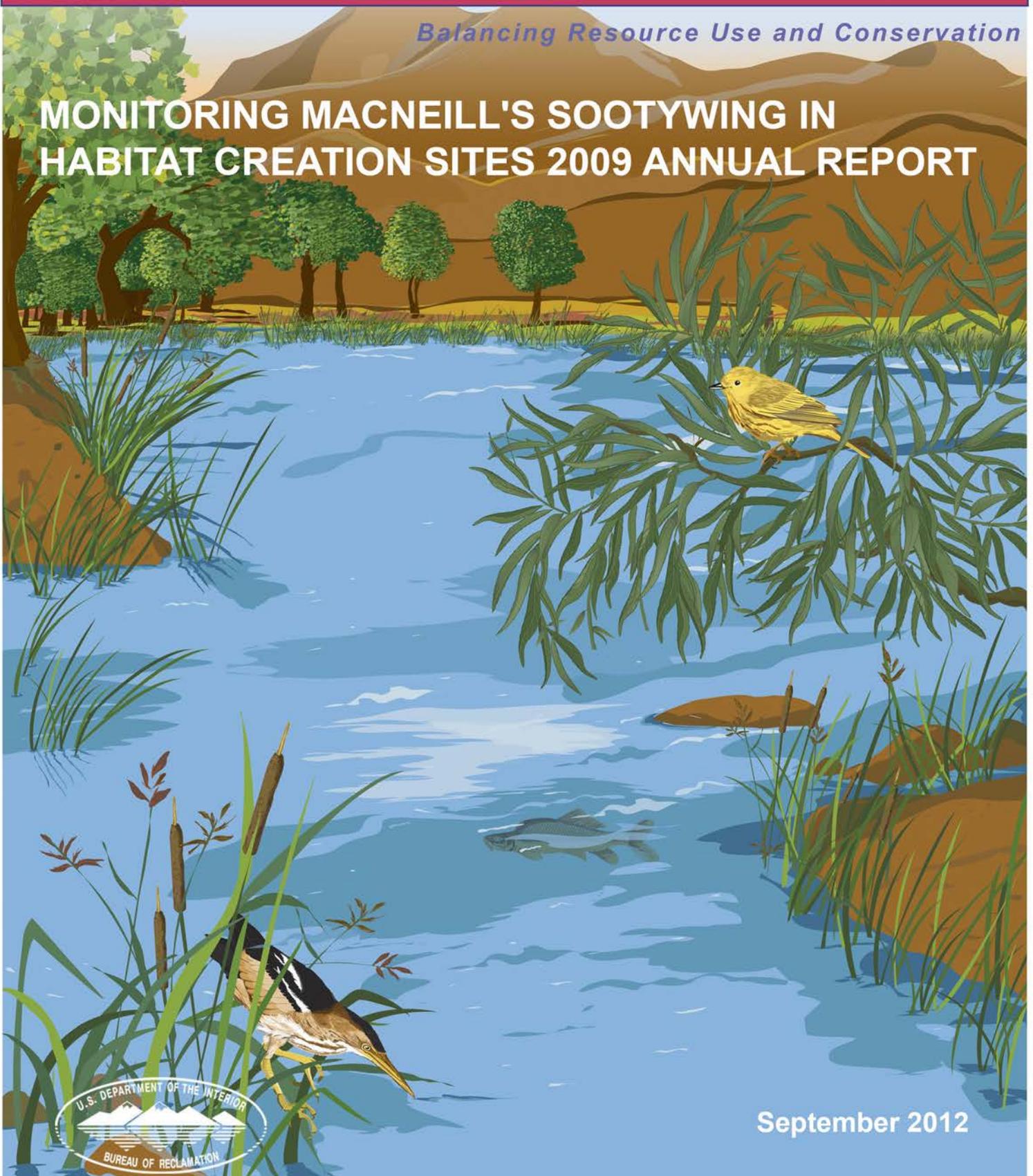




# Lower Colorado River Multi-Species Conservation Program

*Balancing Resource Use and Conservation*

## MONITORING MACNEILL'S SOOTYWING IN HABITAT CREATION SITES 2009 ANNUAL REPORT



September 2012

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The Nature Conservancy



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

September 2012

## ABSTRACT

Habitat created in part for MacNeill's sootywing was surveyed for adult sootywings during April-September 2009. Four plots at Cibola Valley Conservation Area (CVCA), totaling 162 acres, and one 6-acre plot at the Palo Verde Ecological Reserve (PVER) were sampled. Sootywings were most abundant in a 58-acre plot at CVCA Phase 4 planted in March 2009, with > 200 adults counted during September along a dirt road bisecting the plot. Sootywings also were abundant at a detached 90-acre Phase 4 plot. An 8-acre plot at CVCA Phase 2 supported low abundances of sootywings, only along the west edge where rainfall collected from an adjacent dirt road. A 6-acre CVCA Phase 3 plot was devoid of sootywings. At PVER Phase 3, only one sootywing was observed in September. The deep-furrow irrigation used at CVCA Phase 4 appears very effective in growing suitable *Atriplex lentiformis* host plants and other plants that provide adults with nectar. We suggest deep-furrows should be used at all future plots constructed for MacNeill's sootywings.

## INTRODUCTION

MacNeill's sootywing, *Hesperopsis graciellae* (MacNeill), is a small (wingspread = 23 mm) dark-brown butterfly (Lepidoptera: Hesperiidae; Pyrginae) found along the lower Colorado River and near the river along its tributaries in southeastern California, western Arizona, southern Nevada, and southern Utah (MacNeill 1970, Austin and Austin 1980, Scott 1986, Nelson and Anderson 1999). The species is State listed as S1 (critically imperiled) in Nevada and S2 (imperiled) or