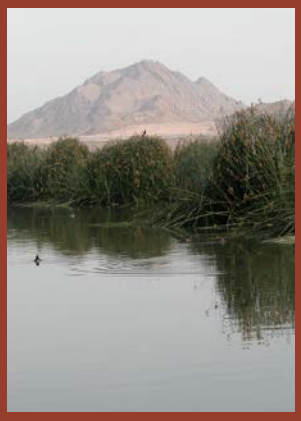

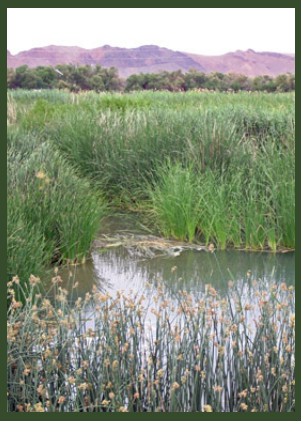

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Marsh Bird Monitoring, including Yuma Clapper Rail, along Las Vegas Wash, Clark County, Nevada, 2011

January 2012

SOUTHERN NEVADA WATER AUTHORITY

Las Vegas Wash Coordination Committee

Marsh Bird Monitoring, including Yuma Clapper Rail, along Las Vegas Wash, Clark County, Nevada, 2011

SOUTHERN NEVADA WATER AUTHORITY
Las Vegas Wash Project Coordination Team

Prepared for:

U.S. Fish and Wildlife Service
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ABSTRACT

The Las Vegas Wash Coordination Committee, a 29-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 2900-acre Clark County Wetlands Park. Activities associated with the stabilization program and park development include wetland revegetation and expansion. During informal Section 7 consultation on the project, the U.S. Fish and Wildlife Service recommended that annual surveys for Yuma clapper rail (*Rallus longirostris yumanensis*) be conducted during the breeding season to determine the species occurrence within the park. Surveys were conducted by permitted consultants nearly annually from 2000 through 2007 (McKernan and Braden 2001, 2002; SWCA 2002, 2003, 2005, 2006, 2007, 2008). Wanting to obtain information on all secretive marsh bird species that may benefit from wetland enhancement in the study area, the Las Vegas Wash Project Coordination Team began a study using the standardized North American marsh bird monitoring protocol (Conway 2005) in 2007 (Van Dooremolen 2010a).

Six species were targeted during the 2011 surveys: American bittern, least bittern, black rail, clapper rail, Virginia rail, and sora. Detections of pied-billed grebe, common gallinule (formerly common moorhen), and American coot (referred to as non-target species) were also recorded. Surveys were conducted along three survey routes comprising 24 points. No clapper rail, black rail or American bittern were detected. Least bittern, Virginia rail, and sora were detected, as were the three non-target species. Sora continued to be the most abundant of the target species. Including non-target species, American coot was the most abundant. Abundances were greater than or within the range of values from the prior four years of surveys for all species detected. Virginia rail abundance increased the most, with the majority of the detections occurring on the route in the in-lieu fee mitigation ponds (Route 4), which increased from a partial route of just three points in 2010 to a full route of nine points in 2011. The route had the highest total abundance of target and non-target species overall and offers perhaps the widest variety of wetland habitat currently available in the study area. Annual marsh bird surveys along the Wash should continue in order to comply with informal Section 7 consultation measures regarding Yuma clapper rail and to determine whether changes or stability in the abundances of the other marsh bird species represent actual trends.

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1.0 BACKGROUND

The Las Vegas Wash (Wash) is the primary drainage channel for the Las Vegas Valley carrying urban flows, including highly treated wastewater, urban runoff, shallow groundwater, and storm runoff, into 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 percent from their peak extent, leaving less than 200 acres.

