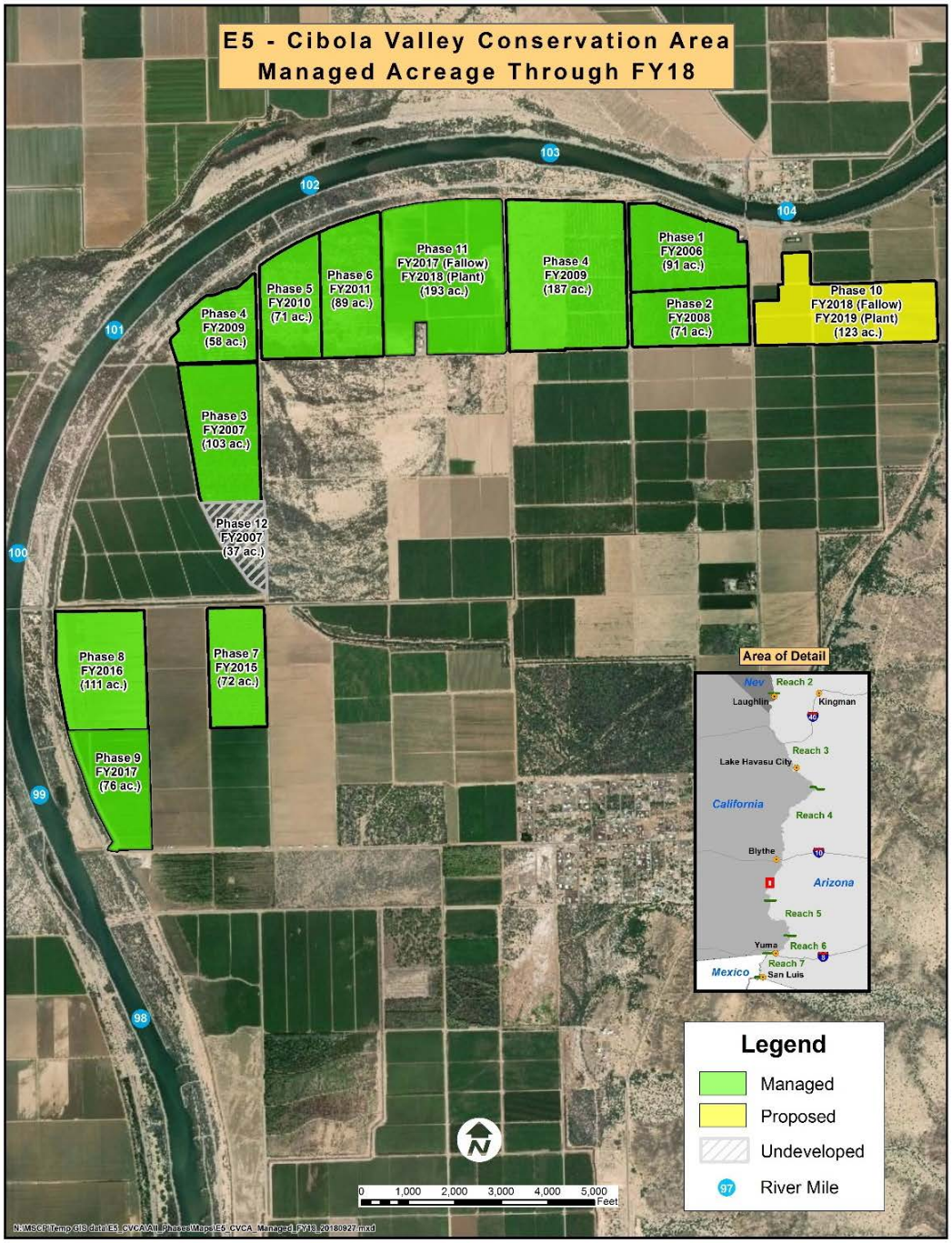


Figure 3.—Cibola Valley Conservation Area managed acreage through fiscal year 2018.