S3 (rare or uncommon but not imperiled) in Arizona and California. Flights of MacNeill's sootywing occur from April to October with three generations in southern Nevada (Austin & Austin 1980) and two flights in southeastern California (April & July to October, Emmel & Emmel 1973). MacNeill's sootywing appears to require shade to tolerate the high temperatures where it lives (Wiesenborn 1999).

Larvae of sootywings feed only on quail brush, *Atriplex lentiformis* (Torrey) (Chenopodiaceae), a shrub found in dense clumps along lower Colorado River drainages (Emmel & Emmel 1973). Quail brush fixes atmospheric nitrogen (Malik et al. 1991). Female sootywings oviposit on large (radius > 1.6 m) host plants with high concentrations of water (> 64%) in branches and nitrogen (> 3.2% of dry-mass) in leaves (Wiesenborn and Pratt 2008). Sources of nectar for butterflies may limit the sootywing's distribution, because quail brush is wind pollinated and does not produce nectar. Other plant species therefore are needed by the skipper for nectar. We have observed sootywings nectar-feeding on eight plant species (Pratt and Wiesenborn 2009):

Heliotrope	<i>Heliotropium curassavicum</i>	Boraginaceae	white flowers
Sea purslane	<i>Sesuvium verrucosum</i>	Aizoaceae	pink flowers
Arrowweed	<i>Pluchea sericea</i>	Asteraceae	purple flowers
Alkali mallow	<i>Malvella leprosa</i>	Malvaceae	white-yellow flowers
Screwbean mesquite	<i>Prosopis pubescens</i>	Fabaceae	yellow flowers
Honey mesquite	<i>Prosopis glandulosa</i>	Fabaceae	yellow flowers
Tamarisk	<i>Tamarix ramosissima</i>	Tamaricaceae	white-pink flowers
Common purslane	<i>Portulaca oleracea</i>	Portulacaceae	yellow flowers

The objectives of this work task are to (1) survey MacNeill's sootywings at MSCP restoration sites and (2) determine if new or existing sites need to be altered to ensure sootywing establishment. This work task is integrated with three other MSCP work tasks:

