Marsh Bird Monitoring, including Yuma Ridgway's Rail, along Las Vegas Wash, Clark County, Nevada, 2025

SOUTHERN NEVADA WATER AUTHORITY

LVWCC

Marsh Bird Monitoring, including Yuma Ridgway's Rail, along Las Vegas Wash, Clark County, Nevada, 2025

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,
Nicholas Rice and
Timothy Ricks
Southern Nevada Water Authority
P.O. Box 99956
Las Vegas, Nevada 89193-9956

January 2026

ABSTRACT

The Las Vegas Wash Coordination Committee has been working to stabilize and enhance the Las Vegas Wash (Wash) since 1998, with Southern Nevada Water Authority (SNWA) as the lead agency. U.S. Fish and Wildlife Service (USFWS) recommended conducting annual breeding surveys for the federally endangered Yuma Ridgway's rail (*Rallus obsoletus yumanensis*) during Endangered Species Act (ESA) informal section 7 consultation for the project. Permitted contractors performed the surveys through 2007. In 2006, USFWS established a protocol for the Yuma Ridgway's rail surveys that includes monitoring for other marsh bird species. SNWA initiated surveys using this protocol, targeting six species through call broadcast: (1) black rail, (2) Ridgway's rail, (3) Virginia rail, (4) sora, (5) American bittern and (6) least bittern. Detections of pied-billed grebe and common gallinule (referred to as non-target species) are also reported; American coot numbers are no longer tracked. In 2022, after staff had regularly detected Yuma Ridgway's rail for a few years, SNWA and the Bureau of Reclamation worked with USFWS on new ESA compliance. USFWS issued a biological opinion in December 2023, and annual surveys for the rail continue. In April–May 2025, field crews conducted three surveys of three routes comprising 16 points and detected seven Yuma Ridgway's rails. Field personnel also identified Virginia rail, sora, least bittern and the two non-target species. Prior to 2021, no more than one Ridgway's rail had been confirmed in the study area in any given year; detections were intermittent and typically incidental to other work. Since 2021, field staff have detected 3–7 during annual surveys, a significant increase in numbers despite a reduction in survey effort starting that same year. Conversely, least bittern detections have declined significantly over the course of the study. Habitat quality along the routes was fair to good, but improvements could be made for the least bittern, which may also further benefit the Ridgway's rail. Marsh bird monitoring should continue in the Wash study area.

ACKNOWLEDGMENTS

We thank Nayelit Ramirez for assisting with surveys. We also thank Jason Eckberg, Keiba Crear and the Research and Environmental Monitoring Study Team for their review of this report. Finally, we thank the Las Vegas Wash Coordination Committee for their continued support of 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. TE148556-5 (expires July 31, 2030), Nicholas Rice under permit no. ES64580A (expires July 6, 2027) and Timothy Ricks under permit no. ES67397A (expires July 6, 2027) as issued by the USFWS, Sacramento, California.

Marsh Bird Monitoring, including Yuma Ridgway's Rail, along Las Vegas Wash, Clark County, Nevada, 2025

Table of Contents

Page No.

Abstract ..... *ii*

Acknowledgments ..... *iii*

Table of Contents ..... *iv*

List of Tables ..... *v*

List of Figures ..... *v*

List of Appendices ..... *vi*

1.0 BACKGROUND 1
- **1.1 Las Vegas Wash** 1
- **1.2 Yuma Ridgway's Rail** 4

2.0 METHODS 4
- **2.1 Description of Survey Routes** 4
- **2.2 Survey Protocol** 6
- **2.3 Data Analysis** 7

3.0 RESULTS AND DISCUSSION 8
- **3.1 Species** 8
- **3.2 Routes** 11
  - **3.2.1 Route 2** 11
  - **3.2.2 Route 3** 13
  - **3.2.3 Route 4** 13

4.0 RECOMMENDATIONS 15

5.0 CONCLUSION 16

6.0 LITERATURE CITED 16

Page No.

List of Tables

Table 1. Total 2025 Las Vegas Wash detections for each species by route and date. YRRA=Yuma Ridgway's rail, VIRA=Virginia rail, SORA=sora, LEBI=least bittern, PBGR=pied-billed grebe, COGA=common gallinule 8

Table 2. Total and per point abundances for each species by route and overall for 2024 and 2025 with study averages. Overall averages include data from Route 1, which was surveyed 2007–2010. YRRA=Yuma Ridgway's rail, VIRA=Virginia rail, SORA=sora, LEBI=least bittern, PBGR=pied-billed grebe, COGA=common gallinule 8

List of Figures

Figure 1. General study area map for the Las Vegas Wash 1

Figure 2. Marsh bird monitoring points and surveyed habitat by route. Locations of interest also shown 3

Figure 3. Number of Yuma Ridgway's rails confirmed at the Las Vegas Wash by year and detection type 9

Figure 4. Yuma Ridgway's rail per point abundance by year (no surveys in 2020 due to pandemic) 9

Figure 5. Virginia rail (VIRA), sora (SORA), American bittern (AMBI) and least bittern (LEBI) per point abundance by year (no surveys in 2020 due to pandemic) 10

Figure 6. Pied-billed grebe (PBGR) and common gallinule (COGA) per point abundance by year (no surveys in 2020 due to pandemic) 11

Figure 7. Yuma Ridgway's rail (YRRA), Virginia rail (VIRA), sora (SORA) and least bittern (LEBI) per point abundance for Route 2 by year (no surveys in 2020 due to pandemic). Not shown is a single detection of American bittern (0.1 per point) in 2017 12

Figure 8. Pied-billed grebe (PBGR) and common gallinule (COGA) per point abundance for Route 2 by year (no surveys in 2020 due to pandemic) 12

Page No.

Figure 9. Yuma Ridgway's rail (YRRA), Virginia rail (VIRA), sora (SORA) and least bittern (LEBI) per point abundance for Route 3 by year (no surveys in 2020 due to pandemic).....13
Figure 10. Pied-billed grebe (PBGR) and common gallinule (COGA) per point abundance for Route 3 by year (no surveys in 2020 due to pandemic).....14
Figure 11. Yuma Ridgway's rail (YRRA), Virginia rail (VIRA), sora (SORA), American bittern (AMBI) and least bittern (LEBI) per point abundance for Route 4 by year (no surveys in 2020 due to pandemic).....14
Figure 12. Pied-billed grebe (PBGR) and common gallinule (COGA) per point abundance for Route 4 by year (no surveys in 2020 due to pandemic).....15

List of Appendices

Appendix A GPS Coordinates for 2025 Marsh Bird Monitoring Points
Appendix B Total and Per Point Abundances by Year and Route for the Las Vegas Wash. No Surveys Conducted in 2020 Due to Pandemic. YRRA=Yuma Ridgway's Rail, VIRA=Virginia Rail, SORA=Sora, AMBI=American Bittern, LEBI=Least Bittern, PBGR=Pied-billed Grebe, COGA=Common Gallinule

1.0 BACKGROUND

1.1 Las Vegas Wash

The Las Vegas Wash (Wash) is the primary drainage channel for the Las Vegas Valley in Clark County, Nevada, USA. It carries highly treated wastewater, urban runoff, shallow groundwater, and storm runoff through the Clark County Wetlands Park (Wetlands Park) to Lake Mead at Las Vegas Bay (Figure 1). Although once 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 80 hectares.

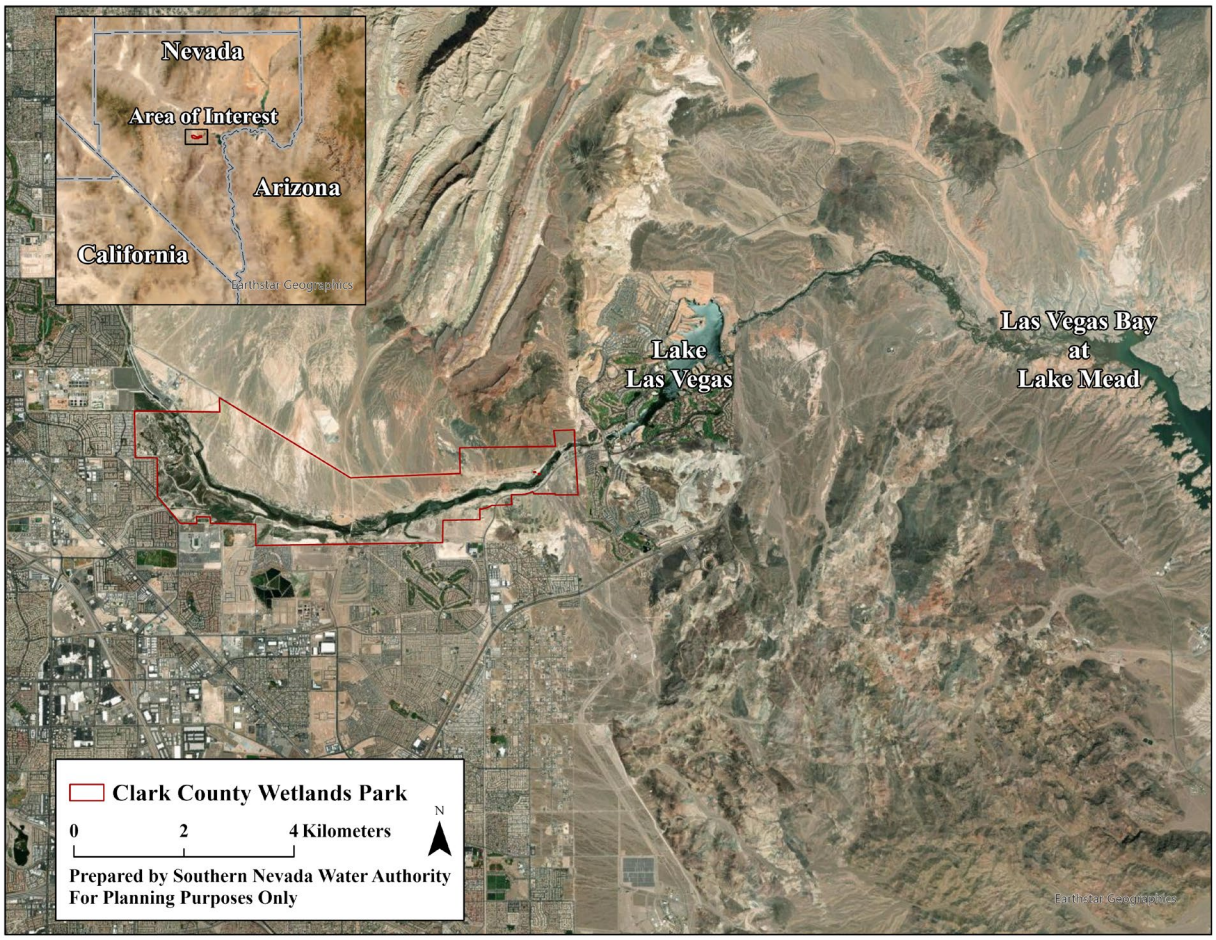

Figure 1. General study area map for the Las Vegas Wash.

