

Lower Colorado River Multi-Species Conservation Program



Balancing Resource Use and Conservation

2011 Marsh Bird Surveys



April 2012

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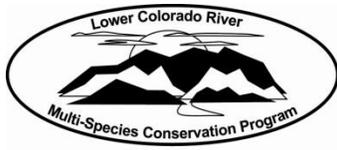
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Lower Colorado River Multi-Species Conservation Program

2011 Marsh Bird Surveys

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April 2012

ACRONYMS AND ABBREVIATIONS

CD	compact disc
LCR MSCP	Lower Colorado River Multi-Species Conservation Program
NWR	National Wildlife Refuge
Reclamation	Bureau of Reclamation
USFWS	U.S. Fish and Wildlife Service

Symbols

%	percent
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CONTENTS

	Page
Abstract.....	iii
Introduction.....	1
Background.....	1
Survey Areas.....	2
Methods.....	5
Results.....	6
Discussion.....	7
Big Bend Conservation Area	7
Topock Gorge	7
Recommendations.....	9
Literature Cited.....	11

Tables

Table	Page
1 Big Bend Conservation Area marsh bird survey results, 2011	6
2 Topock Gorge marsh bird survey results, 2011	8

Figures

Figure	Page
1 LCR MSCP area map.....	3
2 Big Bend Conservation Area and Topock Gorge.	4
3 Yuma clapper rail detections by year in Topock Gorge.	9

Attachments

Attachment	
1 Species List	
2 Survey Data Sheet	

ABSTRACT

In 2011, surveys for marsh birds were conducted by the Lower Colorado River Multi-Species Conservation Program along portions of the lower Colorado River and adjacent backwaters, lakes, and marshes (see figures 1 and 2). Surveys were conducted during March, April, and May. A Virginia rail (*Rallus limicola*) was detected at the Big Bend Conservation Area. In Topock Gorge, Yuma clapper rails (*Rallus longirostris yumanensis*), California black rail (*Lateralus jamaicensis coturniculus*), least bitterns (*Ixobrychus exilis*), and Virginia rails were detected.

INTRODUCTION

The Yuma clapper rail (*Rallus longirostris yumanensis*) was listed as an endangered species by the U.S. Department of the Interior in 1967 (U.S. Department of the Interior 1967) and is currently listed under the Endangered Species Act regulated by the U.S. Fish and Wildlife Service (USFWS). The species is presently listed as threatened in California and is a species of special concern in Arizona (Arizona Game and Fish Department 2006; California Department of Fish and Game 2006). The California black rail (*Laterallus jamaicensis coturniculus*) is a migratory non-game bird of management concern (USFWS 1995). In California, this species is listed as threatened and is also listed as a species of special concern in Arizona (Arizona Game and Fish Department 2002; California Department of Fish and Game 2006). The least bittern (*Ixobrychus exilis*) is a species of special concern in Arizona and California (Arizona Game and Fish Department 2001; Sterling 2008). It is listed by the USFWS as a migratory non-game bird of management concern (USFWS 1995).

Conservation measures for the Habitat Conservation Plan of the Lower Colorado River Multi-Species Conservation Program (LCR MSCP) provide for monitoring and research of the Yuma clapper rail, California black rail, and least bittern (LCR MSCP 2004). Surveys for these three covered species are conducted in existing habitat as part of system-wide monitoring and at sites prior to and after creation of marshland habitat (LCR MSCP 2004).

Research into the habitat requirements of covered marsh birds includes a recently completed study under the direction of Dr. Courtney Conway. In June 2008, the Bureau of Reclamation (Reclamation) entered into a Cooperative Agreement with the University of Arizona and the U.S. Geological Survey. A study was initiated in a newly created marsh at Imperial National Wildlife Refuge to document vegetation and depth of water used by marsh birds over a 2-year period, correlating the range of hydrologic conditions and plant associations preferred by black rails, clapper rails, and least bitterns, as well as other marsh bird species encountered. The results of this study are now being used to develop new marsh habitat under the LCR MSCP at the Laguna Division Conservation Area near Yuma, Arizona, and to manage existing and created wetlands at Cibola National Wildlife Refuge (Nadeau et al. 2011). More information about these sites, as well as recent reports, can be found at www.lcrmscp.gov.

