

2009 Survey for Southwestern Willow Flycatchers along Las Vegas Wash, Clark County, Nevada

Prepared for

Southern Nevada Water Authority

Prepared by

SWCA Environmental Consultants

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**2009 SURVEY FOR
SOUTHWESTERN WILLOW FLYCATCHERS
ALONG LAS VEGAS WASH, CLARK COUNTY, NEVADA**

Submitted to

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EXECUTIVE SUMMARY

Systematic surveys for southwestern willow flycatchers (*Empidonax traillii extimus*) were conducted along an approximately 11-km (7-mile) reach of the Las Vegas Wash (Wash) from May through July 2009. The survey techniques included playback recordings of the southwestern willow flycatcher in accordance with the standardized survey protocol (Sogge et al. 1997). A total of three willow flycatchers were detected in 2009. Two of these individuals were detected during the first survey period and one was detected during the second survey period. All three were later determined to be migrants based on the absence of additional willow flycatcher detections during subsequent surveys of the same areas.

Previous survey reports (SWCA 1999, 2000, 2001, 2002, 2003, 2004, 2006, 2007, 2008, 2009) have identified losses of potentially suitable southwestern willow flycatcher habitat. Although losses continued into 2009, the habitat quality of the revegetation sites planted by the Southern Nevada Water Authority (SNWA) has continued to improve, with a few sites now offering potentially suitable habitat. Although none of the three willow flycatchers were detected in SNWA revegetation sites, one was detected in the Lake Las Vegas mitigation wetland site adjacent to the Clark County Wetlands Park. This area has also developed into potentially suitable southwestern willow flycatcher habitat. Another location that has developed into potentially suitable habitat is the Clark County Nature Preserve, which was surveyed for the first time this year.

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1.0 INTRODUCTION

This study was undertaken in order to further examine the breeding status of the federally endangered southwestern willow flycatcher (*Empidonax traillii extimus*) along Las Vegas Wash (Wash) in Clark County, Nevada. In 1997, as part of the environmental permitting process associated with the proposed development of the Clark County Wetlands Park (Park), through which the Wash flows, it was recognized that potentially suitable southwestern willow flycatcher habitat existed along the Wash and could be affected by the installation of erosion control structures and the development of other Park facilities. At that time, agency biologists recommended that a systematic survey be undertaken to determine whether or not the species breeds within the Park boundary. Initial surveys for the southwestern willow flycatcher were conducted in 1998 (SWCA 1998), and follow-up surveys have been conducted every year, beginning in 1999 (SWCA 1999, 2000, 2001, 2002, 2003, 2004, 2006, 2007, 2008, 2009).

The results of the 2009 survey effort for the southwestern willow flycatcher are presented in this report, the purpose of which is twofold:

1. Document the results of the 2009 surveys with respect to the distribution and abundance of southwestern willow flycatchers in the Wash.
2. Qualitatively estimate the utility of existing and future potential habitat to nesting southwestern willow flycatchers.

2.0 STUDY AREA

The general study area for this survey consists of an approximately 405-ha (1,000-acre) portion of the Wash dominated by tamarisk (*Tamarix ramosissima*; Bureau of Reclamation 1988), with revegetated patches of Fremont cottonwood (*Populus fremontii*) and Goodding willow (*Salix gooddingii*), and contained within the boundaries of the Park (see Figure 1). This area is spread along an 11-km (7-mile) reach of the Wash and includes portions of the City of Henderson, as well as private, county, and Bureau of Reclamation lands. The study area was defined in 1998 in consultation with the Bureau of Reclamation, Clark County, the Southern Nevada Water Authority (SNWA), and the U.S. Fish and Wildlife Service (USFWS). It includes areas that have been and will be revegetated with native species, as well as areas that have been and will continue to be affected by construction of erosion and grade control structures, roads, trails, and other facilities associated with the development of the Park. Areas adjacent to the Park boundary are also surveyed if potentially suitable nesting habitat is present, and if the land is privately owned, permission is obtained from the landowner. In 2009, these areas included the Lake Las Vegas mitigation wetland and a large stand of tamarisk just upstream of the Park on Clark County Water Reclamation District property.

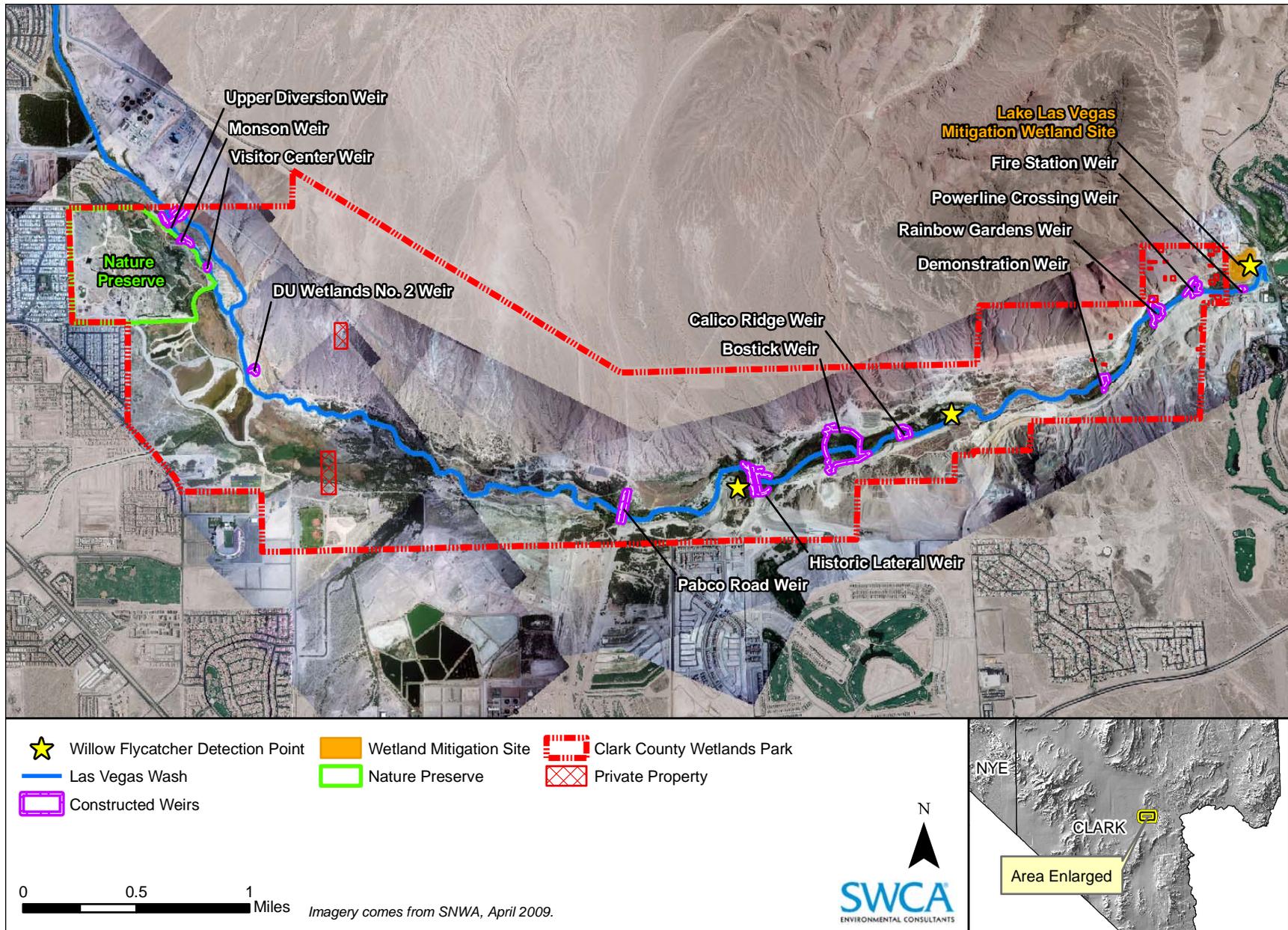


Figure 1. The study area with 2009 willow flycatcher detection points.