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 implemented the Las Vegas Wash Comprehensive Adaptive Management Plan (LVWCC 2000) to stabilize the Wash and restore its ecological functions. Stabilization and enhancement activities included the installation of 21 erosion control structures (weirs) and more than 245

hectares of revegetation to help deter further erosion and reduce the amount of sediment being deposited in Lake Mead. The capital improvements phase of the project was completed in June 2022, and activities continue under the direction of the Las Vegas Wash Long-Term Operating Plan (LTOP; LVWCC 2020).

As a result of Endangered Species Act (ESA) informal section 7 consultation between the U.S. Army Corps of Engineers and U.S. Fish and Wildlife Service (USFWS) on the proposed development of the Wetlands Park and erosion control structures, USFWS recommended annual surveys to determine the occurrence of the federally endangered Yuma Ridgway's rail (*Rallus obsoletus yumanensis*) in the project area. This species was known as the Yuma clapper rail (*R. longirostris yumanensis*) until it was reclassified by Chesser et al. (2014); for simplicity, all references below have been updated with the current species name.

Alcorn (1988) reported nine detections of Ridgway's rail in the Las Vegas Sewage disposal drainage ditch, the present-day City of Las Vegas Water Pollution Control Facility's discharge channel to the Wash at Desert Inn Road, approximately three kilometers upstream of the Wetlands Park, in September 1959. San Bernardino County Museum field personnel reported Yuma Ridgway's rail detections at the Wash in spring 1997 and 1998 (McKernan and Braden 2001); they heard two on May 1, 1997, and one on May 2, 1997, in a small cattail marsh on the Wash just upstream of Desert Inn Road (R. McKernan pers. comm.). SWCA Environmental Consultants (SWCA) field staff detected a Yuma Ridgway's rail 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 (Southwest Wetlands Consortium 1998; Figure 2).

Southern Nevada Water Authority (SNWA), the lead agency of the LVWCC, contracted with permitted consultants for surveys in 2000–2004 and 2006–2007 (McKernan and Braden 2001; McKernan and Carter 2002; SWCA 2002, 2003, 2005, 2006, 2007, 2008). In 2006, USFWS established a new survey protocol for the Yuma Ridgway's rail based on Conway (2005) that provides information on other sensitive marsh obligates, such as the least bittern (*Botaurus exilis*) and black rail (*Laterallus jamaicensis*), which are covered under the Lower Colorado River Multi-Species Conservation Program (LCRMSCP 2004). So, in 2007, the Las Vegas Wash Project Coordination Team (Wash Team; the implementation arm of the LVWCC) initiated a marsh bird monitoring study (Van Dooremolen 2010a, 2010b, 2012, 2013, 2014a, 2014b, 2015, 2017a, 2017b, 2018, 2019; Van Dooremolen et al. 2022, 2023, 2024, 2025). Yuma Ridgway's rail was added in 2008 when federal permitting was in place.

In 2019, USFWS determined the Wash project would have no effect on the Ridgway's rail, but annual surveys continued under the Las Vegas Wash Wildlife Management Plan (WMP; Shanahan et al. 2008). In 2022, after staff had regularly detected Yuma Ridgway's rail for a few years, SNWA and the Bureau of Reclamation (BOR) worked with USFWS on new ESA compliance for the LTOP. In December 2023, USFWS issued a biological opinion (BO) authorizing incidental take for the rail in the form of a habitat surrogate for operations and maintenance of stabilization facilities. Annual surveys for the species are now conducted under the BO and the WMP. This report presents results from the 2025 monitoring season.

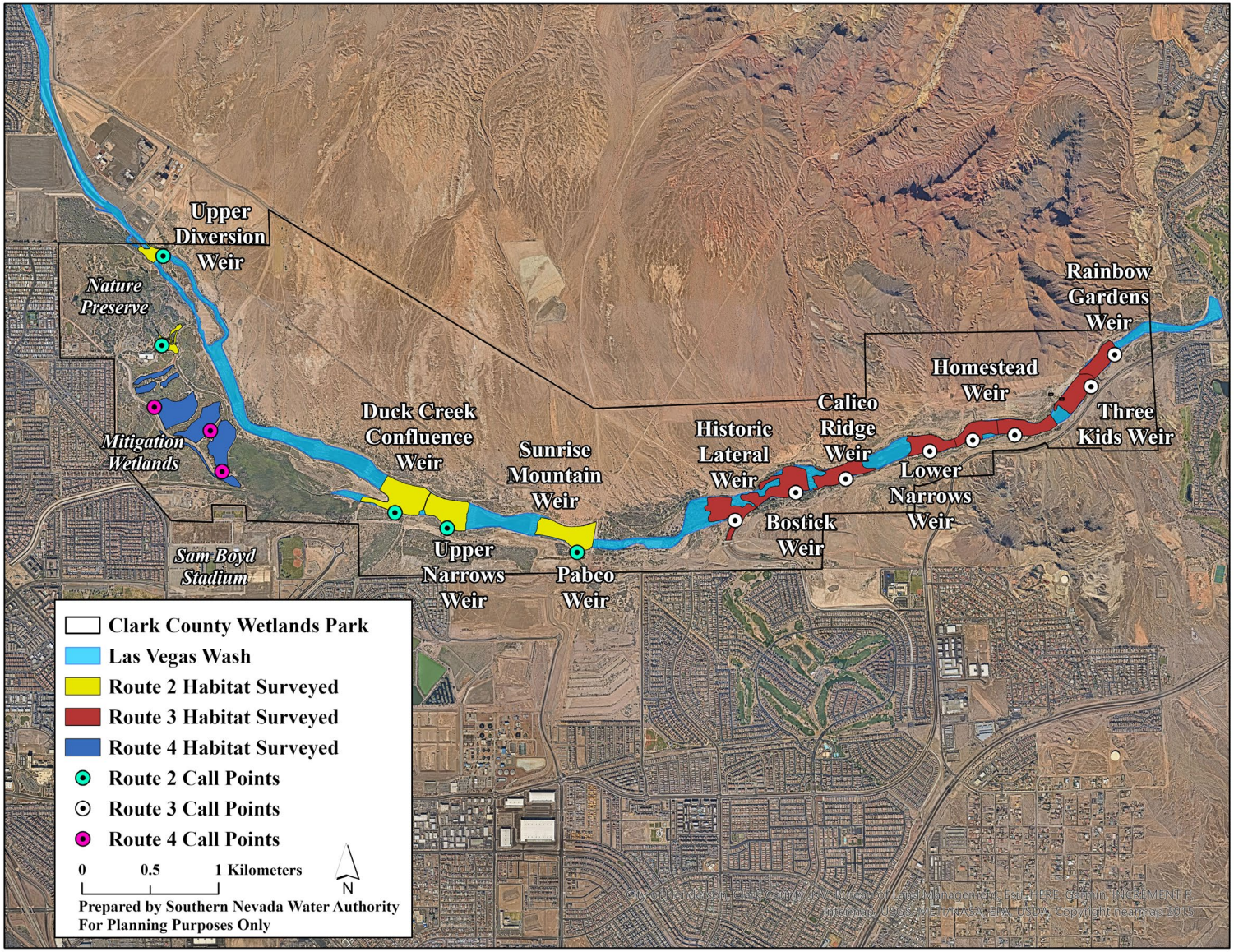

Figure 2. Marsh bird monitoring points and surveyed habitat by route. Locations of interest also shown.

1.2 Yuma Ridgway's Rail

The Yuma Ridgway's rail is a large brownish rail with long orange legs and a long, slightly decurved bill. The endangered Yuma subspecies is found primarily in the lower Colorado River watershed and the Salton Sea (Anderson and Ohmart 1985). While many are year-round residents, more than 35% of the individuals of several populations migrate (Harrity and Conway 2020).

The Yuma Ridgway's rail inhabits 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 an average annual home range size of more than 7 hectares, while Conway et al. (1993) estimated it at 12 hectares. Sites occupied by Yuma Ridgway's rail have greater shallow water coverage (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 (*Typha domingensis*) and bulrush (*Schoenoplectus* spp.) are preferred; although, Yuma Ridgway's rails have also been detected in wetlands dominated by common reed (*Phragmites australis*), salt cedar (*Tamarix* spp.) 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.

Yuma Ridgway's rail nesting begins in March and peaks in mid-May on the lower Colorado River (Eddleman 1989). The rail has been documented nesting in stands of living bulrush and cattails over shallow water and in dense dead cattails (Eddleman 1989).

2.0 METHODS

2.1 Description of Survey Routes

The LVWCC has increased wetland habitat by planting bulrush in the impoundments and along the Wash's banks, and cattails and common reed have established from upstream sources. Clark County has also created 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).

The Wash Team established three routes to survey this habitat (Routes 2–4; Route 1 was surveyed 2007–2010) and has surveyed the Wash and Nature Preserve since 2007 and the Mitigation Wetlands since 2010. To reduce effort and more closely approach the recommended point spacing of 400 meters, in 2021, staff decreased the total number of points surveyed to 16 (Figure 2), a reduction of more than 35% from the average of 25.5 points surveyed in prior years (Appendices A–B).

Route 2 covers 22 hectares of habitat with five points: four along the Wash and one in Vern's Pond at the Nature Preserve (Figure 2).

- Above Pabco Weir, one point monitors 6.6 hectares, including emergent habitat dominated by cattails and common reed in a small backwater created by the City of Henderson Water Reclamation Facility outfall channel. It also monitors an extensive area of open water and marsh between Sunrise Mountain and Pabco weirs.
- A point in the impoundment of the Upper Narrows Weir covers 5.8 hectares of habitat; California and Olney bulrush (*S. californicus* and *S. americanus*), cattails and common reed line the banks, and there is extensive open water.
- One point samples 7.0 hectares of habitat at 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.
- From the bridge, the Upper Diversion Weir point covers the 1.5-hectare impoundment, with cattails and common reed along the banks and on an island in the center.
- A point on Vern's Pond at the Nature Preserve surveys 1.1 hectares of habitat. The pond has areas of open water and dense vegetation composed of cattails, California and hardstem bulrush (*S. acutus*), common reed and a mix of native riparian species along the banks.