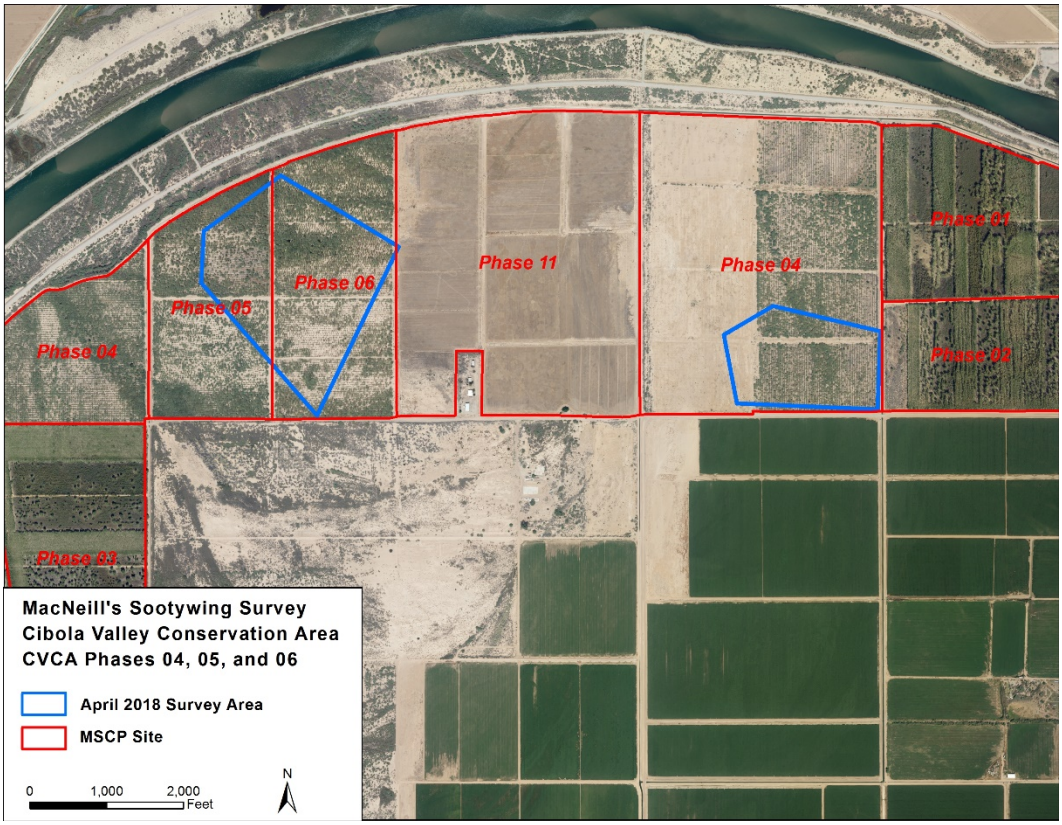
