

**State of California  
Natural Resources Agency  
Department of Fish and Game  
Wildlife Branch**

**Light-footed Clapper Rail Management, Study,  
and Propagation in California**

**2010 Season**

**By**

**Richard Zembal, Susan M. Hoffman, John Konecny  
Laurie Conrad, Charles Gailband, and Michael Mace**

**Final Report**

To

State of California  
Department of Fish and Game  
South Coast Region  
4949 Viewridge Avenue  
San Diego, CA 92123

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and Propagation in California**

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Clapper Rail Recovery Fund  
Huntington Beach Wetlands Conservancy  
24821 Buckboard Lane  
Laguna Hills, CA 92653

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# **Light-footed Clapper Rail Management, Study, and Propagation in California**

## **2010 Season<sup>1</sup>**

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### **ABSTRACT**

The thirty-first annual census of the Light-footed Clapper Rail in California was conducted from 5 February to 26 May, 2010. Thirty coastal wetlands were surveyed by assessing call counts from Mugu Lagoon in Ventura County, south to Tijuana Marsh National Wildlife Refuge (NWR) on the Mexican border.

A total of 376 pairs of Light-footed Clapper Rails exhibited breeding behavior in 19 marshes in 2010. This is the third highest count on record, a 17.5% increase over the breeding population detected in 2009, but 15% lower than the high count in 2007. Upper Newport Bay with 131 pairs was once again the largest subpopulation in California with 11.5% fewer rails exhibiting breeding behavior than in 2009 and 24.7% fewer than the high count in 2005 of 174 pairs. Tijuana Marsh NWR did not recover significantly toward the record high level of 142 pairs in 2007 but did increase from 2009 by 33% to 76 breeding pairs in 2010. The Newport subpopulation comprised 35% of the state population in 2010 and the subpopulation in the Tijuana Marsh NWR comprised 20%, together accounting for 55% of the breeding population of this rail in California.

Thirteen of the small subpopulations increased in size from the 2009 totals, increasing by a combined total of 59 breeding pairs in 2010. The subpopulation in Batiquitos Lagoon reached a

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<sup>1</sup>Zembal, R., S.M. Hoffman, J. Konecny, L. Conrad, C. Gailband, and M. Mace. 2010. Light-footed Clapper Rail Management, Study, and Propagation in California, 2010. California Department of Fish and Game, Wildlife Branch, Nongame Wildlife Program Report 2010-11. Sacramento, CA 28pp.

new high total of 36 breeding pairs. Two of the smaller subpopulations were reduced by three and four pairs, respectively. Point Mugu increased by 33% to 12 pairs and the Seal Beach tally was up slightly to 25 pairs. San Elijo Lagoon reached its all-time high count of 15 breeding pairs in 2006 and again in 2010 and the U.C. Kendall-Frost Reserve held strong at 10 pairs. Excluding the two largest subpopulations, there were six subpopulations in double figures, ranging from 10 to 36 pairs and totaling 126 breeding pairs, or 33.5% of the state total. The remaining 11 subpopulations ranged from one to nine pairs and totaled 43 breeding pairs of clapper rails, or 11.4% of the total.

The annual increases in the population total of the Light-footed Clapper Rail between 2002 and 2007 gave encouragement that restoration and management were contributing to the recovery of this endangered bird. The 2008 crash was presumably weather-related and a harbinger of what could be in store if wide weather fluctuations are the future norm. The boost to 376 pairs of Light-footed Clapper Rails in 2010 is a manifestation of the high reproductive potential of this endangered bird, a tangible demonstration of the resiliency of this subspecies.

Evidence of breeding activity in addition to territorial manifestation by vocalizations was observed in 11 of the 12 breeding territories at Point Mugu. That evidence included: four egg nests, each with at least a partial hatch; four additional hatched nests in four territories; and there was evidence of chick-feeding in 11 territories. On the Seal Beach NWR there were 25 clutches of eggs laid on 19 rafts and 28 brood nests were built on 28 rafts. Overall nesting success was 90%. Nest searches at Upper Newport Bay revealed seven incubation nests: five were active when found with two to nine eggs each; one clutch was hatching when discovered; and two were depredated by raccoons, *Procyon lotor*. Four eggs were taken from Newport for relocation in the face of heavy egg losses to raccoons. At the Kendall-Frost Reserve 16 of 21 rafts held nests with 11 clutches of eggs and an additional three clutches in nests off rafts; hatching success was poor at 64% but also was poorly documented. Finally, in Sweetwater Marsh NWR there was no use of the nesting rafts, but seven nests were found in the habitat including evidence of hatching at four nests.

Three of six captive pairs laid eggs in 2010. As a result, 19 Clapper Rails were released to the wild - six in the San Diego River and 13 into Sweetwater Marsh NWR. This brings the total number of rails released to the wild since 2001 to 271.