3.0 METHODS

3.1 DETECTION SURVEYS

Southwestern willow flycatcher survey efforts focused on areas with tamarisk and species such as Fremont cottonwood and Goodding willow that have the proper structure to be potentially suitable for use by southwestern willow flycatchers. For the purposes of the study, potentially suitable habitat was defined as dense woody riparian vegetation greater than 3.0 m (9.8 feet) in height and with greater than 75% canopy cover. Areas dominated by desert scrub vegetation and other upland habitats known to be unsuitable for southwestern willow flycatchers were not surveyed as part of this effort.

Surveys for southwestern willow flycatchers were conducted from May through July 2009 using playback of a tape-recorded southwestern willow flycatcher song and call notes (*fitz-bew* and *britt*), according to the standard protocol described by Sogge et al. (1997). The five-visit protocol described in Braden and McKernan (1998) and currently mandated by the USFWS was used. Trained observers conducted five surveys of the study area in the three established survey periods: one survey each in the May 15–31 and June 1–21 periods, and three surveys in the June 22–July 17 period. Surveys in 2009 were conducted on the following dates: May 21 and 22, June 10 and 11, June 23 and 24, July 1 and 2, and July 7 and 8. On the first day of each survey, observers covered the north bank of the Wash, and on the second day they covered the south bank.

Surveys were initiated approximately 30 minutes before sunrise and were terminated by 10:00 a.m. (Pacific Daylight Time). Observers played the tape recordings at approximately 20–30 m (65–98 foot) intervals in potential nesting habitat. Excluded from the surveys were extensive areas of dense cattail (*Typha domingensis*), common reed (*Phragmites australis*), and quailbush (*Atriplex lentiformis*) as well as stands of recently burned tamarisk and large areas of tamarisk that exhibited low stature and less than 75% canopy cover. Survey routes primarily followed the edges of dense riparian patches and were designed to permit efficient and effective coverage of as large an area as feasible. Survey routes also attempted to follow the water's edge. This was not always possible, especially in the portion of the Park downstream of Bostick Weir, where the steep, eroded, and high (approximately 10–15 m, or 30–50 foot) banks of the Wash prevent access to the water's edge in some places. Surveys were conducted in this area by walking the "rim" of the Wash and broadcasting the taped song and call notes to the habitat below. Special care was taken to avoid double-counting individuals. If a willow flycatcher was detected calling from roughly the same location on consecutive days, it was counted as a single individual. Likewise, if a willow flycatcher responded from approximately the same location when the tape was played at adjacent calling stations, it was counted as a single individual.

It should be noted that construction activities, although removing potentially suitable habitat in some locations, have also provided access to the active floodplain and improved the ability to survey these areas. Vegetation clearing has also allowed biologists to survey areas that were formerly inaccessible due to impenetrable stands of tamarisk and/or quailbush.

4.0 RESULTS

4.1 2009 RESULTS

During the 2009 surveys three willow flycatchers singing (*fitz-bew*) were detected. The first willow flycatcher was detected at 08:30 on the first day of the first survey (May 21), responding to a playback recording. The individual was located on the north side of the Wash (Figure 1), roughly 0.4 km (0.25 miles) downstream of Calico Ridge Weir. This area has a small backwater section with native vegetation that likely makes it more attractive to willow flycatchers, but the exact mechanism by which this area floods is unknown. The detected willow flycatcher responded multiple times.

The second detection was made at 08:15 on the second day of the first survey (May 22). This detection occurred in thick tamarisk roughly 0.1 km (0.06 miles) upstream of Historic Lateral Weir (Figure 1) on the south side of the Wash. The bird seemed to have been called in from an area nearer to the Wash.

The third willow flycatcher detection occurred at 10:10 on the first day of the second survey (June 10), responding to a playback recording. The individual was located in the Lake Las Vegas mitigation wetland site (Figure 1) less than 0.4 km (0.25 miles) east of the Park border. This wetland is developing into very good willow flycatcher habitat—it has large ponds with emergent vegetation growing on the edges and Goodding willows dominating the upper canopy—and the habitat could continue to improve if the willows are allowed to grow larger and fill in the canopy cover. The detected willow flycatcher responded multiple times. All three individuals were determined to be migrants due to the fact that the subsequent surveys failed to detect any willow flycatchers at or near these same locations.

4.2 2008 TERRITORIAL FLYCATCHER

The southwestern willow flycatcher that displayed territorial behavior and stayed on territory for 34 days in 2008 was not detected on the Wash in 2009. Nor were any other willow flycatchers detected in the 2008 “territory.” Since the southwestern willow flycatcher was detected, the habitat in the territory has been thinned out due to concerns regarding flood flow conveyance through the site.

However, the 2008 territorial bird was detected at another SWCA southwestern willow flycatcher project site (personal communication between Thomas Sharp, SWCA, and Mary Anne McLeod, SWCA Flagstaff office). He was first detected on July 22, 2009 at Overton Wildlife Management Area (Muddy River), singing ebulliently. He was detected again a week later on July 29, at which point he was just whitting, not singing. This area on the Muddy River near Overton, Nevada, is roughly 64.4 km (40 miles) northeast of the original detection site. The individual showed up rather late in the season, possibly suggesting that earlier in the season he had unsuccessfully tried to set up a nest territory in another area.

4.3 RESULTS HISTORY

The 2009 southwestern willow flycatcher survey represents the twelfth annual systematic survey for this species within Park boundaries. During the 1998 survey, two willow flycatchers were detected during the first survey period approximately 2.4 km (1.4 miles) downstream of Pabco Road Weir. It was later concluded that these individuals were migrants based on the fact that they were detected only in the first of the three survey periods. Seven willow flycatchers were detected during the 2000 survey—one during the first survey period and six during the second survey period—and it was conjectured that the second round of surveys (June 8–9) had coincided with a migratory wave. However, because no nesting behavior or activity was observed, and no willow flycatchers were detected during the third survey period despite special care taken to search for the previously detected birds, all seven willow flycatcher detections were considered to be migrant birds. Two willow flycatchers were detected per year during the 2002, 2003, and 2006 surveys, with one of the 2006 detections occurring prior to the official survey season. Again, these individuals were concluded to be migrants. In 2004, 16 willow flycatchers were detected on May 18–19 during the first survey period, and it was speculated that surveys had once again coincided with a migratory wave. Because no willow flycatchers were detected in the last four surveys, all 16 individuals were later concluded to be migrants. In 1999, 2001, and 2005, no willow flycatchers were detected. In 2007, one willow flycatcher was detected on a single survey in the third survey period. This individual was determined to be a southwestern willow flycatcher based on the date of detection, the first documented southwestern willow flycatcher within Park boundaries.