BACKGROUND

Using broadcast vocalizations, Gibbs and Melvin (1993) found that three visits to a wetland were adequate to determine the presence or absence of all target species with 90 percent (%) certainty. Up to a 25% change in population abundance of

2011 Marsh Bird Surveys

water birds can be detected over a 10-year monitoring period by surveying 40–80 mini routes on 2–3 occasions annually (Gibbs and Melvin 1997). Along the lower Colorado River at Mittry Lake (north of Yuma, Arizona), Conway et al. (1993) used radio telemetry in conjunction with playback recordings of Yuma clapper rail to determine detection rates. They determined that marked birds exhibited a year-round response rate of 19.2%. During the early breeding season in March and April, the response rate was 40%. During the late breeding season in May and through July, the response rate was 20%. The maximum number of responses detected during any one survey period provides the minimum number of birds present during the survey year.

Reclamation began conducting surveys in the Topock Gorge portion of the Havasu National Wildlife Refuge (NWR) in 1996 using a protocol specifically for Yuma clapper rail (figure 2). These surveys were part of a basin-wide multi-partner effort to monitor the population of Yuma clapper rails with the ultimate goal of delisting the species (USFWS 1983). In June 2000, Reclamation conducted surveys for the California black rail in Topock Gorge and Topock Marsh as part of a onetime basin-wide survey; no black rails were found at either location (Conway et al. 2002).

Conway and Nadeau (2006) found that broadcasting calls of multiple species of marsh birds does not compromise the vocalization probability of any one species. Since 2006, Reclamation has participated in the National Marsh Bird Monitoring Program (<http://ag.arizona.edu/research/azfwru/NationalMarshBird/index.htm>), which involves surveying several species simultaneously using taped recordings of the species' calls (Conway 2005; USFWS 2006). The goal of the national program is to estimate population changes in marsh birds using standardized, repeatable survey methods (Conway and Nadeau 2006). This goal parallels Reclamation's requirement for long-term monitoring of created habitat to determine if it is suitable for species covered by the LCR MSCP and if the species are present. All Reclamation personnel involved with marsh bird surveys have attended and successfully completed the Marsh Bird Training Workshop presented by Dr. Courtney Conway.

SURVEY AREAS

The Big Bend Conservation Area is located south of Laughlin, Nevada, along the Colorado River (figures 1 and 2). It is a small marsh/backwater that contains approximately 15 acres of backwater and 15 acres of upland. The predominant vegetation of the backwater is southern cattail (*Typha domingensis*). It is at the northern limit of Reach 3, and there are four survey points.

Topock Gorge is located along the lower Colorado River between Needles, California, and Lake Havasu City, Arizona, in the Havasu NWR and is also located in Reach 3 (figures 1 and 2). The survey route in Topock Gorge runs

