Marsh Bird Monitoring, including Yuma Ridgway's Rail, along Las Vegas Wash, Clark County, Nevada, 2018

SOUTHERN NEVADA WATER AUTHORITY®

Las Vegas Wash Coordination Committee

lvwash.org

Marsh Bird Monitoring, including Yuma Ridgway's Rail, along Las Vegas Wash, Clark County, Nevada, 2018

SOUTHERN NEVADA WATER AUTHORITY
Las Vegas Wash Project Coordination Team

Prepared for:

U.S. Fish and Wildlife Service
Southern Nevada Field Office

and

Las Vegas Wash Coordination Committee

Prepared by:

Deborah Van Dooremolen
Southern Nevada Water Authority
Las Vegas Wash Project Coordination Team
P.O. Box 99956
Las Vegas, Nevada 89193-9956

November 2018

ABSTRACT

The Las Vegas Wash Coordination Committee (LVWCC), a 28-member stakeholder group, is working to stabilize and enhance the Las Vegas Wash (Wash), the channel that drains flows from the Las Vegas Valley to Lake Mead at Las Vegas Bay. The Wash also flows through the 2,900-acre Clark County Wetlands Park (Wetlands Park). As part of informal Section 7 consultation for the project with the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service (USFWS) recommended conducting annual surveys to determine the occurrence of the federally endangered Yuma Ridgway's rail (*Rallus obsoletus yumanensis*) within the Wetlands Park. Surveys were conducted by permitted consultants nearly annually from 2000 through 2007. The U.S. Fish and Wildlife Service established a new standard protocol for conducting Yuma Ridgway's rail surveys in 2006 that includes monitoring for other marsh bird species. The Las Vegas Wash Project Coordination Team (Wash Team) began conducting surveys using this protocol in 2007 and added Yuma Ridgway's rail in 2008 once a federal permit was obtained. This report presents 2018 monitoring season results.

Six species were targeted during the surveys: American bittern, least bittern, black rail, Ridgway's rail, Virginia rail, and sora. Detections of pied-billed grebe, common gallinule, and American coot (referred to as non-target species) were also recorded. Surveys were conducted along three survey routes (Routes 2-4) comprising 26 points. American bittern, least bittern, Virginia rail, sora and the three non-target species were detected. Sora was the most abundant of the target species, and American coot was the most abundant of all species. No Yuma Ridgway's rail or black rail were identified.

Habitat quality on Routes 2 and 3 was fair to good. In the past, the Mitigation Wetlands (Route 4) have offered the highest quality potentially suitable nesting habitat for Yuma Ridgway's rail, born out by the April-June detections of a male on territory in 2017, but habitat quality continues to suffer due to low water level in the spring. The Wash Team should be able to keep water levels higher in 2019.

Annual marsh bird surveys along the Wash should continue in order to comply with informal Section 7 consultation measures.

ACKNOWLEDGEMENTS

I thank Nicholas Rice and Timothy Ricks for assisting with surveys. I also thank the Las Vegas Wash Coordination Committee for their continued support for wildlife monitoring and the implementation of the Las Vegas Wash Comprehensive Adaptive Management Plan and the Las Vegas Wash Wildlife Management Plan. These activities have been conducted by Deborah Van Dooremolen under permit no. TE148556-3 (expired May 24, 2018; renewal in process and submitted >30 days in advance allowing surveys to continue), Nicholas Rice under permit no. TE64580A-2 (expires May 26, 2021) and Timothy Ricks under permit no. TE67397A-2 (expires May 30, 2021) as issued by the U.S. Fish and Wildlife Service, Sacramento, California.

Marsh Bird Monitoring, including Yuma Ridgway's Rail, along Las Vegas Wash, Clark County, Nevada, 2018

Table of Contents

Page No.

Page No.

List of Tables

List of Figures

List of Appendices

1.0 BACKGROUND

The Las Vegas Wash (Wash) is the primary drainage channel for the Las Vegas Valley, carrying flows, including highly treated wastewater, urban runoff, shallow groundwater, and storm runoff, through the 2,900-acre Clark County Wetlands Park (Wetlands Park) to Lake Mead at Las Vegas Bay (Figure 1). Although originally an ephemeral stream, the Wash began supporting perennial flows in the 1950s when the discharge of treated wastewater into the channel was initiated. At first these perennial flows created a lush wetland along the channel. However, the volume of flows in the Wash continued to increase with the increasing urban population, and erosion began to drain the wetlands and carry thousands of tons of sediment to Lake Mead. By the late 1990s, headcutting had deeply incised the channel and reduced the wetlands by approximately 90% from their peak extent, leaving less than 200 acres.

