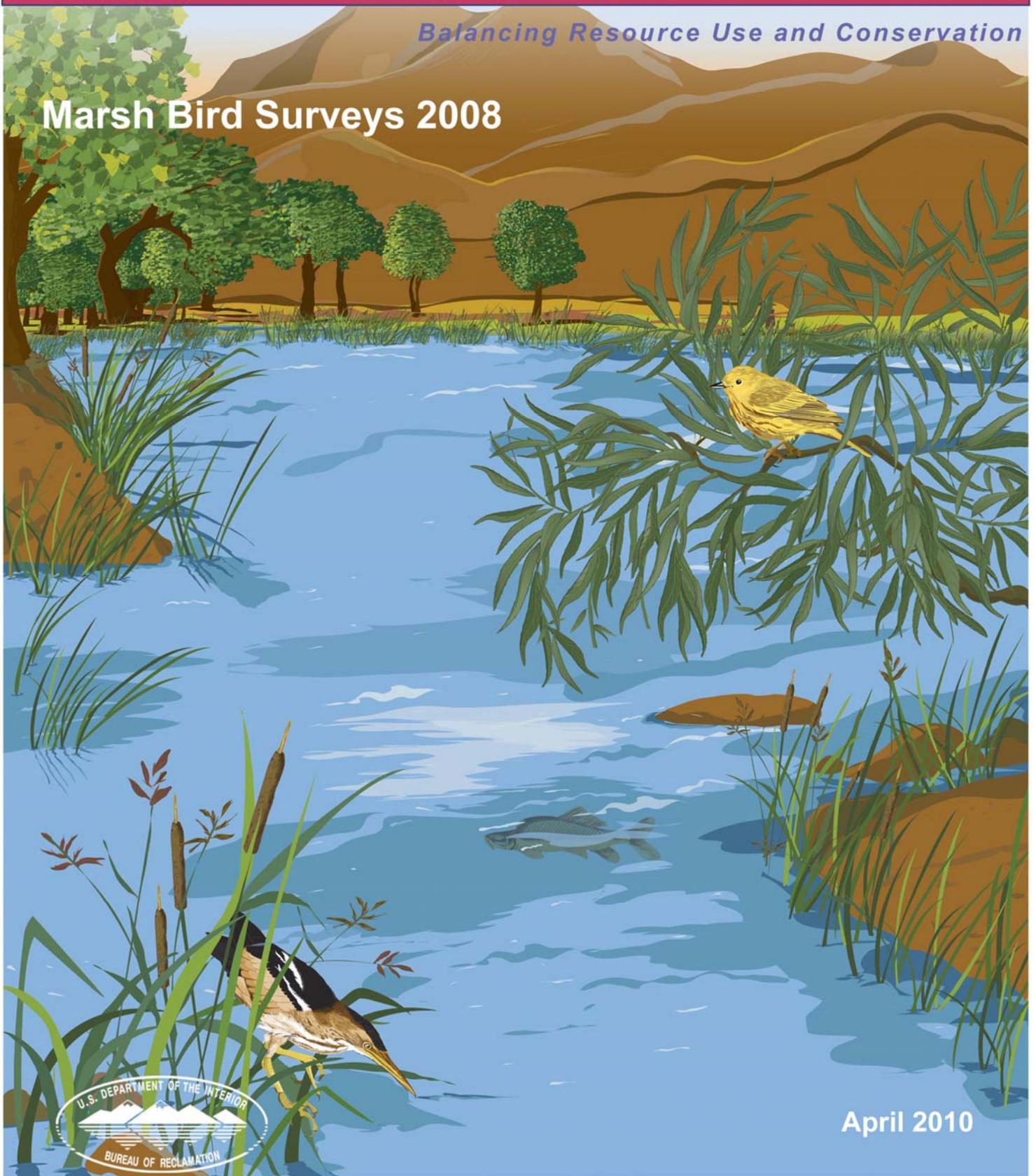




Lower Colorado River Multi-Species Conservation Program

Balancing Resource Use and Conservation

Marsh Bird Surveys 2008



April 2010

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 Department of Water Resources
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Arizona Game and Fish Department
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City of Lake Havasu City
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Desert Wildlife Unlimited