In 2008, eight willow flycatchers were detected. Seven of these individuals were detected during the first survey period and were later determined to be migrants based on the absence of additional willow flycatcher detections during subsequent surveys of the same areas. It was conjectured that the first round of surveys (May 20 and 22) had coincided with a migratory wave, the third of which to be documented in 12 years. One willow flycatcher was detected during the second and third survey periods and was mist-netted and banded. Because it was present in the Wash during the third survey period, in accordance with protocol, it was considered a southwestern willow flycatcher. It was first detected on May 28, between the first and second surveys, and last detected on June 30, just after the third survey. No other willow flycatchers were detected on the site during this period despite significant observation time, and it was concluded that the bird was unpaired. It was on territory for 34 days before abandoning the site, possibly due to the inability to find a mate. This was the first southwestern willow flycatcher to be documented as on territory along the Wash, and the second confirmed detection of the federally endangered subspecies along the Wash.

4.3.1 12-YEAR WILLOW FLYCATCHER SURVEY REVIEW

Annual surveys for southwestern willow flycatchers have been conducted in the study area since 1998. During this time, the Wash has undergone large changes in terms of human encroachment, changing habitat (largely due to SNWA's stabilization and native revegetation program), and weir construction. This section of the report focuses on the willow flycatcher data that has been collected during this time span. Analyses focus on the number of individuals presumed to have

been detected during the 12-year period. “Initially detected” refers to birds detected for the first time. “Previously detected” refers to individuals that were re-detected from a prior survey.

4.3.1.1 WILLOW FLYCATCHERS DETECTED BY YEAR

During the last 12 years, 43 willow flycatchers have been detected along the Wash, only two (4.6%) of which were determined to be southwestern willow flycatchers, and only one (2.3%) of the two was determined to be on territory. The other 41 were concluded to be migrants. The yearly distribution of these birds over the last 12 years is shown in Figure 2.

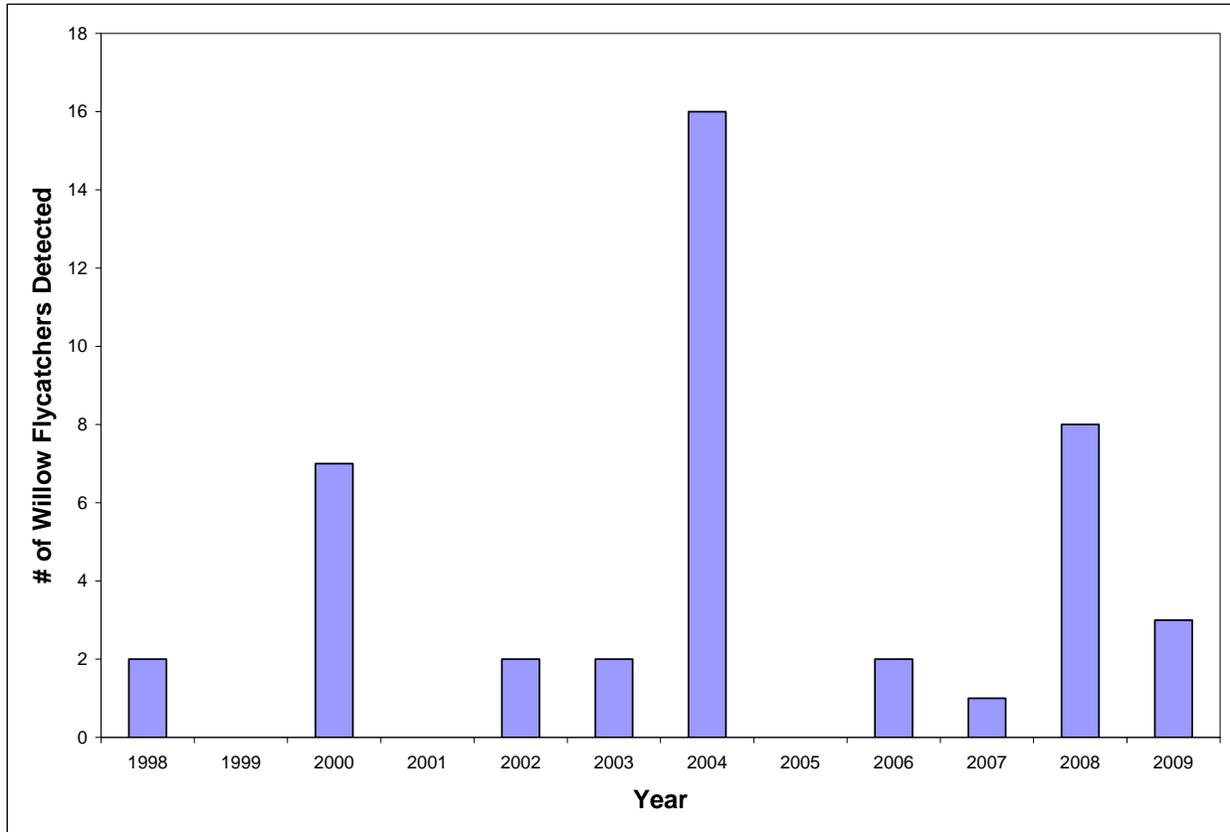


Figure 2. Willow flycatchers detected by year.

The surveys that were completed during the first survey period of 2000, 2004, and 2008 were thought to have coincided with willow flycatcher migratory waves. Whether this migratory wave is a yearly event along the Wash is not known. It may be a relatively unusual phenomenon on the Wash, possibly caused by climatic events. The overall differences in the number of willow flycatchers detected each year may have more to do with random chance of when the surveys occur relative to the timing of migration rather than the number of willow flycatchers using the Wash as a temporary layover per year. However, this remains unconfirmed.

4.3.1.2 WILLOW FLYCATCHERS DETECTED BY DATE

Over the past 12 years, 19 of the 43 (or 44.2%) willow flycatchers' initial detections occurred from May 15 to May 20 (Figure 3), the first six days of the first southwestern willow flycatcher survey period. Thirty-one individuals (or 72.1%) were initially detected during May (including the single pre-survey season detection and the southwestern willow flycatcher that set up a territory, which was first detected May 28 during surveys for other species). Of the remaining 12 (27.9%), 11 (25.6%) were detected for the first time before June 15. Only one willow flycatcher (2.3%) was detected for the first time after June 15, and only two flycatchers (4.6%) have ever been detected after June 15. The first was detected for the first and last time on June 26, late enough in the season to be considered a resident rather than migrant willow flycatcher (Sogge et al. 1997). As such, it was the first documented resident southwestern willow flycatcher detected along the Wash. The second willow flycatcher detection that occurred after June 15 was an individual that had first been documented on May 28 and was continually documented on territory through June 30.