- C7: Survey and Habitat Characterization for MacNeill's Sootywing
- E4: Palo Verde Ecological Reserve (PVER)
- E5: Cibola Valley Conservation Area (CVCA)

## STUDY AREAS

Five restoration plots supporting *A. lentiformis* alone or together with *Prosopis* sp. (mesquite) were surveyed during 2009. Four plots were at CVCA and one plot was at PVER. These were:

<u>Restoration Plot</u>	<u>Planted</u>	<u>Acres</u>	<u>Description</u>
CVCA Phase 2	2007	8	entirely quail brush, flood irrigated
CVCA Phase 3	2009	6	quail brush and mesquite in deep furrows
CVCA Phase 4 west	2009	58	quail brush and mesquite in deep furrows
CVCA Phase 4 east	2009	90	quail brush and mesquite in deep furrows
PVER Phase 3	2008	6	quail brush in 4 strips within alfalfa, flood irrigated

## METHODS

We sampled CVCA Phase 2 and PVER Phase 3 nine times, every 1-5 weeks, during April-September 2009. CVCA Phases 3-4, planted later, were sampled three times, every 2-4 weeks, during July-September 2009. We sampled plots by counting adult sootywings along dirt roads that provided transects that bordered or bisected the plots. Transects sampled were:

<u>Restoration Plot</u>	<u>Transect Sampled</u>
CVCA Phase 2	entire west edge (0.3 km)
CVCA Phase 3	entire south edge (0.4 km)
CVCA Phase 4 west	entire dirt road bisecting plot (0.5 km)
CVCA Phase 4 east	entire south and east edges (1.1 km)
PVER Phase 3	entire west edge (0.4 km)

Sootywing adults flying around *A. lentiformis* shrubs or landing on flowers on other plants were counted. Plants landed on were noted. Plots were sampled during 0930-1452 PDT when air temperature was 22-40 °C and relative humidity was 19-26%.

## RESULTS

Data recorded at the plots, including observations noted in the last column, are presented below:

Plot	Date 2009	Time MST	Air Temp (C)	% RH	Wind Speed (mph)	No. Adults	Shrub ht. (m)	Note
CVCA2	03-Jun	1250	35	21	5-10	0	1.5	irrigated
CVCA2	07-May	1000	30	23	0	1	1.5	on heliotrope
CVCA2	16-Apr	-	-	-	-	-	-	site too dry
CVCA2	16-Apr	1115	22	26	0-5	0	1.5	
CVCA2	17-Jun	1253	32	22	5-10	1	1.5	abundant heliotrope
CVCA2	20-May	1320	31	22	0-5	8	1.5	photographed
CVCA2	22-Apr	1215	32	22	5-10	3	1.5	on heliotrope
CVCA2	23-Apr	915	28	24	10-15	0	1.5	
CVCA2	09-Sep	1452	35	21	0-5	0	1.5	A.l. half dead
CVCA2	26-Aug	1220	34	22	0-5	0	2	being irrigated; A.l. mostly dead
CVCA2	30-Jul	930	29	25	5-10	6	1.5	
CVCA3	09-Sep	1415	35	21	0-5	0	1	sampled heliotrope
CVCA3	25-Aug	1345	40	19	0-5	0	1.5	site dry and weedy
CVCA3	26-Aug	1145	34	22	0-5	0	1.5	heliotrope abundant
CVCA3	30-Jul	1210	35	21	5-10	0	1	heliotrope abundant
CVCA4	30-Jul	1030	31	24	5-10	1	1.5	on <i>Portulaca oleracea</i>
CVCA4-E	09-Sep	1442	35	21	0-5	10	1	sampled heliotrope
CVCA4-E	26-Aug	1200	34	22	0-5	30	1.5	sampled heliotrope
CVCA4-W	25-Aug	1300	40	19	0-5	100	2	all on heliotrope