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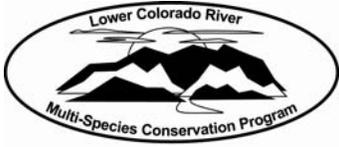
Colorado River Commission of Nevada
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Lower Colorado River Multi-Species Conservation Program

Marsh Bird Surveys 2008

Prepared by Joseph Kahl, Wildlife Group

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

April 2010

Abstract

In 2008, surveys for marsh birds were conducted by the Lower Colorado River Multi-Species Conservation Program (LCR MSCP) along portions of the lower Colorado River and adjacent backwaters, lakes, and marshes (Maps 1-3). Surveys were conducted during March, April, and May. In Topock Gorge, Yuma clapper rails (*Rallus longirostris yumanensis*), least bitterns (*Ixobrychus exilis*), and Virginia rails (*R. limicola*) were detected. Yuma clapper rails, least bitterns, and Virginia rails were also detected at Hart Mine Marsh. California black rails, (*Laterallus jamaicensis coturniculus*) were not detected during any surveys. There were no detections of these species at the Section 10 Backwater.

Introduction

Conservation measures for the Habitat Conservation Plan of the Lower Colorado River Multi-Species Conservation Program (LCR MSCP) provide for surveys of the Yuma clapper rail (*Rallus longirostris yumanensis*), California black rail (*Laterallus jamaicensis coturniculus*), and least bittern (*Ixobrychus exilis*) (LCR MSCP 2004). Surveys are conducted in existing habitat as part of system-wide monitoring and at sites prior to creation of marshland habitat (LCR MSCP 2004).

The Yuma clapper rail is listed as an endangered species by the Department of Interior (U.S. Department of Interior 1967). The species is presently listed as threatened in California and is a species of special concern in Arizona (Arizona Department of Game and Fish Department 2006, California Department of Fish and Game 2006).

The California black rail is listed by the U.S. Fish & Wildlife Service (USFWS) as a migratory nongame bird of special concern (U.S. Fish & Wildlife Service 1995). In California, this species is listed as threatened and is 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 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 nongame bird of management concern (U.S. Fish & Wildlife Service 1995).

Background

The Bureau of Reclamation (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. 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 one time basin-wide survey; no black rails were found in Topock Gorge or Topock Marsh (Conway et al. 2002). 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). 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 Section 10 Backwater is located on the Arizona side of the lower Colorado River at the southern end of Bullhead City, Arizona, and is in Reach 3 of the LCR MSCP planning area. The backwater consists of two small marshes adjacent to but separate from the Colorado River; the marshes are 3.2 and 1.0 acres (1.3 and 0.4 ha), respectively, with the larger marsh having an open backwater of 0.5 acres (0.2 ha). The predominant vegetation is cattail (*Typha* sp.). There are five 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. The survey route is 15.3 miles (24.6 km) long. The predominant vegetation consists of California bulrush (*Schoenoplectus californicus*), southern cattail (*Typha domingensis*), and common reed (*Phragmites communis*) interspersed with stands of saltcedar (*Tamarix* sp.) and coyote willow (*Salix exigua*). There are 52 survey points in the Topock Gorge.

Hart Mine Marsh is a degraded marsh located on Cibola NWR, south of the refuge headquarters, in Arizona. This marsh is located in Reach 4 of the LCR MSCP planning area. It is the terminus for agricultural drain water from the refuge's farm units. Surveys were conducted prior to restoration, which began in late 2008. There are 11.6 acres (4.7 ha) of open backwater that contain patches of cattail. The entire site is 623 acres (252 ha) and consists of eight survey points.

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, Conway 2005, USFWS 2006). Three surveys were conducted, and a standardized survey form was used to record 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*), and common moorhens (*Gallinula chloropus*) were also recorded, although they were not targeted species.

Surveys began 30 minutes before sunrise and continued until marsh birds ceased calling, but never continued later than 10:00 am. Surveys ceased when wind speed was greater than 20 kilometers per hour. This was due to the impaired detection of birds caused by noise from rustling vegetation. Surveys are not conducted during periods of sustained rain or heavy fog (Conway 2005).

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.

Birds encountered before or after the official 9-minute survey period were also noted on the survey form (Attachment 1). Surveys in Topock Gorge were conducted by motorized boat, surveys at Hart Mine Marsh were conducted by kayak or on foot, and surveys at the Section 10 Backwater were conducted on foot. Maps of the survey sites showing the general location of the birds encountered were marked and Universal Transverse Mercator (UTM) coordinates were taken using a Global Positioning System (GPS) for the survey sites.

