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Desert Wildlife Unlimited
Lower Colorado River
Multi-Species Conservation Program

Marsh Bird Surveys — 2007

Prepared by Joe Kahl, Wildlife Group

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

September 2009
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Abstract

In 2007, 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 and marshes (Maps 1 and 2). Surveys were conducted during March, April, and May in Topock Gorge. Yuma clapper rails (*Rallus longirostris yumanensis*), California black rails (*Laterallus jamaicensis coturniculus*), least bitterns (*Ixobrychus exilis*), and Virginia rails (*R. limicola*) were detected. This was the first year that black rails were detected in Topock Gorge. Marsh bird surveys were conducted in April and May of 2007 at Hart Mine Marsh; least bitterns were the only marsh birds detected.
Introduction

Monitoring and research measures under the Habitat Conservation Plan of the LCR MSCP provide for surveys of the Yuma clapper rail, California black rail, and least bittern (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 the Interior (U.S. Dept. of Interior 1967). It is presently listed as threatened in California and is a species of special concern in Arizona (California Department of Fish and Game 2006, Arizona Game and Fish Department 2006). The California black rail is listed by the U.S. Fish & Wildlife Service (USFWS) as a migratory nongame bird of management concern (U.S. Fish & Wildlife Service 1995). In California, it 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 California and Arizona (Remsen 1978, Arizona Game and Fish Department 2001). It is listed by the USFWS as a migratory nongame species of management concern (U.S. Fish & Wildlife Service 1995).

Background

The Bureau of Reclamation (Reclamation) conducted surveys in the Topock Gorge portion of the Havasu National Wildlife Refuge (NWR) from 1996 to 2005 using a protocol specifically for Yuma clapper rail. These surveys were part of a lower Colorado River basin-wide, multi-partner effort to monitor the population of the Yuma clapper rails with the ultimate goal of delisting the Yuma clapper rail (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; none were found in Topock Gorge or Topock Marsh (Conway et al. 2002). In 2005, multi-species marsh bird surveys were performed, in conjunction with the Yuma clapper rail surveys, to compare clapper rail detections between the two survey methods. The marsh bird surveys were specifically directed towards California black rail, least bittern, Virginia rail, and Yuma clapper rail. Starting in 2006, marsh bird survey protocols were used for official Yuma clapper rail surveys (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

Topock Gorge is located along the lower Colorado River between Needles, California, and Lake Havasu City, Arizona, in the Havasu NWR. The survey route in Topock Gorge is 15.4 mi (24.8 km) in length, from River Mile 233 to River Mile 217.6. 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, and extending south to River Mile 216.5 (Map 2). The predominant vegetation consists of California bulrush (Juncus californicus), southern cattail (Typha domingensis), and common reed (Phragmites communis) with stands of
saltcedar (*Tamarix sp.*) and coyote willow (*Salix exigua*) mixed in. There are 52 survey sites in Topock Gorge (Table 1). Topock Gorge is located in Reach 3 of the LCR MSCP planning area.

Table 1. Approximate locations of Survey Points, River Mile 0 at Southerly International Boundary

<table>
<thead>
<tr>
<th>Site</th>
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Hart Mine Marsh is a degraded marsh located on Cibola NWR, south of the refuge headquarters, in Arizona. It is the terminus for agricultural drain water from the refuge’s farm units. Surveys were conducted prior to potential restoration. There are 11.6 ac (4.7 h) of open backwater that contain patches of cattail (*Typha sp.*); the entire site is 623 ac (252 h). There are eight survey sites. Hart Mine Marsh is in Reach 4.

**Methods**

Using a standardized protocol from the National Marsh Bird Monitoring Program, three surveys for 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). 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). Though not targeted species, the calls and locations of the pied-billed grebe (*Podilymbus podiceps*), sora (*Porzana carolina*), and common moorhen (*Gallinula chloropus*) were also recorded. Surveys were started 30 minutes before sunrise and continued until marsh birds ceased calling but never later than 10:00 am. Surveys ceased when wind speed was greater than 12.4 miles per hour (20 km per hour) which impairs detection of birds caused by noise from rustling vegetation. Surveys were 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 3.2 feet (ft) (1 meter) (m) 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 done using motorized boats, and surveys at Hart Mine Marsh were done using kayaks or 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 of the survey points using a global positioning system (GPS) device.