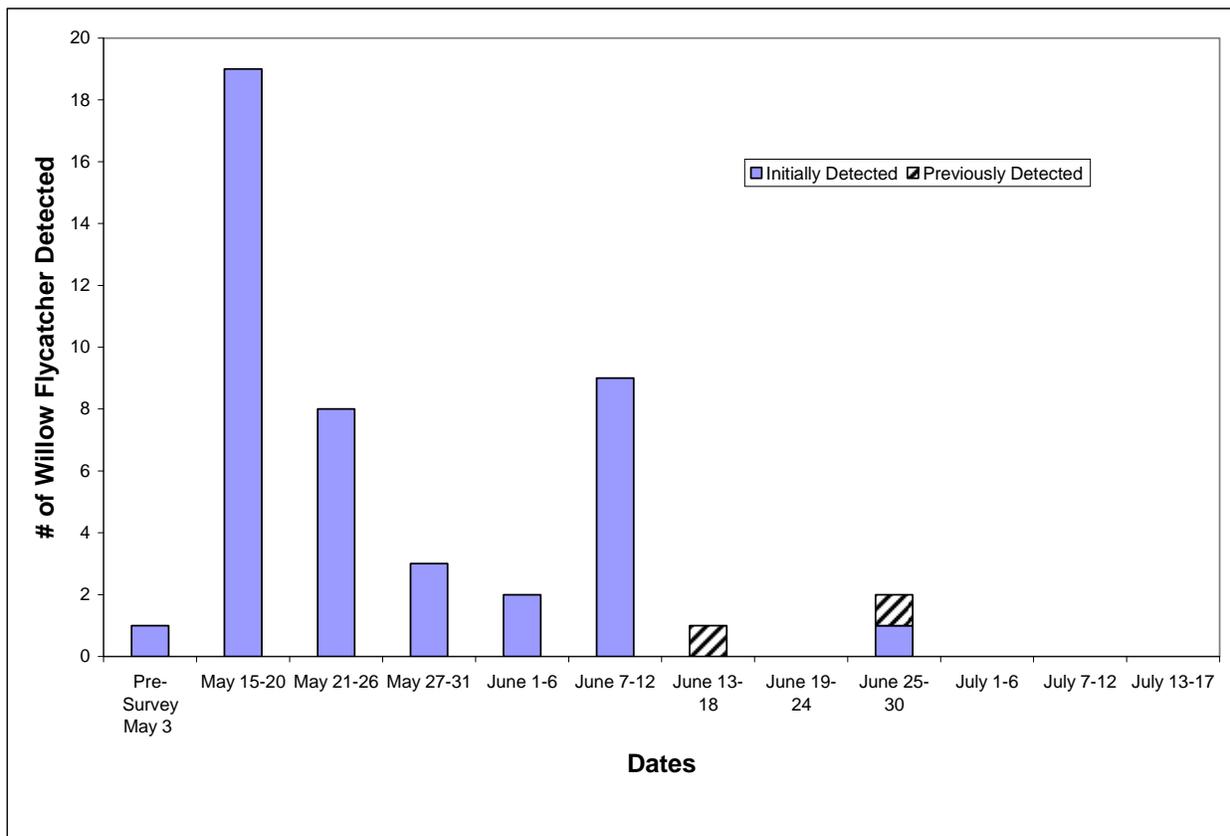


Figure 3. Willow flycatchers detected by date; grouped in five- or six-day periods.

4.3.1.3 WILLOW FLYCATCHERS DETECTED BY SURVEY PERIOD

Forty-two willow flycatchers were detected within at least one of the official survey periods. As can be surmised from the dates given in Section 4.3.1.2, the vast majority of willow flycatchers—30 (or 71.4%)—were initially detected in the first survey period, May 15–31 (Figure 4). Eleven (or 26.2%) were initially detected during the second survey period, June 1–21, while only one (2.4%) bird was re-detected from the first survey period. The last three surveys take place in the third survey period, June 22–July 17. Only one (2.4%) individual was detected for the first time during the third survey period, and it was detected during the first survey of that period. Only two individuals have been detected in the third period, and no willow flycatchers have been detected during the fourth or fifth surveys. Only one individual has been detected during more than one survey period. It should be noted that although the survey protocol was altered in 2001 to add one week to the third survey period and an additional two surveys to the end of the survey window, the first two survey periods were not altered.

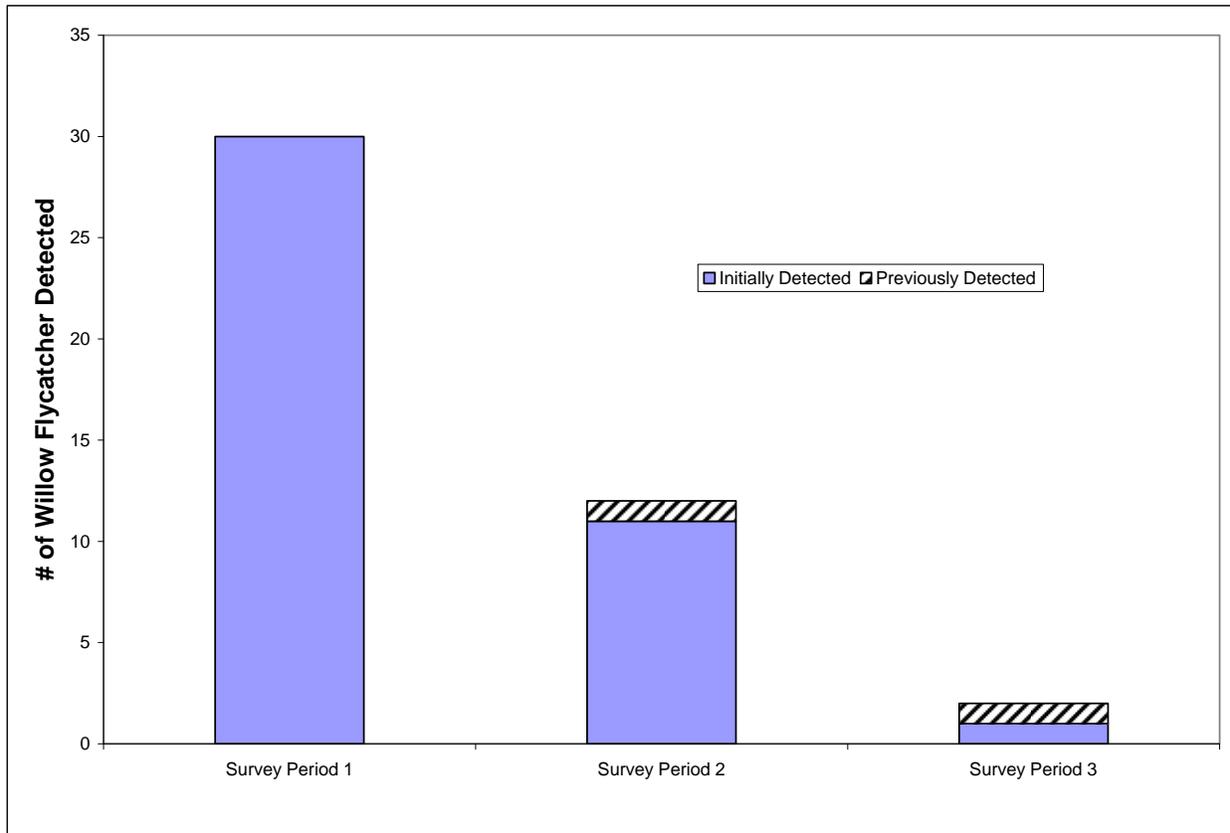


Figure 4. Willow flycatchers detected by survey period.