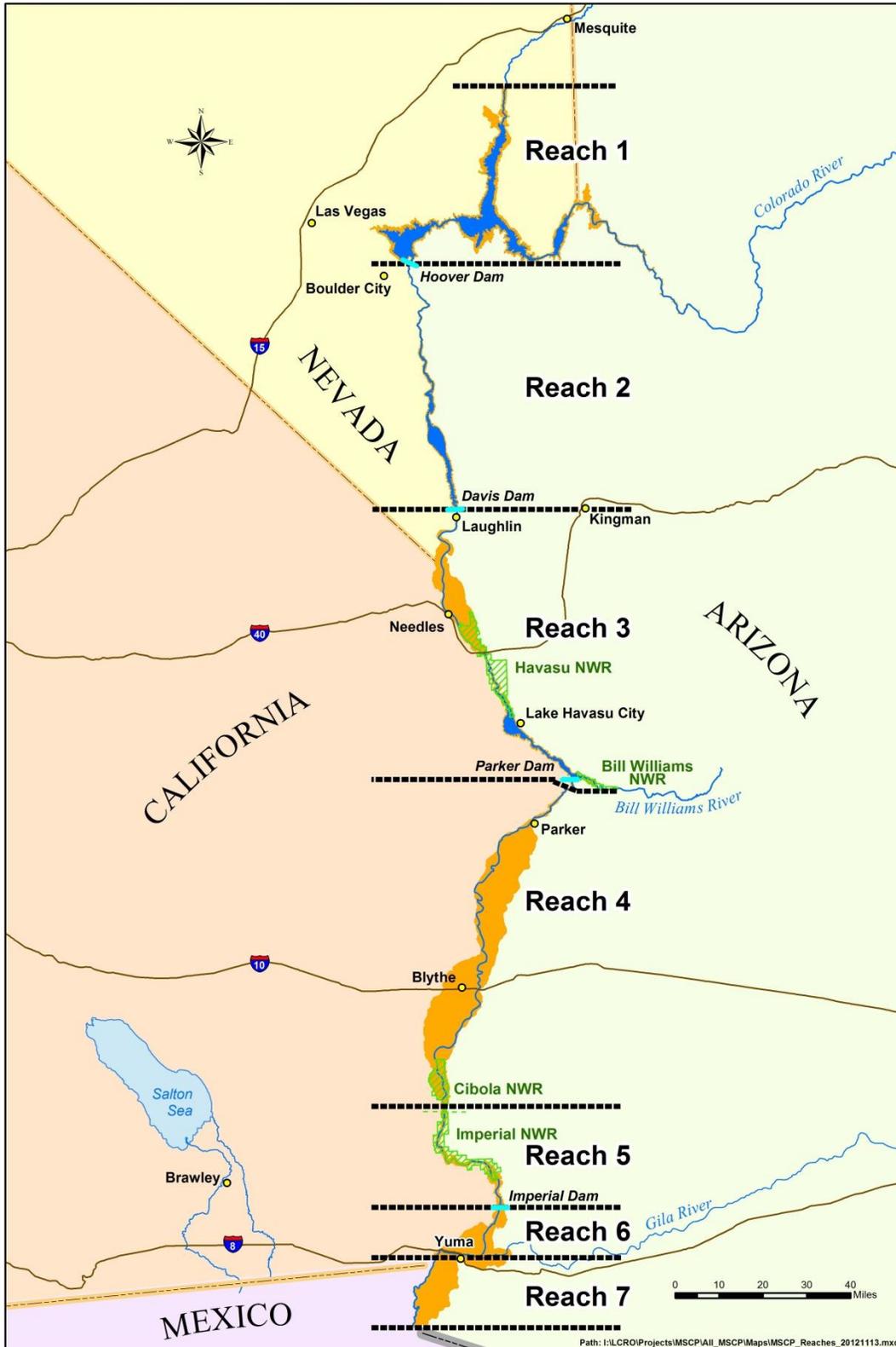


Figure 1.—LCR MSCP area map.

2011 Marsh Bird Surveys



Figure 2.—Big Bend Conservation Area and Topock Gorge.

from River Mile 233 to just past River Mile 218, a distance of 15.3 miles (24.6 kilometers). Marshes are located on both the California and Arizona sides of the river, with the largest marsh complexes on the Arizona side just north and south of Blankenship Bend (River Mile 222.5). The predominant vegetation consists of California bulrush (*Schoenoplectus californicus*), southern cattail, and common reed (*Phragmites communis*) interspersed with stands of saltcedar (*Tamarix* sp.) and coyote willow (*Salix exigua*). There are 52 survey points in Topock Gorge.

Hart Mine Marsh is located in Cibola NWR. It was a decadent marsh that was restored from 2009 through 2011. It is at the southern limit of Reach 4 and is adjacent to River Miles 91 and 92. There are 163 acres of marsh. The vegetation consist of southern cattail, three-square bulrush (*Scirpus olneyi*), California bulrush, common spikerush (*Eleocharis palustris*), great bulrush (*S.tabernaemontani*), inland saltgrass (*Distichlis spicata*) with quail bush (*Atriplex lentiformis*), and honey mesquite (*Prosopis glandulosa*). There are eight survey points. Surveys are conducted by the USFWS.

METHODS

Using a standardized protocol from the National Marsh Bird Monitoring Program, surveys for the California black rail, least bittern, Virginia rail, and Yuma clapper rail were performed between March 15 and May 31 (USFWS 2003; USFWS 2006; Conway 2009). Three surveys were conducted, and a standardized survey form was used to record the date, start and end time, location, route, observers, environmental data, and other comments as well as selected marsh birds encountered, their responses, and direction and distance from the survey point (attachment 1). Locations and numbers of pied-billed grebes (*Podilymbus podiceps*), soras (*Porzana carolina*), common gallinule (*Gallinula galeata*), and marsh wrens (*Cistothorus palustris*) were also recorded.

Surveys began 30 minutes before sunrise and continued until marsh birds ceased calling, usually by 10:00 a.m. Surveys ceased when the wind speed was greater than 20 kilometers per hour because it impaired detection of birds due to noise from rustling vegetation. Surveys are not conducted during periods of sustained rain or heavy fog (Conway 2009).