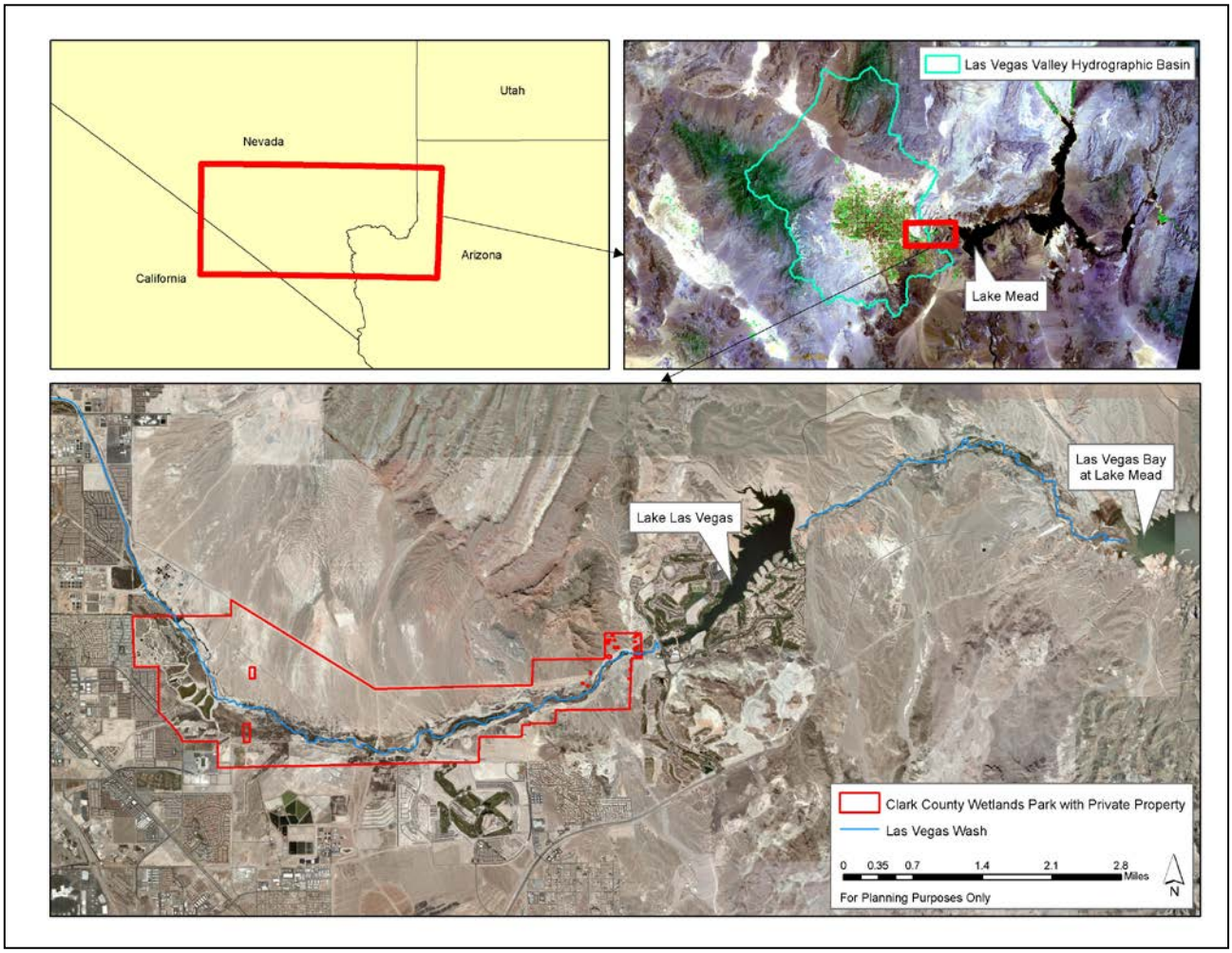

Figure 1: Las Vegas Wash location and general study area map.

In 1998, the Las Vegas Wash Coordination Committee (LVWCC), a now 29-member community 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

to stabilize the Wash and restore its ecological functions. Stabilization and enhancement activities, which include the construction of 22 erosion control structures (weirs) and extensive revegetation, will help deter further erosion and reduce the amount of sediment being deposited in Lake Mead; 12 weirs were in place by spring 2011.

The LVWCC is increasing wetland habitat along the channel by planting bulrush (*Schoenoplectus* spp.) in the impoundments of the weirs and along the weir faces, and cattail (*Typha domingensis*) and common reed (*Phragmites australis*) volunteer from upstream seed sources. Emergent vegetation can also be found in the constructed wetland ponds in the nearby Nature Preserve, the developed portion of the Clark County Wetlands Park (Wetlands Park) through which the Wash flows. The county has created additional wetland habitat within the Wetlands Park in the form of the in-lieu fee mitigation ponds (Figure 2). The increase in wetland habitat along the Wash and throughout the Wetlands Park could have a positive impact on secretive marsh birds (e.g., rails and bitterns), including the federally endangered Yuma clapper rail (*Rallus longirostris yumanensis*).