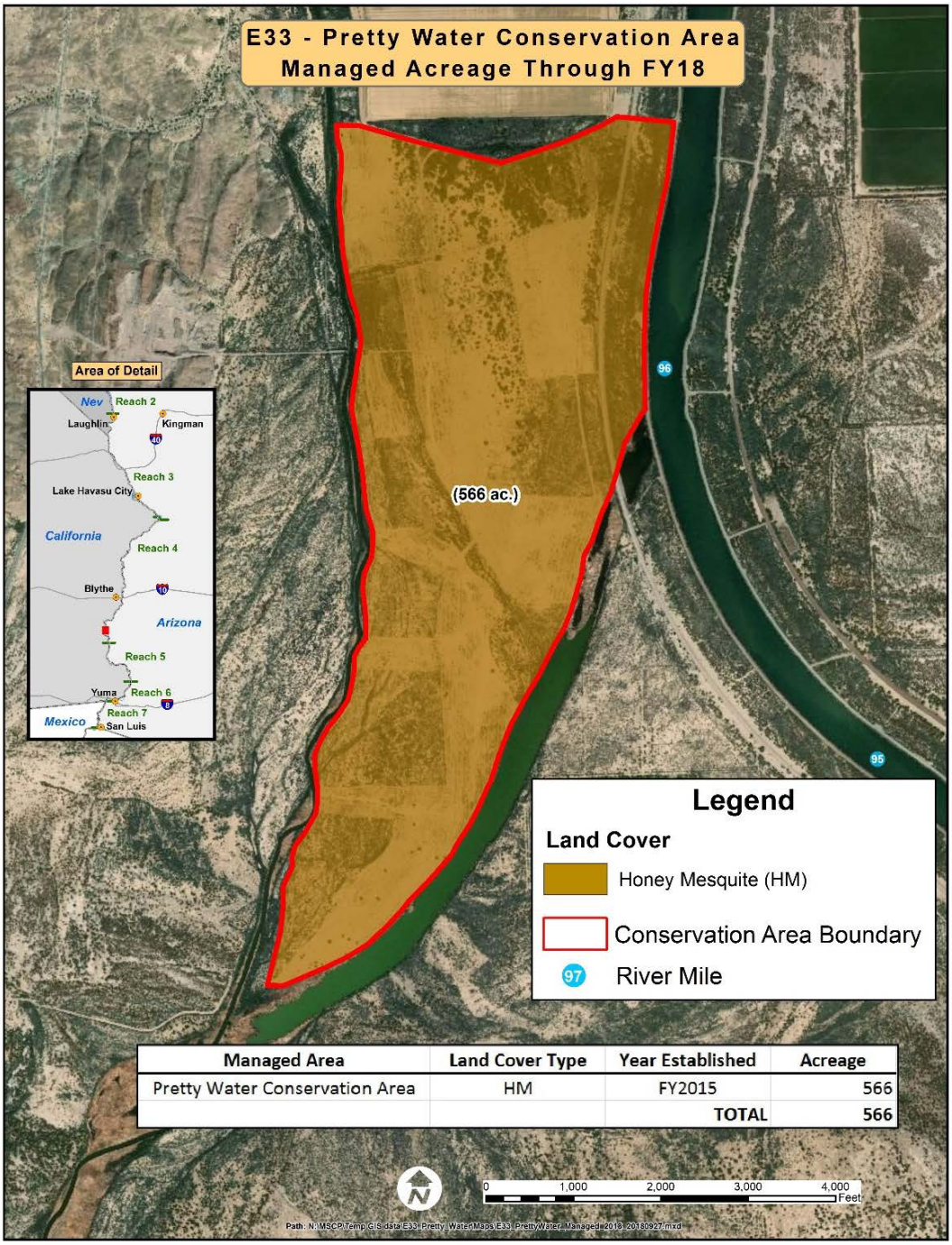