**Results**

Surveys in Topock Gorge were conducted on March 20-22, on April 25-27, and on May 22-23. In March, 17 clapper rails, 5 least bitterns, 1 black rail, 10 Virginia rails, 4 soras, and 15 pied-billed grebes were detected during the survey period. During the April survey period, 61 clapper rails, 22 least bitterns, 1 black rail, 14 Virginia rails, 11 soras, 66 pied-billed grebes, and 6 common moorhens were detected. The May surveys resulted in detections of 20 clapper rails, 17 least bitterns, 4 Virginia rails, 41 pied-billed grebes, and 1 common moorhen (Figure 1).

The surveys conducted during April 25-27 had higher or equal numbers of marsh birds detected than the other 2 survey periods (Figure 1). The number of clapper rails detected, 61, is the highest number of clapper rails detected since the May 2004 survey period in which 71 were detected (Figure 3). During the entire survey season, clapper rails were detected at a total of 32 sites, least bitterns at 28 sites, black rails at 2 sites, and Virginia rails at 15 sites. Only 1 site had all 4 species. Clapper rails and least bitterns shared 12 sites. There were 8 sites that did not have any of the 4 species present (Figure 1). Clapper rails were found throughout the gorge as were least bitterns. Virginia rails were primarily found from Blankenship Bend south. Soras were most numerous on the Arizona side of the river in the extensive marshes near the Castle Rock area as were the common moorhens. Pied-billed grebes were distributed throughout the gorge and detected at 45 of the 52 survey sites (Figure 1).

This was the first year that California black rails were detected on any black rail, marsh bird or clapper rail survey in Topock Gorge conducted by Reclamation. Black rails were detected during the first two survey periods. None were detected in Topock Gorge during the third survey period but as a note, 1 black rail was detected at Beal Lake on May 26 (C. Nadeau pers. comm.). Beal Lake is near the south end of Topock Marsh on Havasu NWR and is 16 miles (9.9 km) upstream of Blankenship Bend. The black rail detected on March 21 in Topock Gorge was on the California side of the river near River Mile 226. It vocalized the “kicky-doo” call after the broadcast sequence was completed. The black rail detected at Blankenship Bend on April 26 was also on the California side of the river. It also vocalized the “kicky-doo” call but did this before, during, and after the broadcast call sequence. In 2000, 15 black rails were detected at Planet
Ranch on the upper Bill Williams River, approximately 45 mi (72 km) to the south of Blankenship Bend, during surveys for California black rails (Conway et al. 2002).

As stated previously, marsh bird surveys were first conducted in 2005 during the April and May survey periods in conjunction with clapper rail surveys. The results for the 3 years; showing the highest amount of the four targeted species, is shown in Figure 5. The highest number of encounters for least bittern and Virginia rail was in 2006. The highest for clapper rail and black rail was in 2007. The numbers for clapper rails in 2005, 32, is taken from the marsh bird surveys and the number used in figures 3 and 4, 44, is taken from the clapper rail surveys.

A species list of birds observed while doing marsh bird surveys was maintained during each survey period (Attachments 2-4). Two birds of note were a red-necked grebe (Pociceps grisegena) and an earlier than usual indigo bunting (Passerina cyrena) encountered during the April survey period (Rosenberg et al. 1991).

At the Hart Mine Marsh, surveys were conducted on April 6, on April 27, and May 11. The April 6 survey produced the most detections, 3 least bitterns and 1 pied-billed grebe. Only 1 pied-billed grebe each was detected during the April 27 and May 11 surveys (Figure 2).