There was a single trapping and banding session at Upper Newport Bay. Two males and two females were captured and relocated into captivity at the Chula Vista Nature Center. All of the captive-reared rails released to the wild were banded; the annual code for 2010 was a gold anodized band on the right leg. There were multiple sightings of banded rails and rails in unusual places in 2010: a banded female was observed with chicks in freshwater marsh at Point Mugu; a rail banded in 2009 was recovered at San Elijo Lagoon; two banded rails were observed closely at the San Diego River; a rail was in Famosa Slough; and a female released at Point Mugu in 2009 traveled the 160 miles back to Sweetwater Marsh NWR and the Chula Vista Nature Center where she was hatched and reared.

## INTRODUCTION

The Light-footed Clapper Rail (*Rallus longirostris levipes*) is a state- and federally- listed endangered species that is resident in coastal wetlands in southern California and northern Baja, California, Mexico. Loss and degradation of habitat threaten the continued existence of this bird, in spite of ongoing management efforts. The California population of this endangered rail was at a former high of 325 pairs in 15 marshes in 1996, the largest number detected breeding since statewide annual surveys were begun in 1980, until 2004 when 350 pairs were detected in 15 marshes. Since then there were annual increases until the record high in 2007, when 443 breeding pairs were detected in 19 marshes. There was a population crash in 2008 followed by recovery of 37% in 2009 to 320 breeding pairs.

One of the first major investigations of this rail identified the lack of suitable nesting habitat as a major, widespread limiting factor (Massey and Zembal 1980). Subsequent work demonstrated the need for emergency actions and recommended management strategies to stem the alarming population decline of this endangered bird in southern California. The actions taken have included: 1) habitat restoration, particularly through enhancement of tidal action to former wetlands; 2) study and control of introduced predators and unnaturally high predator populations; 3) provision of nesting sites in marshes with good habitat but limited options for protected nesting locations; 4) studies that have led to adaptive management strategies, benefiting the rail and the other co-inhabitants of these biologically-rich ecosystems; 5) development of a protocol for captive breeding and genetic and demographic augmentation of smaller subpopulations; and 6) surveys of the California population, in part to track the effects of management on annual recruitment.

Implementation of these measures has succeeded in protecting and maintaining most of the small subpopulations and in supporting the expansion of a few. However, the benefits of this attention go far beyond this single species. These endangered birds thrive in our most productive, remaining coastal wetlands. Measures that benefit this rail and its environs enhance conditions for a myriad of other species as well, including people. These places and the wildlife are cherished by hundreds of thousands of southern Californians for their inherent aesthetic, recreational, economic, scientific, educational, and ecological values. Furthermore, there are essential links between the coastal wetlands and vast acres of diverse upland habitats and wildlife located many miles from the coast (Soule et al. 1988, Zembal 1993). Consequently, restoring and maintaining the diversity and vital productivity of the coastal wetlands, while achieving the recovery of the Light-footed Clapper Rail, may only be possible in an environment that includes coastal southern California's complete wildlife heritage.

Hundreds of wetland acres have undergone, or are being planned for restoration. However, full recovery and functionality of a coastal wetland may take decades to achieve. In the meantime, habitat suitability for the clapper rail may be quite marginal. All but a few of the current subpopulations of Light-footed Clapper Rails depend upon a marginal habitat base and are too small to be expected to maintain themselves without management. Population monitoring is

essential in understanding the effects of other management efforts and in stewardship of this critically endangered bird toward recovery. Reported herein are the results of the 2010 statewide survey, management, and propagation efforts for the Light-footed Clapper Rail.

## STUDY AREAS

Descriptions of all the marshes recently occupied by Light-footed Clapper Rails are available (U.S. Fish and Wildlife Service 1985 and Zembal and Massey 1981). Three of the current principle study areas are at the Naval Air Station Point Mugu (NASPM, also Point Mugu), the Seal Beach NWR, and Upper Newport Bay State Ecological Reserve.

The marsh at Point Mugu is located in southeastern Ventura County on the 1,821 ha (4,500 acres) NBVC, about 13 km (8 miles) west of the Los Angeles County line. There are 1,012 ha (2,500 acres) of jurisdictional wetlands in Point Mugu (USACOE/EPA 1994), including the largest functioning salt marsh in coastal southern California today. Considering the combined acreages of marshes that are regularly occupied, the vegetated marsh and most closely-associated habitats at Mugu Lagoon represent more than 25% of the clapper rail's potential habitat base. The marsh is subject to nearly full tidal action in the central and eastern arms with an amplitude of about nine feet. The tides are dampened by constrictions at Laguna Road and farther west, resulting in a tidal amplitude of only four to five feet. The wetland vegetation is dominated by pickleweed (*Salicornia virginica*) but scattered stands of spiny rush (*Juncus acutus* ssp. *leopoldii*) are critical for rail nest placement.