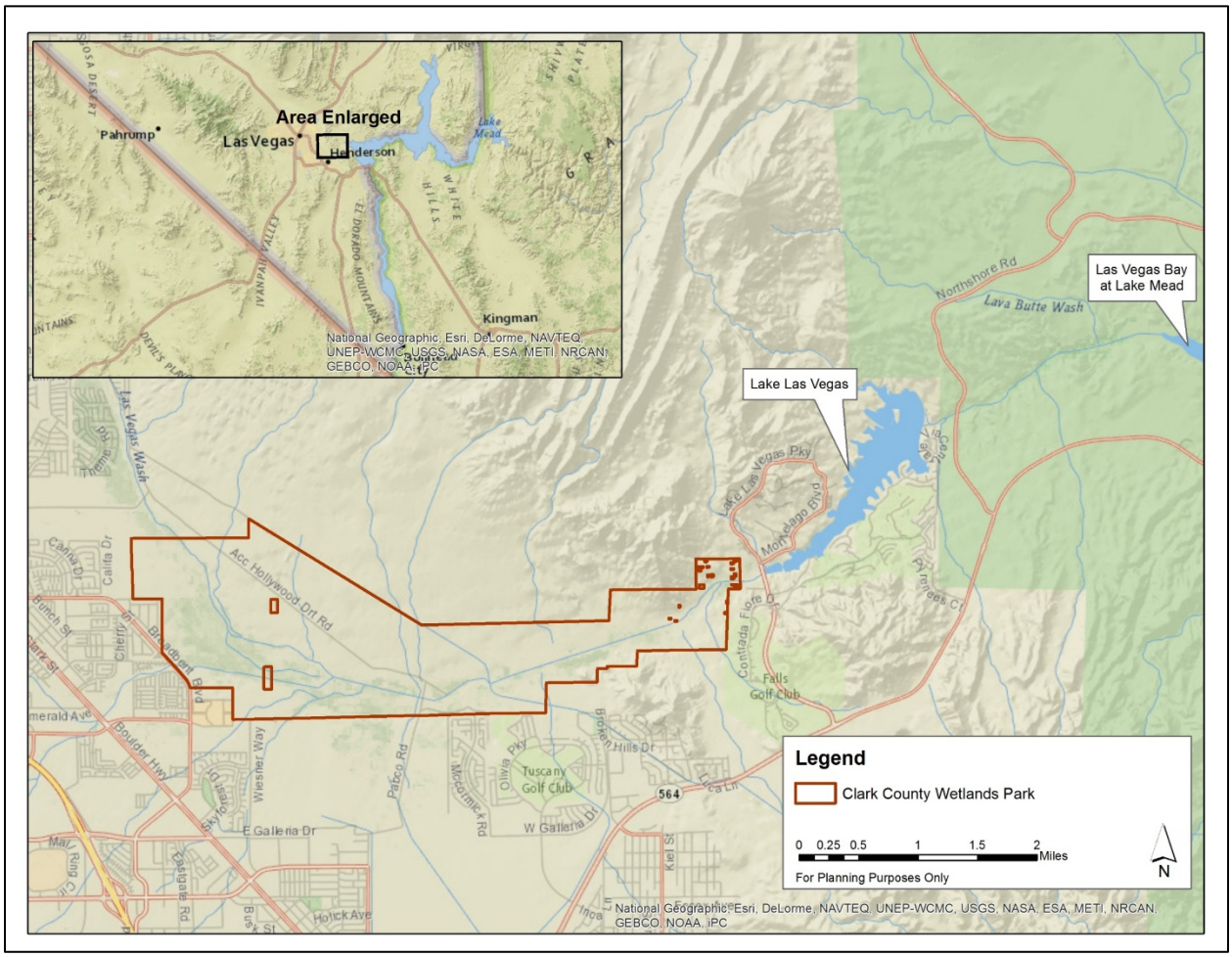

Figure 1. Las Vegas Wash location and general study area map.

In 1998, the Las Vegas Wash Coordination Committee (LVWCC), a 28-member stakeholder group, was created to address the degradation of the Wash. The group developed and is implementing the Las Vegas Wash Comprehensive Adaptive Management Plan (LVWCC 2000) to stabilize the Wash and restore its ecological functions. Stabilization and enhancement activities, which include the construction of 21 erosion control structures (weirs) and extensive

revegetation, will help deter further erosion and reduce the amount of sediment being deposited in Lake Mead. In the spring of 2018, 20 weirs were in place, and construction was under way on the Sunrise Mountain Weir and a major expansion of the Historic Lateral Weir.

The LVWCC is increasing wetland habitat along the channel by planting bulrush (*Schoenoplectus* spp.) in the impoundments of the weirs, and cattails (*Typha domingensis*) and common reed (*Phragmites australis*) volunteer from upstream sources, creating islands and often covering the faces of the weirs themselves. Clark County established emergent wetlands in the constructed wetland ponds in the Wetlands Park Nature Preserve (Nature Preserve) and in the in-lieu fee mitigation wetlands (Mitigation Wetlands; Figure 2). The increase in wetland habitat along the Wash and in other areas of the Wetlands Park could impact the occurrence of secretive marsh birds (e.g., rails and bitterns), including the federally endangered Yuma Ridgway's rail (*Rallus obsoletus yumanensis*). (Note: This species was known as the Yuma clapper rail [*R. longirostris yumanensis*] until it was reclassified as a different species by Chesser et al. [2014]; for simplicity, all references below have been updated with the new species name).

The Yuma Ridgway's rail is largely restricted to the lower Colorado River watershed and the Salton Sea, inhabiting freshwater and brackish water wetlands (Anderson and Ohmart 1985). Home range size varies seasonally and is greatest during winter and post-breeding (Eddleman 1989, Conway et al. 1993). Eddleman (1989) reported a mean annual home range size of more than 17 acres, while Conway et al. (1993) reported mean annual home range size to be 30 acres. Sites occupied by Yuma Ridgway's rail have a higher percent cover of shallow water (Eddleman 1989). Density of emergent vegetation has also been reported as an important habitat variable, although findings differ. Anderson and Ohmart (1985) found that Yuma Ridgway's rail typically reached their highest numbers year-round in the densest stands of emergent vegetation, while Conway et al. (1993) found low stem densities to be an important component. Species preferences also vary. Conway et al. (1993) found that cattails and bulrush are preferred, although Yuma Ridgway's rails have also been detected in wetlands dominated by common reed, salt cedar (*Tamarix ramosissima*), and willow (*Salix* spp.; Eddleman 1989, Hinojosa-Huerta et al. 2001). Differences in preferred density and species of emergent vegetation among different geographic locations may relate to densities of crayfish, the most abundantly consumed prey item of the Yuma Ridgway's rail (Anderson and Ohmart 1985). Habitat use also changes throughout the year, thus Conway et al. (1993) suggest that maintaining shallow, open water areas with stands of emergent vegetation at different successional stages would best support Ridgway's rails year-round.

Alcorn (1988) reported that eight Ridgway's rails were observed in the Las Vegas Sewage disposal drainage ditch on September 6, 1959, and that a lone individual was observed in the same location a few weeks later (the site of the detections is believed to be the present-day City of Las Vegas Water Pollution Control Facility discharge channel, located approximately 1.5 miles upstream of the Wetlands Park boundary; Figure 2). A Yuma Ridgway's rail was also detected along the Wash, within the Wetlands Park, on May 28 and June 18, 1998, in a wet, salt cedar-dominated area upstream of Pabco Road Weir (Southwest Wetlands Consortium 1998; Figure 2). As a result of informal Section 7 consultation with the U.S. Fish and Wildlife Service on the proposed development of the Wetlands Park and associated erosion control structures, the