4.3.2 SPATIAL LOCATIONS OF WILLOW FLYCATCHERS DETECTED

4.3.2.1 2007 HOT SPOTS

The locations of willow flycatcher detections over the last 12 years have been predominantly in thick tamarisk, though more recently in cottonwood groves and willows. Figure 5 shows the locations of all willow flycatchers detected over the past 12 years. Certain locations have been used by willow flycatchers in multiple years, leading to the conclusion that some areas are more agreeable to migrating willow flycatchers than others. Based on this idea, the 2007 report defined four “hot spot” areas. Because of recent changes along the Wash, however, these hot spots are not thought to necessarily be current or future hot spots and are now referred to as past hot spots. These past hot spots are described below with updated information including modifications that are thought to have negatively affected the attractiveness of these areas to willow flycatchers.

Past Hot Spot 1 (PHS1) – Five migrating willow flycatchers have been detected in this area: one each in 2000, 2004, and 2006, and two in 2002. PHS1 is a unique location; although it is roughly 0.65 km (0.4 miles) from the Wash, it has an almost constant source of water in the form of runoff from Sam Boyd Stadium, Duck Creek, and the Clark County Nature Preserve. Habitat in the area is characterized by patchy stands of tamarisk with some standing water beneath the trees. In 2008 this hot spot was substantially degraded due to construction in the area diverting the water source; the hot spot was completely dry throughout the southwestern willow flycatcher surveys. In 2009 some water was present in the hot spot for the first three surveys but was gone by the fourth and fifth surveys. The future of this site as a hot spot remains uncertain and largely depends on the future hydrology of the area. However, even if water is present, this spot shows little promise as a nesting site due to the small patch size, and it will likely only be used as a migration stopover point.

Past Hot Spot 2 (PHS2) – Two migrating willow flycatchers have been detected in this area: one in 2000 and one in 2004. Like PHS1, this area is off the main channel and is dominated by tamarisk. It is fed by a different water source that eventually flows into the main channel. This hot spot has not had a detection in five years, and the vegetation does not show much promise for flycatcher suitability, although the area’s hydrology is most likely favorable. This area will not likely be a hot spot in the future.

Past Hot Spot 3 (PHS3) – Two migrating willow flycatchers have been detected in this area: one in 2000 and one in 2002. Unlike PHS1 and PHS2, PHS3 is associated with the main channel of the Wash. There was once a large, thick stand of tamarisk in this area, but the habitat has undergone much change due to the construction of weirs in the channel. Presently there is nothing to suggest that this area will continue to be a hot spot.

Past Hot Spot 4 (PHS4) – Seven willow flycatchers have been detected in this area in five different years: two in 1998 and 2004, and one in 2007 (which was determined to be a southwestern willow flycatcher), as well as one each in 2008 and 2009. This area is also associated with the main channel and once included large thick stands of tamarisk mixed with some native vegetation, but unlike PHS3 this area has some additional hydrology in the form of a small back water area.

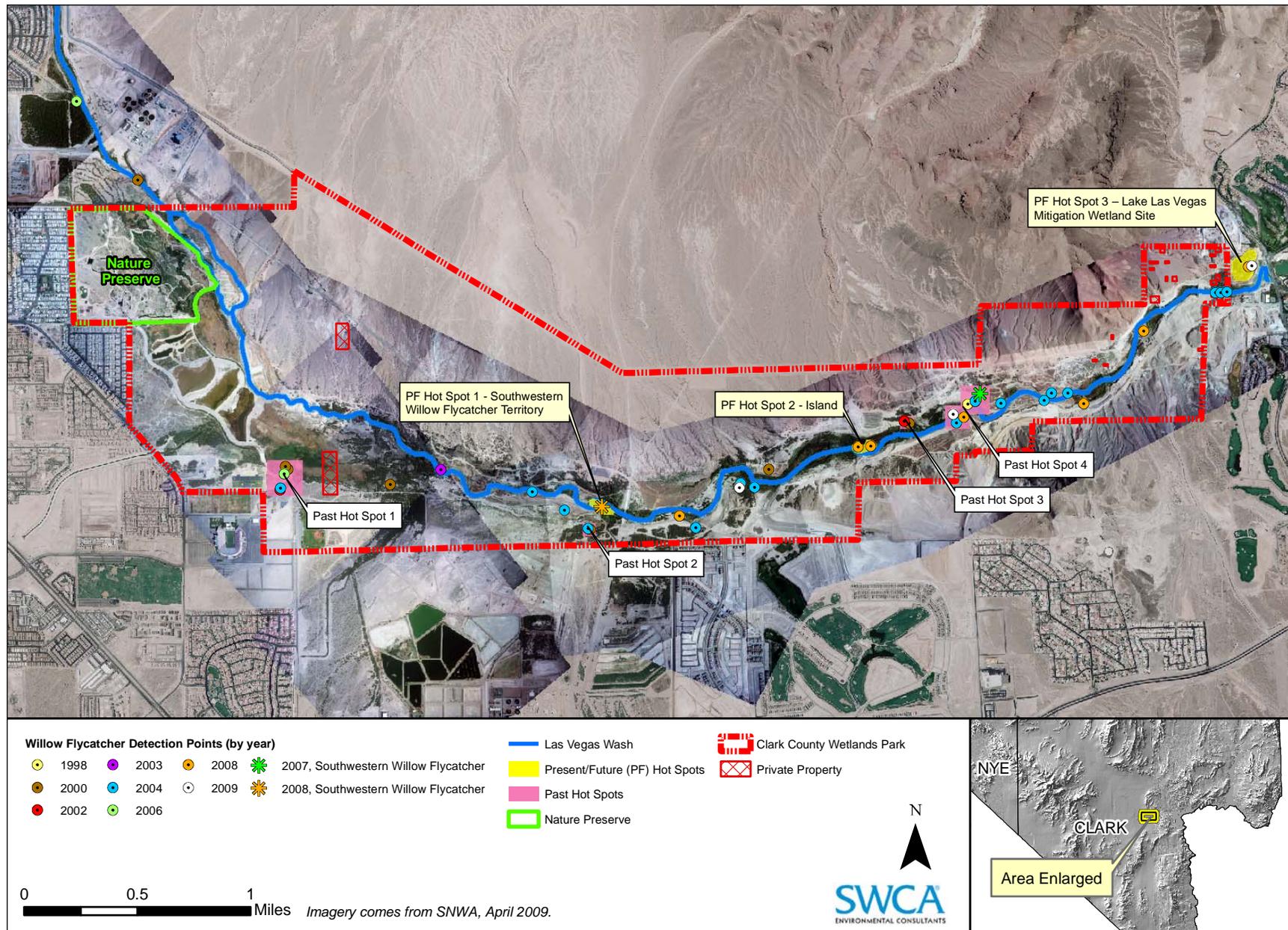


Figure 5. Twelve years of willow flycatcher detections, 1998–2009.