Portable compact disc (CD) players with amplified speakers were used to broadcast calls of the four selected species. The CD consisted of 5 minutes of silence followed by 30 seconds of selected calls and 30 seconds of silence for each of the species. Specific calls used were “kicky-doo” and “grr” for black rail, “coo” and “kak” for least bittern, “grunt,” “ticket,” and “kicker” for Virginia rail, and “clatter,” “kek,” and “kek-burr” for clapper rail. Calls were played at a volume of 80–90 decibels measured 1 meter from the speakers.

2011 Marsh Bird Surveys

Birds encountered before or after the official 9-minute survey period were also noted on the survey form (attachment 2). Maps of the survey sites showing the general location of the birds encountered were marked, and Universal Transverse Mercator coordinates were taken using a Global Positioning System for the survey sites. Surveys in Topock Gorge were conducted using a motorized boat; surveys at Big Bend Conservation Area were conducted on foot.

RESULTS

Surveys at Big Bend Conservation Area were conducted on March 30, April 29, and May 13 (table 1). One Virginia rail, one sora, and two pied-billed grebes were detected in March. In April and May, only two pied-billed grebes were detected during each survey.

Table 1.—Big Bend Conservation Area marsh bird survey results, 2011¹

March 30

Site	CLRA	LEBI	BLRA	VIRA	SORA	PBGR	COGA
1	0	0	0	1	0	0	0
2	0	0	0	0	0	2	0
3	0	0	0	0	1	0	0
4	0	0	0	0	0	0	0

April 29

Site	CLRA	LEBI	BLRA	VIRA	SORA	PBGR	COGA
1	0	0	0	0	0	0	0
2	0	0	0	0	0	2	0
3	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0

May 13

Site	CLRA	LEBI	BLRA	VIRA	SORA	PBGR	COGA
1	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0
3	0	0	0	0	0	2	0
4	0	0	0	0	0	0	0

¹ CLRA – Yuma clapper rail, LEBI – least bittern, BLRA – California black rail, VIRA – Virginia rail, SORA – sora, PBGR – pied-billed grebe, COMO – common moorhen.

Surveys in Topock Gorge were conducted March 22–25, April 19–22, and May 10–13 (table 2). All survey points were visited during each survey period. Yuma clapper rails, California black rails, and least bitterns were detected during all three surveys. In March, 38 clapper rails, 4 black rails, 9 least bitterns, 23 Virginia rails, 9 soras, 46 pied-billed grebes, and 7 common gallinules were detected during the survey period. During the April surveys, 76 clapper rails, 3 black rails, 40 least bitterns, 17 Virginia rails, 2 soras, 79 pied-billed grebes, and 17 common gallinules were detected. The May surveys resulted in detections of 70 clapper rails, 7 black rails, 50 least bitterns, 10 Virginia rails, 70 pied-billed grebes, and 16 common gallinules. No soras were detected on this last survey.

Surveys at Hart Mine Marsh were conducted on March 28 and April 19. One Yuma clapper rail, four least bitterns, and one common gallinule were detected during the March survey. During the April survey, five Yuma clapper rails, three least bittern, one Virginia rail, and three pied-billed grebes were detected.

DISCUSSION

Big Bend Conservation Area

None of the LCR MSCP targeted species were detected at the Big Bend Conservation Area in 2011. Two secretive marsh bird species were detected, Virginia rail and sora, during the March survey. Pied-billed grebes were detected during all three surveys. The most numerous of the bird species inhabiting the marsh continued to be the yellow-headed blackbird (*Xanthocephalus xanthocephalus*), with over 100 detected. Reclamation has conducted surveys at this site since 2009. Reclamation conducted surveys in April 1999 in cooperation with Nevada Division of Wildlife, and none of the targeted species were detected during that particular survey.

Topock Gorge

All four covered species were encountered during surveys in Topock Gorge. Surveys conducted in April detected 76 Yuma clapper rails, the highest since Reclamation started surveys in 1996, continuing an increasing trend in the lower Colorado River (figure 3). Least bittern detections were highest in May, with 50 detected. The highest detections of Virginia rails were 23 during the March survey period (table 2). Black rails were detected during each survey period, with 4 in March, 3 in April, and 7 in May. Black rails may be increasing in Topock Gorge since first detected in March and April 2007, when only one was detected each month. There were no detections in 2008, but in 2009, 1 was detected in March, 3 in April, and 1 in May. One black rail was detected in 2010 during the April survey. More surveys will help to determine if this is an increasing trend.