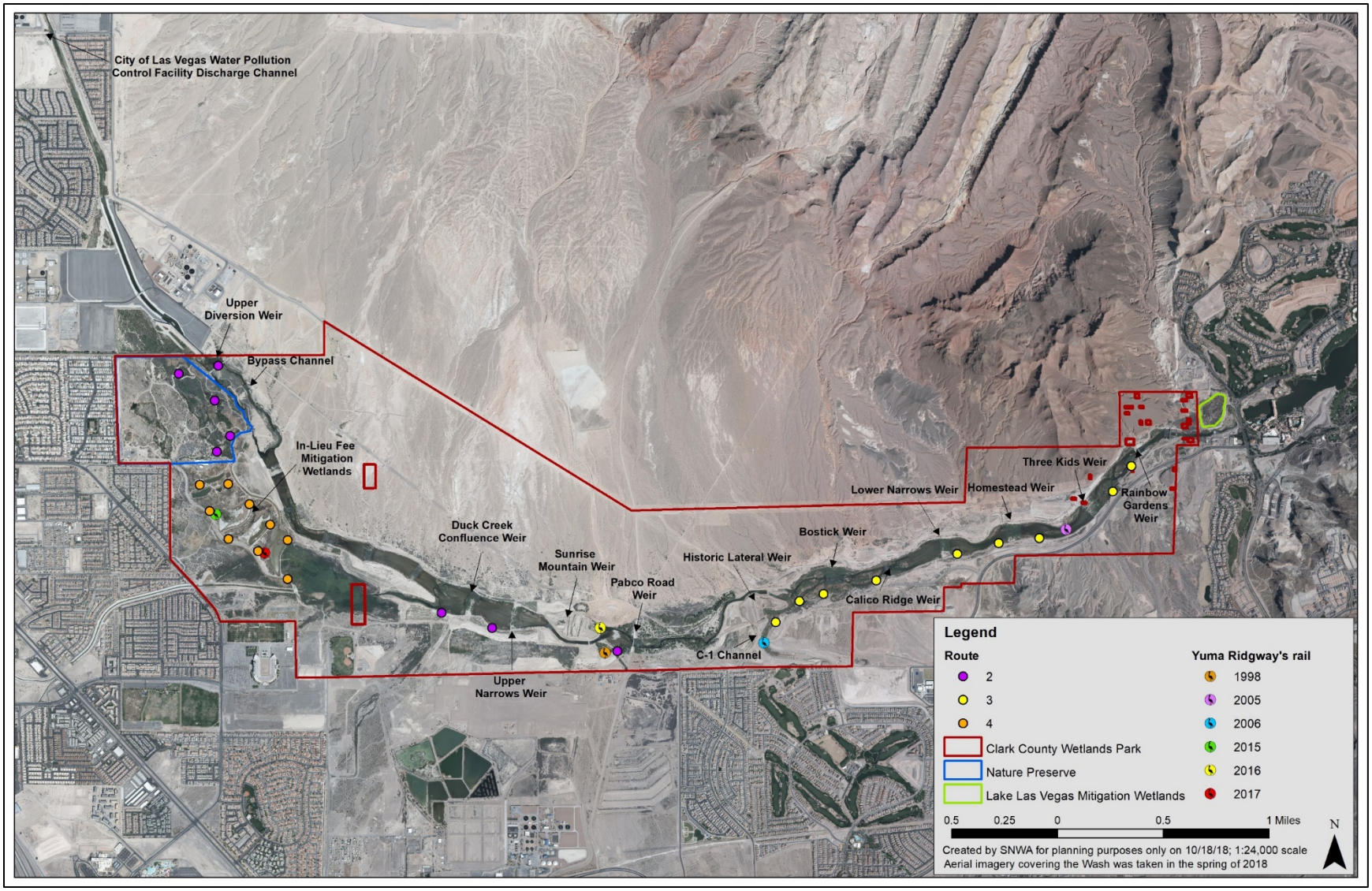

Figure 2. Yuma Ridgway's rail detection locations by year and 2018 monitoring points by survey route. Locations of interest also shown.

Southern Nevada Water Authority (SNWA), the lead agency of the LVWCC, began annual surveys to determine the occurrence of Yuma Ridgway's rail within the Wetlands Park.

SNWA contracted with permitted consultants to perform these species-specific surveys from 2000 to 2004 and 2006 to 2007 (McKernan and Braden 2001; McKernan and Carter 2002; SWCA 2002, 2003, 2005, 2006, 2007, 2008). Then, Conway (2005, 2009) developed a protocol for conducting marsh bird monitoring that includes calling for Ridgway's rail. It was established as the official Yuma Ridgway's rail survey protocol in 2006 and enables compliance obligations to be met, while also providing information on the status, abundance, and distribution of other sensitive species such as the least bittern (*Ixobrychus exilis*) and black rail (*Laterallus jamaicensis*), which are covered under the Lower Colorado River Multi-Species Conservation Program. Consequently, in 2007, the Las Vegas Wash Project Coordination Team (Wash Team; the implementation team of the LVWCC) initiated a marsh bird monitoring study along the Wash and within the Wetlands Park (Van Dooremolen 2010a, 2010b, 2012, 2013, 2014a, 2014b, 2015, 2017a, 2017b). Yuma Ridgway's rail could not be surveyed for initially because the necessary federal permit was not in place; therefore, the species was not added to the survey until 2008.

This report presents results from the 2018 monitoring season.

2.0 METHODS

2.1 Description of Survey Routes

Three routes totaling 26 points were surveyed in 2018 (Figure 2). GPS coordinates of the points are included in Appendix A.

Route 2 included eight points in 2018: four within the constructed wetland ponds at the Nature Preserve and four along the Wash, with one in the Upper Diversion Weir impoundment, a new point above Duck Creek Confluence Weir, one upstream of Upper Narrows Weir, and one upstream of Pabco Road Weir (Figure 2). Points covering the bypass channel were discarded in 2018 due to lack of suitability for the Ridgway's rail. The Nature Preserve ponds (3-acre lower pond [Vern's Pond], 1.5-acre middle pond complex, and 1.5-acre upper pond) have varying amounts of open water and the vegetation is composed of cattails, California and hardstem bulrush (*S. californicus* and *S. acutus*), common reed, sandbar willow (*S. exigua*), Goodding willow (*S. gooddingii*) and cottonwood (*Populus fremontii*). The Upper Diversion Weir point covers the 3.5-acre impoundment; this site is still largely open water, but the cattail marsh is beginning to fill in again (it was cleared in the winter of 2017). A newly added point samples habitat from approximately 17 acres of the Duck Creek Confluence Weir and its impoundment. Common reed, cattails and some bulrush blanket the banks and there are islands of cattails and common reed in the impoundment. In the approximately 14-acre impoundment of the Upper Narrows Weir, California and Olney bulrush (*S. americanus*), cattails, and common reed line the banks and there is extensive open water. Approximately six acres of wetland habitat are monitored upstream of Pabco Road Weir. The emergent habitat is dominated by cattails and common reed and includes a small backwater pond and wetlands created by the City of Henderson Water Reclamation Facility outfall channel. There are typically two points in this area, but due to the construction of Sunrise Mountain Weir, one could not be surveyed in 2018.

Route 3 included nine points (approximately 65 acres of habitat; Figure 2) in 2018. The route begins in the small backwater wetland at the discharge of the C-1 Channel into the Wash (at the toe of Historic Lateral Weir) and continues downstream to end at the Rainbow Gardens Weir. It includes points sampling the impoundments of Bostick, Calico Ridge, Homestead, Three Kids (reinitiated in 2016; originally surveyed in 2012 and 2013, prior to the construction of the weir) and Rainbow Gardens weirs, as well as the toe of Lower Narrows and Three Kids weirs (the latter point was new in 2018; Figure 2). All of these locations have banks and islands covered in varying amounts of cattails, common reed, and bulrush. The oldest of them, Bostick and Calico Ridge, also have mature Goodding willow with lesser amounts of sandbar willow, cottonwood and other riparian vegetation. The other points have more limited riparian habitat. The point in the Lake Las Vegas mitigation wetlands, just east of the Wetlands Park boundary, was discarded in 2018.

Route 4 included nine points (approximately 60 acres of habitat; Figure 2) in 2018. Two points cover the three small wetland cells, six points cover the three large cells, and one point covers habitat created by Duck Creek and the west channel. The three small cells are dominated by dense stands of cattails and common reed, with the closest open water approximately 150 feet or more from the points. The three large cells had been dominated by open water with cattails, bulrush, and common reed of varying width along the banks and in a few stands in the interior. Revegetation activities to enhance wetland and riparian vegetation in two of the cells' interiors began in fall 2016 and are further described in Section 3.2.3. Open water is deep in the small cells (greater than three feet), but mostly shallow in the large cells, which contain only narrow zones of deeper water. The habitat at the point immediately adjacent to the Mitigation Wetlands consists primarily of cattails, common reed, and flooded tamarisk.

Along each route, survey points were established a minimum of 656 feet apart. Although Conway (2005, 2009) recommends a separation of 1,312 feet, the Wash does not contain enough emergent marsh to allow for such wide spacing while still maintaining a sufficient number of points per route. Conway (2005, 2009) does allow for tighter spacing in such circumstances but warns of the risk of double-counting individuals.