The Seal Beach NWR covers 369 ha (911 acres) of the 2,024 ha (5,000 acres) Seal Beach Naval Weapons Station in Orange County near the City of Seal Beach. About 299 ha (739 acres) of the refuge lands are subject to regular inundation by the tides. There are about 229 ha (565 acres) of salt marsh vegetation, 24 ha (60 acres) of mudflats that are exposed daily, and 46 ha (114 acres) of channel and open water. The wetlands are fully tidal, with a range of about - 0.5 m (1.7 ft) to + 2.2 m (7.2 ft) MLLW, and very productive with a high diversity and abundance of wildlife.

Upper Newport Bay is an Ecological Reserve of the California Department of Fish and Game (CDFG), located approximately 22 km (13.7 mi) down coast of the Seal Beach NWR. Approximately 304 ha (750 acres) are fully tidal, including 105 ha (260 acres) of marsh. The bay is bordered by bluffs, nine to 18 m (30 - 59 ft) high, and surrounded by houses and roads. There are approximately 100 ha (247 acres) of shrublands remaining undeveloped on the edge of the wetlands and two local drainages with some cover along them coursing into the bay.

## METHODS

### Population Assessment

The thirty-first consecutive annual census of Light-footed Clapper Rails in California was conducted from February 5 through May 26, 2010. Thirty coastal wetlands were surveyed by

mapping territorial pairs based on their calls (Zemba and Massey 1981, 1985; Zemba 1992). All of the coastal marshes with known or suspected rail subpopulations were surveyed until an evening or early morning with good calling activity was encountered. Small wetlands with no recent clapper rail sightings that again yielded negative results were surveyed at least twice as were marsh parcels with lower than expected results on the first call count. Additionally, nesting data were considered in the assessment of the subpopulations inhabiting the three wetlands wherein such data were gathered in 2010 and a pre-nesting high tide count was accomplished on December 9, 2009 on the Seal Beach NWR; a post-nesting high tide count will be scheduled for November 5, 2010. This NWR is the only wetland inhabited by clapper rails that is inundated thoroughly enough during a 6.7 ft. tide or higher to get a relatively complete visual survey of the rails.

In the two marshes with abundant clapper rails, mapping spontaneous calls was the prevalent technique. In marshes with fewer rails and along long, narrow strips of habitat, playbacks of taped "dueting" were used sparingly to elicit responses. In the Tijuana Marsh NWR, enough observers were stationed within potential hearing range of any calling rail to cover the entire marsh on a single evening. However, most of the marshes were surveyed by a single observer visiting discrete patches of habitat on consecutive evenings until all available habitat had been covered. Most of the observations were those of three observers, but primarily the principal investigator. Additional observers participated primarily in three of the year 2010 counts, those at Seal Beach NWR, Tijuana Slough NWR and Kendall-Frost Reserve.

The more movement required of an observer during a survey, the more likely that breeding, but infrequently calling, rails would be missed. Calling frequency and the detection of calls are influenced by observer's hearing ability and experience with the calls, the stage of breeding of individual pairs, rail density, and weather conditions (Zemba and Massey 1987). Many surveys attempted on stormy, windy days needed to be repeated. When calling frequency is high with many rounds of calling as adjacent pairs respond to one another, it is possible to map the rails accurately and move on to survey more marsh area. However, under usual circumstances, approximately 20 ha (50 acres) of marsh can be adequately covered during a single survey.

Surveys are usually conducted in the two hours before dark, but some are done between first light and about two hours after sunrise. In the past, early morning and late evening surveys have been comparable, although evening calling by the rails is more intense and often ends with one or more flurries of intense calling (Zemba et al. 1989).

The playback of a taped "clapping" call appears to be responded to by the rails as if a living pair is calling nearby. However, work done with Yuma Clapper Rails (*Rallus longirostris yumanensis*) strongly suggests that this closely-related species can become conditioned to the tape if it is used excessively (B. Eddleman, pers. comm.). During prime calling times in the evening or early morning, a playback sometimes elicits a single response or a round of calling. However, there are sometimes no vocal responses to the tape. If played at a time of day when the rails are not particularly prone to call, the only response likely to be elicited is that of the

territorial pair intruded upon. Sometimes the response is non-vocal investigation by the pair or one member. Repeated playbacks are likely to elicit aggression. When used only once per year at a given marsh and with minimal repetition, playbacks have yielded important results. Unmated clapper rails, for example, often respond at considerable distances and may approach the tape. Isolated single rails often approach very closely and remain in the vicinity unless displaced.