Route 3 has eight points covering approximately 34 hectares of banks and islands with varying amounts of cattails, common reed and bulrush, as well as riparian vegetation, along the Wash. The route (Figure 2) includes:

- The backwater wetland at the confluence of the C-1 Channel with the Wash and adjacent wetlands at the toe of Historic Lateral Weir (4.8 hectares).
- The impoundment of Bostick Weir (6.3 hectares).
- The impoundment of Calico Ridge Weir (4.3 hectares).
- The toe of Lower Narrows Weir (3.7 hectares).
- The impoundment of Homestead Weir (3.3 hectares).
- Habitat between Homestead and Three Kids weirs (4.2 hectares).
- Habitat at the toe of Three Kids Weir (4.1 hectares).
- The impoundment of Rainbow Gardens Weir (3.2 hectares).

Route 4 covers 14 hectares of habitat at the Mitigation Wetlands and has three points: one point on each of the three large cells (Cells D–F [formerly Cells 5–7]; Figure 2).

- Cell D (5.1 hectares) is densely vegetated with little to no open water.
- Cell E (4.2 hectares) is also densely vegetated, with a small area of deep open water.
- Cell F (4.7 hectares) has a large area of shallow open water with islands of emergents in addition to dense vegetation along its banks. Emergent vegetation in the three cells is dominated by cattails and phragmites with some bulrush.
- While no longer directly surveyed, the three small cells (2.2 hectares) to the northwest and the 7.2-hectare area flooded by Duck Creek to the southeast can still contribute to results given their proximity to the large cells and the distance calls travel at the site.

Most survey points are separated by at least 400 meters, but there are some that are closer together. Conway (2005, 2009) does allow for tighter spacing but warns of the risk of double-counting individuals.

2.2 Survey Protocol

Field staff performed surveys using a modified version of the North American marsh bird monitoring protocol developed by Conway (2005, 2009). One to two trained observers, including at least one of the following permitted individuals—Deborah Van Dooremolen, Nicholas Rice, Timothy Ricks—conducted one survey per route in each of the following three survey windows: April 1–14, April 15–30 and May 1–15. A field crew surveyed Routes 2 and 4 on one morning and then Route 3 on a second morning. 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, observers ran each route 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). Staff stopped the survey if wind reached or exceeded 20 kilometers per hour, as measured by the Beaufort wind scale, for more than two points and redid the survey at a later date.

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 black rail, Ridgway's rail, Virginia rail (*R. limicola*), sora (*Porzana carolina*), American bittern (*B. lentiginosus*) and least bittern. Using an iPhone with portable speakers, the field crew broadcast each species' vocalizations 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.

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. Field staff also recorded detections of two other marsh bird species that were not targeted through the broadcast: pied-billed grebe (*Podilymbus podiceps*) and common gallinule (*Gallinula galeata*). The counting of American coots (*Fulica americana*) was discontinued. 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. Observers also recorded the background noise level at each point. Noise designated as loud or intense meant that at least some species could not be heard beyond 50 or 25 meters, respectively.

When two trained observers conducted a survey together, they compared data after the survey was completed at each point to rectify any differences in detections.

2.3 Data Analysis

Detections of target and non-target species were summarized by route and survey date to characterize spatial and temporal patterns. Since multiple detections could be made of the same bird over the course of a survey season, the number of unique individuals (i.e., abundance) per species 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.

A bird was counted as a unique individual based on the following criteria:

- Individuals detected at the same point on multiple surveys were considered the same.
- If detected at a previous point during the same survey, subsequent detections were not counted.
- Detections within 200 meters of a location where an individual had been reported on a prior survey, calling from the same direction, were considered the same individual.

For each route, total individuals detected per species and overall were divided by the number of points surveyed on that route to calculate per point abundance. For the entire study area, totals were divided by the total points surveyed. Per point abundance allows more accurate comparisons across routes and years, accounting for variation in survey effort. However, small counts mean that adding or losing one or two individuals can noticeably affect these metrics.

Total and per point abundance data were compared with results from the prior year and with an average of all 18 years of survey data (15 for the Mitigation Wetlands; no data was collected in 2020 due to pandemic restrictions).

Additionally, to assess long-term trends in abundance for the two regularly detected sensitive species, Yuma Ridgway's rail and least bittern, linear regression analyses were conducted of annual total detections and per point abundance (detections standardized by the number of survey points). The regression model was:

$$\text{Abundance}_{\text{year}} = \beta_0 + \beta_1 \times \text{Year} + \varepsilon$$

where β_1 represents the annual rate of change in detections.

Model diagnostics included examination of residuals for linearity and independence. Given the reduction in survey points by over 35% starting in 2021, per point abundance was used to control for effort variation and ensure robustness of trend estimates.

Regression slopes, 95% confidence intervals, p-values and coefficients of determination (R^2) are reported for both total and per point abundance models. These statistics quantify the magnitude, direction and significance of population trends over the study period.

3.0 RESULTS AND DISCUSSION

3.1 Species

In 2025, field crews detected four of the six target species as well as the two non-target species (Table 1). Sora was the most abundant of the target species with 10 individuals (0.6 per point; Table 2). Common gallinule was the most abundant of all species with 19 birds (1.2 per point; Table 2). Detections were uneven across routes and surveys (Table 1).

Route	Date	YRRA	VIRA	SORA	LEBI	PBGR	COGA	Total
2	4/3/2025	1	1	3	1	3	4	13
2	4/21/2025					3	8	11
2	5/8/2025	2				1	5	8
2 Total		**3**	**1**	**3**	**1**	**7**	**17**	**32**
3	4/2/2025		1	3		2	1	7
3	4/16/2025		3	5		1	5	14
3	5/9/2025			3	1		6	10
3 Total			**4**	**11**	**1**	**3**	**12**	**31**
4	4/3/2025	5						5
4	4/17/2025	4				1		5
4	5/8/2025	2			1		2	5
4 Total		**11**			**1**	**1**	**2**	**15**
Total		**14**	**5**	**14**	**3**	**11**	**31**	**78**

Table 1. Total 2025 Las Vegas Wash detections for each species by route and date. YRRA=Yuma Ridgway's rail, VIRA=Virginia rail, SORA=sora, LEBI=least bittern, PBGR=pied-billed grebe, COGA=common gallinule.

Route	Year	Pts	YRRA	VIRA	SORA	LEBI	PBGR	COGA	Total
2	2024	5	3 (0.6)	0	6 (1.2)	1 (0.2)	4 (0.8)	13 (2.6)	27 (5.4)
2	2025	5	2 (0.4)	1 (0.2)	3 (0.6)	1 (0.2)	5 (1.0)	8 (1.6)	20 (4.0)
2	**18Y AVG**	**7.7**	**0.6 (0.1)**	**1 (0.1)**	**5.7 (0.8)**	**2.7 (0.3)**	**3.7 (0.5)**	**13.2 (1.8)**	**26.9 (3.7)**
3	2024	8	1 (0.1)	2 (0.3)	8 (1.0)	2 (0.3)	1 (0.1)	11 (1.4)	25 (3.1)
3	2025	8	0	3 (0.4)	7 (0.9)	1 (0.1)	3 (0.4)	9 (1.1)	23 (2.9)
3	**18Y AVG**	**7.9**	**0.2 (0.0)**	**2.1 (0.3)**	**5.6 (0.7)**	**2 (0.3)**	**2.6 (0.3)**	**10.6 (1.3)**	**23.1 (2.9)**
4	2024	3	1 (0.3)	4 (1.3)	4 (1.3)	0	1 (0.3)	6 (2.0)	16 (5.3)
4	2025	3	5 (1.7)	0	0	1 (0.3)	1 (0.3)	2 (0.7)	9 (3.0)
4	**15Y AVG**	**6.6**	**0.9 (0.3)**	**4.3 (0.7)**	**8.4 (1.4)**	**1.7 (0.2)**	**2.2 (0.3)**	**5.9 (0.9)**	**23.6 (3.7)**
Total	2024	16	5 (0.3)	6 (0.4)	18 (1.1)	3 (0.2)	6 (0.4)	30 (1.9)	68 (4.3)
Total	2025	16	7 (0.4)	4 (0.3)	10 (0.6)	3 (0.2)	9 (0.6)	19 (1.2)	52 (3.3)
Total	**18Y AVG**	**22.8**	**1.5 (0.1)**	**7.4 (0.3)**	**19.4 (0.9)**	**6.3 (0.3)**	**8.2 (0.4)**	**28.8 (1.3)**	**71.8 (3.2)**

Table 2. Total and per point abundances for each species by route and overall for 2024 and 2025 with study averages. Overall averages include data from Route 1, which was surveyed 2007–2010. YRRA=Yuma Ridgway's rail, VIRA=Virginia rail, SORA=sora, LEBI=least bittern, PBGR=pied-billed grebe, COGA=common gallinule.

The abundance of Yuma Ridgway's rails increased from 2024 and was well above the study average (Table 2, Figures 3–4, Appendix B). Field crews identified seven individuals, the highest survey count in study history. Prior to 2021, detections were intermittent, limited to one individual per year and typically incidental to other work (Figure 3). Since 2021, however,

annual surveys have detected 3–7 individuals (Figure 3), despite a reduction in survey effort by over 35%. A linear regression of the survey data shows the increasing trend in detections over time is significant. Total abundance increased by approximately 0.39 detections per year (95% CI: 0.25 to 0.53; $p < 0.001$), explaining 70% of the variation in annual counts ($R^2 = 0.70$). When standardized by survey effort, per point abundance also increased significantly by 0.024 detections per point per year (95% CI: 0.015 to 0.033; $p < 0.001$; $R^2 = 0.69$). This positive trend suggests improving habitat conditions or population recovery in the Wash area.