The water was very low; only several inches in depth or non-existent throughout Hart Mine Marsh during the survey periods. Most survey sites were reached by foot where previously a kayak had been used. The April 6 survey produced 3 least bitterns and 1 pied-billed grebe. Only 1 pied-billed grebe was encountered during the April 27 and May 11 surveys. All of the least bitterns encountered were at different survey sites as were the pied-billed grebes. In 2006, a pair of clapper rails was encountered at Hart Mine Marsh during both the second and third survey periods and 2 least bitterns during the third survey. No pied-billed grebes were encountered during the 2006 surveys. Surveys in 2007 were not performed on the same dates as the 2006 surveys (Figure 2). A species list of birds observed while doing the marsh bird surveys in April was maintained during each survey period (Attachment 5). The only bird of note was a solitary sandpiper (Tringa solitaria) encountered on the April 6 survey (Rosenberg et al. 1991).

**Discussion**

The primary goal of a continental marsh bird monitoring program is to estimate population trends of secretive marsh birds (Conway and Nadeau 2006). 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). Conway et al. (1993) used radiotelemetry, in conjunction with playback recordings of Yuma clapper rail, along the lower Colorado River at Mittry Lake, north of Yuma, Arizona to determine detection rates. They determined marked birds exhibited a year-round response rate of 19.2%. During the early breeding season, March and April, the response rate was 40%. During May through July, late breeding season, the response rate was 20%. Our surveys are done not to estimate the population of marsh birds but to provide a minimum number of birds present.
Prior to 2006, all marsh bird surveys that Reclamation conducted were specifically directed at detecting Yuma clapper rails, excluding the California black rail surveys in 2000. In 2006, a standardized protocol taken from the National Marsh Bird Monitoring Program was adopted as the official Yuma clapper rail survey protocol (USFWS 2006). Conway and Nadeau (2006) found that broadcasting calls of multiple species of marsh birds instead of one species does not compromise the vocalization probability of any one species. They concluded that there should be no significant difference in Yuma clapper rail detections between the marsh bird surveys and the clapper rail surveys. In 2005, Reclamation conducted both types of surveys to compare results and found no significant difference. The annual count of Yuma clapper rails in Arizona, California, Nevada, and Mexico is determined by recording the highest number of birds encountered for each route regardless of survey period (USFWS 2006). The number of Yuma clapper rails encountered in Topock Gorge from 1996 to present show a progressive increase (Figures 3 and 4).

Monitoring and research measures in the Final Habitat Conservation Plan (FHCP) call for system monitoring of existing habitats and populations of the covered marsh bird species as well as research to better identify their habitat requirements (LCR MSCP 2004). Continued surveys in Topock Gorge will help to accomplish this. The identification of plant species and their composition and percentages, distance to shoreline and open water, and depth of water where covered marsh species are encountered on a consistent basis can be used to determine habitat requirements of the covered species and be used in the creation of marsh habitat.

Jackson (1983) observed a pair of clapper rails in Mississippi respond to high water during a storm event by building their nest higher; the depth of the nest was later measured at 7.7 inches (19.5 cm). In Arizona, Eddleman (1989) found one nest 3 ft (92 cm) above the substrate and presumed it was built at the level of the water earlier in the year. Water levels at Topock Gorge can fluctuate as much as 4-5 ft (1.2-1.5 m) during March through May, a large part of the breeding season (USBR 2004). Clapper rail populations have had to deal with these fluctuations for as long as they have inhabited Topock Gorge. Eddleman et al. (1988) recommended that manipulation of water levels on diked marsh units should be examined as a possible management tool for the Yuma clapper rail. One of the FHCP conservation measures is the creation and management of 512 ac (201.2 ha) of Yuma clapper rail habitat (LCR MSCP 2004). This can be an opportunity to determine what fluctuations in water levels clapper rails, least bitterns, and black rails can manage during the nesting period.