Results

Surveys at the Section 10 Backwater were conducted on March 22, on April 18, and on May 18 (Figure 1). As in 2006, none of the targeted marsh bird species were encountered.

Surveys in Topock Gorge were conducted March 21-24, April 25-26, and May 16-17 (Figure 2). Yuma clapper rails were detected during all three surveys. In March, 35 clapper rails, 3 least bitterns, 33 Virginia rails, 1 sora, 16 pied-billed grebes, and 3 common moorhens were detected during the survey period. During the April surveys, 47 clapper rails, 7 least bitterns, 18 Virginia rails, 8 soras, 68 pied-billed grebes, and 4 common moorhens were detected. The May surveys resulted in detections of 58 clapper rails, 23 least bitterns, 4 Virginia rails, 59 pied-billed grebes, and 4 common moorhens.

At Hart Mine Marsh, surveys were conducted on March 26, on April 22, and on May 28 (Figure 1). The March survey produced most of the marsh bird detections: 3 Virginia rails and 2 least bitterns. One clapper rail and 1 Virginia rail were detected during the April survey. No marsh birds were encountered during the May survey (Figure 1). California black rails were not detected during any of the surveys in 2008.

Discussion

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% certainty. Up to 25% change in population abundance of waterbirds 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 surveys provide the minimum number of birds present during the survey periods.

Conway and Nadeau (2006) found that broadcasting calls of multiple species of marsh birds does not compromise the vocalization probability of any one species. Beginning in 2006, Reclamation adopted the multi-species survey method for all marsh bird surveys on the lower Colorado River. This information is provided to the National Marsh Bird Monitoring Program database. The goal of this program is to estimate population changes in marsh birds using standardized, repeatable survey methods (Conway and Nadeau 2006). From 1996 to present, the number of Yuma clapper rails encountered in Topock Gorge shows a progressive increase (Figures 3 and 4).

Section 10 Backwater

There were no targeted species encountered at the Section 10 Backwater (Figure 1). Species observed in the backwater were mallard (*Anas platyrhynchos*), marsh wren (*Cistothorus palustris*), common yellowthroat (*Geothlypis trichas*), red-winged blackbirds (*Agelaius phoeniceus*), yellow-headed blackbirds (*Xanthocephalus xanthocephalus*), and great-tailed grackle (*Quiscalus mexicanus*). A species list of all birds observed while doing marsh bird surveys was maintained during each survey period (Attachment 2).

Topock Gorge

The California black rail was the only targeted species not encountered during surveys in Topock Gorge. The survey route in Topock Gorge runs 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).

Surveys conducted in May had the highest detections for Yuma clapper rails, 58, and least bitterns, 23, although 13 of the 52 sites were not visited (Figure 2). The highest detections of Virginia rails, 33, were during the March survey period (Figure 2). The number of clapper rails detected in May, 58, is similar to April 2007's high of 61. The highest number of clapper rails detected in Topock Gorge by Reclamation was 71 during the May 2004 survey period (Figures 3 and 4).

During the 2008 survey season, clapper rails were detected at 32 sites, least bitterns at 22 sites, and Virginia rails at 18 sites. This is similar to the 2007 site totals of 32, 28, and 15, respectively. Clapper rails and least bitterns shared 9 sites. Clapper rails, least bitterns, and Virginia rails shared 5 sites. There were 9 sites that did not have detections of targeted species (Figure 2).

Clapper rails, Virginia rails, and pied-billed grebes were found throughout Topock Gorge. Least bitterns were found primarily south of Devil's Elbow. All the soras

encountered were south of Blankenship Bend and north of Castle Rock. Common moorhens were found near to and south of Castle Rock (Figure 2). A species list of birds observed while doing marsh bird surveys was maintained during each survey period (Attachment 3). This was the first year that the Eurasian collared-dove (*Streptopelia decaocto*) was observed in Topock Gorge.