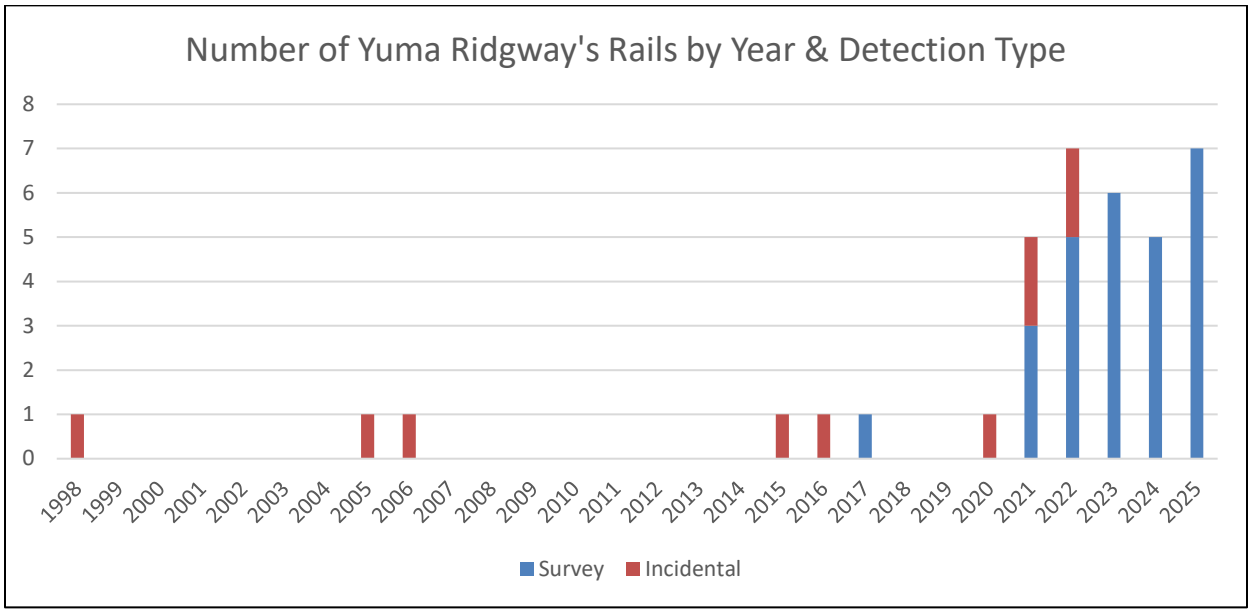

Figure 3. Number of Yuma Ridgway's rails confirmed at the Las Vegas Wash by year and detection type.

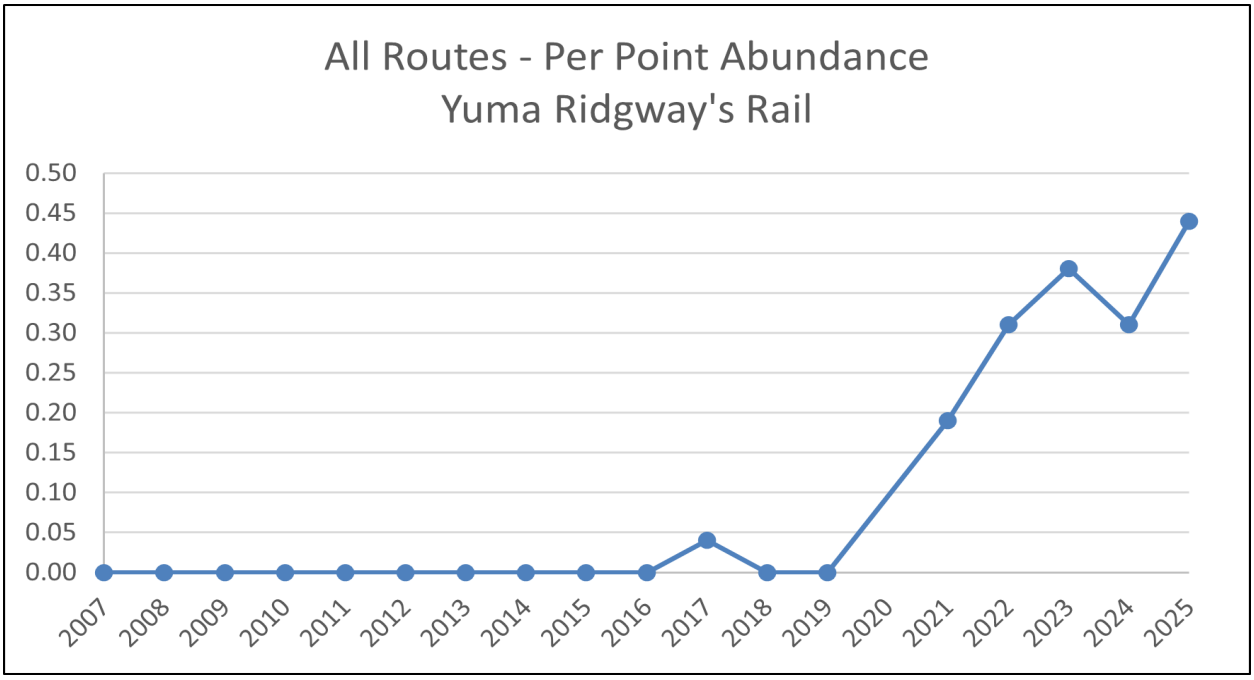

Figure 4. Yuma Ridgway's rail per point abundance by year (no surveys in 2020 due to pandemic).

Least bittern abundance was the same year over year and below the long-term average (Table 2, Figure 5, Appendix B). Per point abundance has been steady at approximately 0.2 birds per point since 2016, except for two years with notably lower counts. During the first nine years, abundance was more variable, with 0.2 birds per point representing the lower range (Figure 5). Linear regression reveals a significant decreasing trend in detections over time. Total abundance declined by approximately 0.49 detections per year (95% CI: -0.79 to -0.19; $p = 0.003$; $R^2 = 0.45$). Per point abundance declined by 0.016 detections per point per year (95% CI: -0.027 to -0.005; $p = 0.009$; $R^2 = 0.38$). This decreasing trend may reflect sensitivity to habitat changes or other ecological pressures.

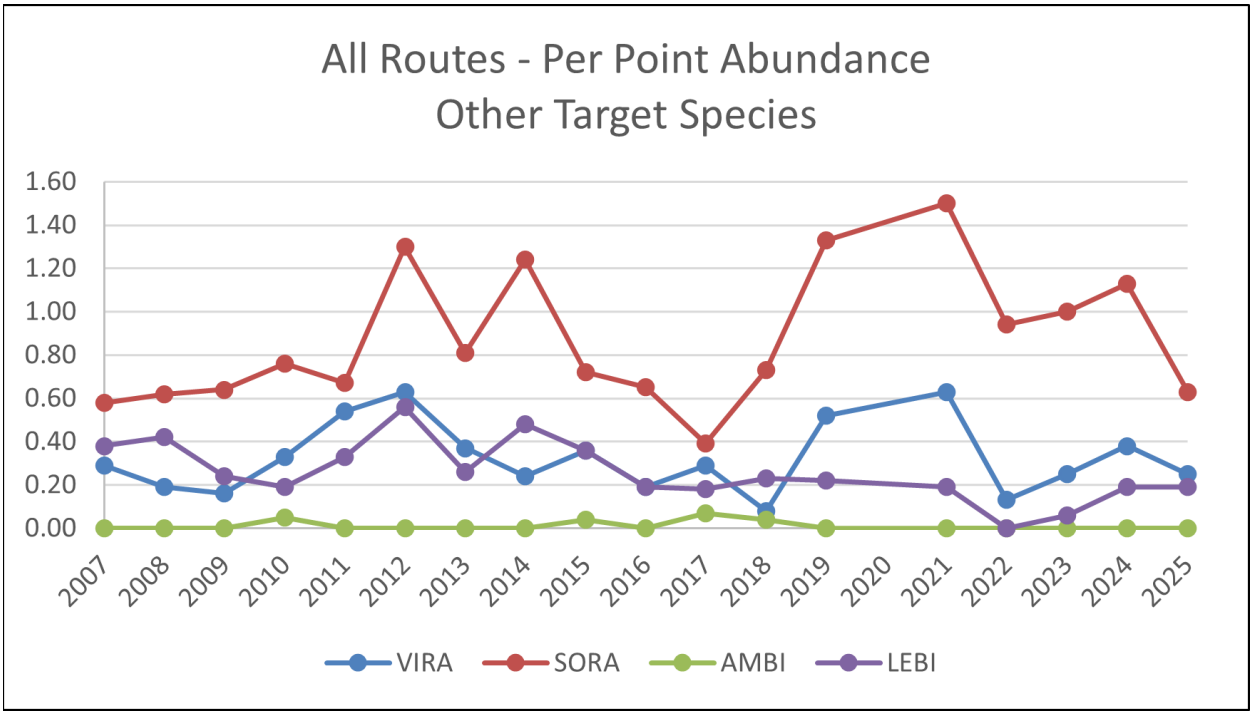

Figure 5. Virginia rail (VIRA), sora (SORA), American bittern (AMBI) and least bittern (LEBI) per point abundance by year (no surveys in 2020 due to pandemic).

Sora continued to be the most abundant of the target species, but its total abundance in 2025 was the lowest of the study and per point abundance was well below average (Table 2, Figure 5, Appendix B). Virginia rail abundance was also down from 2024 but was average. Over the course of the study, the abundances of these two species, along with least bittern, have followed similar, although not identical, patterns (Figure 5), with peaks and valleys often lining up. Their long-term trends differ from least bittern, however, with sora and Virginia rail showing no clear trend.

Field crews have only rarely detected American bittern (Figure 5) and never detected black rail.

Now that American coots are no longer tracked, common gallinule is the most abundant of all species recorded. While declining substantially year over year, its per point abundance was still in line with the study average (Table 2, Figure 6). Pied-billed grebe abundance was up from 2024 and above the long-term average (Table 2, Figure 6). These two species' abundance patterns also follow similar, but not identical, tracks.