The Yuma clapper 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 clapper 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 clapper 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 cattail and bulrush are preferred, although Yuma clapper 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 clapper 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 clapper rails year-round.

Alcorn (1988) reported that eight clapper 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 clapper 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, during informal Section 7 consultation on the proposed development of the Wetlands Park and associated erosion control structures, the U.S. Fish and Wildlife Service required that the Southern Nevada Water Authority (SNWA), the lead agency of the LVWCC, conduct annual surveys to determine the breeding status of Yuma clapper rail within the Wetlands Park.

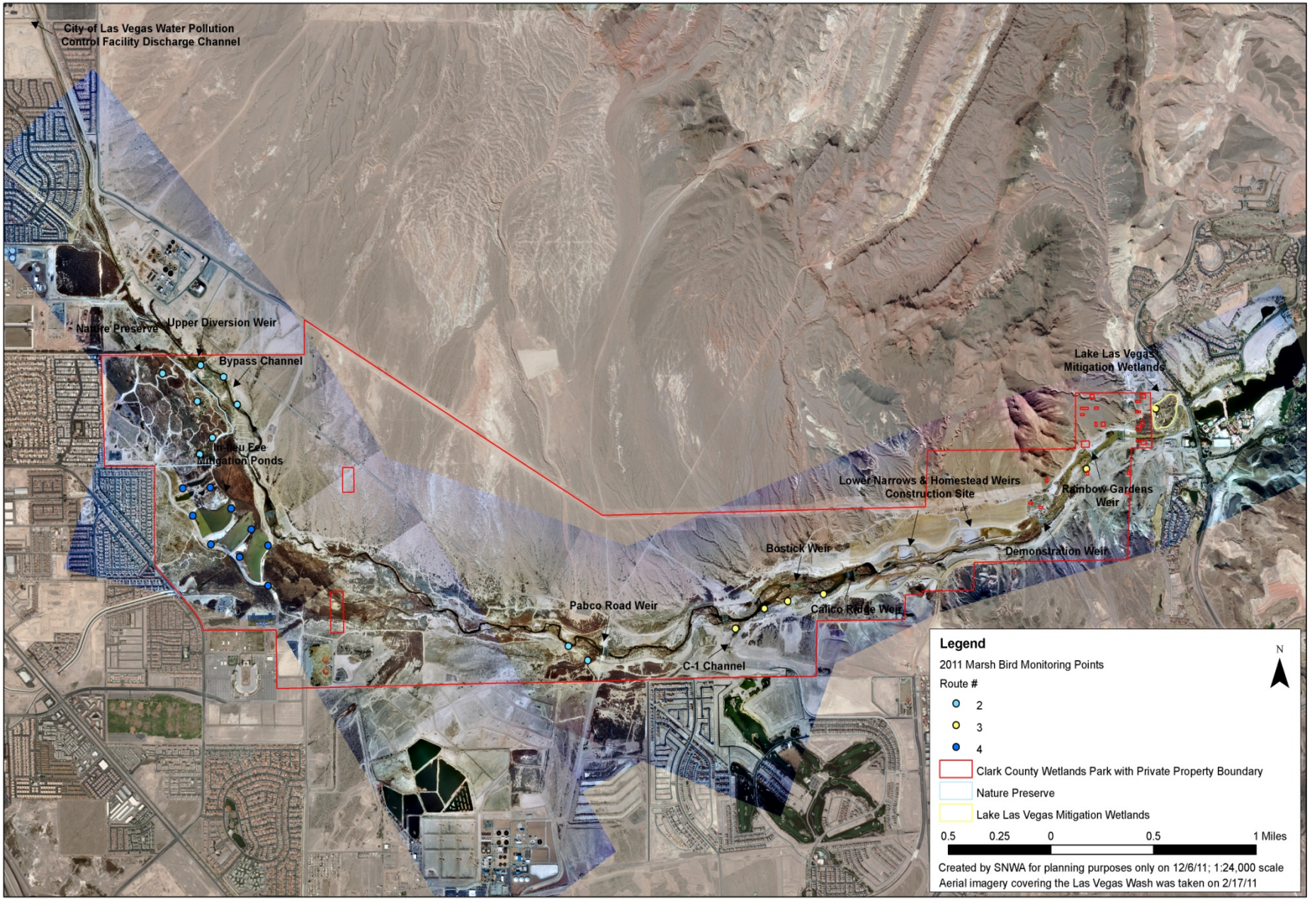

Figure 2: Historical clapper rail detection areas and 2011 marsh bird monitoring points.