2.2 Survey Protocol

Surveys were performed using the North American marsh bird monitoring protocol developed by Conway (2005, 2009). Trained observers conducted the surveys during the breeding season from April through early May. Three surveys of each route were conducted, as required by the protocol (from 2007-2016, a fourth survey was conducted, in mid-May) and each route was surveyed on a separate day. Two observers conducted each survey, including at least one of the following permitted individuals: Deborah Van Dooremolen-TE148556-3, Nicholas Rice-TE64580A-2, and Timothy Ricks-TE67397A-2. Surveys began one half hour before sunrise and concluded by 9 a.m. Although Conway (2005, 2009) specifies that the survey route be run in the same direction every time, each route was run in reverse on the second survey to ensure that most points were surveyed during the earliest morning hours (the time of peak marsh bird vocalization). Surveys were not conducted if wind reached or exceeded 12 miles per hour, as measured by the Beaufort wind scale, for more than two points (see Appendix B for weather conditions on survey days).

At each point, surveys began with a five-minute period of passive listening followed by broadcasting the vocalizations of each target species in succession to elicit a response. Target species for the Wash survey include American bittern (*Botaurus lentiginosus*), least bittern, black rail, Ridgway's rail, Virginia rail (*R. limicola*), and sora (*Porzana carolina*). Each species' vocalizations were broadcast for 30 seconds, followed by 30 seconds of silence to listen for responses, for a total of one minute per species. Species' vocalizations were broadcast in succession from most sensitive (i.e., likely to be deterred from responding by hearing the call of another species) to least sensitive: black rail, least bittern, sora, Virginia rail, Ridgway's rail, and American bittern. Vocalizations were broadcast using MP3 players with portable speakers. The observers recorded all target species heard and/or seen during the survey, making a separate record for each bird and noting each minute of the survey period in which it was heard calling and/or seen. Individuals were also recorded if they were heard or seen at the point immediately before or after the survey. Detections of three other marsh bird species that were not targeted through the broadcast were also recorded, including pied-billed grebe (*Podilymbus podiceps*), common gallinule (*Gallinula galeata*), and American coot (*Fulica americana*). Given the sheer numbers of coots present at some points, observers often counted them either before or after the survey. Other data collected include the call type heard, the distance and direction to each detected bird, and whether the bird was detected at a previous point. The background noise level was also recorded at each point. Noise designated as loud or intense meant that at least some species could not be heard beyond approximately 165 or 80 feet, respectively.

The observers compared data after the survey was completed at each point in order to rectify any differences in detections.

2.3 Data Analysis

Detections of target and non-target species were summarized by route and date to provide an overall picture of when and where birds were detected. However, since multiple detections could be made of the same bird over the course of a survey season, the number of unique individuals per species along each route was also estimated. This number was calculated as the sum of the maximum number of birds of the species that were detected at each point during the season. Whether or not a bird was counted as a unique individual was determined by the following criteria. If one or more individuals of a species were detected at the same point on more than one survey, they were considered to be the same individual(s). If an individual had been detected at a previous point during a survey, the second survey detection was not counted. If an individual was detected at a point within 656 feet of a location where an individual had been detected on a prior survey, and the individual was calling from approximately the same direction where the other bird had been detected, it was considered to be the previously detected bird and was not counted as a new individual. This yielded an estimate of the number of individuals detected, i.e., the abundance, of each species. (Note: The above assumes that individuals inhabit a relatively small, defined area, a home range, throughout the survey season. Thus a sora detected at Point 1 during the second and third surveys on Route 4 would be considered a unique individual, and a sora detected at Point 6 on the same route in the fourth survey would be considered a unique individual.)

For each route, the total number of individuals detected of each species and the total number of individuals detected regardless of species, were divided by the number of points the route

contained, yielding a per point abundance for each. Then for the study area as a whole, the total number of individuals detected of each species and the total number of individuals detected regardless of species, were divided by the total number of points surveyed to yield the total abundance per point for each. Per point abundance provides for a more accurate comparison between routes and between years than the raw abundance because the number of points surveyed has varied over time. However, it should also be noted that, with the exception of American coot, the number of individuals detected on each route is typically small enough that the loss or addition of just one or two individuals can have a noticeable impact on this metric.

Per point abundance data were compared with results from the previous year and with an average of all 12 years of surveys (nine for the Mitigation Wetlands) to look for changes, and charts of each species' annual abundance were also created to show trends and variations over time.

As stated in Section 2.1, the recommended spacing of points is 1,312 feet. Broadcasting from points with tighter spacing may impact bird behavior, calling them in from more distant points (Conway 2005, 2009). Since spacing for this study is half of the recommended distance, it is possible that some individuals were double-counted.

3.0 RESULTS AND DISCUSSION

2018 was the second year the three-survey protocol was implemented. In the prior ten years, four surveys were conducted. A few new individuals were typically detected on the fourth survey, so the reduction in effort likely led to lower abundances for some species.

3.1 Species

In 2018, four of the six target species were detected: American bittern, least bittern, Virginia rail, and sora (Table 1). Sora was the only target species identified on all routes. The three non-target species were also detected, with common gallinule and American coot ubiquitous, identified during all survey replicates on all routes (Table 1). Sora was the most abundant of the target species with 0.73 individuals per point (Table 2). American coot was the most abundant of all species with 12.50 birds per point (Table 2).

2018 was a fairly typical year for marsh bird monitoring in the study area. Least bittern, Virginia rail, and sora were identified, as they have been in all 12 years of surveys, as have the three non-target species (Table 2, Figures 3-5). Sora was the most abundant of the target species, as it has been every year, just as American coot has always been the most abundant, by far, of all species identified. Also as in all prior years, no black rail were detected (Table 2). Abundances of most species increased year over year, but Virginia rail abundance decreased dramatically, establishing a new historical low of just two birds, or 0.08 per point (Table 2, Figures 3-5). Reasons for this sharp decline are unknown. American bittern abundance also decreased year over year, but it was still above average given how rarely the species has been detected (Table 2, Figure 3). Abundances of least bittern and pied-billed grebe were below their 12-year averages, while common gallinule and American coot were above; sora abundance was roughly average (Table 2).

Route	Date	AMBI	LEBI	VIRA	SORA	PBGR	COGA	AMCO	Grand Total
2	4/2/2018	0	2	1	3	1	19	174	200
2	4/17/2018	0	1	0	2	2	9	84	98
2	5/1/2018	0	2	0	0	1	8	66	77
2 Total	all dates	0	5	1	5	4	36	324	375
3	4/3/2018	0	0	1	2	1	4	123	131
3	4/18/2018	0	2	1	6	3	11	12	35
3	5/2/2018	0	0	0	0	0	7	17	24
3 Total	all dates	0	2	2	8	4	22	152	190
4	4/4/2018	1	0	0	7	1	3	14	26
4	4/19/2018	0	0	0	6	0	4	13	23
4	5/3/2018	0	0	0	4	0	4	7	15
4 Total	all dates	1	0	0	17	1	11	34	64
Grand Total	all dates	1	7	3	30	9	69	510	629

Table 1. Total 2018 detections for each species by route and date for the 26 points surveyed. AMBI=American Bittern, LEBI=Least Bittern, VIRA=Virginia Rail, SORA=Sora, PBGR=Pied-billed Grebe, COGA=Common Gallinule, AMCO=American Coot.