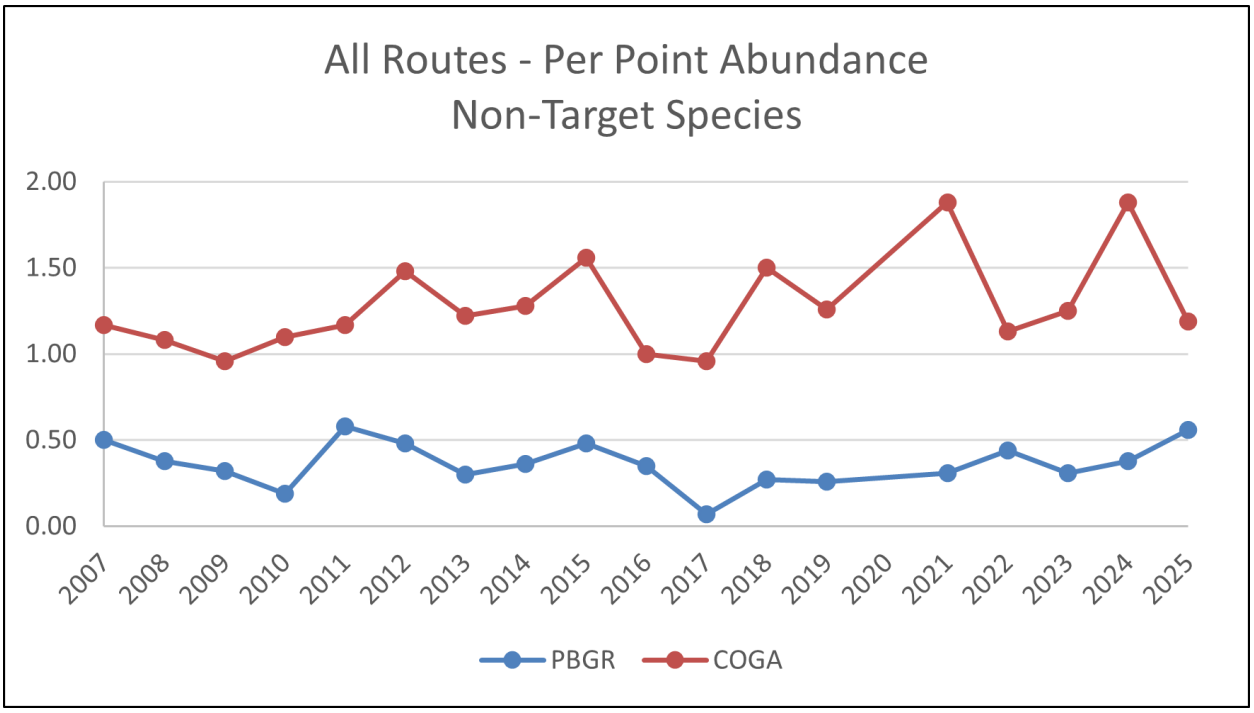

Figure 6. Pied-billed grebe (PBGR) and common gallinule (COGA) per point abundance by year (no surveys in 2020 due to pandemic).

3.2 Routes

3.2.1 Route 2

In 2025, Route 2 had the highest species richness; field staff identified six species (Tables 1–2, Figures 7–8). The route contributed to the abundance of Yuma Ridgway's rail, with incidental and survey detections of a kekking male upstream of Pabco Weir and kekking on April 3 and a clatter on May 8 above Upper Narrows Weir. This was the fourth consecutive year with a territorial male in the Pabco impoundment and the fifth with a territory in the Upper Narrows impoundment. Abundance, while above the long-term average, did decline year over year. A pair was documented at Upper Narrows in 2023 and 2024 and over the winter but not during surveys. For other species, comparing 2025 abundances to 2024 and to the long-term averages, results were mixed (Table 2, Figures 7–8, Appendix B).

Habitat quality was fair to good. The habitat from just above Duck Creek Confluence Weir downstream to Upper Narrows Weir (Figure 2) is among the highest quality potentially suitable nesting habitat currently available for Yuma Ridgway's rail on the Wash channel.

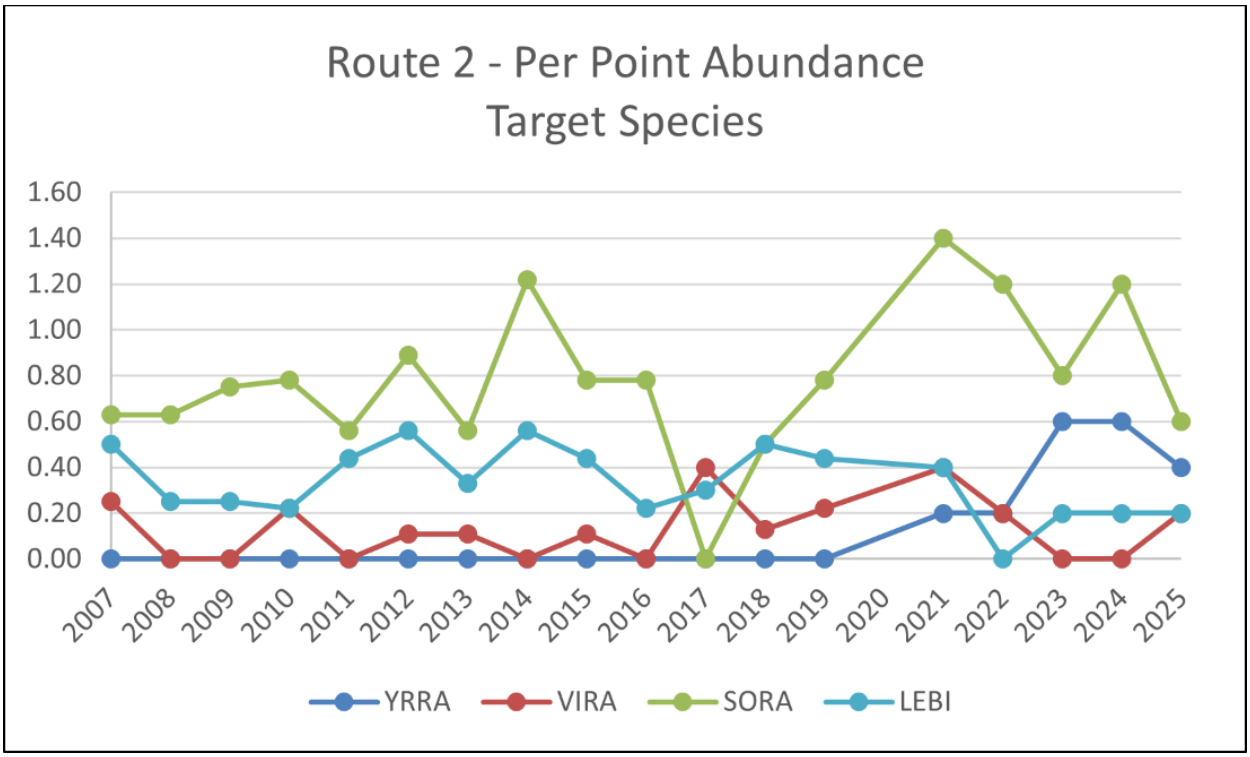

Figure 7. Yuma Ridgway's rail (YRRA), Virginia rail (VIRA), sora (SORA) and least bittern (LEBI) per point abundance for Route 2 by year (no surveys in 2020 due to pandemic). Not shown is a single detection of American bittern (0.1 per point) in 2017.

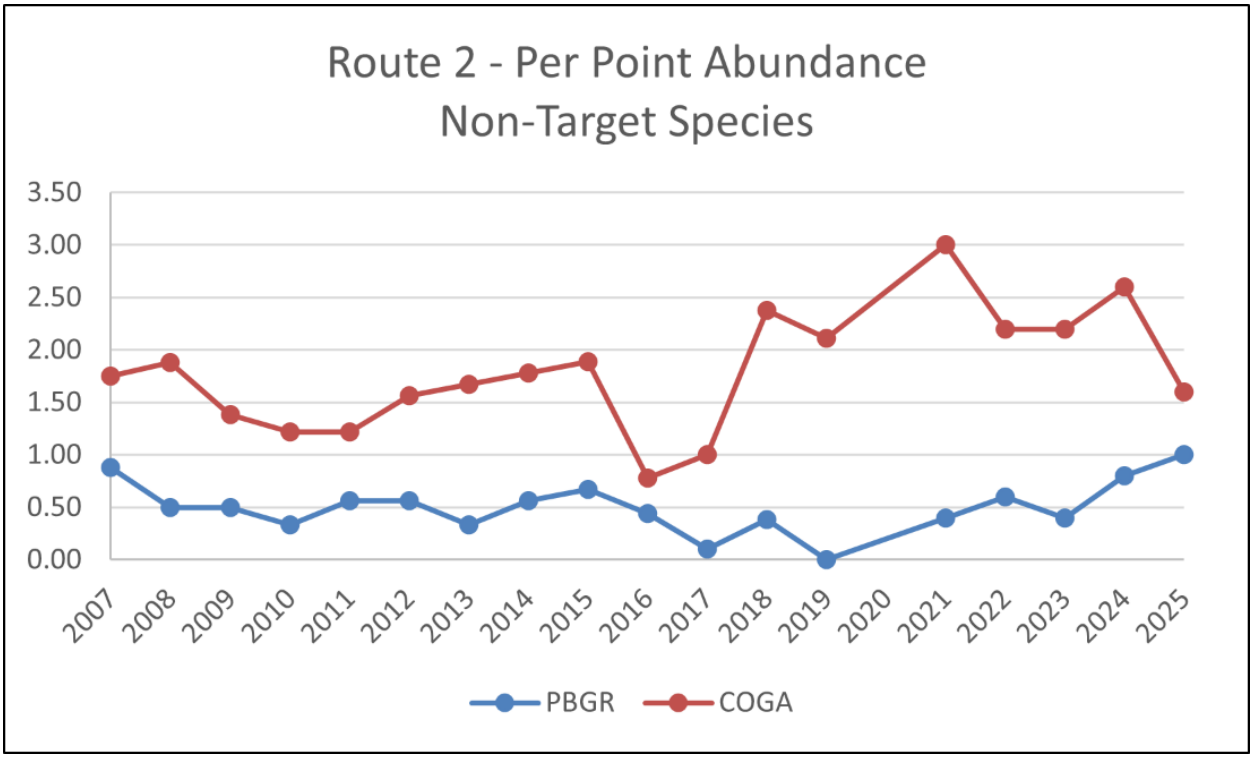

Figure 8. Pied-billed grebe (PBGR) and common gallinule (COGA) per point abundance for Route 2 by year (no surveys in 2020 due to pandemic).

3.2.2 Route 3

Field personnel identified five species on this route (Tables 1–2, Figures 9–10). No Yuma Ridgway's rails were detected for the first time since 2021. Results for other species varied (Table 2, Figures 9–10, Appendix B).