The USFWS Arizona Ecological Services Office is the central repository of marsh bird surveys within the reaches of the LCR MSCP. By coordinating with the USFWS in cataloging survey areas within the LCR MSCP boundaries, one can determine areas that are not being surveyed and potentially survey them for the targeted marsh bird species.
Literature Cited


California Department of Fish and Game. 2006. State and federally listed endangered and threatened animals of California. California Department of Fish and Game, Sacramento, California. 12 pp.


Map 1. General Area
Map 3. Hart Mine Marsh
<table>
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<tr>
<th>Location</th>
<th>Background Noise</th>
<th>Species</th>
<th>Call</th>
<th>Distance (meters)</th>
<th>Comments</th>
</tr>
</thead>
</table>

- **Call Types:** BLRA: kicky-choo, grr, churr  CLRA: clir, klurr, kek, kummer  LEBE: coo, kek, err  VRRA: grunt, ticket, tickler
- **Preliminary noise:**
  - 0: no noise
  - 1: faint noise
  - 2: moderate noise (probably can't hear some birds beyond 100m)
  - 3: loud noise (probably can't hear some birds beyond 50m)
  - 4: intense noise (probably can't hear some birds beyond 25m)
Species list of birds observed during marsh bird surveys, Topock Gorge, March 21-22, 2007

pied-billed grebe (Podilymbus podiceps)
clark’s grebe (Aechmophorus clarkii)
double-crested cormorant (Phalacrocorax auritus)
least bittern (Ixobrychus exilis)
great blue heron (Ardea Herodias)
great egret (Ardea alba)
turkey vulture (Cathartes aura)

Cactus wren (Campylorhynchus brunneicapillus)
Bewick’s wren (Thryomanes bewickii)
marsh wren (Cistothorus palustris)
black-tailed gnatcatcher (Polioptila melanura)
northern mockingbird (Mimus polyglottos)
American pipit (Anthus rubescens)
phainopepla (Phainopepla nitens)

Yellow-rumped warbler (Dendroica coronata)
common yellowthroat (Geothlypis trichas)
song sparrow (Melospiza melodia)
red-winged blackbird (Agelaius phoeniceus)
yellow-headed blackbird (Xanthocephalus xanthocephalus)
great-tailed grackle (Quiscalus mexicanus)

Bald eagle (Haliaeetus leucocephalus)
Northern harrier (Circus cyaneus)
American kestrel (Falco sparverius)

Yuma clapper rail (Rallus longirostris yumanensis)
Virginia rail (Rallus limicola)
sora (Porzana Carolina)

American coot (Fulica Americana)
long-billed curlew (Numenius americanus)
ring-billed gull (Larus delawarensis)
mourning dove (Zenaida macroura)
barn owl (Tyto alba)
white-throated swift (Aeronautes saxatalis)

black-chinned hummingbird (Archilochus alexandri)
ladder-backed woodpecker (Picoides scalaris)
northern flicker (Colaptes auratus)
asl-throated flycatcher (Myiarchus cinerascens)
black phoebe (Sayornis nigricans)
Say’s phoebe (Sayornis saya)
common raven (Corvus corax)
tree swallow (Tachycineta bicolor)
violet-green swallow (Tachycineta thalassina)
northern rough-winged swallow (Stelgidopteryx serripennis)
cave swallow (Petrochelidon pyrrhonota)
barn swallow (Hirundo rustica)
verdin (Auriparus flaviceps)

Attachment 2
Species list of birds observed during marsh bird surveys, Topock Gorge, April 25-27, 2007

common loon (Gavia immer)
pied-billed grebe (Podilymbus podiceps)
red-necked grebe (Podiceps grisegena)
eared grebe (Podiceps nigricollis)
Clark’s grebe (Aechmophorus clarkii)
double-crested cormorant (Phalacrocorax auritus)
greater roadrunner (Geococcyx californianus)
barn owl (Tyto alba)
great horned owl (Bubo virginianus)
lesser nighthawk (Chordeiles acutipennis)
Vaux’s swift (Chaetura vauxii)
black-chinned hummingbird (Archilochus alexandri)
least bittern (Ixobrychus exilis)
great blue heron (Ardea Herodias)
great egret (Ardea alba)
snowy egret (Egretta thula)
green heron (Butorides virescens)
black-crowned night heron (Nycticorax nycticorax)
white-faced ibis (Plegadis chihi)
gadwall (Anas strepera)