In assessing the rail population, duets and some single "clapperings" were treated as territories. Since advertising singles are not indicative of an occupied territory with reproductive potential at the time of the survey, they are not included in the population total. However, a single "clapping" is as good an indicator of a territory as a duet, when advertising is not heard later from the same territory. Eventually, during a two to four hour census period, pairs often dueted from territories where only single pair members had called earlier. However, the fewer rails in a marsh, the more important it is to count only duets as pairs to avoid over-estimating the breeding subpopulation. The 2010 call counts were conducted on 43 dates and totaled approximately 387 field-hours.

#### Management and Monitoring of Nesting Sites

Fleischer et al (1995) documented low genetic variability in Light-footed Clapper Rails and recommended translocations from larger to small subpopulations for the inherent genetic and demographic benefits. We are still vigilant for potential translocation opportunities with eggs but have mostly used captive-bred juveniles in recent years (see below).

A review of the literature and examination of the feasibility of translocation was completed for this rail (Hoffman 1995). A maximum of nine males and six females were proposed in that study for translocation from Newport to Seal Beach NWR. This is a lower number than usually proposed for translocation but might represent a reasonable approach, given the rarity of this rail. In 1997, for example, 15 rails equaled 5% of the breeding population at Upper Newport Bay (Table 1). Moving 15 adult rails from Newport to each of five marshes represents moving 25% of this largest subpopulation. That is more birds than should be moved in a single year. We proposed to move fewer, up to 10 rails each to as many of the target marshes as possible each year. It should be noted that there is some precedence for positive results, even with very low numbers of relocated birds. For example, translocations of Red-cockaded Woodpeckers (*Picoides borealis*) have involved only one to four birds and resulted in successful breeding and recruitment (Allen et al. 1993).

Potential egg translocations necessitated nest searching and monitoring at Upper Newport Bay and the five marshes to potentially receive eggs. Nest searches and observations were begun in February and continued into July 2010. The activities were conducted as they have been in the past (Massey and Zembal 1980, Massey et al. 1984). Extreme care was taken to minimize visitation and disturbance.



Nest searches at two of the six wetlands potentially involved in translocations were focused mostly on the artificial nesting rafts deployed in them for the rails. Three other wetlands used to have rafts deployed, maintained, and monitored annually in each but the efforts were abandoned because of low use. Point Mugu was one such marsh; 25 floatable rafts were deployed there in 1988. However, there was never any evidence that the rails used the rafts until recently (see below). Although many marshes occupied by rails suffer from a poor supply of good nesting sites, artificial nesting rafts have been used in only four of seven marshes where they have been tried. Those four and the number of rafts in each during the 2010 season were Point Mugu with 10 rafts, Seal Beach NWR with 83 rafts, Kendall-Frost Reserve with 21 rafts, and Sweetwater Marsh NWR with 10 rafts. The rafts in Kendall-Frost and Seal Beach were refurbished in February and early March and visited approximately every three weeks during the breeding season into July. The rafts at Point Mugu and Sweetwater Marsh NWR were visited four and two times, respectively. Raft maintenance and monitoring involved a minimum of 294 field-hours.

A new nest raft design and cover were first deployed in 2008 and 2009. The raft looks like a small palette measuring 33 in X 24 in. The top is made of four 1 in X 6 in pine boards and the sides and two bottom slats are made of 1 in X 3 in boards fastened perpendicular to the top and forming three compartments on the underside of the raft that hold Styrofoam for flotation. The raft is anchored in the marsh by  $\frac{3}{4}$  in PVC fastened to the middle of the long sides and extending 62 in from each side to a cross bar of PVC that is anchored with two 70 in long pieces of  $\frac{3}{8}$  in rebar driven at an angle into the mud. The covers were woven willows and reeds or constructed of a PVC and wire cage covered in quack grass. The cover was fastened with wood screws and plastic ties. This new design eliminates the upright dowels (potential raptor perches) and renders the rafts less conspicuous in the marsh.

Nest searches and monitoring were focused at Upper Newport Bay, Point Mugu, Seal Beach NWR, Kendall-Frost Reserve, and there were four searches in Tijuana Slough NWR and two in the Sweetwater Marsh NWR in 2010. At Upper Newport Bay, between March and June, three observers conducted six field-days and 60 field-hours of nest searching and observation. There were six dates at Point Mugu during which two to three participants spent 101 field-hours surveying. On the Seal Beach NWR, one to two observers accumulated 172 field-hours over 24 dates. There were 143 field-hours spent at the Kendall-Frost Reserve by three to 17 observers over eight dates. Lastly, in Tijuana Slough, one to five observers expended 114 field-hours nest searching over four dates, and 46 field-hours were expended at Sweetwater Marsh. The nesting and other activities of the captive rails at the Chula Vista Nature Center, Sea World, and the Wild Animal Park were monitored daily by one to seven observers totaling many hundreds of hours.