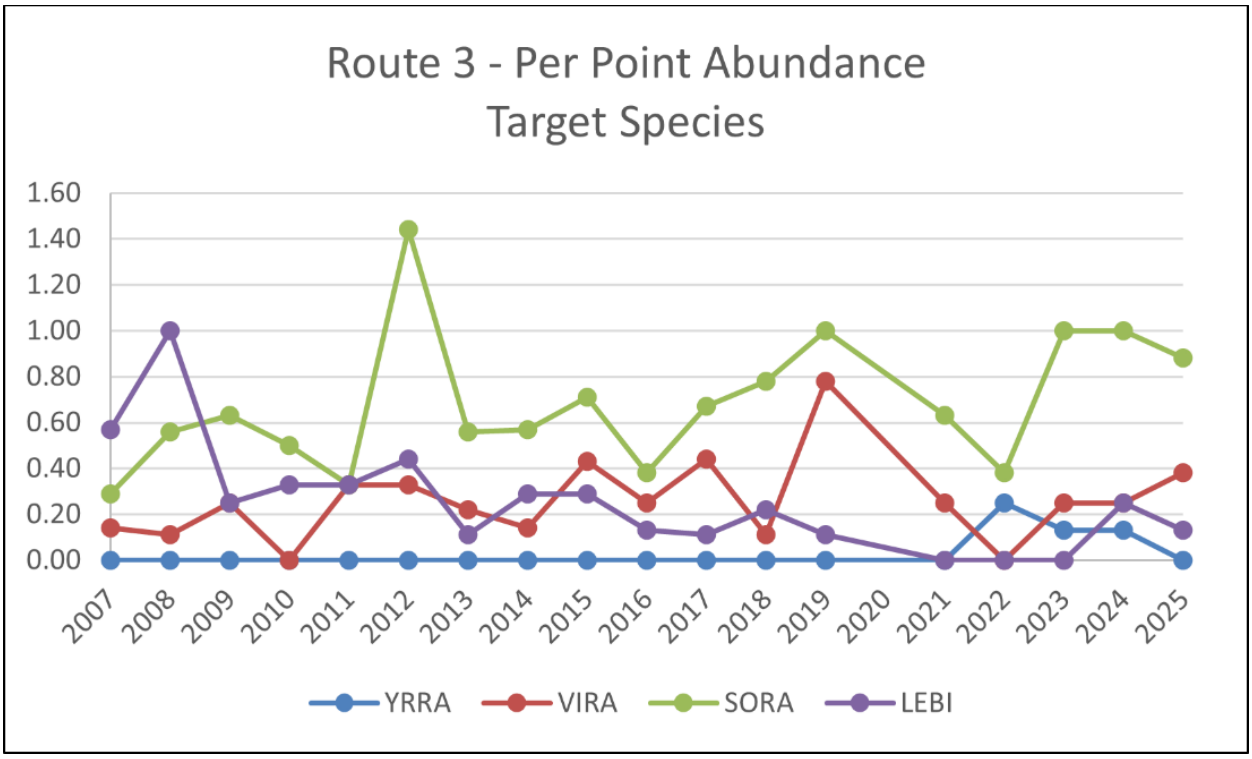

Figure 9. Yuma Ridgway's rail (YRRA), Virginia rail (VIRA), sora (SORA) and least bittern (LEBI) per point abundance for Route 3 by year (no surveys in 2020 due to pandemic).

Habitat quality was fair to good. Habitat in the reach between Lower Narrows and Homestead weirs (Figure 2) still appears to be the highest quality potentially suitable nesting habitat for Ridgway's rail on the route.

3.2.3 Route 4

Field personnel reported the lowest species richness (n=4) on this route (Tables 1–2, Figures 11–12). Although species richness was low, the site also had the highest abundance of Yuma Ridgway's rail (n=5), accounting for more than 70% of the individuals identified (Table 2). Notably absent were Virginia rail and sora. The route had the highest abundance of Virginia rail in 2024, and field crews had identified sora in all prior years (Table 2, Figure 11, Appendix B). Field personnel also detected a least bittern on the route for the first time since 2021 (Figure 11).

The habitat quality at the Mitigation Wetlands (Figure 2) continues to be good for the Yuma Ridgway's rail, as indicated by the high abundance of the species in 2025.

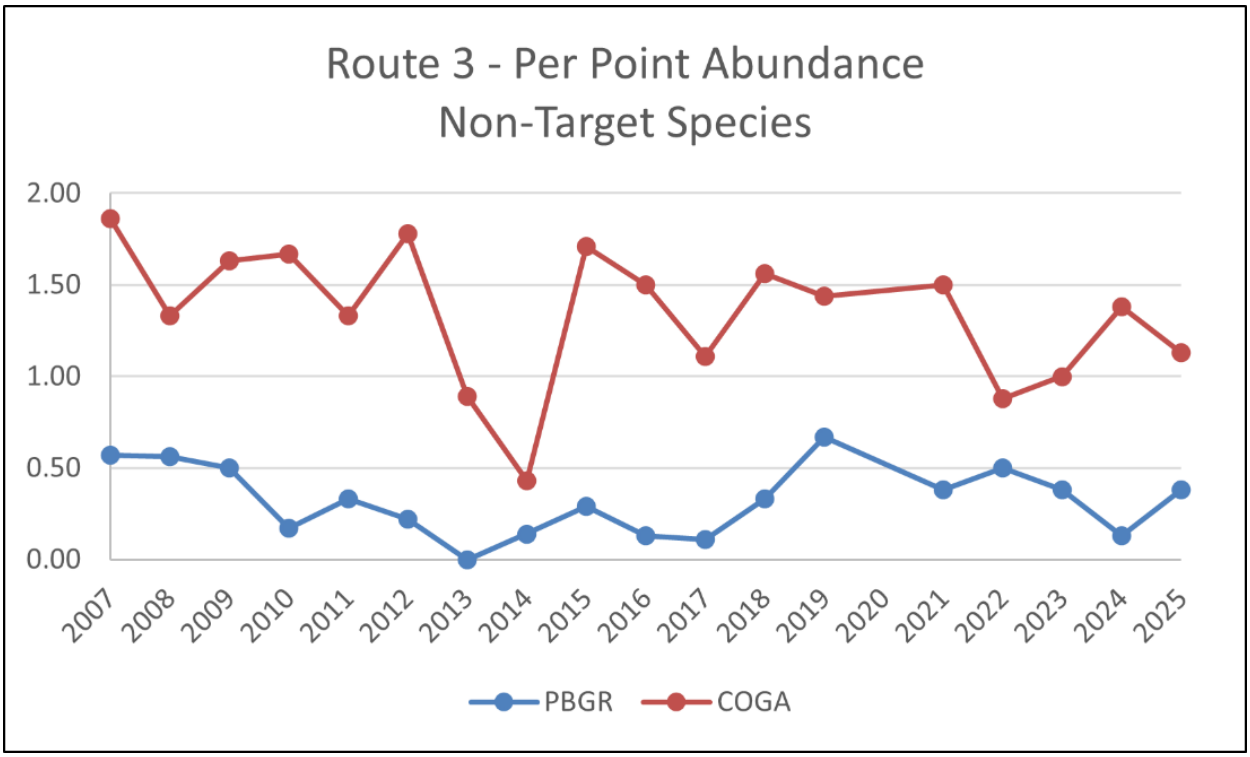

Figure 10. Pied-billed grebe (PBGR) and common gallinule (COGA) per point abundance for Route 3 by year (no surveys in 2020 due to pandemic).

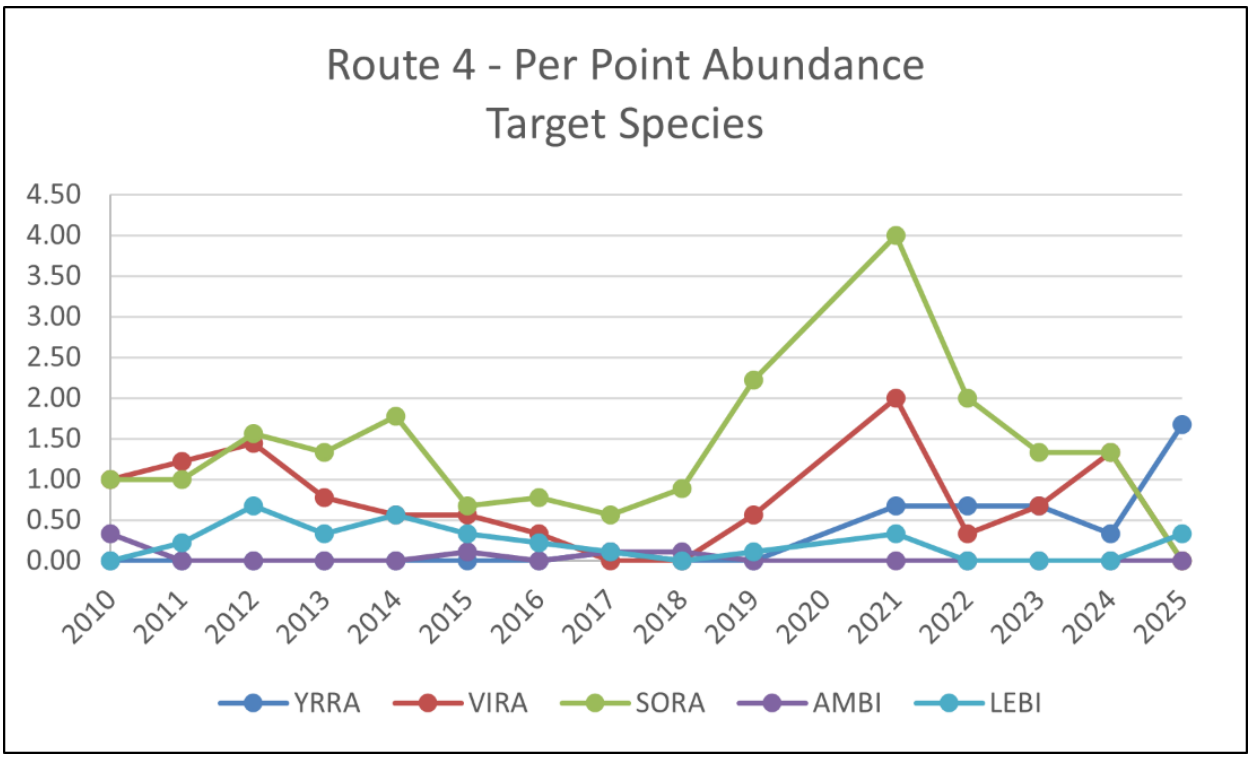

Figure 11. Yuma Ridgway's rail (YRRA), Virginia rail (VIRA), sora (SORA), American bittern (AMBI) and least bittern (LEBI) per point abundance for Route 4 by year (no surveys in 2020 due to pandemic).