Hart Mine Marsh

Three Virginia rails, which included a pair, and 2 least bitterns were observed during the March survey. Water levels were high and a kayak was used to access most sites. Cattails were more abundant than during the 2007 survey period. The April 22 survey detected only 1 clapper rail and 1 Virginia rail. Surveys were done mostly on foot. No targeted species were detected during the May 28 survey. Water levels were very low; sites were either muddy or completely dry. Most of the cattails at site 5 were dead. All surveys were done on foot. A species list of birds observed and their numbers was maintained while doing marsh bird surveys during each survey period (Attachment 4).

Recommendations

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

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.

Habitat characteristics where target marsh bird species are encountered on a consistent basis should be analyzed, including plant species composition and percentages, distance from detection point to shore and open waters, and depth of water. This information can be used in creation of marsh habitat (Conway 2008)¹.

Reclamation should 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.

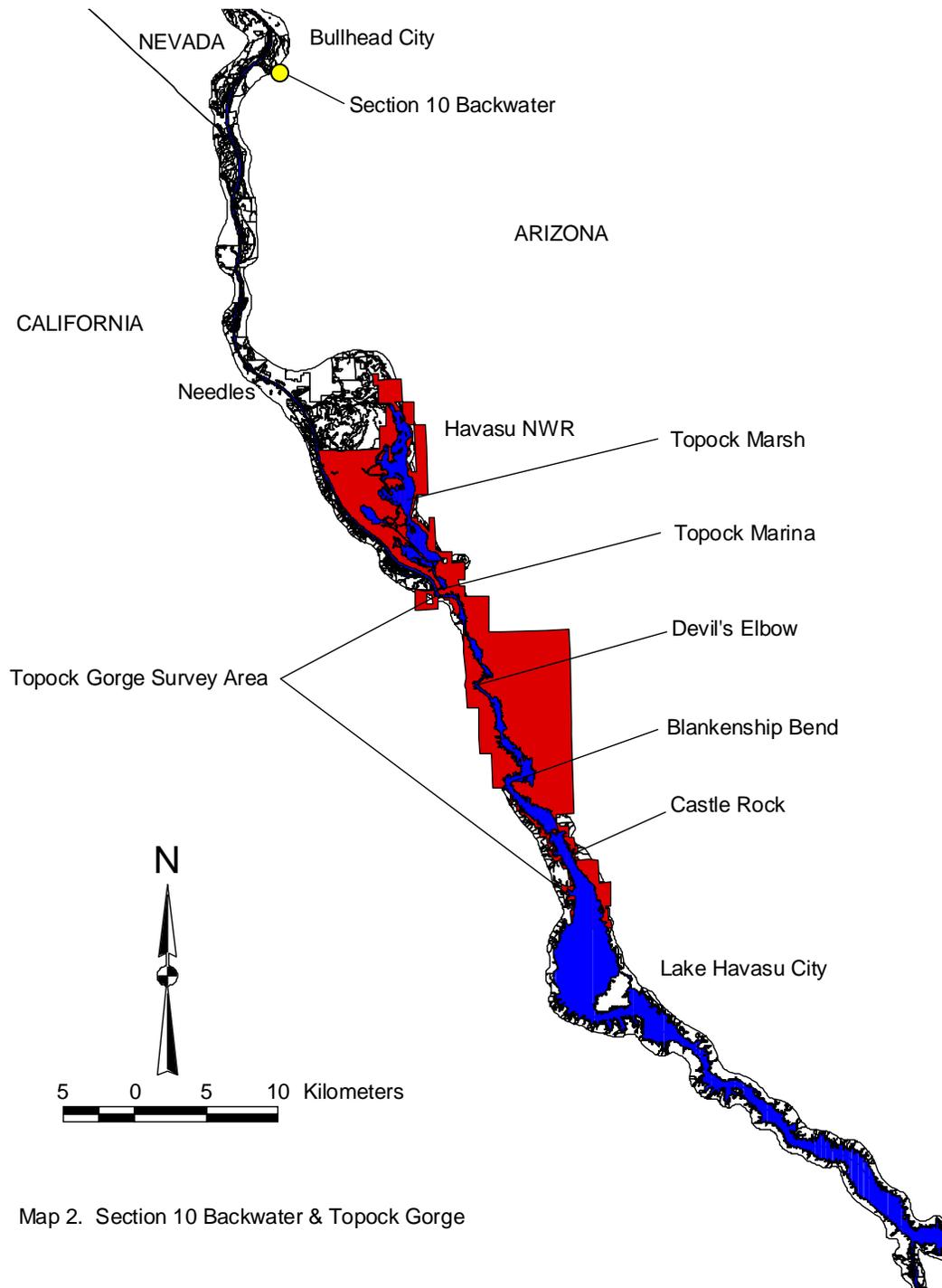
¹ In June 2008, Reclamation entered into a Cooperative Agreement with the University of Arizona and the U.S. Geological Survey, under the direction of Dr. Courtney Conway. Under this agreement, a study was initiated in a newly created marsh at Imperial National Wildlife Refuge. The study will document the growth of vegetation and its use by marsh birds over a 2-year period. The study will correlate 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.