The lack of Yuma Ridgway's rail detections was disappointing but, given its history in the study area, not entirely surprising. The species has rarely been detected and observations have typically been during other work rather than the official surveys. These include detections on May 23, 2005 in what is now the Three Kids Weir impoundment; on June 4 and June 7, 2006 along the C-1 Channel near the Wash confluence; at the Mitigation Wetlands (Route 4) off and on from August 19 through September 3, 2015; and upstream of Pabco Road Weir on October 20, 2016 (SWCA 2006, 2007; Van Dooremolen 2015, 2017a; Figure 2). Finally, in 2017, a male was heard kekking from shallowly flooded cattail marsh at the Mitigation Wetlands (Route 4) on April 19 and May 3, 2017 representing the first time the species was detected during the surveys targeting it. It was also heard periodically during other work, including on June 1, 2017 the last confirmed detection, when it was also seen (Van Dooremolen 2017b; Figure 2).

Route	Year	No. of Points	AMBI	LEBI	VIRA	SORA	PBGR	COGA	AMCO	Grand Total
2	2017	10	0.10	0.30	0.40	0.00	0.10	1.00	10.30	12.20
2	2018	8	0.00	0.50	0.13	0.50	0.38	2.38	23.13	27.00
2	**12Y AVG**	**8.75**	**0.01**	**0.38**	**0.11**	**0.67**	**0.48**	**1.54**	**7.10**	**10.30**
3	2017	9	0.00	0.11	0.44	0.67	0.11	1.11	21.33	23.78
3	2018	9	0.00	0.22	0.11	0.78	0.33	1.56	13.67	16.67
3	**12Y AVG**	**7.83**	**0.00**	**0.34**	**0.23**	**0.62**	**0.28**	**1.40**	**14.33**	**17.19**
4	2017	9	0.11	0.11	0.00	0.56	0.00	0.78	2.44	4.11
4	2018	9	0.11	0.00	0.00	0.89	0.11	0.67	1.89	3.67
4	**9Y AVG**	**8.33**	**0.07**	**0.27**	**0.65**	**1.06**	**0.37**	**0.96**	**4.28**	**7.70**
Total	2017	28	0.07	0.18	0.29	0.39	0.07	0.96	11.32	13.32
Total	2018	26	0.04	0.23	0.08	0.73	0.27	1.50	12.50	15.35
Total	**12Y AVG**	**25.33**	**0.02**	**0.31**	**0.32**	**0.76**	**0.34**	**1.19**	**8.11**	**11.06**

Table 2. Species and total per point abundances for each route and overall for 2017 and 2018 with study averages. Overall averages include data from Route 1, which was surveyed from 2007 through 2010. AMBI=American Bittern, LEBI=Least Bittern, VIRA= Virginia Rail, SORA=Sora, PBGR=Pied-billed Grebe, COGA=Common Gallinule, AMCO=American Coot.

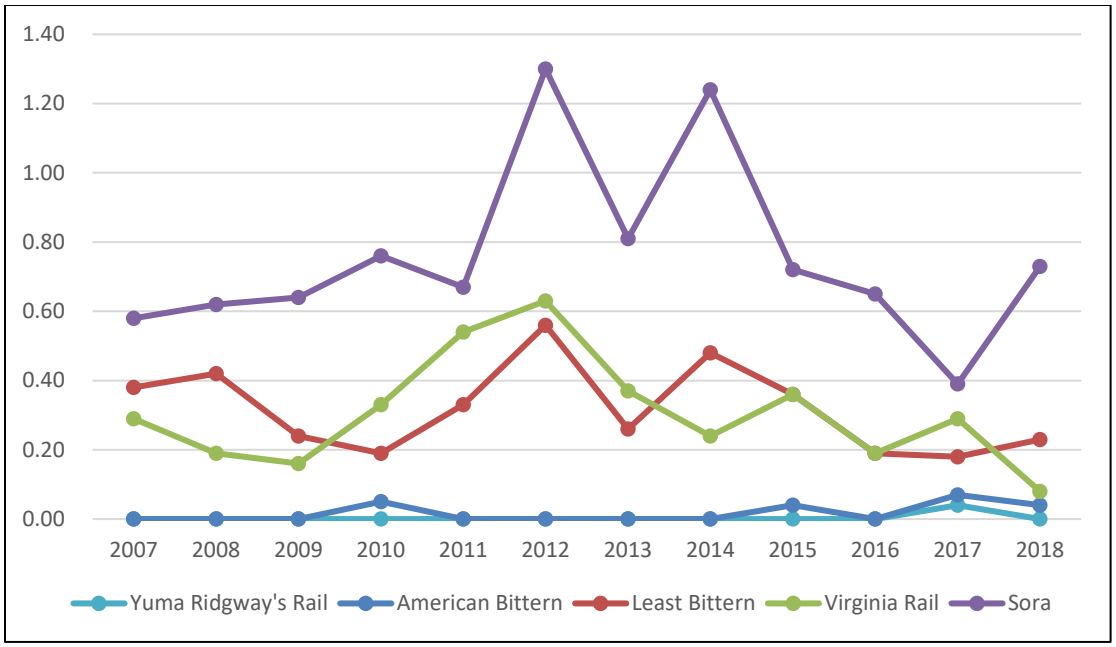

Figure 3. Target species per point abundances by year, 2007-2018.

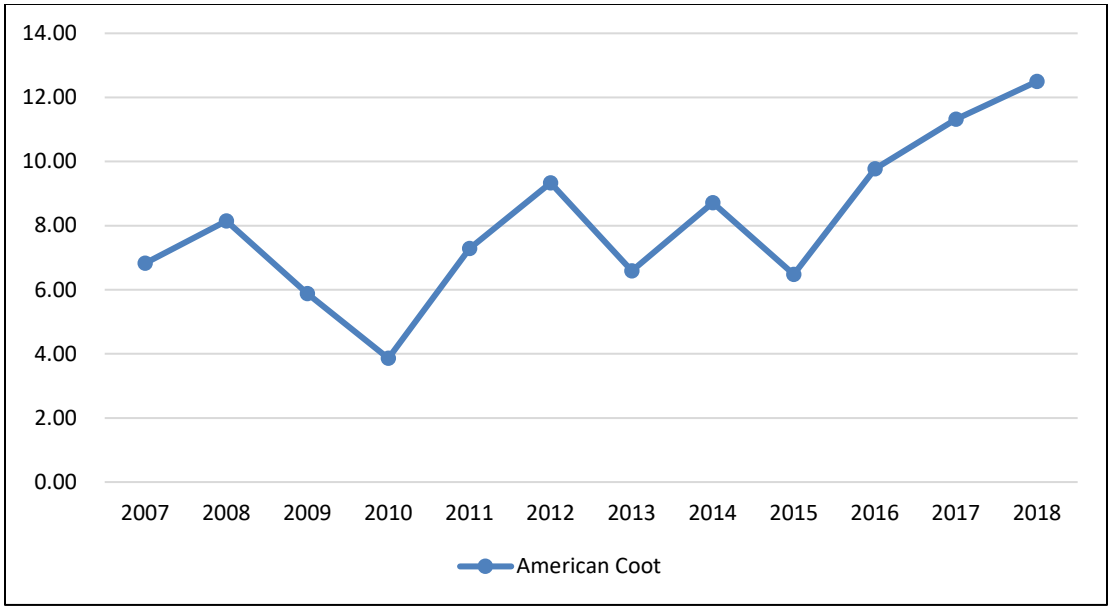

Figure 4. American coot per point abundance by year, 2007-2018.