Considering the detections in 2007, 2008, and 2009 (with the 2007 detection representing the first confirmed southwestern willow flycatcher in the Park) and the rather unique back water area, it would seem reasonable to predict that this area will continue to be a hot spot in the future. However, in preparation for the construction of two more nearby weirs, most of the tamarisk was cleared prior to the 2009 surveys, and the habitat that remains will likely be flooded once the weirs are completed. Hence, the area's immediate and long-term future as a hot spot is uncertain.

4.3.2.2 PRESENT/FUTURE HOT SPOTS

Based on present habitat, potential for habitat improvement, and willow flycatcher detections, three new areas have been determined as among the best present and future habitats for willow flycatcher along the Wash (Figure 5). Not surprisingly, all three areas have been replanted with native vegetation, including cottonwoods and willows. These "present/future hot spots" are described below.

Present/Future Hot Spot 1 (PFHS1) – Only one willow flycatcher has been detected in this area. However, this 2008 willow flycatcher is the only southwestern willow flycatcher to be documented on territory within the Park boundaries. The construction of Pabco Road Weir, along with an aggressive replanting program, had made this perhaps the best willow flycatcher habitat area on the Wash. There is an overstory of cottonwood trees in the center of the habitat, and there are willow trees along the edges. The area is also occasionally flooded, keeping humidity high and making the area more attractive to willow flycatchers. However, the hydrology is not fully understood and therefore the area's future hydrology is still somewhat in question. Additionally, early in 2009, the cottonwoods, Goodding willows, and much of the understory were thinned to improve floodwater conveyance through the site, reducing the habitat's potential suitability for nesting southwestern willow flycatchers. This thinned state must be maintained until the Sunrise Mountain Outfall Weir is constructed upstream of the site (expected to occur sometime between 2010 and 2012). Although no willow flycatchers were detected there in 2009, this area still has much potential.

Present/Future Hot Spot 2 (PFHS2) – The second area that has developed into potentially suitable habitat over the last two years (and looks to have potential heading into the future) is located immediately downstream of the Bostick Weir. In this area, islands have grown thick with riparian vegetation, and offer high-quality potentially suitable habitat. Goodding willows are dominant with some sandbar willow and seep willow (*Baccharis salicifolia*) in portions of the understory, and common reed, cattail, and bulrush (*Schoenoplectus* spp.) along the edges. During the 2008 surveys, two migrant willow flycatchers were detected in this area. Although migrating willow flycatchers may use marginal habitats, their presence on these islands implies that this habitat is improving. No willow flycatchers were detected on these islands in 2009.

This area has the potential to be highly dynamic because the existing vegetation is capable of trapping sediment and causing the islands to aggrade relatively quickly. Also, because the vegetation is not moisture limited, island size, vegetative structure, and volume is capable of increasing rapidly. Conversely, the islands are also susceptible to the effects of flood scour, which is capable of reducing their size, degrading their habitat quality, or completely denuding or destroying them depending on the severity of the flood event. Also, changing hydrology could

eventually alter island vegetation, drying it out and making it susceptible to further invasion by common reed or upland plants. However, these islands still have much potential as willow flycatcher habitat.

Present/Future Hot Spot 3 (PFHS3) – The third present/future hot spot site is the Lake Las Vegas mitigation wetland (Figure 5). Although this site falls outside the Park boundary (less than 0.4 km [0.25 miles] east of the Park border), it deserves mention because it really functions as part of the Park. This wetland is developing into very good willow flycatcher habitat—it has large ponds with emergent vegetation growing on the edges, and Goodding willows dominating the upper canopy—and the habitat will continue to improve if these willows are allowed to grow larger and fill in the canopy cover. This area has been surveyed for the last two years, and each of these years a willow flycatcher has been detected.

4.3.2.3 12-YEAR WILLOW FLYCATCHER SURVEY REVIEW DISCUSSION

The 12-year dataset does give insight into the use of the Wash by migrating willow flycatchers as well as potential habitat requirements likely to induce southwestern willow flycatchers to set up a territory on the Wash. The data indicate that the vast majority of migrating willow flycatchers that use the Wash as a stopover pass through the area in May and early June. This timing of use correlates with the first two survey periods.

The first two southwestern willow flycatchers ever detected on the Wash were the June 26, 2007 southwestern willow flycatcher and the May 28, 2008 southwestern willow flycatcher that stayed on territory for 34 days (it was last detected on June 30). That these detections occurred after habitat improvement is likely more than coincidence, and the next several years could be very telling.

Some Wash areas that were termed hot spots in 2007—even while seeming more favorable to migrating willow flycatchers than prospective residents—are not likely to be considered hot spots in the future. Three present/future hot spots represent some of the best potential habitat on the Wash at this time and into the future. Two are within Park boundaries but the third is not. All three areas have experienced major revegetation efforts.

4.4 OBSERVATIONS ON SUITABILITY OF EXISTING AND POTENTIAL FUTURE HABITAT

Our qualitative observations of habitat conditions in the spring and summer of 2009 indicate that site clearing for weir construction, weir maintenance and other activities caused a reduction in the amount of potentially suitable southwestern willow flycatcher nesting habitat available along the Wash between the 2008 and 2009 surveys.

Although overall potentially suitable nesting habitat declined, SNWA's revegetation efforts along the Wash continue to improve the quality of habitat and are developing areas to the point that they have potential use for willow flycatchers. Perhaps the highest-quality potentially suitable habitat is located immediately downstream of the Bostick Weir. Here, the banks and several islands within the Wash have grown thick with riparian vegetation. Goodding willows are

dominant, with some sandbar willow (*Salix exigua*) and seep willow in portions of the understory, and common reed, cattail, and bulrush along the edges. Slightly more water in the islands' understory could make the habitat more ideal. As previously mentioned, the existing vegetation can cause the islands to aggrade, and island size is capable of rapid increase. However, flood scour and changing hydrology could have major effects on the islands, reducing their habitat quality or even destroying them

The area that hosted the first documented territorial southwestern willow flycatcher, located just upstream of Pabco Road Weir on the south bank of the Wash (Figure 5), underwent a major change between the 2008 and 2009 nesting seasons. Planted in 2002, this was among the first areas to be revegetated following the Park's creation. At the time of the 2008 surveys, it was home to a healthy gallery of cottonwoods and Goodding willows, with fairly dense common reed and sandbar willow. The site appeared to flood relatively regularly, keeping the forest floor moist and adding to the area's humidity. The Wash borders the site, as does the outfall channel for the City of Henderson's Water Reclamation Facility. A small backwater pond created by storm scour further enhances the hydrology. However, early in 2009, the cottonwoods, Goodding willows, and much of the understory were thinned to improve floodwater conveyance through the site, reducing the potential suitability of the habitat for nesting southwestern willow flycatchers. This thinned state must be maintained until Sunrise Mountain Outfall Weir is constructed upstream.

Another area that has developed into potentially suitable habitat is the Clark County Nature Preserve (Nature Preserve). The Nature Preserve consists of several constructed wetland ponds surrounded by cottonwoods, sandbar and Goodding willows and other woody riparian vegetation. This location was surveyed for the first time in 2009 and while it did not yield any willow flycatcher detections, it has the potential to in the future.