SNWA contracted with permitted consultants to perform these surveys from 2000 to 2004 and 2006 to 2007. No Yuma clapper rails were detected from 2000 to 2004, nor in 2007 (Mckernan and Braden 2001, 2002; SWCA 2002, 2003, 2005, 2008). A Yuma clapper rail was detected on May 23, 2005, during surveys for other species. It was calling from emergent habitat in the impoundment of the Demonstration Weir (SWCA 2006; Figure 2). Another was detected in the marsh along the C-1 Channel near where it discharges to the Wash on June 4 and June 7, 2006, also during surveys for other species (SWCA 2007; Figure 2). The portion of the channel where the bird was detected has since been lined with rock and concrete, but emergents are returning.

Conway (2005) developed a protocol for conducting marsh bird monitoring surveys that includes calling for clapper rail. The U.S. Fish and Wildlife Service accepted this protocol as the new official Yuma clapper rail survey protocol in 2006. The survey protocol enables compliance obligations regarding the clapper rail 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 on the Lower Colorado River Multi-Species Conservation Program, that may benefit from wetland revegetation efforts. Consequently in 2007, the Las Vegas Wash Project Coordination Team, the implementation team of the LVWCC, initiated a marsh bird monitoring study along the Wash and within the Wetlands Park (Van Dooremolen 2010a, Van Dooremolen 2010b). Yuma clapper rail could not be surveyed for the first year because the necessary federal permit was not in place. The species was added to the survey in 2008. Results described below are from the 2011 monitoring season.

2.0 METHODS

2.1 Description of Survey Routes

Three routes were surveyed in 2011 along the Wash both within and adjacent to the Wetlands Park (Figure 2). GPS coordinates of the points are included in Appendix A.

Route 1, located upstream of the Wetlands Park between the Clark County Water Reclamation District and the City of Las Vegas Water Pollution Control Facility, was not surveyed in 2011. The cattail habitat had been largely degraded in 2010 and the decision was made to discontinue surveys along the route in favor of surveying a new route in the in-lieu fee mitigation ponds.

Route 2 included nine points in 2011: four within the constructed wetlands ponds at the Nature Preserve, one in the Upper Diversion Weir impoundment, two along the bypass channel, and two along the Wash upstream of Pabco Road Weir (Figure 2). The Nature Preserve ponds (3-acre lower 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 (*Salix exigua*), Goodding willow (*S. gooddingii*) and cottonwood (*Populus fremontii*). The Upper Diversion Weir point covers the 3.5-acre cattail complex in the impoundment. The bypass channel points include three acres of emergent marsh dominated by bulrush and cattails with some sandbar and Goodding willow and other woody riparian species. The points at Pabco Road Weir cover approximately six acres of wetland habitat, with two points upstream of the weir. The emergent habitat is dominated by cattail and common reed with stands of sandbar and Goodding willows and cottonwood interspersed. The water upstream of the weir is slow-moving and includes a small backwater pond and wetlands created by the City of Henderson Water Reclamation Facility outfall channel.

Route 3 included six points (40 acres of habitat) in 2011 (Figure 2); two additional points were inaccessible or impacted by excessive noise due to construction and so were not surveyed in 2011. The route begins in the small backwater wetland at the discharge of the C-1 Channel into the Wash and continues downstream to the Lake Las Vegas mitigation wetlands, an off-channel wetland located on private property just east of the Wetlands Park boundary. It includes points sampling the impoundments of Bostick Weir, Calico Ridge Weir, and Rainbow Gardens Weir (Figure 2) that have banks and islands covered in cattail, hardstem bulrush, common reed and Goodding willow with lesser amounts of sandbar willow and cottonwood.