Figure 4.—Cibola Valley Conservation Area survey area.

Pretty Water Conservation Area

The Pretty Water Conservation Area consists of approximately 566 acres (225 ha) on the Cibola National Wildlife Refuge, located in California between River Miles 95 and 97 (figure 5). The initial partnership for the Pretty Water Conservation Area includes the Bureau of Reclamation and U.S. Fish and Wildlife Service, Cibola National Wildlife Refuge. The Pretty Water Conservation Area was developed for terrestrial wildlife species. The site was planted with honey mesquite habitat in 2015. The area surveyed was a mix of arrowweed (*Pluchea sericea*) and mature saltcedar (*Tamarix* spp.), with quailbush present along the sides of the road (figure 6).



Managed Area	Land Cover Type	Year Established	Acreage
Pretty Water Conservation Area	HM	FY2015	566
		TOTAL	566

Figure 5.—Pretty Water Conservation Area managed acreage through fiscal year 2018.

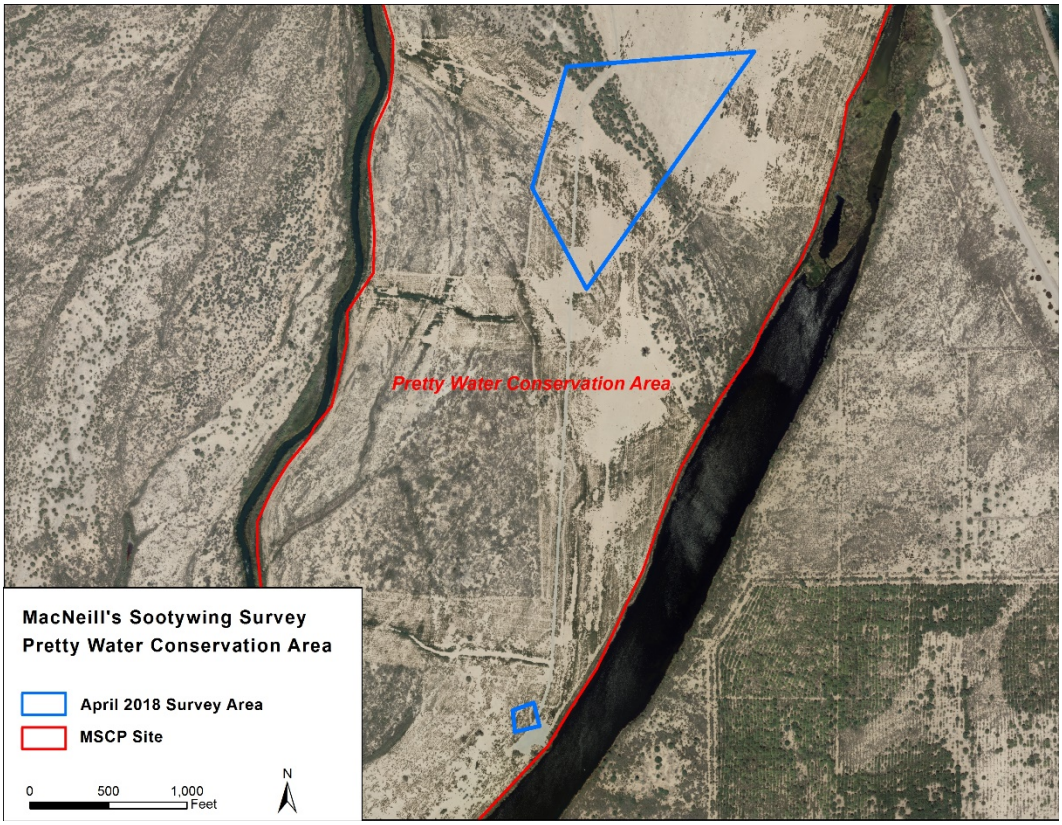


Figure 6.—Pretty Water Conservation Area survey area.

RESULTS

Site Characteristics and Quailbush Attributes

Quailbush patch typology varied from dispersed to densely packed (table 2). Soil moisture was low at all sites, and leaf size was generally smaller and of lower density on sites with lower soil moisture (table 3). Insect presence was generally low, with the most common damage being caused by galls. There was no nectar presence noted in any of the sites at the time of surveys. The pygmy blue butterfly (*Brephidium exilis*) was common at all sites.