Although habitats such as these that are located along and within the Wash's main channel are vulnerable to erosion and may be severely degraded or lost during flood events, they can also threaten erosion control structures and bank protection. Weirs can be damaged by the growth of Goodding willows on their surfaces because the willows interfere with their ability to evenly disperse flood flows. Similarly, if allowed to grow too dense in the floodplain, cottonwood and willow galleries form an impenetrable wall to flood flows, forcing the flows to scour around them, eroding the banks and negatively impacting channel configuration. Consequently, areas of cottonwood and willow habitat must be removed or thinned periodically in locations where woody, inflexible vegetation negatively impacts the integrity of the engineered channel bed and bank infrastructure along the Wash.

Lateral erosion, although likely still occurring in portions of the active floodplain, has been minimized by the construction of erosion control structures and bank protection, and has not been observed to have had a major positive or negative effect on potentially suitable southwestern willow flycatcher habitat in the last few years. Although lateral erosion will likely continue to result in the incremental loss of existing riparian habitat in the short term, the associated widening of the floodplain is beginning to create more braided channels, and in time will create abandoned meander loops and isolated floodplain depressions. The creation of these habitat elements should eventually increase the extent of moist-soil and standing shallow-water habitats, which are important elements of southwestern willow flycatcher nesting habitat (Sogge et al. 1997).

Although lateral erosion of the floodplain can help create substrate conditions favorable to the development of southwestern willow flycatcher habitat, this process is tempered by catastrophic flooding and vertical erosion (e.g., headcutting). To the extent to which the existing erosion control structures dissipate floodwater energy (which, in turn, counters headcutting and lateral scour), future conditions will continue to become more favorable to the development of suitable southwestern willow flycatcher habitat along the Wash.

4.5 BROWN-HEADED COWBIRD

Another aspect of southwestern willow flycatcher habitat suitability, somewhat independent of vegetative structure, involves other members of the Wash's avian community. True colonization of the study area by the southwestern willow flycatcher would eventually require successful reproduction. Breeding within the study area may prove difficult for southwestern willow flycatchers due to their susceptibility to brood parasitism by the brown-headed cowbird (*Molothrus ater*), which has been shown to significantly reduce their nesting success (Brown 1994; Sogge et al. 1997; USFWS 1995). All 12 southwestern willow flycatcher survey years have shown cowbirds to be one of the most common (if not the most common) birds found in the study area, with more than 50 seen on a daily basis (see Appendix A). In addition, the somewhat fragmented habitat, which presently is becoming more fragmented due to ongoing construction, maintenance, fires, and other events, makes potential southwestern willow flycatcher nests more susceptible to this type of parasitism than they would be in habitats with more contiguous canopy coverage.

5.0 DISCUSSION

5.1 WILLOW FLYCATCHER MIGRATORY WAVES

During 12 years surveying the Wash, three possible willow flycatcher migratory waves have been documented. The first of these occurred on June 8–9, 2000, when six willow flycatchers were detected over a two-day period. The second was on May 18–19, 2004, when 16 willow flycatchers were detected over a two-day span, and the third occurred on May 22, 2008, when six willow flycatchers were detected. These migratory waves may suggest that the Park has some value to this species even if nesting never occurs. Also, given that only four days of surveying occur between May 15 and June 20, migratory waves in other years could have been easily missed.

It is interesting to note that when six willow flycatchers were detected on the morning of May 22, 2008, the previous morning's survey had been canceled due to excessively high winds in the Park. This suggests that the high number of detections may have been associated with birds temporarily delaying continued migration due to weather conditions. Although this cannot be proven, migrating birds have been documented delaying migration when weather conditions are not beneficial to flying (Berthold et al. 2001).

5.2 2008 TERRITORIAL SOUTHWESTERN WILLOW FLYCATCHER

The fact that the first documented southwestern willow flycatcher on territory in the Park showed up by the Muddy River site in 2009 is interesting on several levels. First, it arrived relatively late

in the breeding season, suggesting that perhaps it had attempted to set up a territory in a different area first. Second, Muddy River is the closest active southwestern willow flycatcher breeding site to the Park. Perhaps Muddy River birds could actively colonize the Park if the habitat is present.

5.3 PAST, PRESENT, AND FUTURE WILLOW FLYCATCHER ACTIVITY ON THE WASH

Twelve consecutive years of intensive systematic surveys for southwestern willow flycatchers along the Wash have not detected nesting southwestern willow flycatchers, and therefore indicate an extremely low probability that the species is currently a regular breeding resident. However, there are several reasons to believe that colonization could occur in the near future.

First, the 1998, 2000, 2002, 2003, 2004, 2006, 2007, 2008, and 2009 surveys detected willow flycatchers in the study area. Although these detections could represent part of a normal willow flycatcher migration pattern, it may be that willow flycatchers are adjusting their migratory route to take advantage of the riparian habitat in the Wash. If so, there could be an increased probability of the Wash being colonized by a migrant, wandering, or dispersing pair of southwestern willow flycatchers. The first time a southwestern willow flycatcher was detected in the Park was during the 2007 survey. This detection was followed in 2008 by the observation of a southwestern willow flycatcher on territory. This increase in use is notable and may indicate that the Wash is becoming more suitable for nesting by this species.

Second, the erosion control structures that have been and are presently being installed continue to foster conditions favoring the development of potentially suitable southwestern willow flycatcher habitat. Third, successful riparian revegetation projects have been occurring and continue to occur on the Wash, and are improving habitat quality.

Finally, there are four known active southwestern willow flycatcher nesting areas within close proximity of the Wash: Mesquite, Nevada, approximately 81 km (50 miles) northeast of Las Vegas; Pahrnatagat, Nevada, approximately 122 km (75 miles) north-northeast of Las Vegas; Mormon Mesa on the Virgin River, approximately 97 km (60 miles) east of Las Vegas; and Muddy River, approximately 71 km (44 miles) northeast of Las Vegas. In the summer of 2009, there were 28 total southwestern willow flycatchers and 16 active nests in Mesquite; there were 24 total southwestern willow flycatchers and 18 active nests in Pahrnatagat; there were 33 southwestern willow flycatchers and 18 active nests in Mormon Mesa; and there were 17 southwestern willow flycatchers and nine active nests in Muddy River. Individuals from these populations have the potential to colonize the Wash.

6.0 RECOMMENDATIONS

After 12 years of surveys, two of the last three years have revealed an increase in southwestern willow flycatcher activity along the Wash. To the extent that this may be correlated with improvements in the habitat quality of the riparian revegetation sites, it suggests that southwestern willow flycatcher activity along the Wash may continue to increase in the future. It is therefore recommended that annual willow flycatcher surveys continue and that areas previously described as having the highest potential habitat value be surveyed with particular

care. It is further recommended that the island habitats downstream of Bostick Weir continue to be physically visited by the surveyors. Additionally, monitoring of the Lake Las Vegas mitigation wetland site and the Nature Preserve should continue into the future.

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**APPENDIX A: ANNOTATED CHECKLIST OF BIRD SPECIES DETECTED ALONG LAS
VEGAS WASH, MAY–JULY 2009**

This annotated checklist identifies the bird species that were detected along the Las Vegas Wash in Clark County, Nevada, during surveys for southwestern willow flycatchers from mid May through early July 2009. Presumed status is from Ryser (1985), Alcorn (1988), and/or our field observations. Relative abundance categories are modified after Phillips et al. (1964); abundance of a given species is based on our field observations. Common names and phylogenetic order conform to ornithological standards established by the American Ornithologists' Union (AOU 1998) and subsequent revisions.