#### Development of a Protocol for Captive Breeding

A wetland aviary was developed at the Chula Vista Nature Center (CVNC or Chula Vista), adjacent to the Sweetwater Marsh NWR to house Clapper Rails and develop a protocol for captive breeding (Bayfront Conservancy Trust 1995). The first pair of rails was taken into the facility in December 1998. The second pair was taken into captivity in November 2000 and young Light-footed Clapper

Rails were produced in captivity for the first time in 2001. Any eggs produced by these captive rails were to be used in the egg translocation efforts or hatched and reared in captivity, preferably by the parents and released into Point Mugu. However, because 28 of 60 captive-reared and released rails had been from one breeding pair from 2001 to 2003, care had to be taken not to genetically swamp the Mugu rails. Consequently, there were four other marshes where captive-reared young could be released initially and five more marshes that were added in 2004 and 2005 (Zembal et al. 2005).

There were six potential breeding pairs in captivity in 2010, two pairs at each of the three facilities. The CVNC housed rails #208/052 and 219/217; Sea World held #089/218 and 359/366; and the San Diego Zoo Safari Park kept #362/209 and 207/246. The male #208 was banded 103544891 (L) at Newport on October 8, 2005 and mated with female #052 that was captured from Newport on September 20, 2002. The pair 219/217 were hatched at Sea World on May 23 and 15, 2006, respectively, from eggs taken from two different nests at Upper Newport Bay. The male #089 was hatched at Sea World on June 3, 2003 from a Newport egg and mated to #218, a Sea World hatchling on May 22, 2006 from an egg taken from Newport. The male 359 was hatched from a Newport egg at Sea World on June 11, 2009; the female 366 was trapped from Tijuana Estuary on October 5, 2009. The male #362 was hatched at Sea World on June 19, 2009 from a Newport egg and mated to #209, a Newport capture from November 29, 2005. The male #207 was trapped from Newport on September 19, 2005 and mated to #197 from a Newport egg hatched at Sea World on May 19, 2005. The female #197 was the only casualty during fire evacuation at the Safari Park and was replaced with a female # 246 captured at Upper Newport Bay on November 25, 2007 and banded #103544924.

We attempt to mix the genetic stock of the captive breeders by adding new rails hatched from Newport eggs collected annually when possible. Sometimes adults are trapped from Newport and added to the captive flock. In 2010, reproduction was mediocre in Newport and depredation by raccoons was still a major issue. Even so, four eggs were taken into captivity for relocation from Newport nests, two each from two nests on June 15. They were incubated and hatched at Sea World.

Rail chicks that are hand-reared at Sea World are transferred from the hatcher to a brooder box in which the temperature is maintained at 88 – 90° F for the first week, then gradually decreased to ambient. A recording of outdoor marsh sounds was played in the background. Chicks are fed with a puppet to avoid imprinting. Food items include small cut up pieces of lettuce, cricket abdomens, and as the chicks grow, graduating to whole live crickets, guppies, herring filets, pieces of capelin without bones or scales, krill with tails and heads removed, live meal worms with heads removed, live wax worms with heads removed, live black worms, pinkies, live red worms, mussels, and “rail mix”. Rail mix was composed of Mazuri waterfowl starter, soaked dry dog food, and hard-boiled eggs. Food items were sprinkled with vitamins and fed hourly. As the chicks grew, the commercial diet was phased out and replaced with live foods plus thawed frozen fish and krill. At eight to 10 days the chicks were moved from the brooder boxes to the indoor runs. The runs were lined with dirt and planted with plenty of cover. At one month the young rails were moved to the

“conditioning” pens at CVNC to prepare for release into the wild. The Sea World diet and protocol was appended to the 2005 annual clapper rail report (Zemba et al. 2005); there were refinements made to the protocol again in 2009.

In 2010, one to four observers monitored the captive rails from several minutes to many hours daily at the CVNC, Sea World, and Safari Park. Forty thousand visitors were given the opportunity to view the rails at Chula Vista, hear about their plight, and the importance of their ecosystem. The rails at Sea World were incorporated into the educational program curriculum in 2007 and approximately 15,000 students observed and studied them; the rails at the Safari Park have been isolated from visitor contact as were the Sea World rails in 2008 to 2010.

### Banding and Telemetry

Trapping and banding sessions were conducted only at Upper Newport Bay and there was no telemetry in 2010. At Newport, six participants monitored 20 traps for three hours on October 7. The primary purpose for trapping at Newport has been to refresh the captive flock. Preferably, old breeders are replaced with young raised from wild eggs, alleviating the need for trapping. However, the breeding performance of hand-reared males has been poor.