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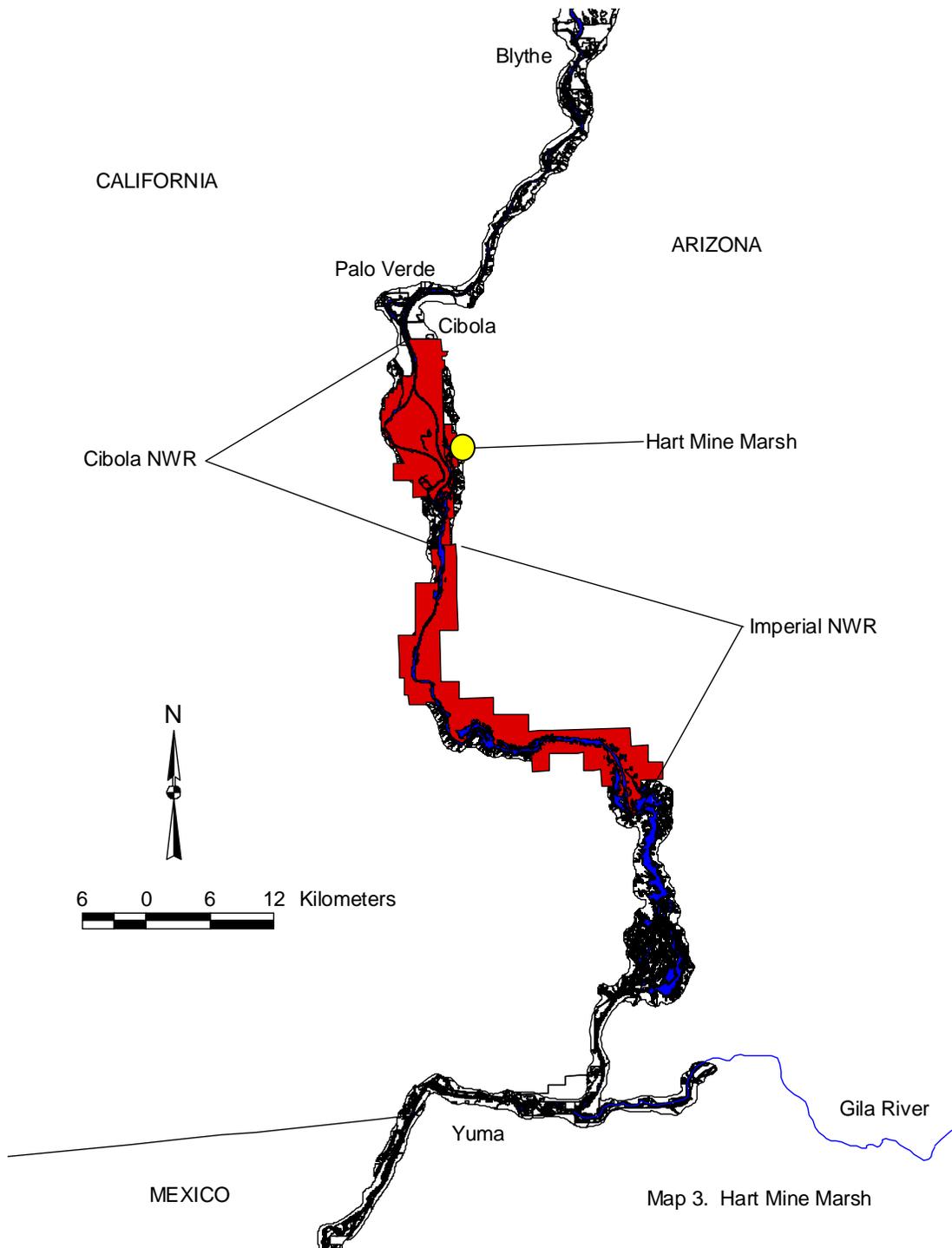
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Map 2. Section 10 Backwater & Topock Gorge