American wigeon (Anas Americana)
mallard (Anas platyrhynchos)
green-winged teal (Anas crecca)
redhead (Aythya Americana)
bufalhead (Bucephala albeola)
ruddy duck (Oxyura jamaicensis)
northern harrier (Circus cyaneus)
peregrine falcon (Falco peregrinus)
Gambel’s quail (Callipepla gambelli)
California black rail (Laterallus jamaicensis coturniculus)
Yuma clapper rail (Rallus longirostris yumanensis)
Virginia rail (Rallus limicola)
sora (Porzana carolina)
common moorhen (Gallinula chloropus)
American coot (Fulica Americana)
kildeer (Charadrius vociferous)
black-necked stilt (Himantopus mexicanus)
American avocet (Recurvirostra Americana)
willet (Catoptrophorus semilatus)

spotted sandpiper (Actitis macularia)
marbled godwit (Limosa fedoa)
western sandpiper (Calidris mauri)
least sandpiper (Calidris minutilla)
Franklin’s gull (Larus pipixcan)
Casian tern (Sterna caspia)
white-winged dove (Zenaida asiatica)
mourning dove (Zenaida macroura)

Pacific-slope flycatcher (Empidonax difficilis)
ash-throated flycatcher (Myiarchus cinerascens)
Bell’s vireo (Vireo bellii)
common raven (Corvus corax)
tree swallow (Tachycineta bicolor)
violet-green swallow (Tachycineta thalassina)
northern rough-winged swallow (Stelgidopteryx serripennis)
bank swallow (Riparia riparia)
cliff swallow (Petrochelidon pyrrhonota)
barn swallow (Hirundo rustica)
verdin (Auriparus flaviceps)
cactus wren (Campylorhynchus brunneicapillus)
canyon wren (Catherpes mexicanus)
marsh wren (Cistothorus palustris)
Lucy’s warbler (Vermivora luciae)
yellow-rumped warbler (Dendroica coronata)

common yellowthroat (Geothlypis trichas)
Wilson’s warbler (Wilsonia pusilla)
yellow-breasted chat (Icteria virens)
song sparrow (Melospiza melodia)
white-crowned sparrow (Zonotrichia leucophrys)
indigo bunting (Passerina cyanea)
red-winged blackbird (Agelaius phoeniceus)
yellow-headed blackbird (Xanthocephalus xanthocephalus)
great-tailed grackle (Quiscalus mexicanus)
brown-headed cowbird (Molothrus ater)
Bullock’s oriole (Icterus bullockii)
Species list of birds observed during marsh bird surveys, Topock Gorge, May 22-23, 2007