CVCA4-W	26-Aug	1130	34	22	0-5	100	2	1 female collected
CVCA4-W	30-Jul	1045	31	24	5-10	25	1.5	on heliotrope
CVCA4-W	30-Jul	1200	35	21	5-10	28	1.5	on heliotrope
CVCA4-W	9-Sep	1400	35	21	0-5	200	2	on heliotrope
PVER3	04-Jun	1254	34	20	5-10	0	1.5	
PVER3	07-May	1100	30	23	0-5	0	1.5	
PVER3	16-Apr	1200	22	26	0-5	0	1.5	
PVER3	17-Jun	1355	32	22	5-10	0	1.5	field weedy
PVER3	20-May	1450	29	24	0-5	0	1.5	
PVER3	22-Apr	1340	35	20	5-10	0	1.5	
PVER3	10-Sep	1300	35	21	0-5	3	1.5	in <i>A. lentiformis</i>
PVER3	26-Aug	1330	38	19	0-5	0	1.5	A.l. crowded out by alfalfa
PVER3	30-Jul	1345	34	22	0-5	0	1.5	weedy w/ mares tail
PVER4	10-Sep	1320	35	21	0-5	0	1	very weedy, A.l. amongst weeds

## **CVCA Phase 2**

Sootywings were sporadically present in low numbers at this plot (Fig. 1). This planting is entirely flood-irrigated *A. lentiformis* (Fig. 2). Sootywings were only found along the western edge of the plot (Fig. 3), where water-runoff from an adjacent road irrigated the quail brush, increasing their size and water content. Many sootyings were observed on heliotrope (Fig. 4) that voluntarily became established along the same margin. Quail brush in the interior of the plot are thin with little foliage and interspersed among weeds.

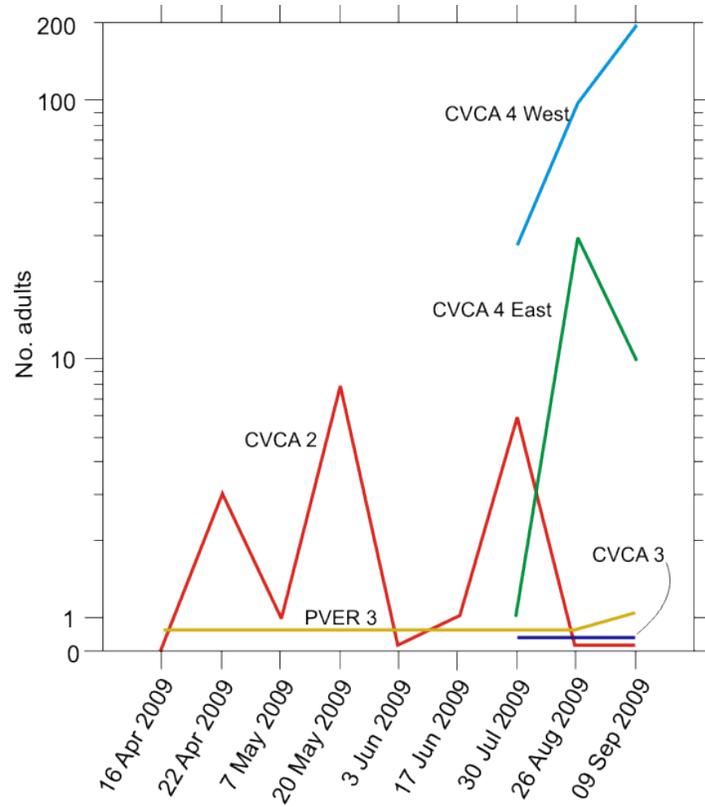


Figure 1. Counts of MacNeill's sootywings along transects at each of the *Atriplex lentiformis* plots. Numbers next to sites are Phases. CVCA Phases 3-4 were planted in March 2009 and surveyed beginning on 30 Jul 2009. Note that Y-axis is log scale.



Figure 2. Overall view of 8-acre *Atriplex lentiformis* plot at CVCA Phase 2 (20 May 2009).



Figure 3. Heliotrope (foreground) and *Atriplex lentiformis* along west edge of CVCA Phase 2 plot (17 Jun 2009). Plants along edge receive water runoff from dirt road bordering lined irrigation canal.