Route 4, created as a partial route (three points) in 2010, was expanded to a full route in 2011 of nine points (60 acres of habitat; Figure 2). The route is located in the in-lieu fee mitigation ponds created by Clark County. Eight points were established on the ponds and one immediately to the southeast of the ponds, which covers habitat flooded by Duck Creek. The two points on the smaller ponds are dominated by relatively monotypic stands of cattail with very limited open water. The five points on the larger ponds are dominated by open water (both shallow and deep); vegetation occurs predominantly on the banks in the form of stringers of cattail, bulrush and common reed of varying width. The habitat at the point immediately adjacent to the mitigation ponds consists primarily of cattails, flooded tamarisk, and common reed. The point at the Tropicana Outfall, surveyed the previous year, was dropped.

Along each route, survey points were established a minimum of 656 feet apart. Although Conway (2005) recommends a separation of 1,312 feet, the Wash does not contain enough emergent marsh habitat to allow for such wide spacing while still maintaining a sufficient number of points per route.

2.2 Survey Protocol

Surveys were performed using the North American marsh bird monitoring protocol developed by Conway (2005). Trained observers conducted the surveys during the breeding season in April and May. Four surveys of each route were conducted. Each route was surveyed on a separate day. Two observers conducted each survey, including at least one permitted individual (Deborah Van Dooremolen [TE-148556-1], Seth Shanahan [TE-231424-0]). Surveys began one half hour before sunrise and concluded by 9 a.m. Although Conway (2005) specifies that the survey route be run in the same direction every time, each route was run in reverse every other 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.

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 included American bittern (*Botaurus lentiginosus*), least bittern, black rail, clapper Rail, Virginia rail (*Rallus 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, clapper rail, and American bittern. Vocalizations were broadcast using MP3 players with portable speakers. The

observer(s) 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 (formerly common moorhen; *Gallinula chloropus*), 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.

2.3 Data Analysis

Points had to be surveyed a minimum of three times under appropriate conditions (wind below 12 miles per hour, no loud or intense noise, etc.) to be used in the 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 individuals (abundance) per species along each route was also calculated. 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 minimum number of individuals present (referred to as total abundance) for each species.

For each route, the total number of individuals detected of each species, the total number of individuals detected of target 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, the total number of individuals detected of target 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 a more accurate comparison between routes because different numbers of points were surveyed.

3.0 RESULTS

Of the target species, least bittern, Virginia rail, and sora were detected (Table 1). Sora and least bittern were detected on all routes; Virginia rail was detected on Routes 3 and 4. The three non-target species were detected on all routes, and both common gallinule and American coot were identified on all survey replicates on all routes (Table 1).

Route	Date	LEBI	VIRA	SORA	PBGR	COGA	AMCO	Grand Total
2	4/5/2011	1		5	2	7	53	68
	4/20/2011	3		3		5	11	22
	5/3/2011	2			4	2	5	13
	5/17/2011					2	5	7
2 Total		6	0	8	6	16	74	110
3	4/11/2011	2	2	1	2	5	65	77
	4/21/2011			2		3	12	17
	5/4/2011					3	4	7
	5/19/2011	2				3	6	11
3 Total		4	2	3	2	14	87	112
4	4/4/2011		3	5	6	6	46	66
	4/18/2011	2	3	3	3	2	45	58
	5/2/2011	1	9	8	3	4	17	42
	5/16/2011		6		2	2	9	19
4 Total		3	21	16	14	14	117	185
Grand Total		13	23	27	22	44	278	407

Table 1. Total 2011 detections for each species by route and date for the 24 points surveyed (Route 2, n=9; Route 3, n=6; Route 4, n=9). LEBI=Least Bittern, VIRA=Virginia Rail, SORA=Sora, PBGR=Pied-billed Grebe, COGA=Common Gallinule (formerly Common Moorhen), AMCO=American Coot.

Sora was the most abundant of the target species with 0.67 individuals per point (Table 2). American coot was the most abundant of all species with more than seven birds per point, and common gallinule was a distant second at 1.17 birds per point (Table 2).

Route 4, had the highest per point abundance of target species overall and of sora and Virginia rail (Table 2). Least bittern per point abundance was highest on Route 2. Total (all species) per point abundance was highest on Route 3 due primarily to its having the highest abundance of American coots.