Map 3. Hart Mine Marsh

Birds Observed or Encountered during Marsh Bird Surveys in 2008
Section 10 Backwaters

		March	April	May
mallard	<i>Anas platyrhynchos</i>	X	X	
Gambel's quail	<i>Callipepla gambeli</i>	X	X	X
wh-to-faced ibis	<i>Plegadis alibi</i>		X	
turkey vulture	<i>Cathartes aura</i>			X
killdeer	<i>Charadrius vociferans</i>			X
wh-te-winged dove	<i>Zenaida asiatica</i>			X
mourning dove	<i>Zenaida macroura</i>		X	X
white-throated swif	<i>Streptoprocne serripennis</i>			X
ladder-backed woodpecker	<i>Picoides scotaris</i>			X
Say's phoebe	<i>Sayornis saya</i>	X		
ash-throated flycatcher	<i>Myiarchus cinerascens</i>	X		X
warbling vireo	<i>Vireo gilvus</i>		X	
common naven	<i>Corvus corax</i>	X		X
tree swallow	<i>Tachycineta bicolor</i>			X
northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>	X		
verdia	<i>Auriparus flaviceps</i>	X	X	
marsh wren	<i>Ostothorus palustris</i>	X	X	
black-tailed gnatcatcher	<i>Psaltriparus melanurus</i>	X	X	
American robin	<i>Turdus migratorius</i>	X		
crissal thrasher	<i>Oxostoma crissale</i>	X		X
Lucy's warbler	<i>Vermivora louisae</i>	X	X	X
yellow-rumped warbler	<i>Dendroica coronata</i>		X	
common yellowthroat	<i>Geothlypis trichas</i>	X	X	X
Abert's towhee	<i>Pipilo aberti</i>	X	X	X
red-winged blackbird	<i>Xanthocephalus xanthocephalus</i>	X	X	X
yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>	X	X	X
great-tailed grackle	<i>Quiscalus mexicanus</i>	X	X	X
brown-headed cowbird	<i>Molothrus ater</i>	X	X	X
house finch	<i>Carpodacus mexicanus</i>			X

Attachment 2

Birds Observed or Encountered during Marsh Bird Surveys in 2008
Topock Gorge, Havasu National Wildlife Refuge

		March	April	May
gadwall	<i>Anas strepera</i>		X	
mallard	<i>Anas platyrhynchos</i>	X	X	
diamond teal	<i>Anas cyanoptera</i>	X	X	
northern shoveler	<i>Anas platyrhynchos</i>	X		
redhead	<i>Aythya americana</i>		X	X
ring-necked duck	<i>Aythya collaris</i>		X	
bufflehead	<i>Bucephala albeola</i>	X	X	
common goldeneye	<i>Bucephala clangula</i>	X		
ruddy duck	<i>Oxyura jamaicensis</i>	X	X	
Gambel's quail	<i>Callipepla gambelii</i>	X	X	X
common quail	<i>Quail</i>		X	X
pied-billed grebe	<i>Podilymbus podiceps</i>	X	X	X
eared grebe	<i>Podiceps nigricollis</i>	X	X	X
Clark's grebe	<i>Acchamphorus clarkii</i>			X
double-crested cormorant	<i>Phalacrocorax auritus</i>	X	X	
least bittern	<i>Ixobrychus exilis</i>	X	X	X
great blue heron	<i>Ardea herodias</i>	X	X	X
great egret	<i>Ardea alba</i>		X	
snowy egret	<i>Egretta thula</i>		X	
green heron	<i>Bulweria viridis</i>		X	X
black-crowned night heron	<i>Nycticorax nycticorax</i>		X	
turkey vulture	<i>Cathartes aura</i>		X	
osprey	<i>Pandion haliaetus</i>	X	X	
bald eagle	<i>Haliaeetus leucocephalus</i>	X	X	
northern harrier	<i>Circus cyaneus</i>	X		
American kestrel	<i>Falco sparverius</i>	X	X	
Yuma clapper rail	<i>Rallus longirostris yumanensis</i>	X	X	X
Virginia rail	<i>Rallus limicola</i>	X	X	X
sand	<i>Porzana carolina</i>		X	
common noddie	<i>Gallinula chloropus</i>	X	X	X
American coot	<i>Fulica americana</i>	X	X	X
American avocet	<i>Recurvirostra americana</i>		X	
least sandpiper	<i>Calidris minutilla</i>	X		
Wilson's snipe	<i>Gallinago delicata</i>	X		
Caspian tern	<i>Hydroprogne caspia</i>			X
rock pigeon	<i>Columba livia</i>	X	X	X
Eurasian collared-dove	<i>Streptopelia decaocto</i>			X
white-winged dove	<i>Zenaidura macroura</i>		X	X
mourning dove	<i>Zenaidura macroura</i>	X	X	X
great-horned owl	<i>Bubo virginianus</i>			X
lesser nighthawk	<i>Chordeiles cucullata</i>			X
western wood-pewee	<i>Contopus sordidulus</i>			X
willow flycatcher	<i>Empidonax traillii</i>			X
Pacific-slope flycatcher	<i>Empidonax difficilis</i>			X