2011 Marsh Bird Surveys

Table 2.—Topock Gorge marsh bird survey results, 2011

Point #	March 22–25							April 19–22							May 10–13							Point #
	CLRA	LEBI	BLRA	VIRA	SORA	PBGR	COGA	CLRA	LEBI	BLRA	VIRA	SORA	PBGR	COGA	CLRA	LEBI	BLRA	VIRA	SORA	PBGR	COGA	
1	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
2	0	1	0	1	0	0	0	2	0	0	0	0	4	0	2	0	0	0	0	1	1	2
3	0	1	0	1	1	0	0	2	0	0	1	0	2	1	0	0	0	0	0	0	0	3
4	0	0	0	0	0	1	0	1	1	0	0	0	5	1	0	2	0	0	0	3	1	4
5	0	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0	5
6	0	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0	6
7	0	0	0	0	0	0	0	2	0	0	0	0	4	0	0	0	0	0	0	3	1	7
8	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	3	0	8
9	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	9
10	0	0	0	0	0	1	0	0	0	0	0	1	1	0	1	2	0	0	0	1	0	10
11	0	0	0	0	0	2	0	1	0	0	0	0	0	0	2	0	1	0	0	0	0	11
12	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	1	0	0	0	2	2	12
13	0	2	0	0	0	0	0	3	0	0	0	0	2	0	1	0	0	0	0	1	1	13
14	0	2	1	1	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	14
15	1	1	0	0	1	0	0	0	0	0	0	0	2	1	1	1	0	0	0	0	0	15
16	0	0	0	1	2	1	0	1	0	0	0	0	2	0	2	1	0	0	0	1	1	16
17	5	0	2	1	0	1	0	3	0	1	0	0	0	0	3	3	1	0	0	0	0	17
18	1	0	1	1	0	0	0	6	1	0	0	0	2	0	4	1	2	1	0	1	0	18
19	2	0	0	0	0	1	0	6	3	0	1	0	0	0	2	2	0	0	0	1	0	19
20	0	0	0	1	0	0	0	5	1	0	1	0	0	0	2	0	0	0	0	0	0	20
21	2	1	0	1	0	2	2	2	2	0	0	0	0	0	4	0	0	0	0	2	0	21
22	1	0	0	0	0	0	0	3	2	0	1	0	1	0	2	0	0	0	0	4	0	22
23	1	0	0	0	0	0	0	0	1	0	0	0	1	0	2	2	0	0	0	0	0	23
24	0	0	0	0	0	0	0	0	1	0	0	0	1	0	3	1	1	0	0	2	0	24
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	25
26	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	26
27	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	27
28	0	0	0	0	0	0	0	2	0	2	1	0	1	0	1	0	1	2	0	0	0	28
29	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	29
30	0	0	0	1	0	2	0	0	0	0	0	0	3	0	1	1	0	0	0	0	0	30
31	0	0	0	0	0	1	0	0	0	0	0	0	2	0	0	0	0	0	0	3	0	31
32	2	0	0	1	0	1	0	0	1	0	1	0	2	0	0	1	0	0	0	1	0	32
33	1	0	0	1	0	1	0	1	0	0	3	0	1	0	2	0	0	0	0	0	0	33
34	2	0	0	5	0	0	0	1	1	0	2	0	0	0	0	0	2	0	2	0	2	34
35	0	0	0	0	1	1	0	0	2	0	3	0	3	1	4	4	1	1	0	1	2	35
36	0	0	0	1	0	3	0	4	0	0	0	0	1	0	3	1	0	1	0	2	0	36
37	6	0	0	2	0	2	0	8	1	0	0	0	6	1	6	0	0	2	0	0	1	37
38	5	0	0	1	0	4	0	7	2	0	0	0	5	0	6	1	0	0	0	3	0	38
39	5	0	0	1	0	7	1	4	2	0	0	0	4	1	5	3	0	0	0	4	2	39
40	0	0	0	0	0	0	0	0	1	0	2	0	1	1	0	0	0	0	0	1	0	40
41	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0	41
42	1	0	0	1	0	0	0	3	0	0	0	0	4	0	3	4	0	0	0	1	0	42
43	2	0	0	0	0	1	0	1	1	0	0	0	1	3	1	2	0	0	0	0	0	43
44	0	0	0	0	0	1	1	0	2	0	0	0	0	1	0	2	0	0	0	1	0	44
45	0	0	0	0	1	0	0	2	2	0	0	0	2	0	0	2	0	0	0	2	0	45
46	0	0	0	0	0	3	2	0	4	0	0	0	2	1	0	4	0	0	0	7	1	46
47	0	0	0	0	0	2	0	0	2	0	1	0	0	1	1	2	0	0	0	2	0	47
48	0	0	0	0	0	0	0	2	1	0	0	1	0	0	1	1	0	0	0	0	1	48
49	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	1	0	0	0	1	0	49
50	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	2	0	0	0	7	2	50
51	0	0	0	0	0	1	0	2	1	0	0	0	0	0	0	1	0	0	0	0	0	51
52	3	0	0	1	0	0	0	0	1	0	0	0	2	0	4	0	0	0	0	2	1	52
Totals	38	9	4	23	9	46	7	76	40	3	17	2	79	17	70	50	7	10	0	70	16	Totals