All of the 19 Clapper Rails raised in captivity and released to the wild in 2010 were first banded except for one individual that escaped at Sweetwater Marsh prior to banding (see Zemba and Massey 1983 for a full discussion of trapping and banding techniques). Five rails were put into the San Diego River on July 5 and 13 were released into Sweetwater Marsh on 22 September. The annual code for 2010 was an anodized gold metal band on the right leg; the Service band was placed on the left leg. USFWS band numbers on the rails released to the San Diego River were #1065-39879 – 1065-39883 and into the Sweetwater Marsh NWR were #1065-39885 – 1065-39897.

## **RESULTS and DISCUSSION**

A total of 376 pairs of Light-footed Clapper Rails exhibited breeding behavior in 19 marshes in 2010 (Table 1). This is a 17.5% increase over the breeding population detected in 2009, but 15% lower than the high count in 2007. The state total has been smaller than in 2010 in 29 of the 31 years of record. The subpopulation in Upper Newport Bay was once again the largest in California but down by 11.5% from 2009 and 24.7% lower than the record high in 2005.

The Tijuana Marsh NWR subpopulation recovered slightly with an increase of 33% to 76 nesting pairs but was well below the record level of 142 pairs in 2007. The Newport subpopulation comprised 35% of the state total in 2010 and the Tijuana Marsh NWR subpopulation comprised 20%, together accounting for 55% of the breeding population of the Light-footed Clapper Rail in California. In addition, six marshes held 10 to 36 pairs each for a combined total of 122 pairs or 33% of the state total.

Five egg nests were found in 2010 in Upper Newport Bay compared to six in 2009 and two in 2008. Nest searching effort has been similar from year to year and in the same locations with three observers spending 60 field-hours over six field-days in 2010. One of the two 2008 nests was depredated. In 2009, three of six egg nests were depredated and the eggs were not viable in a fourth. In 2007, intensive nest searches over 17 days, perhaps 100 acres, and 300 field-hours revealed only six incubation nests, four of which were depredated in the same areas that in 2006 held 24 nests, 12 of which were active egg nests when discovered. Nesting activity and hatching results have gravely deteriorated recently in Upper Newport Bay in part due to raccoons, *Procyon lotor*. There is raccoon sign well out into the marsh, spanning the bay, and stirring of sediments, habitat disturbance, and noise associated with the ongoing dredging activity. In spite of this, this subpopulation rebounded and is maintaining its numbers, so far.

Tijuana Marsh's subpopulation was 87 pairs strong for two consecutive years prior to the 2006 high count of 102 breeding pairs, followed by an even higher record count of 142 pairs in 2007. That 40-pair increase in 2007 was not detected at any marsh except Upper Newport Bay; the 95 pair decrease in 2008 was simply unprecedented. This subpopulation had not been that small since 1991. The 19-pair increase in 2010 places this subpopulation's size directly in mid-range for the 2000s thus far; it was smaller in five of 11 years and larger in the other five years since 2000. Six of the pairs detected in 2010 were in the restored "Model Marsh" south of the river where several post-hatching nests were found. The rails increased gradually in Batiquitos Lagoon as the ecological functionality of the wetland continued to improve over time following the major restoration project implemented there by December 1996. The lagoon has remained tidal and rail habitat has been increasing and improving. Breeding rails were detected on the north side of the lagoon for the first time in 2004 and a total of 11 pairs was detected. Clapper Rail numbers grew to 22 pairs in 2007 and 2008 and Batiquitos Lagoon was the third largest subpopulation in the state in 2008. New highs were reached in both 2009 and 2010 and with 36 pairs, the Batiquitos subpopulation was again the third largest in the state in 2010.

In 2010, there were two breeding pairs vocalizing from habitat adjacent to the western tern island; 11 pairs along the north edge of the inner lagoon; 21 pairs along the southern edge; and a pair in the northeast corner of the basin just west of the freeway. The cordgrass in the west basin is extensive and looks vigorous, although most of it is too submerged during higher tides to provide adequate nest cover. Finally, a pair responded to the tape from freshwater reeds along the southeast creek at Levante and El Camino Real.

Table 1. Census of the Light-footed Clapper Rail in California, 1980-2010.