Figure 4. MacNeill's sootywing on heliotrope (*Heliotropium curassavicum*) flower at CVCA Phase 2 (20 May 2009).

### **CVCA Phase 3**

This 6-acre plot (Fig. 5) was replanted in March 2009 after an unsuccessful planting in 2008. The plot is irrigated with deep furrows. Plants in this plot appear healthy, with large *A. lentiformis* shrubs and large patches of heliotrope providing nectar. However, sootywings were not found in this planting during 2009 (Fig. 1).



Figure 5. *Atriplex lentiformis* and *Prosopis* spp. plot at CVCA Phase 3 (30 Jul 2009). This plot supports large host plants and nectar sources but does not support sootywings.

### **CVCA Phase 4**

These two plots are the most successful restoration sites for MacNeill's sootywings to date. Phase 4 includes two disconnected fields, identified as west (Figs. 6-7) and east (Fig. 7). Both plots use deep-furrow irrigation, with water delivered directly to the shrubs and minimizing weed growth. Populations along transects reached 200 sootywings at the west plot and 30 sootywings at the east plot (Fig. 1). Heliotrope has voluntarily become established at both sites and supports aggregations of sootywings feeding on its nectar (Fig. 8).



Figure 6. Aerial view of *Atriplex lentiformis* and *Prosopis* spp. plot at CVCA Phase 4, west. Levee road along east side of river is at left in photo.



Figure 7. *Atriplex lentiformis* and *Prosopis* spp. plot at CVCA Phase 4, west (30 Jul 2009).



Figure 8. MacNeill's sootywing feeding on heliotrope nectar at CVCA Phase 4, west (30 Jul 2009).

### **PVER Phase 3**

This plot is a 26-acre alfalfa field containing 4, 1.5-acre strips of *A. lentiformis* (Fig. 9). The field is flood-irrigated. The west side of this plot was surveyed throughout the 2009 season. Only one sootywing was observed, flying around quail brush, on the last sampling date in September (Fig. 1).



Figure 9. *Atriplex lentiformis* plot at PVER Phase 3 (30 Jul 2009). *A. lentiformis* is planted in 4 north-to-south strips, totaling 6 acres, within a 26-acre alfalfa field. This is the quail brush strip along the west edge, where sootywings were sampled.

## DISCUSSION

The plots sampled for sootywings during 2009 were all planted within the last three years. Populations of sootywings are likely to change at each of the fields as they mature. For example, quail brush grows faster than mesquite due to its C<sub>4</sub> physiology. As plots mature, mesquite will eventually overtop the *A. lentiformis* plants, changing the vegetation structure. These will likely not effect, or increase, sootywing populations, because of the sootywing's requirement for shade (Wiesenborn 1999). Nevertheless, early indications suggest the deep furrows at CVCA Phase 4 are the best method of constructing plots. These furrows provide adequate water to the intended plants, quail brush and mesquite, while minimizing the water supply to weeds. Adequate watering of quail brush provides the plant water-content needed to produce shrubs suitable for sootywings (Wiesenborn and Pratt 2008). It is suggested that all future construction of *A. lentiformis* and *Prosopis* spp. plots use deep-furrow irrigation.

Adult sootywings require sources of nectar that are not provided by *A. lentiformis*. Generally, nectar-source plants such as heliotrope have voluntarily become established at each of the plots. Nectar-providing plants at CVCA Phase 4 may be limiting sootywing populations. Although heliotrope is present at the plots, its abundance is far less than that of quail brush. Supplemental plantings of heliotrope or sea purslane may be required to balance abundances of host plants and plants producing nectar.

Of interest is the lack of sootywings at CVCA Phase 3. This field appears to be suitable for *H. graciellae*. Additional work may be needed to clarify why sootywings are not colonizing the plot. Possible problems may include inadequate host-plant water and nitrogen contents, low nectar production by flowering plants, field isolation, or small field size.

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