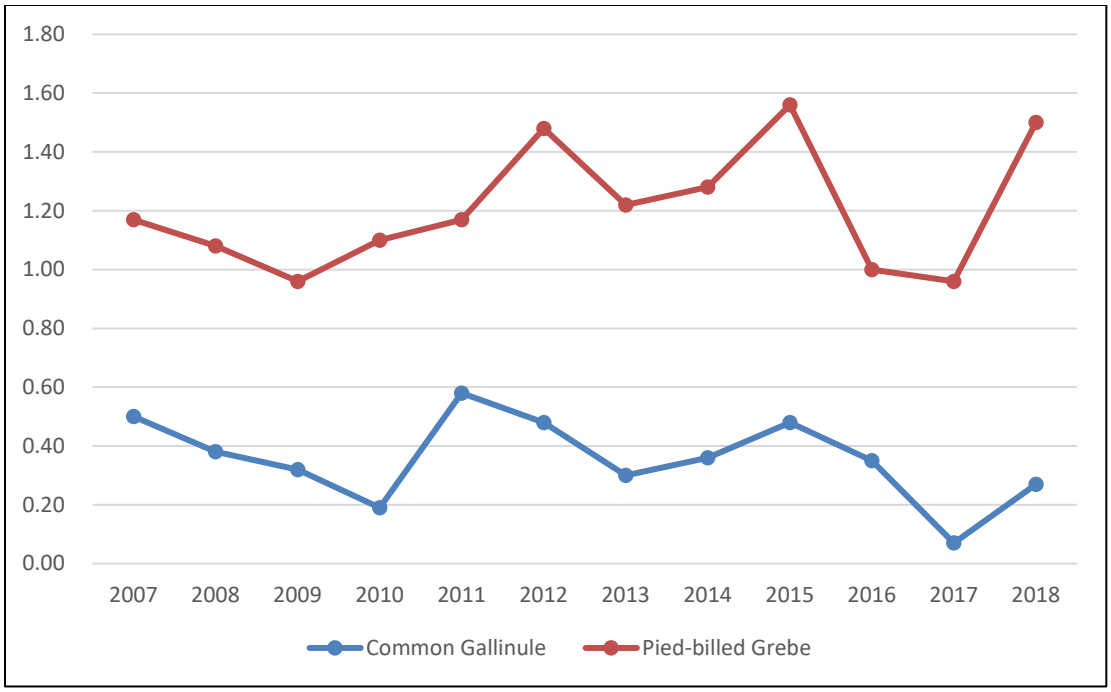

Figure 5. Pied-billed grebe and common gallinule per point abundances by year, 2007-2018.

3.2 Routes

3.2.1 Route 2

In 2018, Route 2 had the highest per point abundances of least bittern and Virginia rail, although raw abundance of just one bird for the latter was shared with Route 3. It also had the highest abundances of the three non-target species. It had the lowest abundance of sora, but it was still a substantial increase over the lack of detections in 2017 (Table 2). While sora and pied-billed grebe abundance increased from the prior year, they were still below average. Least bittern, common gallinule, and coot abundances increased year over year and were above average, the latter two substantially. Virginia rail abundance was down but still just above average for the route (Table 2).

Overall, habitat quality was fair to good, as in the prior few years. The cattail-dominated marsh that had been cleared from the Upper Diversion Weir impoundment in the prior year began to recover. Two sora were detected there in 2018 compared to no detections in 2017, the number of gallinules identified there increased from one to five, and the number of coots increased from 14 to 83. The habitat around Duck Creek Confluence Weir, coupled with the habitat of the Upper Narrows Weir just downstream, likely represents the most suitable potential habitat currently available for Yuma Ridgway's rail on the Wash channel itself. The point above Upper Narrows Weir had resulted in three Virginia rail detections the prior year but yielded just one in 2018. Still, the addition of the two points in the past few years and the removal of the bypass channel points this year has changed the nature of the route, weighting the habitat coverage to the Wash versus the constructed wetland ponds, given how large each of the impoundments are. Clearing for construction of the Sunrise Mountain Weir increased open water habitat above Pabco Road Weir. The points along the Wash yielded the large increase in coot detections for the route in

2018. Cattails in the Nature Preserve continued to age and expand, further closing off portions of the ponds, reducing open water. Clark County's last widespread cattail management occurred in 2014.

3.2.2 Route 3

The route shared the highest raw abundance of Virginia rail with Route 2, but as stated previously, this was just one bird. This is a substantial decline year over year for the species and below average (Table 2). American coot abundance also declined significantly, to just below average. Abundances for least bittern, sora, pied-billed grebe and common gallinule increased and all but least bittern were above average (Table 2).

Overall, habitat quality in 2018 was still fair to good. The addition of the marsh at the toe of Three Kids Weir contributed to results, adding three sora, a pied-billed grebe, three gallinule and 13 coots, which helped to balance poor results at the C-1 Channel. The latter point typically yields at least one sora and Virginia rail in addition to others but was impacted by the construction expanding the Historic Lateral Weir, resulting in just two detections of common gallinule for the season. Construction is now complete. Habitat in the two-point stretch between Lower Narrows and Homestead weirs continued to improve and expand, and still likely represents the highest quality potentially suitable nesting habitat for Ridgway's rail on the route.

3.2.3 Route 4

2018 was a quiet year for Route 4. The Yuma Ridgway's rail from 2017 was not detected again. The site, which had hosted the highest abundance of Virginia rail from 2010 through 2016 and of total target species from 2011 through 2016, had zero detections of the former and lagged the other routes for the latter, as in 2017 (Table 2). While the route did have the highest abundance of sora, it had the lowest abundances of all other species (Table 2). No least bittern were detected for the first time since 2010, the year the route only contained three points. Year over year changes and comparisons with averages were mixed. The site did yield another American bittern and has now accounted for four of the five detected over the course of the study.

In 2016, it was first suggested that water level changes in the spring may have contributed to the year over year declines of some species along the route. There is little doubt that lower water levels and other changes in hydrology negatively impacted habitat quality and contributed to the continued decline in detections in 2017 and 2018. Water levels were lowered in two of the three large wetland cells to aid the growth of new plantings. Common reed was removed from select areas along the banks, and riparian and wetland vegetation was planted both in the cleared areas and on hummocks in the interior of the cells to help Clark County meet their U.S. Army Corps of Engineers permit requirements for the project. Cell 5 had just a thin stream of water covering a small portion of the site during the monitoring season, allowing cattails and other wetland vegetation to continue filling in the interior. Cell 6 varied from shallowly flooded to largely dry but for a zone of deeper open water. Even Cell 7, which hosted the majority of the target species in 2017, including the Yuma Ridgway's rail, generally had insufficient water to flood the emergent marsh along the edges.