Part I: 1980 - 1989

| Location                  | Number of Pairs Detected In: |      |      |      |      |      |      |      |      |      |
|---------------------------|------------------------------|------|------|------|------|------|------|------|------|------|
|                           | 1980                         | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
| Santa Barbara County      |                              |      |      |      |      |      |      |      |      |      |
| Goleta Slough             | 0                            | 0    | -    | 0    | -    | -    | -    | -    | 0    | 0    |
| Carpinteria Marsh         | 16                           | 14   | 20   | 18   | 26   | 7    | 4    | 5#   | 2#   | 0    |
| Ventura County            |                              |      |      |      |      |      |      |      |      |      |
| Ventura River Mouth       | -                            | -    | 0    | 0    | -    | -    | -    | -    | -    | 0    |
| Santa Clara River Mouth   | -                            | -    | 0    | -    | -    | -    | -    | -    | -    | 0    |
| Mugu Lagoon               | -                            | 0    | -    | 1    | 3    | 7    | 6    | 7#   | 7#   | 5    |
| Los Angeles County        |                              |      |      |      |      |      |      |      |      |      |
| Whittier Narrows Marsh    | -                            | -    | -    | *    | 0    | -    | -    | -    | -    | 0    |
| Orange County             |                              |      |      |      |      |      |      |      |      |      |
| Seal Beach NWR            | 30                           | 19   | 28   | 20   | 24   | 11   | 5    | 7    | 14   | 6#   |
| Bolsa Chica               | 0                            | 0    | 0    | 0    | -    | -    | -    | *    | 0    | 0*   |
| Huntington Beach Wetlands | -                            | 0    | -    | -    | -    | -    | 0    | 0    | 0    | 0    |
| Upper Newport Bay         | 98                           | 66   | 103  | 112  | 112  | 87   | 99   | 119  | 116  | 116  |
| San Joaquin Reserve       | -                            | -    | 5    | 4    | 1    | 2    | 1    | 0    | 0    | 0    |
| Carlson Rd Marsh          | -                            | -    | 5    | 4    | 2    | 0    | 0    | 1#   | 0    | 0    |
| San Diego County          |                              |      |      |      |      |      |      |      |      |      |
| San Mateo Creek Mouth     | -                            | -    | 0    | 0    | -    | -    | 0    | -    | 0    | 0    |
| Las Pulgas Canyon Mouth   | -                            | -    | 0    | 0    | 0    | -    | -    | -    | -    | 0    |
| Las Flores Marsh          | -                            | -    | 0    | 0    | 0    | -    | 0    | -    | 0    | 0    |
| French Canyon Mouth       | -                            | -    | -    | 0    | 0    | -    | -    | -    | -    | 0    |
| Cocklebur Canyon Mouth    | -                            | -    | 1    | 0    | 0    | -    | -    | 0    | 0    | 0    |
| Santa Margarita Lagoon    | 0                            | 0    | 2    | 1    | 2    | 1    | 1    | 1    | 1    | 0    |
| San Luis Rey River Mouth  | -                            | -    | 0    | 0    | -    | -    | 0    | 0    | 0    | 0    |
| Guajome Lake Marsh        | -                            | -    | 0    | 1    | 2    | 0    | 0    | 0    | 0    | 0    |
| Buena Vista Lagoon        | 0                            | 0    | 0    | *    | 0    | -    | -    | -    | 0    | 0    |
| Agua Hedionda Lagoon      | 1                            | 2    | 1    | 7    | 6    | 1    | 0    | 0    | 0    | 0    |
| Batiquitos Lagoon         | 0                            | 0    | 0    | 0    | 0    | -    | -    | -    | -    | 0    |
| San Elijo Lagoon          | -                            | 5a   | 4    | 4    | 10   | 1    | 0    | 2    | 5#   | 7#   |
| San Dieguito Lagoon       | -                            | -    | -    | -    | -    | -    | -    | *    | 0    | 0    |
| Los Penasquitos Lagoon    | -                            | 0    | -    | 0    | 0    | -    | 0    | -    | 1a#  | 0    |
| Kendall-Frost Reserve     | 18                           | 16   | 6    | 20   | 24   | 17   | 12   | 6a#  | 4a#  | 4#   |
| San Diego River           | -                            | 3    | 1    | 2    | 2    | 1    | 0    | 0    | 1a#  | 0#   |
| Paradise Creek Marsh      | 1                            | 2    | 3    | 1    | 1    | 0    | 0    | 0    | 0    | 0    |
| Sweetwater Marsh          | 4                            | 5    | 7    | 6    | 14   | 3    | 9    | 5a#  | 5    | 5#   |
| E Street Marsh            | 3                            | 1    | 3    | 3    | 2    | 2    | 2    | 0a   | 1#   | 0    |
| F Street Marsh            | -                            | 1    | 1    | 0    | 1    | 0    | 0    | 0    | 0    | 0    |
| J Street Marsh            | -                            | 1    | 0    | 0    | -    | -    | 0    | 0    | 0    | 0    |
| Otay River Mouth          | 3                            | 4    | 5    | 3    | 5    | 1    | 1    | 0    | 0    | 0    |
| South Bay Marine Reserve  | 3                            | 3    | 1    | 1    | 2    | 1    | 1a   | 2#   | 5    | 5#   |
| Dairymart Ponds           | -                            | -    | -    | -    | -    | -    | 0    | *    | 1a   | 0#   |
| Tijuana Marsh NWR         | 26                           | 31   | 25   | 41   | 38   | 0    | 2    | 23a# | 14a# | 15a# |
| Total: pairs              | 203                          | 173  | 221  | 249  | 277  | 142  | 143  | 178  | 177  | 163  |
| marshes                   | 11                           | 15   | 18   | 18   | 19   | 14   | 12   | 11   | 14   | 8    |