Table 2.—General site characteristics, observed feeding damage, and butterfly presence

Location	Quailbush grove typology/irrigation history	Leaf size and density	Caterpillar feeding damage	Insect presence	Nectar Presence	Butterfly Presence
Palo Verde Ecological Reserve Phase 1	Densely packed	Small to normal leaves of low to medium density	None	None	None	Pygmy blue
Cibola Valley Conservation Area Phase 4	Dispersed	Small to normal leaves of low to medium density	Scarce to light	Galls	None	Pygmy blue
Cibola Valley Conservation Area Phase 5	Dispersed	Normal to large leaves of medium density	Scarce to moderate	Galls	None	Pygmy blue
Cibola Valley Conservation Area Phase 6	Densely packed	Small to normal leaves of low to medium density	Scarce to light	Galls	None	Pygmy blue
Pretty Water Conservation Area	Dispersed	Normal leaves of medium to high density	Aphids, galls	Light	None	Pygmy blue

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

Location	Quailbush attributes			
	Height (feet)	Width (feet)	Plant dryness (%)	Soil moisture (%)
Palo Verde Ecological Reserve Phase 1	7.2 ± 1.0	11.4 ± 2.4	43.0 ± 17.6	0.0 ± 0.0
(n = 5)	(5.0 – 10.0)	(7.0 – 19.0)	(0.0 – 90.0)	(0.0 – 0.0)
Cibola Valley Conservation Area Phase 4	7.6 ± 1.6	9.4 ± 2.0	30.0 ± 9.4	0.0 ± 0.0
(n = 5)	(3.0 – 12.0)	(6.0 – 18.0)	(5.0 – 75.0)	(0.0 – 0.0)
Cibola Valley Conservation Area Phase 5	3.4 ± 0.2	3.4 ± 0.6	1.0 ± 1.0	0.0 ± 0.0
(n = 5)	(3.0 – 4.0)	(2.0 – 5.0)	(0.0 – 5.0)	(0.0 – 0.0)
Cibola Valley Conservation Area Phase 6	3.5 ± 0.5	4.5 ± 0.5	5.0 ± 5.0	0.0 ± 0.0
(n = 2)*	(3.0 – 4.0)	(4.0 – 5.0)	(0.0 – 10.0)	(0.0 – 0.0)
Pretty Water Conservation Area	3.8 ± 0.8	5.6 ± 1.0	2.0 ± 1.2	2.0 ± 1.2
(n = 5)	(1.0 – 6.0)	(2.0 – 8.0)	(0.0 – 5.0)	(0.0 – 5.0)

Sootywing Numbers and Behaviors

Sootywings were detected in all sites (table 4). Of the eight adult sootywing detections, all behaviors noted were flying. No perching, basking, nectaring, puddling, mating, or ovipositing was noted. Eggs were noted at three sites, and a caterpillar was noted at one site.

Table 4.—Sootywing numbers and behaviors detected

Location	Month	Number of eggs	Number of caterpillars	Number of adults	Total – all stages and months
Palo Verde Ecological Reserve Phase 1	April	1	0	1	2
Cibola Valley Conservation Area Phase 4	April	0	0	2	2
Cibola Valley Conservation Area Phase 5	April	1	0	1	2
Cibola Valley Conservation Area Phase 6	April	1	0	1	2
Pretty Water Conservation Area	April	0	1	4	5

DISCUSSION

Sootywing were detected at all sites. In past years, sootywing have been detected at sites where they were absent previously, like the Cibola National Wildlife Refuge-Island Unit. This year, they were detected in sparse quailbush at the Pretty Water Conservation Area. Though sootywing have relatively short dispersal distances, the ready colonization of previously unoccupied or extirpated sites suggests they are able to easily move through the landscape, perhaps along the abundant stretches of nectar sources in saltcedar groves. The only LCR MSCP site surveyed where they remain undetected is at the Big Bend Conservation Area. However, they were detected by Nelson et al. in 2015 at nearby quailbush stands. Quailbush become decadent relatively quickly in the absence of watering, as was apparent in Palo Verde Ecological Reserve Phase 1, where a large stand of quailbush was completely dessicated. However, there was a continuous strip of large, healthy quailbush immediately adjacent to the concrete-lined canal feeding that cell. This suggests that quailbush can be easily sustained by nearby seepage from irrigation systems, of which there are likely many throughout the river system. These discontinuous pockets of suitable habitat are beneficial to the continued presence and colonization of sootywings on the lower Colorado River.

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