	Target Species (TS) abundance (per point)				Non-target Species abundance (per point)			
Route	**LEBI**	**VIRA**	**SORA**	**Total TS**	**PBGR**	**COGA**	**AMCO**	**Grand Total**
2	4 (0.44)	0 (0.00)	5 (0.56)	9 (1.00)	5 (0.56)	11 (1.22)	54 (6.00)	79 (8.78)
3	2 (0.33)	2 (0.33)	2 (0.33)	6 (1.00)	2 (0.33)	8 (1.33)	65 (10.83)	81 (13.50)
4	2 (0.22)	11 (1.22)	9 (1.00)	22 (2.44)	7 (0.78)	9 (1.00)	56 (6.22)	94 (10.44)
Grand Total	8 (0.33)	13 (0.54)	16 (0.67)	37 (1.54)	14 (0.58)	28 (1.17)	175 (7.29)	254 (10.58)

Table 2. Total and per point abundances for 2011 for the 24 points surveyed (Route 2, n=9; Route 3, n=6; Route 4, n=9). LEBI=Least Bittern, VIRA=Virginia Rail, SORA=Sora, PBGR=Pied-billed Grebe, COGA=Common Gallinule (formerly Common Moorhen), AMCO=American Coot.

4.0 DISCUSSION

As in the prior four years of the study (Table 3), no Yuma clapper rail or black rail were detected. There have been no detections of Yuma clapper rail on the Wash now since 2006, making it highly unlikely that there are breeding individuals in the study area at this time. However, breeding colonies exist within approximately 40 miles, on the Muddy River and in the Overton Wildlife Management Area, making colonization a continuing possibility. American bittern has only been detected in one year (Table 3).

		Target Species (TS) abundance (per point)					**Non-target Species** abundance (per point)			
Year	**Route**	**AMBI**	**LEBI**	**VIRA**	**SORA**	**Total TS**	**PBGR**	**COGA**	**AMCO**	**Grand Total**
2007	1	0 (0.00)	1 (0.11)	4 (0.44)	7 (0.78)	12 (1.33)	1 (0.11)	1 (0.11)	15 (1.67)	29 (3.22)
	2	0 (0.00)	4 (0.50)	2 (0.25)	5 (0.63)	11 (1.38)	7 (0.88)	14 (1.75)	81 (10.13)	113 (14.13)
	3	0 (0.00)	4 (0.57)	1 (0.14)	2 (0.29)	7 (1.00)	4 (0.57)	13 (1.86)	68 (9.71)	92 (13.14)
2007 Total		0 (0.00)	9 (0.38)	7 (0.29)	14 (0.58)	30 (1.25)	12 (0.50)	28 (1.17)	164 (6.83)	234 (9.75)
2008	1	0 (0.00)	0 (0.00)	4 (0.44)	6 (0.67)	10 (1.11)	1 (0.11)	1 (0.11)	20 (2.22)	32 (3.56)
	2	0 (0.00)	2 (0.25)	0 (0.00)	5 (0.63)	7 (0.88)	4 (0.50)	15 (1.88)	41 (5.13)	67 (8.38)
	3	0 (0.00)	9 (1.00)	1 (0.11)	5 (0.56)	15 (1.67)	5 (0.56)	12 (1.33)	151 (16.78)	183 (20.33)
2008 Total		0 (0.00)	11 (0.42)	5 (0.19)	16 (0.62)	32 (1.23)	10 (0.38)	28 (1.08)	212 (8.15)	282 (10.85)
2009	1	0 (0.00)	2 (0.22)	2 (0.22)	5 (0.56)	9 (1.00)	0 (0.00)	0 (0.00)	4 (0.44)	13 (1.44)
	2	0 (0.00)	2 (0.25)	0 (0.00)	6 (0.75)	8 (1.00)	4 (0.50)	11 (1.38)	46 (5.75)	69 (8.63)
	3	0 (0.00)	2 (0.25)	2 (0.25)	5 (0.63)	9 (1.13)	4 (0.50)	13 (1.63)	97 (12.13)	123 (15.38)
2009 Total		0 (0.00)	6 (0.24)	4 (0.16)	16 (0.64)	26 (1.04)	8 (0.32)	24 (0.96)	147 (5.88)	205 (8.20)
2010	1	0 (0.00)	0 (0.00)	2 (0.67)	3 (1.00)	5 (1.67)	0 (0.00)	0 (0.00)	0 (0.00)	5 (1.67)
	2	0 (0.00)	2 (0.22)	2 (0.22)	7 (0.78)	11 (1.22)	3 (0.33)	11 (1.22)	28 (3.11)	53 (5.89)
	3	0 (0.00)	2 (0.25)	0 (0.00)	3 (0.50)	5 (0.83)	1 (0.17)	10 (1.67)	50 (8.33)	66 (11.00)
	4	1 (0.33)	0 (0.00)	3 (1.00)	3 (1.00)	7 (2.33)	0 (0.00)	2 (0.67)	3 (1.00)	12 (4.00)
2010 Total		1 (0.05)	4 (0.19)	7 (0.33)	16 (0.76)	28 (1.33)	4 (0.19)	23 (1.10)	81 (3.86)	136 (6.48)
Grand Total		1 (0.01)	30 (0.31)	23 (0.24)	62 (0.65)	116 (1.21)	34 (0.35)	103 (1.07)	604 (6.29)	857 (8.93)