During the 2011 survey season, clapper rails were detected at 36 sites, black rails at 7 sites, least bitterns at 41 sites, and Virginia rails at 24 sites (see table 2). Clapper rails, least bitterns, soras, pied-billed grebes, and common moorhen were distributed throughout Topock Gorge. Virginia rails were found primarily south

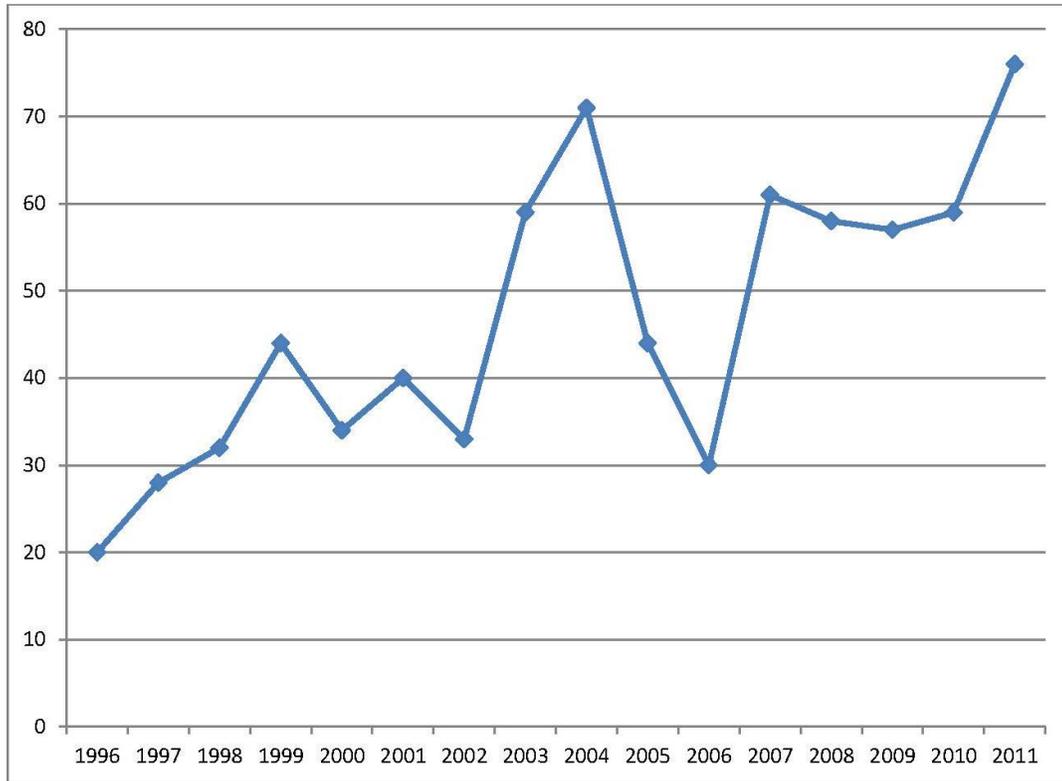


Figure 3.—Yuma clapper rail detections by year in Topock Gorge.

of Devil’s Elbow (see figure 2). Black rails were detected above, in, and below Blankenship Bend. One survey site between Devil’s Elbow and Blankenship Bend had at least one black rail during each survey period (see figure 2).

Yuma clapper rails, least bitterns, Virginia rails, and pied-billed grebes continue to be detected during marsh bird surveys at Hart Mine Marsh. Reclamation conducted marsh bird surveys at this site from 2006 to 2008 and detected these species (LCR MSCP 2008, 2009, 2010). California black rails have not been detected during any marsh bird surveys.