pied-billed grebe (*Podilymbus podiceps*)
eared grebe (*Podiceps nigricollis*)
Clark’s grebe (*Aechmophorus clarkii*)
double-crested cormorant (*Phalacrocorax auritus*)
least bittern (*Ixobrychus exilis*)
great blue heron (*Ardea Herodias*)
great egret (*Ardea alba*)
snowy egret (*Egretta thula*)
cattle egret (*Bubulcus ibis*)
green heron (*Butorides virescens*)
white-faced ibis (*Plegadis chihi*)
turkey vulture (*Cathartes aura*)
mallard (*Anas platyrhynchos*)
cinnamon teal (*Anas cyanoptera*)
northern shoveler (*Anas clypeata*)
redhead (*Aythya Americanica*)
red-tailed hawk (*Buteo jamaicensis*)
Yuma clapper rail (*Rallus longirostris yumanensis*)
Virginia rail (*Rallus limicola*)
common moorhen (*Gallinula chloropus*)
American coot (*Fulica Americana*)
black-necked stilt (*Himantopus mexicanus*)
western sandpiper (*Calidris mauri*)
Franklin’s gull (*Larus pipixcan*)
Caspian tern (*Sterna caspia*)
white-winged dove (*Zenaida asiatica*)
mourning dove (*Zenaida macroura*)
barn owl (*Tyto alba*)
lesser nighthawk (*Chordeiles acutipennis*)
white-throated swift (*Aeronautes saxatalis*)
black phoebe (*Sayornis nigricans*)
Bell’s vireo (*Vireo bellii*)
common raven (*Corvus corax*)
northern rough-winged swallow (*Stelgidopteryx serripennis*)
cliff swallow (*Petrochelidon pyrrhonota*)
barn swallow (*Hirundo rustica*)
verdin (*Auriparus flaviceps*)
canyon wren (*Catherpes mexicanus*)
marsh wren (*Cistothorus palustris*)
phainopepla (*Phainopepla nitens*)
Lucy’s warbler (*Vermivora luciae*)

common yellowthroat (*Geothlypis trichas*)
yellow-breasted chat (*Icteria virens*)
song sparrow (*Melospiza melodia*)
Abert’s towhee (*Pipilo aberti*)
red-winged blackbird (*Agelaius phoeniceus*)
yellow-headed blackbird (*Xanthocephalus xanthocephalus*)
great-tailed grackle (*Quiscalus mexicanus*)
brown-headed cowbird (*Molothrus ater*)
house finch (*Carpodacus mexicanus*)

Attachment 4
Species list of birds observed during marsh bird surveys, Hart Mine Marsh, April 6, 2007

pied-billed grebe (*Podilymbus podiceps*)
least bittern (*Ixobrychus exilis*)
snowy egret (*Egretta thula*)
mallard (*Anas platyrhynchos*)
cinnamon teal (*Anas cyanoptera*)
killdeer (*Charadrius vociferous*)
black-necked stilt (*Himantopus mexicanus*)
greater yellowlegs (*Tringa melanoleuca*)
solitary sandpiper (*Tringa solitaria*)
least sandpiper (*Calidris minutilla*)
long-billed dowitcher (*Limnodromus scolopaceus*)
mourning dove (*Zenaida macroura*)
lesser nighthawk (*Chordeiles acutipennis*)
Pacific-slope flycatcher (*Empidonax difficilis*)

ash-throated flycatcher (*Myiarchus cinerascens*)
western kingbird (*Tyrannus verticalis*)
northern rough-winged swallow (*Stelgidopteryx serripennis*)
black-throated gray warbler (*Dendroica nigriceps*)
yellow-rumped warbler (*Dendroica coronata*)
common yellowthroat (*Geothlypis trichas*)
Abert’s towhee (*Pipilo aberti*)
song sparrow (*Melospiza melodia*)
white-crowned sparrow (*Zonotrichia leucophrys*)
red-winged blackbird (*Agelaius phoeniceus*)
brown-headed cowbird (*Molothrus ater*)
Bullock’s oriole (*Icterus bullockii*)

Species list of birds observed during marsh bird surveys, Hart Mine Marsh, April 27, 2007

pied-billed grebe (*Podilymbus podiceps*)
great egret (*Ardea alba*)
American coot (*Fulica Americana*)
killdeer (*Charadrius vociferous*)
white-winged dove (*Zenaida asiatica*)
mourning dove (*Zenaida macroura*)
lesser nighthawk (*Chordeiles acutipennis*)
western kingbird (*Tyrannus verticalis*)
Bewick’s wren (*Thryomanes bewickii*)
common yellowthroat (*Geothlypis trichas*)
song sparrow (*Melospiza melodia*)
red-winged blackbird (*Agelaius phoeniceus*)
great-tailed grackle (*Quiscalus mexicanus*)
brown-headed cowbird (*Molothrus ater*)

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

Figure 2
Marsh Bird Survey - Topock Gorge

Figure 5