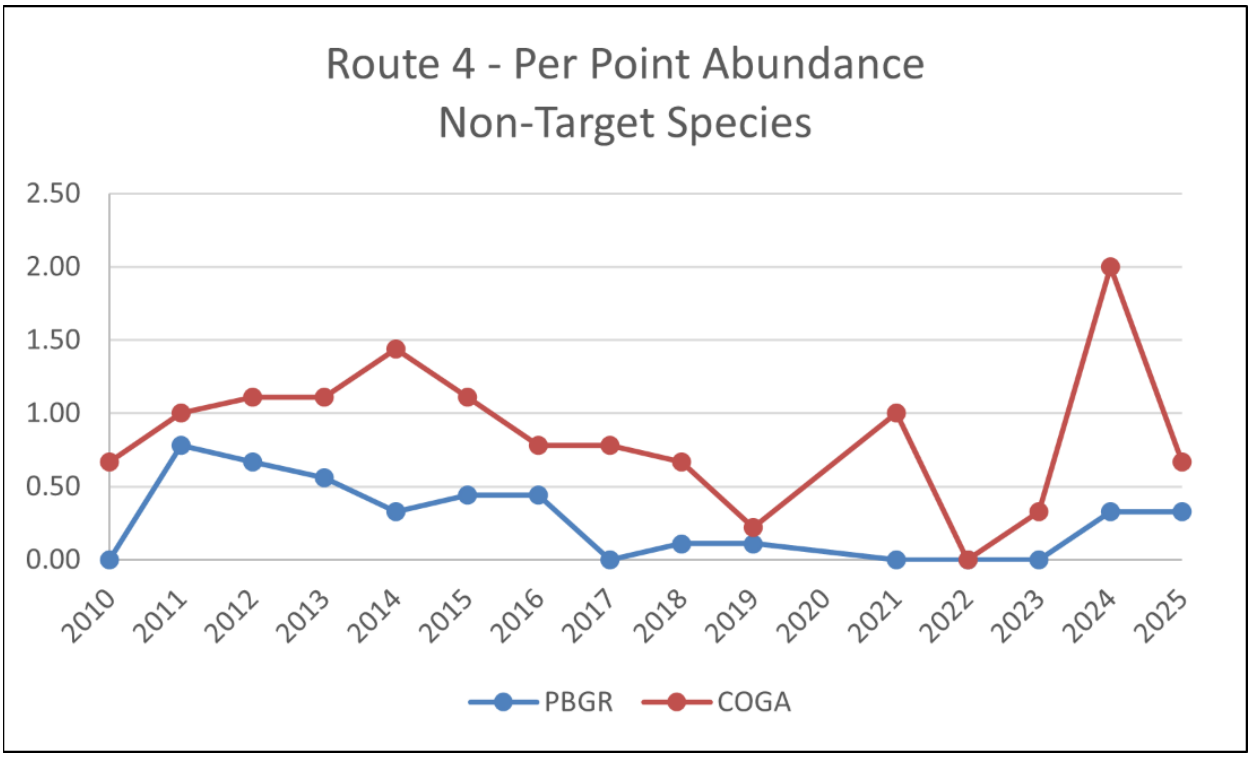

Figure 12. Pied-billed grebe (PBGR) and common gallinule (COGA) per point abundance for Route 4 by year (no surveys in 2020 due to pandemic).

4.0 RECOMMENDATIONS

Annual monitoring for Yuma Ridgway's rail should continue in support of the BO and WMP.

Crews clear hectares of marsh and riparian vegetation from alternating weir sites each winter to ensure they continue to function as designed. Results have shown that the clearing can benefit Yuma Ridgway's rail habitat values and site occupation. The site at Pabco Weir that yielded detections of an individual in 2022–2025 was cleared of degraded riparian habitat in 2020 and had converted to a passively established cattail-dominated wetland by 2022. Such work may be positively contributing to the significant increase in the endangered rail at Wash sites in the past several years. Continued marsh bird monitoring will provide additional information on weir maintenance impacts.

While the Yuma Ridgway's rail population at Wash sites has significantly increased, the least bittern has shown a decreasing trend. The least bittern is the only other species of those regularly detected by this study that is considered sensitive. Project staff should consider enhancing habitat values for the least bittern by creating more hemi-marsh (i.e., 50% open water to 50% vegetated area) at Wash sites. This may also further improve habitat quality for the Ridgway's rail.

5.0 CONCLUSION

The LVWCC installed 21 weirs and more than 245 hectares of native vegetation to stabilize and enhance the Wash. The project entered long-term operations in 2022. In the BO for LTOP actions, USFWS requires annual breeding surveys for the federally endangered Yuma Ridgway's rail. The survey protocol includes monitoring for other marsh bird species. This report presents 2025 monitoring results for six target species and two non-target species. Three surveys were conducted along three survey routes comprising 16 points in the study area. Field crews detected a high number of Yuma Ridgway's rail (n=7) and also identified Virginia rail, sora, least bittern and the non-target species. Detections of the Ridgway's rail have significantly increased over the course of the study, while detections of least bittern have significantly declined. Habitat quality on the routes was fair to good. Marsh bird monitoring should continue at the Wash in support of the BO and WMP.

6.0 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.

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. 127 p.

Harrity, E.J., and C.J. Conway. 2020. Satellite transmitters reveal previously unknown migratory behavior and wintering locations of Yuma Ridgway's rails. Journal of Field Ornithology 91:300–312.

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.

LCRMSCP (Lower Colorado River Multi-Species Conservation Program). 2004. Lower Colorado River Multi-Species Conservation Program, Volume II: Habitat Conservation Plan. Final. December 17. Sacramento, California.

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. 482 p.

LVWCC. 2020. Las Vegas Wash Long-Term Operating Plan. Las Vegas Wash Project Coordination Team, Southern Nevada Water Authority, Las Vegas, Nevada. 25 p.

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, Nevada, prepared by San Bernardino County Museum, Redlands, California. 19 p.

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, Nevada, prepared by San Bernardino County Museum, Redlands, California. 17 p.

Shanahan, S.A., D.M. Van Dooremolen, T. Sharp, S. Martin, and B. Brown. 2008. Las Vegas Wash Wildlife Management Plan. Las Vegas Wash Coordination Committee, Las Vegas, Nevada. 103 p.

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, Nevada, prepared by SWCA Environmental Consultants, Salt Lake City, Utah. 19 p.

SWCA (SWCA Environmental Consultants). 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, Utah. Final report prepared for the Southern Nevada Water Authority, Las Vegas, Nevada. 30 p.

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, Utah. Final report prepared for the Southern Nevada Water Authority, Las Vegas, Nevada. 26 p.

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, Utah. Final report prepared for the Southern Nevada Water Authority, Las Vegas, Nevada. 28 p.

SWCA. 2006. Survey for southwestern willow flycatchers in 2005 along Las Vegas Wash, Clark County, Nevada. Prepared by SWCA Environmental Consultants, Salt Lake City, Utah. Final report prepared for the Southern Nevada Water Authority, Las Vegas, Nevada. 16 p.

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, Utah. Final report prepared for the Southern Nevada Water Authority, Las Vegas, Nevada. 17 p.

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, Utah. Final report prepared for the Southern Nevada Water Authority, Las Vegas, Nevada. 23 p.

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, Nevada, and Las Vegas Wash Coordination Committee, Las Vegas, Nevada. 15 p.

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, Nevada, and Las Vegas Wash Coordination Committee, Las Vegas, Nevada. 14 p.

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, Nevada, and Las Vegas Wash Coordination Committee, Las Vegas, Nevada. 13 p.

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, Nevada, and Las Vegas Wash Coordination Committee, Las Vegas, Nevada. 15 p.

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, Nevada, and Las Vegas Wash Coordination Committee, Las Vegas, Nevada. 16 p.

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, Nevada, and Las Vegas Wash Coordination Committee, Las Vegas, Nevada. 16 p.

Van Dooremolen, D. 2015. Marsh bird monitoring, including Yuma Ridgway's 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, Nevada, and Las Vegas Wash Coordination Committee, Las Vegas, Nevada. 17 p.

Van Dooremolen, D. 2017a. Marsh bird monitoring, including Yuma Ridgway's 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, Nevada, and Las Vegas Wash Coordination Committee, Las Vegas, Nevada. 22 p.

Van Dooremolen, D. 2017b. Marsh bird monitoring, including Yuma Ridgway's 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, Nevada, and Las Vegas Wash Coordination Committee, Las Vegas, Nevada. 21 p.

Van Dooremolen, D. 2018. Marsh bird monitoring, including Yuma Ridgway's rail, along Las Vegas Wash, Clark County, Nevada, 2018. Final report prepared for the U.S. Fish and Wildlife Service, Southern Nevada Field Office, Las Vegas, Nevada, and Las Vegas Wash Coordination Committee, Las Vegas, Nevada. 19 p.

Van Dooremolen, D. 2019. Marsh bird monitoring, including Yuma Ridgway's rail, along Las Vegas Wash, Clark County, Nevada, 2019. Final report prepared for the U.S. Fish and Wildlife Service, Southern Nevada Field Office, Las Vegas, Nevada, and Las Vegas Wash Coordination Committee, Las Vegas, Nevada. 22 p.

Van Dooremolen, D., N. Rice, and T. Ricks. 2022. Marsh bird monitoring, including Yuma Ridgway's rail, along Las Vegas Wash and Lower Las Vegas Wash, Clark County, Nevada, 2021. Final report prepared for the U.S. Fish and Wildlife Service, Southern Nevada Field Office, Las Vegas, Nevada, and Las Vegas Wash Coordination Committee, Las Vegas, Nevada. 22 p.

Van Dooremolen, D., N. Rice, and T. Ricks. 2023. Marsh bird monitoring, including Yuma Ridgway's rail, along Las Vegas Wash, Clark County, Nevada, 2022. Final report prepared for the U.S. Fish and Wildlife Service, Southern Nevada Field Office, Las Vegas, Nevada, and Las Vegas Wash Coordination Committee, Las Vegas, Nevada. 18 p.

Van Dooremolen, D., N. Rice, and T. Ricks. 2024. Marsh bird monitoring, including Yuma Ridgway's rail, along Las Vegas Wash, Clark County, Nevada, 2023. Final report prepared for the U.S. Fish and Wildlife Service, Southern Nevada Field Office, Las Vegas, Nevada, and Las Vegas Wash Coordination Committee, Las Vegas, Nevada. 19 p.

Van Dooremolen, D., N. Rice, and T. Ricks. 2025. Marsh bird monitoring, including Yuma Ridgway's rail, along Las Vegas Wash, Clark County, Nevada, 2024. Final report prepared for the U.S. Fish and Wildlife Service, Southern Nevada Field Office, Las Vegas, Nevada, and Las Vegas Wash Coordination Committee, Las Vegas, Nevada. 19 p.