Table 3. Total and per point abundances by year and route for 2007-2010. AMBI=American Bittern, LEBI=Least Bittern, VIRA=Virginia Rail, SORA=Sora, PBGR=Pied-billed Grebe, COGA=Common Gallinule (formerly Common Moorhen), AMCO=American Coot. Route 1, n=9 points in all years but 2010 where n=3; Route 2 n=8 in all years but 2010 where n=9; Route 3, n=7 in 2007, n=9 in 2008, n=8 in 2009 and n=6 in 2010; Route 4 (added in 2010), n=3.

The other three target species have been identified in all survey years (Tables 2 and 3). Of these, sora total abundance at 16 birds was the same as in all prior years but 2007, while per point abundance was in the middle of the range established in previous years. Although sora has always been the most abundant of the target species detected, it is also the only one of the three for which breeding status is still questionable. As in most years (2010 being the only exception), no sora were detected in the fourth survey and sora breeding has not been confirmed during the study. It is possible that most, if not all, detections are of overwintering individuals that haven't yet departed for their breeding grounds and migrating birds passing through the area. (See Van

Dooremolen 2010a and 2010b for further discussion on the status of sora and the other species in the Wash.)

Virginia rail total and per point abundance reached their peaks in 2011 at nearly twice the value of any previous year (Tables 2 and 3). The large increase is due to detections on Route 4. As a partial route in 2010, it had a high per point abundance of the species, and that abundance increased in 2011. The mitigation ponds and adjacent area clearly offer the best habitat for Virginia rail in the study area.

Least bittern total and per point abundance increased from the lower values of the past few years and were approximately in the middle of the range established from 2007-2010 (Tables 2 and 3).

Route 4 had the highest total and per point abundances (by a large margin) of target species overall and of sora and Virginia rail. It also had the highest total abundance when including all species, although Route 3 had the highest abundance per point. Route 4 offers perhaps the widest variety of wetland habitat currently available in the study area, which likely accounts for the high abundance values recorded there.

5.0 RECOMMENDATIONS

Annual variations in the abundances of individual bird species are common, so more years of data are needed to show whether the changes in some species' abundances and the stability in others represent actual trends. Also, annual monitoring for Yuma clapper rail is needed to comply with informal Section 7 consultation measures. It is recommended that marsh bird monitoring continue in 2012.

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Appendix A

GPS Coordinates for 2011
Marsh Bird Monitoring Points

Route	Point	Eastings	Northings	Comments
2	1	678178	3996968	
2	1.5	678276	3997090	
2	2	678155	3997357	
2	3	677879	3997558	
2	4.5	678178	3997623	
2	4.6	678357	3997540	
2	4.7	678468	3997338	
2	5	681090	3995598	
2	6	681245	3995496	
3	1.5	682400	3995747	
3	2	682626	3995895	
3	3	682808	3995954	
3	4	683088	3996010	
3	7	685136	3996960	
3	8	685673	3997411	
4	0.5	678726	3996304	
4	1	678730	3996008	Same as in 2010
4	2.5	678502	3996216	Moved pt 2 from 2010 across road to pond 6, so changed name to 2.5
4	3.5	678591	3996420	Dropped pt 3 from 2010 (Tropicana Outfall) and created 3.5 on pond 5
4	4	678276	3996306	
4	5	678130	3996515	
4	6	678051	3996715	
4	7	678266	3996725	
4	8	678431	3996573	