In addition to the water level changes in the cells, in March 2017, Clark County re-channelized Duck Creek, leading to reduced inundation of the wetlands around that point. From 2010

through 2016, the point hosted an average of 3.57 individuals of target species and 6.43 individuals of all recorded species. In 2017, only one sora and two common gallinules were detected there, and in 2018 just two sora were identified at the site.

4.0 RECOMMENDATIONS

Annual monitoring for Yuma Ridgway's rail is necessary to comply with informal Section 7 consultation measures. The value of this monitoring is particularly apparent in light of the 2017 detections of a Ridgway's rail on territory within the study area. Thus, it is recommended that marsh bird monitoring continue.

Water level should be raised in the large cells at the Mitigation Wetlands throughout the spring, now that marsh vegetation has filled in and the Corps permit requirements have been fulfilled. Flooding of the emergent wetlands in and along the edges of the cells should improve habitat quality for Yuma Ridgway's rail and other species.

Weir construction has been ongoing on the Wash since 1999, and several structures have been completed since marsh bird monitoring began in 2007. These weirs resulted in additional habitat that needed to be surveyed. The result has been a piecemeal approach, with points being added as habitat becomes available. Construction of the last weirs is now complete. After these areas have been revegetated, all marsh bird monitoring routes will be reviewed and reconfigured as needed.

5.0 LITERATURE CITED

Alcorn, J. R. 1988. *The Birds of Nevada*. Fallon, Nevada: Fairview West Publishing.

Anderson, B.W., and R.D. Ohmart. 1985. Habitat use by clapper rails in the lower Colorado River valley. Condor 87: 116-126.

Braden, G.T., A. Miller, and L. Crew. 2007. The status of Yuma clapper rail and yellow-billed cuckoo along portions of the Virgin River and Muddy River in Southern Nevada: 2006 Final. Final report to the Southern Nevada Water Authority, Las Vegas, prepared by San Bernardino County Museum, Redlands, California.

Chesser, R.T., R.C. Banks, C. Cicero, J.L. Dunn, A.W. Kratter, I.J. Lovette, A.G. Navarro-Siguenza, P.C. Rasmussen, J.V. Remsen, Jr., J.D. Rising, D.F. Stotz, and K. Winker. 2014. Fifty-fifth supplement to the American Ornithologists' Union *Check-list to North American Birds*. The Auk 131: CSi-CSxv.

Conway, C.J, W.R. Eddleman, S.H. Anderson, and L.R. Hanebury. 1993. Seasonal changes in Yuma clapper rail vocalization rate and habitat use. Journal of Wildlife Management 57:282-290.

Conway, C.J. 2005. Standardized North American marsh bird monitoring protocols. Wildlife Research Report #2005-4, U.S. Geological Survey, Arizona Cooperative Fish and Wildlife Research Unit, Tucson, Arizona.

Conway, C.J. 2009. Standardized North American marsh bird monitoring protocols, version 2009-2. Wildlife Research Report #2009-2, U.S. Geological Survey, Arizona Cooperative Fish and Wildlife Research Unit, Tucson, Arizona.

Eddleman, W.R. 1989. Biology of Yuma clapper rail in the southwestern U.S. and northwestern Mexico. Final Rep. Intra-Agency Agreement No. 4-AA-30-02060, U.S. Bureau of Reclamation, Yuma Project Office, Yuma, Arizona. 127pp.

Hinojosa-Huerta, O., S. DeStefano, and W.W. Shaw. 2001. Distribution and abundance of the Yuma clapper rail (Rallus longirostris yumanensis) in the Colorado River delta, Mexico. Journal of Arid Environments 49: 171-182.

LVWCC (Las Vegas Wash Coordination Committee). 2000. Las Vegas Wash Comprehensive Adaptive Management Plan. Las Vegas Wash Project Coordination Team, Southern Nevada Water Authority, Las Vegas, Nevada.

McKernan, R. L., and G. T. Braden. 2001. The status of Yuma clapper rail and yellow-billed cuckoo along portions of Virgin River, Muddy River, and Las Vegas Wash, Southern Nevada, 2000. Final report to the U.S. Fish and Wildlife Service and Southern Nevada Water Authority, Las Vegas, NV, prepared by San Bernardino County Museum, Redlands, California.

McKernan, R. L., and K. J. Carter. 2002. The status of Yuma clapper rail and yellow-billed cuckoo along portions of Virgin River, Muddy River, and Las Vegas Wash, Southern Nevada, 2001. Final report to the U.S. Fish and Wildlife Service and Southern Nevada Water Authority, Las Vegas, NV, prepared by San Bernardino County Museum, Redlands, California.

Rush, S.A., K.F. Gaines, W.R. Eddleman, and C.J. Conway. 2012. Ridgway's Rail (Rallus obsoletus), version 2.0. In The Birds of North America (P. G. Rodewald, editor). Cornell Lab of Ornithology, Ithaca, New York, USA. Retrieved from the Birds of North America: https://birdsna.org/Species-Account/bna/species/ridrai1

Southwest Wetlands Consortium. 1998. A survey for southwestern willow flycatchers along Las Vegas Wash, Clark County Wetlands Park, Nevada. Final report to the Clark County Department of Parks and Recreation, Las Vegas, NV, prepared by SWCA Environmental Consultants, Salt Lake City.

SWCA. 2002. Survey for Yuma clapper rails, yellow-billed cuckoos and southwestern willow flycatchers along Las Vegas Wash, Clark County, Nevada. Prepared by SWCA Environmental Consultants, Salt Lake City. Final report prepared for the Southern Nevada Water Authority, Las Vegas, NV.

SWCA. 2003. Survey for Yuma clapper rails, yellow-billed cuckoos and southwestern willow flycatchers along Las Vegas Wash, Clark County, Nevada. Prepared by SWCA Environmental Consultants, Salt Lake City. Final report prepared for the Southern Nevada Water Authority, Las Vegas, NV.

SWCA. 2005. [2004] Survey for Yuma clapper rails, yellow-billed cuckoos and southwestern willow flycatchers along Las Vegas Wash, Clark County, Nevada. Prepared by SWCA

Environmental Consultants, Salt Lake City. Final report prepared for the Southern Nevada Water Authority, Las Vegas, NV.

SWCA. 2006. Survey for southwestern willow flycatchers in 2005 along Las Vegas Wash, Clark County, Nevada. Prepared by SWCA Environmental Consultants, Salt Lake City. Final report prepared for the Southern Nevada Water Authority, Las Vegas, NV.

SWCA. 2007. 2006 survey for Yuma clapper rails and southwestern willow flycatchers along Las Vegas Wash, Clark County, Nevada. Prepared by SWCA Environmental Consultants, Salt Lake City. Final report prepared for the Southern Nevada Water Authority, Las Vegas, NV.

SWCA. 2008. 2007 survey for Yuma clapper rails and southwestern willow flycatchers along Las Vegas Wash, Clark County, Nevada. Prepared by SWCA Environmental Consultants, Salt Lake City. Final report prepared for the Southern Nevada Water Authority, Las Vegas, NV.