Appendix A

GPS Coordinates for 2025
Marsh Bird Monitoring Points

Route	Point	Easting	Northing	Location (Primary)
2	6	681245	3995496	Wash, Pabco Road Weir impoundment and City of Henderson outfall
2	4.8	680290	3995659	Wash, Upper Narrows Weir impoundment, south bank
2	4.75	679905	3995767	Wash, Duck Creek Confluence Weir impoundment, south bank
2	4.5	678178	3997623	Wash, Upper Diversion Weir bridge
2	1	678178	3996968	Nature Preserve, Vern's Pond
4	5	678130	3996515	Mitigation Wetlands, Cell 5
4	3.5A	678526	3996342	Mitigation Wetlands, Cell 6; replaces 3.5 and 4 to reduce effort and improve spacing between points
4	0.5A	678628	3996058	Mitigation Wetlands, Cell 7; replaces 0.5 and 2.5 to reduce effort and improve spacing between points
3	1.5	682400	3995747	Wash, C-1 Channel
3	3A	682781	3995901	Wash, Bostick Weir impoundment, south bank; moved to bank protection due to flooding from weir maintenance
3	4.5	683207	3996062	Wash, Calico Ridge Weir impoundment, south bank
3	4.55	683820	3996274	Wash, toe of Lower Narrows Weir, south bank
3	4.56	684134	3996360	Wash, Homestead Weir impoundment, south bank
3	4.6A	684535	3996397	Wash, between Homestead and Three Kids weirs, south bank; moved ~100 meters downstream for greater spacing between points
3	6.5A	684978	3996723	Wash, toe of Three Kids Weir, south bank; moved upstream for greater spacing between points
3	7	685136	3996960	Wash, Rainbow Gardens Weir impoundment, south bank

Appendix B

Total and Per Point Abundances by Year and Route for the Las Vegas Wash. No Surveys Conducted in 2020 Due to Pandemic. YRRA=Yuma Ridgway's Rail, VIRA=Virginia Rail, SORA=Sora, AMBI=American Bittern, LEBI=Least Bittern, PBGR=Pied-billed Grebe, COGA=Common Gallinule

Year	Route	Points	YRRA	VIRA	SORA	AMBI	LEBI	PBGR	COGA
2007	1	9	0	4 (0.4)	7 (0.8)	0	1 (0.1)	1 (0.1)	1 (0.1)
2007	2	8	0	2 (0.3)	5 (0.6)	0	4 (0.5)	7 (0.9)	14 (1.8)
2007	3	7	0	1 (0.1)	2 (0.3)	0	4 (0.6)	4 (0.6)	13 (1.9)
2007	Total	24	0	7 (0.3)	14 (0.6)	0	9 (0.4)	12 (0.5)	28 (1.2)
2008	1	9	0	4 (0.4)	6 (0.7)	0	0	1 (0.1)	1 (0.1)
2008	2	8	0	0	5 (0.6)	0	2 (0.3)	4 (0.5)	15 (1.9)
2008	3	9	0	1 (0.1)	5 (0.6)	0	9 (1.0)	5 (0.6)	12 (1.3)
2008	Total	26	0	5 (0.2)	16 (0.6)	0	11 (0.4)	10 (0.4)	28 (1.1)
2009	1	9	0	2 (0.2)	5 (0.6)	0	2 (0.2)	0	0
2009	2	8	0	0	6 (0.8)	0	2 (0.3)	4 (0.5)	11 (1.4)
2009	3	8	0	2 (0.3)	5 (0.6)	0	2 (0.3)	4 (0.5)	13 (1.6)
2009	Total	25	0	4 (0.2)	16 (0.6)	0	6 (0.2)	8 (0.3)	24 (1.0)
2010	1	3	0	2 (0.7)	3 (1.0)	0	0	0	0
2010	2	9	0	2 (0.2)	7 (0.8)	0	2 (0.2)	3 (0.3)	11 (1.2)
2010	3	6	0	0	3 (0.5)	0	2 (0.3)	1 (0.2)	10 (1.7)
2010	4	3	0	3 (1.0)	3 (1.0)	1 (0.3)	0	0	2 (0.7)
2010	Total	21	0	7 (0.3)	16 (0.8)	1 (0.1)	4 (0.2)	4 (0.2)	23 (1.1)
2011	2	9	0	0	5 (0.6)	0	4 (0.4)	5 (0.6)	11 (1.2)
2011	3	6	0	2 (0.3)	2 (0.3)	0	2 (0.3)	2 (0.3)	8 (1.3)
2011	4	9	0	11 (1.2)	9 (1.0)	0	2 (0.2)	7 (0.8)	9 (1.0)
2011	Total	24	0	13 (0.5)	16 (0.7)	0	8 (0.3)	14 (0.6)	28 (1.7)
2012	2	9	0	1 (0.1)	8 (0.9)	0	5 (0.6)	5 (0.6)	14 (1.6)
2012	3	9	0	3 (0.3)	13 (1.4)	0	4 (0.4)	2 (0.2)	16 (1.8)
2012	4	9	0	13 (1.4)	14 (1.6)	0	6 (0.7)	6 (0.7)	10 (1.1)
2012	Total	27	0	17 (0.6)	35 (1.3)	0	15 (0.6)	13 (0.5)	40 (1.5)
2013	2	9	0	1 (0.1)	5 (0.6)	0	3 (0.3)	3 (0.3)	15 (1.7)
2013	3	9	0	2 (0.2)	5 (0.6)	0	1 (0.1)	0	8 (0.9)
2013	4	9	0	7 (0.8)	12 (1.3)	0	3 (0.3)	5 (0.6)	10 (1.1)
2013	Total	27	0	10 (0.4)	22 (0.8)	0	7 (0.3)	8 (0.3)	33 (1.2)
2014	2	9	0	0	11 (1.2)	0	5 (0.6)	5 (0.6)	16 (1.8)
2014	3	7	0	1 (0.1)	4 (0.6)	0	2 (0.3)	1 (0.1)	3 (0.4)
2014	4	9	0	5 (0.6)	16 (1.8)	0	5 (0.6)	3 (0.3)	13 (1.4)
2014	Total	25	0	6 (0.2)	31 (1.2)	0	12 (0.5)	9 (0.4)	32 (1.3)
2015	2	9	0	1 (0.1)	7 (0.8)	0	4 (0.4)	6 (0.7)	17 (1.9)
2015	3	7	0	3 (0.4)	5 (0.7)	0	2 (0.3)	2 (0.3)	12 (1.7)
2015	4	9	0	5 (0.6)	6 (0.7)	1 (0.1)	3 (0.3)	4 (0.4)	10 (1.1)
2015	Total	25	0	9 (0.4)	18 (0.7)	1 (0.0)	9 (0.4)	12 (0.5)	39 (1.6)
2016	2	9	0	0	7 (0.8)	0	2 (0.2)	4 (0.4)	7 (0.8)
2016	3	8	0	2 (0.3)	3 (0.4)	0	1 (0.1)	1 (0.1)	12 (1.5)
2016	4	9	0	3 (0.3)	7 (0.8)	0	2 (0.2)	4 (0.4)	7 (0.8)
2016	Total	26	0	5 (0.2)	17 (0.6)	0	5 (0.2)	9 (0.4)	26 (1.0)
2017	2	10	0	4 (0.4)	0	1 (0.1)	3 (0.3)	1 (0.1)	10 (1.0)
2017	3	9	0	4 (0.4)	6 (0.7)	0	1 (0.1)	1 (0.1)	10 (1.1)
2017	4	9	1 (0.1)	0	5 (0.6)	1 (0.1)	1 (0.1)	0	7 (0.8)
2017	Total	28	1 (0.0)	8 (0.3)	11 (0.4)	2 (0.1)	5 (0.2)	2 (0.1)	27 (1.0)
2018	2	8	0	1 (0.1)	4 (0.5)	0	4 (0.5)	3 (0.4)	19 (2.4)
2018	3	9	0	1 (0.1)	7 (0.8)	0	2 (0.2)	3 (0.3)	14 (1.6)
2018	4	9	0	0	8 (0.9)	1 (0.1)	0	1 (0.1)	6 (0.7)
2018	Total	26	0	2 (0.1)	19 (0.7)	1 (0.0)	6 (0.2)	7 (0.3)	39 (1.5)
2019	2	9	0	2 (0.2)	7 (0.8)	0	4 (0.4)	0	19 (2.1)
2019	3	9	0	7 (0.8)	9 (1.0)	0	1 (0.1)	6 (0.7)	13 (1.4)
2019	4	9	0	5 (0.6)	20 (2.2)	0	1 (0.1)	1 (0.1)	2 (0.2)
2019	Total	27	0	14 (0.5)	36 (1.3)	0	6 (0.2)	7 (0.3)	34 (1.3)

Year	Route	Points	YRRA	VIRA	SORA	AMBI	LEBI	PBGR	COGA
2021	2	5	1 (0.2)	2 (0.4)	7 (1.4)	0	2 (0.4)	2 (0.4)	15 (3.0)
2021	3	8	0	2 (0.3)	5 (0.6)	0	0	3 (0.4)	12 (1.5)
2021	4	3	2 (0.7)	6 (2.0)	12 (4.0)	0	1 (0.3)	0	3 (1.0)
2021	Total	16	3 (0.2)	10 (0.6)	24 (1.5)	0	3 (0.2)	5 (0.3)	30 (1.9)
2022	2	5	1 (0.2)	1 (0.2)	6 (1.2)	0	0	3 (0.6)	11 (2.2)
2022	3	8	2 (0.3)	0	3 (0.4)	0	0	4 (0.5)	7 (0.9)
2022	4	3	2 (0.7)	1 (0.3)	6 (2.0)	0	0	0	0
2022	Total	16	5 (0.3)	2 (0.1)	15 (0.9)	0	0	7 (0.4)	18 (1.1)
2023	2	5	3 (0.6)	0	4 (0.8)	0	1 (0.2)	2 (0.4)	11 (2.2)
2023	3	8	1 (0.1)	2 (0.3)	8 (1.0)	0	0	3 (0.4)	8 (1.0)
2023	4	3	2 (0.7)	2 (0.7)	4 (1.3)	0	0	0	1 (0.3)
2023	Total	16	6 (0.4)	4 (0.3)	16 (1.0)	0	1 (0.1)	5 (0.3)	20 (1.3)
2024	2	5	3 (0.6)	0	6 (1.2)	0	1 (0.2)	4 (0.8)	13 (2.6)
2024	3	8	1 (0.1)	2 (0.3)	8 (1.0)	0	2 (0.3)	1 (0.1)	11 (1.4)
2024	4	3	1 (0.3)	4 (1.3)	4 (1.3)	0	0	1 (0.3)	6 (2.0)
2024	Total	16	5 (0.3)	6 (0.4)	18 (1.1)	0	3 (0.2)	6 (0.4)	30 (1.9)
2025	2	5	2 (0.4)	1 (0.2)	3 (0.6)	0	1 (0.2)	5 (1.0)	8 (1.6)
2025	3	8	0	3 (0.4)	7 (0.9)	0	1 (0.1)	3 (0.4)	9 (1.1)
2025	4	3	5 (1.7)	0	0	0	1 (0.3)	1 (0.3)	2 (0.7)
2025	Total	16	7 (0.4)	4 (0.3)	10 (0.6)	0	3 (0.2)	9 (0.6)	19 (1.2)