RECOMMENDATIONS

These surveys are implemented each year as part of the LCR MSCP. Surveys of existing habitat should be continued as part of system-wide monitoring and at individual sites prior to and after creation of marshland habitat (LCR MSCP 2004).

The relationship between water levels in Topock Gorge and the amount of marsh area that is inundated or exposed should be investigated to determine whether there is a relationship between numbers of marsh birds and available habitat.

2011 Marsh Bird Surveys

Reclamation will continue to coordinate with the USFWS in cataloging areas along the lower Colorado River that are being surveyed. Areas that are not currently being surveyed should be identified and potentially surveyed in the future.

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2011 Marsh Bird Surveys

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ATTACHMENT 1

Species List

Birds Observed during Marsh Bird Surveys in 2011

Big Bend Conservation Area		March	April	May
Abert's towhee	<i>Melospiza aberti</i>	X		X
American coot	<i>Fulcia Americana</i>	X		
Anna's hummingbird	<i>Calypte anna</i>	X		
Black phoebe	<i>Sayornis nigricans</i>		X	X
Black-tailed gnatcatcher	<i>Poliopitila melanura</i>	X	X	X
Brown-headed cowbird	<i>Molothrus ater</i>		X	X
Common yellowthroat	<i>Geothlypis trichas</i>		X	X
Gambel's quail	<i>Callipepla gambelii</i>		X	X
Great egret	<i>Ardea alba</i>	X		
Great-tailed grackle	<i>Quiscalus mexicanus</i>	X	X	X
House finch	<i>Carpodacus mexicanus</i>	X	X	X
Lucy's warbler	<i>Oreothlypis luciae</i>	X	X	X
Mallard	<i>Anas platyrhynchos</i>	X	X	X
Marsh wren	<i>Cistothorus palustris</i>	X	X	X
Mourning dove	<i>Zenaida macroura</i>	X	X	X
Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>	X	X	X
Peregrine falcon	<i>Falco peregrines</i>	X		
Phainopeplas	<i>Phainopepla nitens</i>	X		
Pied-billed grebe	<i>Podilymbus podiceps</i>	X	X	X
Say's phoebe	<i>Sayornis saya</i>			X
Song sparrow	<i>Melospiza melodia</i>	X	X	X
Sora	<i>Porzana Carolina</i>	X		
Turkey vulture	<i>Cathartes aura</i>	X	X	X
Verdin	<i>Auriparus flaviceps</i>	X		
Virginia rail	<i>Rallus limicola</i>	X		
White-winged dove	<i>Zenaida asiatica</i>		X	X
Yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>	X	X	X

Topock Gorge, Havasu National Wildlife Refuge		March	April	May
Abert's towhee	<i>Melospiza aberti</i>	X	X	X
American coot	<i>Fulica americana</i>	X	X	X
American goldfinch	<i>Carduelis tristis</i>	X		
American kestrel	<i>Falco sparverius</i>		X	
American robin	<i>Turdus migratorius</i>			X
American white pelican	<i>Pelecanus erythrorhynchos</i>	X		
Ash-throated flycatcher	<i>Myiarchus cinerascens</i>	X	X	X
Bald Eagle	<i>Haliaeetus leucocephalus</i>	X		
Barn owl	<i>Tyto alba</i>		X	
Barn swallow	<i>Hirundo rustica</i>	X		X
Bell's vireo	<i>Vireo belli</i>	X	X	X
Bewick's wren	<i>Thryomanes bewickii</i>		X	
Black phoebe	<i>Sayornis nigricans</i>	X	X	
Black-crowned night heron	<i>Nycticorax nycticorax</i>	X		
Black-tailed gnatcatcher	<i>Poliopitila melanura</i>	X	X	X
Blue grosbeak	<i>Passerina caerulea</i>			X
Brown-headed cowbird	<i>Molothrus ater</i>	X	X	X
Bufflehead	<i>Bucephala albeola</i>	X	X	X
Bullock's oriole	<i>Icterus bullockii</i>		X	X
Cactus wren	<i>Campylorhynchus brunneicapillus</i>	X	X	X
California black rail	<i>Latterallus jamaicensis coturniculus</i>	X	X	X
Canvasback	<i>Aythya valisineri</i>	X		
Canyon wren	<i>Catherpes mexicanus</i>	X	X	X
Cinnamon teal	<i>Anas cyanoptera</i>			X
Clark's grebe	<i>Aechmophorus clarkia</i>	X		
Cliff swallow	<i>Petrochelidon pyrrhonota</i>	X	X	X
Common gallinule	<i>Gallinula galeata</i>	X	X	X
Common Goldeneye	<i>Bucephala clangula</i>			X
Common loon	<i>Gavia immer</i>		X	
Common raven	<i>Corvus corax</i>	X	X	X
Common yellowthroat	<i>Geothlypis trichas</i>	X	X	X
Crissal thrasher	<i>Toxostoma crissale</i>	X		
Double-crested cormorant	<i>Phalacrocorax auritus</i>	X	X	X
Eared grebe	<i>Podiceps nigricollis</i>	X	X	X