Attachment 3

Birds observed or encountered during marsh bird surveys in 2008
Topock Gorge, Havasu National Wildlife Refuge

		March	Apr	May
western flycatcher	<i>Empidonax difficilis / occidentalis</i>		X	
ash-throated flycatcher	<i>Myiarchus cinerascens</i>	X	X	X
western kingbird	<i>Tyrannus verticalis</i>		X	
Belted vireo	<i>Vireo bellii</i>			X
common raven	<i>Corvus corax</i>	X	X	X
lucy swallow	<i>Tachycineta bicolor</i>	X	X	
northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>	X	X	X
cliff swallow	<i>Petrochelidon pyrrhonota</i>	X	X	X
barn swallow	<i>Hirundo rustica</i>		X	X
verdin	<i>Auriparus flaviceps</i>	X	X	X
sage wren	<i>Campylorhynchus brunneicapillus</i>			X
canyon wren	<i>Catherpes mexicanus</i>	X	X	X
Bewick's wren	<i>Troglodytes bewickii</i>	X	X	X
marsh wren	<i>Cistothorus palustris</i>	X	X	X
phainopepla	<i>Phainopepla nitens</i>		X	
Lucy's warbler	<i>Vermivora ludov</i>			X
yellow warbler	<i>Dendroica pelectica</i>			X
common yellowthroat	<i>Geothlypis trichas</i>	X	X	X
yellow-breasted chat	<i>Icteria virens</i>		X	X
Amer's towhee	<i>Pipilo aberti</i>		X	
song sparrow	<i>Melospiza melodia</i>		X	X
white-crowned sparrow	<i>Zonotrichia leucophrys</i>	X		
red-winged blackbird	<i>Agelaius phoeniceus</i>	X	X	X
yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>		X	X
gray-tailed grackle	<i>Quiscalus mexicanus</i>	X	X	X
brown-headed cowbird	<i>Molothrus ater</i>	X	X	X
Bullock's oriole	<i>Icterus bullockii</i>			X
house finch	<i>Carpodacus mexicanus</i>			X

Attachment 3

Birds Observed or Encountered during Marsh Bird Surveys in 2008
Hart Mine Marsh, Cibola National Wildlife Refuge

		March	April	May
bufflehead	<i>Bucephala albeola</i>		2	
east bittern	<i>Ixobrychus exilis</i>	2		
great egret	<i>Ardea alba</i>		4	4
snowy egret	<i>Egretta thula</i>			4
black-crowned night heron	<i>Nycticorax nycticorax</i>		1	
turkey vulture	<i>Cathartes aura</i>			3
Yuma capper rail	<i>Rallus longirostris yumatensis</i>		1	
Virginia rail	<i>Rallus limicola</i>	3	1	
American coot	<i>Fulica americana</i>	10	6	1
killdeer	<i>Charadrius vociferans</i>			5
black-necked stilt	<i>Himantopus mexicanus</i>			6
American avocet	<i>Recurvirostra americana</i>			1
white-winged dove	<i>Zenaidura macroura</i>		1	4
mourning dove	<i>Zenaidura macroura</i>			6
coltied kingfisher	<i>Megascops asio</i>	1		
Pacific-slope flycatcher	<i>Empidonax difficilis</i>			1
ash-throated flycatcher	<i>Myiarchus cinerascens</i>			2
western kingbird	<i>Tyrannus verticalis</i>	1		
tree swallow	<i>Iachypheta bicolor</i>	4		
marsh wren	<i>Cistothorus palustris</i>	5		
common yellowthroat	<i>Geothlypis trichas</i>	4	1	7
song sparrow	<i>Melospiza melodia</i>	12	1	6
blue grosbeak	<i>Passerina caerulea</i>			1
red-winged blackbird	<i>Agelaius phoeniceus</i>	6		3
yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>			7
great-tailed grackle	<i>Quiscalus mexicanus</i>			6
brown-headed cowbird	<i>Molothrus ater</i>	3	2	6