Van Dooremolen, D. 2010a. Marsh bird monitoring, including Yuma clapper rail, along Las Vegas Wash, Clark County, Nevada, 2007-2009. Final report prepared for the U.S. Fish and Wildlife Service, Southern Nevada Field Office, Las Vegas, NV, and Las Vegas Wash Coordination Committee, Las Vegas, NV.
http://www.lvwash.org/assets/pdf/resources_ecoresearch_marshmonitoring.pdf

Van Dooremolen, D. 2010b. Marsh bird monitoring, including Yuma clapper rail, along Las Vegas Wash, Clark County, Nevada, 2010. Final report prepared for the U.S. Fish and Wildlife Service, Southern Nevada Field Office, Las Vegas, NV, and Las Vegas Wash Coordination Committee, Las Vegas, NV.
http://www.lvwash.org/assets/pdf/resources_ecoresearch_yuma10.pdf

Van Dooremolen, D. 2012. Marsh bird monitoring, including Yuma clapper rail, along Las Vegas Wash, Clark County, Nevada, 2011. Final report prepared for the U.S. Fish and Wildlife Service, Southern Nevada Field Office, Las Vegas, NV, and Las Vegas Wash Coordination Committee, Las Vegas, NV.
http://www.lvwash.org/assets/pdf/resources_ecoresearch_yuma11.pdf

Van Dooremolen, D. 2013. Marsh bird monitoring, including Yuma clapper rail, along Las Vegas Wash, Clark County, Nevada, 2012. Final report prepared for the U.S. Fish and Wildlife Service, Southern Nevada Field Office, Las Vegas, NV, and Las Vegas Wash Coordination Committee, Las Vegas, NV.
http://www.lvwash.org/assets/pdf/resources_ecoresearch_yuma12.pdf

Van Dooremolen, D. 2014a. Marsh bird monitoring, including Yuma clapper rail, along Las Vegas Wash, Clark County, Nevada, 2013. Final report prepared for the U.S. Fish and Wildlife Service, Southern Nevada Field Office, Las Vegas, NV, and Las Vegas Wash Coordination Committee, Las Vegas, NV.
http://www.lvwash.org/assets/pdf/resources_ecoresearch_march_bird_monitor.pdf

Van Dooremolen, D. 2014b. Marsh bird monitoring, including Yuma clapper rail, along Las Vegas Wash, Clark County, Nevada, 2014. Final report prepared for the U.S. Fish and

Wildlife Service, Southern Nevada Field Office, Las Vegas, NV, and Las Vegas Wash Coordination Committee, Las Vegas, NV. http://www.lvwash.org/assets/pdf/resources_ecoresearch_yuma14.pdf

Van Dooremolen, D. 2015. Marsh bird monitoring, including Yuma clapper rail, along Las Vegas Wash, Clark County, Nevada, 2015. Final report prepared for the U.S. Fish and Wildlife Service, Southern Nevada Field Office, Las Vegas, NV, and Las Vegas Wash Coordination Committee, Las Vegas, NV. http://www.lvwash.org/assets/pdf/resources_ecoresearch_yuma15.pdf

Van Dooremolen, D. 2017a. Marsh bird monitoring, including Yuma clapper rail, along Las Vegas Wash, Clark County, Nevada, 2007-2016. Final report prepared for the U.S. Fish and Wildlife Service, Southern Nevada Field Office, Las Vegas, NV, and Las Vegas Wash Coordination Committee, Las Vegas, NV. http://www.lvwash.org/assets/pdf/resources_ecoresearch_yuma16.pdf

Van Dooremolen, D. 2017b. Marsh bird monitoring, including Yuma clapper rail, along Las Vegas Wash, Clark County, Nevada, 2017. Final report prepared for the U.S. Fish and Wildlife Service, Southern Nevada Field Office, Las Vegas, NV, and Las Vegas Wash Coordination Committee, Las Vegas, NV. http://www.lvwash.org/assets/pdf/resources_ecoresearch_yuma17.pdf

Appendix A

GPS Coordinates for 2018
Marsh Bird Monitoring Points

Route	Point	Eastings	Northings	Location (Primary)
2	1	678178	3996968	Nature Preserve, Vern's Pond
2	1.5	678276	3997090	Nature Preserve, Vern's Pond
2	2	678155	3997357	Nature Preserve, Middle Ponds
2	3	677879	3997558	Nature Preserve, Upper Pond
2	4.5	678178	3997623	Wash, Upper Diversion Weir Impoundment
2	4.75	679905	3995767	Wash, Duck Creek Confluence Weir Impoundment
2	4.8	680290	3995659	Wash, Upper Narrows Weir Impoundment
2	6	681245	3995496	Wash, Pabco Road Weir Impoundment
3	1.5B	682447	3995734	Wash, C-1 Channel
3	2	682626	3995895	Wash, Bostick Weir Impoundment
3	3	682808	3995954	Wash, Bostick Weir Impoundment
3	4.5	683207	3996062	Wash, Calico Ridge Weir Impoundment
3	4.55	683820	3996274	Wash, Toe of Lower Narrows Weir
3	4.56	684134	3996360	Wash, Homestead Weir Impoundment
3	4.6	684442	3996402	Wash, Three Kids Weir Impoundment
3	6.5	684996	3996766	Wash, Toe of Three Kids Weir
3	7	685136	3996960	Wash, Rainbow Gardens Weir Impoundment
4	0.5	678726	3996304	Mitigation Wetlands, Cell 7
4	1	678730	3996008	Duck Creek and West Channel
4	2.5	678502	3996216	Mitigation Wetlands, Cell 7
4	3.5	678591	3996420	Mitigation Wetlands, Cell 6
4	4	678276	3996306	Mitigation Wetlands, Cell 6
4	5	678130	3996515	Mitigation Wetlands, Cell 5
4	6	678051	3996715	Mitigation Wetlands, Cell 1
4	7	678266	3996725	Mitigation Wetlands, Cell 3
4	8	678431	3996573	Mitigation Wetlands, Cell 5

Appendix B

2018 Survey Weather Conditions

Date	Route #	Temperature (Start/ Finish) - Fahrenheit	Sky (Start/Finish)	Beaufort (Start/Finish)
4/2/2018	2	56/73	clear skies/clear skies	0 (<1 mph)/0 (<1 mph)
4/3/2018	3	59/62	clear skies/clear skies	3 (8-12 mph)/3 (8-12 mph)
4/4/2018	4	54/72	partly cloudy/partly cloudy	0 (<1 mph)/0 (<1 mph)
4/17/2018	2	57/66	clear skies/clear skies	2 (4-7 mph)/2 (4-7 mph)
4/18/2018	3	51/70	clear skies/clear skies	2 (4-7 mph)/ 0 (<1 mph)
4/19/2018	4	61/60	overcast/overcast	2 (4-7 mph)/ 1 (1-3 mph)
5/1/2018	2	61/65	overcast/overcast	0 (<1 mph)/0 (<1 mph)
5/2/2018	3	60/63	overcast/overcast	0 (<1 mph)/0 (<1 mph)
5/3/2018	4	56/59	clear skies/clear skies	0 (<1 mph)/0 (<1 mph)