Topock Gorge, Havasu National Wildlife Refuge		March	April	May
Gambel's quail	<i>Callipepla gambelli</i>	X	X	
Great blue heron	<i>Ardea Herodias</i>	X		X
Great egret	<i>Ardea alba</i>		X	
Greater roadrunner	<i>Geococcyx californianus</i>		X	
Great-horned owl	<i>Bubo virginianus</i>	X	X	X
Great-tailed grackle	<i>Quiscalus mexicanus</i>	X	X	X
Green heron	<i>Butorides virescens</i>		X	X
House finch	<i>Carpodacus mexicanus</i>	X	X	
Killdeer	<i>Charadrius vociferous</i>	X		
Ladder-backed woodpecker	<i>Picoides scalaris</i>	X	X	X
Least bittern	<i>Ixobrychus exilis</i>	X	X	X
Lesser nighthawk	<i>Chordeiles acutipennis</i>		X	X
Lesser scaup	<i>Aythya affinis</i>	X		
Lucy's warbler	<i>Oreothlypis luciae</i>	X		
Mallard	<i>Anas strepera</i>	X	X	X
Marsh wren	<i>Cistothorus palustris</i>	X	X	X
Mourning dove	<i>Zenaida macroura</i>	X	X	X
Northern flicker	<i>Colaptes auratus</i>	X		
Northern harrier	<i>Circus cyaneus</i>	X		
Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>	X	X	
Osprey	<i>Pandion haliaetus</i>			X
Phainopepla	<i>Phainopepla nitens</i>	X		X
Pied-billed grebe	<i>Podilymbus podiceps</i>	X	X	X
Redhead	<i>Aythya americana</i>	X	X	X
Red-tailed hawk	<i>Buteo jamaicensis</i>	X	X	X
Red-winged blackbird	<i>Agelaius phoeniceus</i>	X	X	X
Rock pigeon	<i>Columbia livia</i>	X	X	X
Rock wren	<i>Salpinctes obsoletus</i>	X		X
Ruddy duck	<i>Oxyura jamaicensis</i>	X	X	
Say's phoebe	<i>Sayornis saya</i>			X
Song sparrow	<i>Melospiza melodia</i>	X	X	X
Sora	<i>Porzana Carolina</i>	X	X	
Spotted sandpiper	<i>Actitis macularius</i>			X
Tree swallow	<i>Tachycineta bicolor</i>	X	X	X

Topock Gorge, Havasu National Wildlife Refuge		March	April	May
Turkey vulture	<i>Cathartes aura</i>	X	X	X
Vaux's swift	<i>Chaetura vauxi</i>			X
Verdin	<i>Auriparus flaviceps</i>	X	X	X
Violet-green swallow	<i>Tachycineta thalassina</i>	X		X
Virginia rail	<i>Rallus limicola</i>	X	X	X
Warbling vireo	<i>Vireo gilvus</i>			X
Western grebe	<i>Aechmophorus occidentalis</i>	X	X	X
White-faced Ibis	<i>Plegadis chihi</i>		X	X
White-throated swift	<i>Aeronautes saxatalis</i>			X
White-winged dove	<i>Zenaida asiatica</i>	X	X	X
Wilson's snipe	<i>Gallinago delicata</i>	X		X
Wilson's warbler	<i>Wilsonia pusilla</i>			X
Yellow warbler	<i>Setophaga petechia</i>			X
Yellow-breasted chat	<i>Icteria virens</i>		X	X
Yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>	X	X	X
Yellow-rumped warbler	<i>Setophaga coronate</i>	X		
Yuma clapper rail	<i>Rallus longirostris yumanensis</i>	X	X	X

ATTACHMENT 2

Survey Data Sheet