Common Name	Scientific Name	Presumed Status	Relative Abundance
Gadwall	<i>Anas strepera</i>	R	R
Mallard	<i>Anas platyrhynchos</i>	R	C
Blue-winged teal	<i>Anas discors</i>	R	R
Cinnamon teal	<i>Anas cyanoptera</i>	R	R
Ring-necked duck	<i>Aythya collaris</i>	M	R
Bufflehead	<i>Bucephala albeola</i>	M	R
Ruddy duck	<i>Oxyura jamaicensis</i>	R	R
Gambel's quail	<i>Callipepla gambelii</i>	R	C
Pied-billed grebe	<i>Podilymbus podiceps</i>	R	R
Eared grebe	<i>Podiceps nigricollis</i>	R	R
Double-crested cormorant	<i>Phalacrocorax auritus</i>	R	U
Least bittern	<i>Ixobrychus exilis</i>	R	U
Great blue heron	<i>Ardea herodias</i>	R	FC
Great egret	<i>Ardea alba</i>	R	U
Snowy egret	<i>Egretta thula</i>	R	U
Cattle egret	<i>Bubulcus ibis</i>	M	R
Green heron	<i>Butorides virescens</i>	R	FC
Black-crowned night-heron	<i>Nycticorax nycticorax</i>	R	U
White-faced ibis	<i>Plegadis chihi</i>	M	U
Northern harrier	<i>Circus cyaneus</i>	R	R
Cooper's hawk	<i>Accipiter cooperii</i>	R	R
Red-tailed hawk	<i>Buteo jamaicensis</i>	R	R
Virginia rail	<i>Rallus limicola</i>	R	R
Common moorhen	<i>Gallinula chloropus</i>	R	U
American coot	<i>Fulica americana</i>	R	C
Killdeer	<i>Charadrius vociferous</i>	R	FC

Common Name	Scientific Name	Presumed Status	Relative Abundance
Black-necked stilt	<i>Himantopus mexicanus</i>	R	R
American avocet	<i>Recurvirostra americana</i>	R	R
Spotted sandpiper	<i>Actitis macularius</i>	R	U
Greater yellowlegs	<i>Tringa melanoleuca</i>	M	R
Western sandpiper	<i>Caladris mauri</i>	M	R
Least sandpiper	<i>Caladris minutella</i>	M	R
Wilson's phalarope	<i>Phalaropus tricolor</i>	M	R
Ring-billed gull	<i>Larus delawarensis</i>	M	R
Black tern	<i>Chlidonias niger</i>	M	R
White-winged dove	<i>Zenaida asiatica</i>	R	C
Mourning dove	<i>Zenaida macroura</i>	R	C
Greater roadrunner	<i>Geococcyx californianus</i>	R	U
Great horned owl	<i>Bubo virginianus</i>	R	R
Lesser nighthawk	<i>Chordeiles acutipennis</i>	R	FC
White-throated swift	<i>Aeronautes saxatalis</i>	R	FC
Black-chinned hummingbird	<i>Archilochus alexandri</i>	R	FC
Anna's hummingbird	<i>Calypte anna</i>	R	R
Costa's hummingbird	<i>Calypte costae</i>	R	U
Western wood-pewee	<i>Contopus sordidulus</i>	R	R
Willow flycatcher	<i>Empidonax traillii</i>	M	R
Black phoebe	<i>Sayornis nigricans</i>	R	FC
Say's phoebe	<i>Sayornis saya</i>	R	FC
Ash-throated flycatcher	<i>Myiarchus cinerascens</i>	R	U
Western kingbird	<i>Tyrannus verticalis</i>	R	U
Eastern kingbird	<i>Tyrannus tyrannus</i>	A	n/a
Loggerhead shrike	<i>Lanius ludovicianus</i>	R	U
Bell's vireo	<i>Vireo bellii</i>	R	U
Common raven	<i>Corvus corax</i>	R	U
Horned lark	<i>Eremophila alpestris</i>	R	R
Tree swallow	<i>Tachycineta bicolor</i>	M	R
Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>	R	C
Cliff swallow	<i>Petrochelidon pyrrhonota</i>	R	R
Verdin	<i>Auriparus flaviceps</i>	R	FC
Bewick's wren	<i>Thryomanes bewickii</i>	R	FC
Marsh wren	<i>Cistothorus palustris</i>	R	C
Blue-gray gnatcatcher	<i>Polioptila caerulea</i>	R	R

Common Name	Scientific Name	Presumed Status	Relative Abundance
Black-tailed gnatcatcher	<i>Polioptila melanura</i>	R	C
Northern mockingbird	<i>Mimus polyglottos</i>	R	U
Crissal thrasher	<i>Toxostoma crissale</i>	R	FC
Lucy's warbler	<i>Vermivora luciae</i>	R	C
Yellow warbler	<i>Dendroica petechia</i>	R	C
MacGillivray's warbler	<i>Oporornis tolmiei</i>	M	R
Common yellowthroat	<i>Geothlypis trichas</i>	R	C
Wilson's warbler	<i>Wilsonia pusilla</i>	M	U
Yellow-breasted chat	<i>Icteria virens</i>	R	C
Abert's towhee	<i>Pipilo aberti</i>	R	C
Song sparrow	<i>Melospiza melodia</i>	R	C
Western tanager	<i>Piranga ludoviciana</i>	M	R
Black-headed grosbeak	<i>Pheucticus melanocephalus</i>	M	R
Blue grosbeak	<i>Passerina caerulea</i>	R	FC
Lazuli bunting	<i>Passerina amoena</i>	M	R
Indigo bunting	<i>Passerina cyanea</i>	R	R
Red-winged blackbird	<i>Agelaius phoeniceus</i>	R	A
Yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>	R	U
Great-tailed grackle	<i>Quiscalus mexicanus</i>	R	C
Brown-headed cowbird	<i>Molothrus ater</i>	R	A
House finch	<i>Carpodacus mexicanus</i>	R	U
Lesser goldfinch	<i>Carduelos psaltria</i>	R	R

Presumed Status

- Resident (R) Species is apparently present in the area throughout the spring and summer nesting season, probably nesting.
- Migrant (M) Species apparently passes through the area during migration, probably not nesting.
- Unknown (U) The presumed status is in question because insufficient information existed for evaluation of status.
- Accidental (A) Species is far (usually >200 miles) from its normal nesting, migration, or wintering range and is not expected to be seen again.

Relative Abundance

- Abundant (A) Species is easily detected in large numbers (50+) on a daily basis.
- Common (C) Species is easily detected on a daily basis, but not in large numbers (5–50).
- Fairly Common (FC) Species regularly detected in small numbers (2–4) on a daily basis.
- Uncommon (U) Species regularly detected in very small numbers, although not necessarily every day.
- Rare (R) Species detected irregularly in very small numbers.
- n/a Not applicable.

APPENDIX B: SWCA PERSONNEL CONDUCTING THE 2009 STUDY

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