Attachment 4

Hart Mine Marsh, Hayasu NWR
 Section 10 Backwaters
 2008 Marshbird Survey Results

Hart Mine Marsh - Cibola NWR										Section 10 Backwater									
Date	Point	YCRA	LEBI	BLRA	VIRA	SORA	PRGR	Date	Point	YCRA	LEBI	BLRA	VIRA	SORA	PRGR				
03/26/08	H1	0	0	0	0	0	0	03/27/08	1	0	0	0	0	0	0				
	H2	0	0	0	0	0	0		2	0	0	0	0	0	0				
	H3	0	0	0	0	0	0		3	0	0	0	0	0	0				
	H4	0	0	0	0	0	0		4	0	0	0	0	0	0				
	H5	0	0	0	0	0	0		5	0	0	0	0	0	0				
	H6	0	0	0	0	0	0	Totals	0	0	0	0	0	0	0				
	H7	0	1	0	2	0	0	04/24/08	1	0	0	0	0	0	0				
	H8	0	1	0	0	0	0		2	0	0	0	0	0	0				
Totals		0	2	0	3	0	0		3	0	0	0	0	0	0				
04/22/08	H1	0	0	0	0	0	0	05/16/08	1	0	0	0	0	0	0				
	H2	0	0	0	0	0	0		2	0	0	0	0	0	0				
	H3	0	0	0	0	0	0		3	0	0	0	0	0	0				
	H4	0	0	0	0	0	0	Totals	4	0	0	0	0	0	0				
	H5	0	0	0	0	0	0		5	0	0	0	0	0	0				
	H6	0	0	0	0	0	0		0	0	0	0	0	0	0				
	H7	0	0	0	0	0	0		0	0	0	0	0	0	0				
	H8	0	0	0	0	0	0	Totals	0	0	0	0	0	0	0				
Totals		1	0	0	1	0	0		0	0	0	0	0	0	0				
05/28/08	H1	0	0	0	0	0	0		0	0	0	0	0	0	0				
	H2	0	0	0	0	0	0		0	0	0	0	0	0	0				
	H3	0	0	0	0	0	0		0	0	0	0	0	0	0				
	H4	0	0	0	0	0	0		0	0	0	0	0	0	0				
	H5	0	0	0	0	0	0		0	0	0	0	0	0	0				
	H6	0	0	0	0	0	0		0	0	0	0	0	0	0				
	H7	0	0	0	0	0	0		0	0	0	0	0	0	0				
	H8	0	0	0	0	0	0	Totals	0	0	0	0	0	0	0				
Totals		0	0	0	0	0	0		0	0	0	0	0	0	0				

YCRA - Yuma clapper rail
 LEBI - least bittern
 BLRA - California black rail
 VIRA - Virginia rail
 SORA - sora
 PRGR - pied-billed grebe

Figure 1

2008 Marsh Bird Survey
 Topock Gudge, Havasu NWR

Point #	March 25-26					April 15, 17-18, 22					May 22-23										
	YCRB	LEBI	BLRA	VISA	SOBA	PRGR	COMO	YCRB	LEBI	BLRA	VISA	SOBA	PRGR	COMO	YCRB	LEBI	BLRA	VISA	SOBA	PRGR	COMO
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CLPA - Yuma dipper rail
 LEBI - least bittern
 BLRA - California black rail
 VISA - western marsh wren
 SOBA - song sparrow
 PRGR - great blue heron
 COMO - common nighthawk

Figure 2