Table 1. Census of the Light-footed Clapper Rail in California, 1980-2010.  
(continued) Part II: 1990 - 1999

| Location                  | Number of Pairs Detected In: |      |      |      |      |      |      |      |      |      |
|---------------------------|------------------------------|------|------|------|------|------|------|------|------|------|
|                           | 1990                         | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
| Santa Barbara County      |                              |      |      |      |      |      |      |      |      |      |
| Goleta Slough             | 0                            | 0    | 0    | 0    | -    | -    | 0    | 0    | -    | -    |
| Carpinteria Marsh         | 0                            | 0    | 0    | 0#   | 0    | 2#   | 3#   | 5#   | 3#   | 2#   |
| Ventura County            |                              |      |      |      |      |      |      |      |      |      |
| Ventura River Mouth       | 0                            | 0    | 0    | 0    | 0    | 0    | 0    | -    | 0    | -    |
| Santa Clara River Mouth   | 0                            | 0    | 0    | 0    | 0    | 0    | 0    | -    | 0    | -    |
| Mugu Lagoon               | 6#                           | 4#   | 5#   | 5    | 6#   | 5#   | 3#   | 4#   | 4#   | 4#   |
| Los Angeles County        |                              |      |      |      |      |      |      |      |      |      |
| Whittier Narrows Marsh    | -                            | -    | -    | 0    | 0    | -    | 0    | 0    | -    | -    |
| Orange County             |                              |      |      |      |      |      |      |      |      |      |
| Seal Beach NWR            | 16                           | 28   | 36   | 65   | 66   | 51#  | 52#  | 37#  | 16#  | 15#  |
| Bolsa Chica               | 0#                           | 0*   | 0#   | 0#   | 0*   | 0*   | 0*   | 0*   | 0*   | 0    |
| Huntington Beach Wetlands | 0                            | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | -    |
| Upper Newport Bay         | 131                          | 128  | 136  | 142  | 129  | 117  | 158  | 149# | 105# | 104# |
| San Joaquin Reserve       | 0                            | 0    | 0#   | 0    | 0    | 0    | 0    | 0    | -    | 0    |
| Carlson Rd Marsh          | 0                            | 0    | 0    | 0    | 0    | 0    | 0    | 0    | -    | 0#?  |
| San Diego County          |                              |      |      |      |      |      |      |      |      |      |
| San Mateo Creek Mouth     | 0                            | 0    | 0    | 0    | 0    | 0    | 0    | -    | -    | -    |
| Las Flores Marsh          | 0                            | 0    | 0    | 0    | 0    | 0    | 0    | -    | -    | -    |
| Cocklebur Canyon Mouth    | 0                            | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Santa Margarita Lagoon    | 0                            | 0    | 0    | 0#   | 0    | 0    | 0    | 0#   | 0    | 0    |
| San Luis Rey River Mouth  | 0#                           | 0    | 1    | 0    | -    | 0    | 0    | 0    | 0    | 0    |
| Guajome Lake Marsh        | 0                            | 0    | 0    | 0    | -    | 0    | 0    | 0    | -    | -    |
| Buena Vista Lagoon        | 0a#                          | 2#   | 5    | 2#   | 3#   | 1#   | 6#   | 7#   | 4    | 5#   |
| Agua Hedionda Lagoon      | 0                            | 0    | 0    | 0    | 0    | 0    | 0    | 1?   | 1    | 0    |
| Batiquitos Lagoon         | 0#                           | 0#   | 0    | 1#   | 1#   | 0#   | 2    | 2    | 1    | 3    |
| San Elijo Lagoon          | 5#                           | 5    | 4#   | 6#   | 1#   | 3#   | 3#   | 8    | 3#   | 5#   |
| San Dieguito Lagoon       | 0                            | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | -    |
| Los Penasquitos Lagoon    | 0                            | 0#   | 0#   | 0#   | 1    | 1    | 1    | 2    | 2#   | 2    |
| Kendall-Frost Reserve     | 5#                           | 9    | 11   | 5#   | 5#   | 4#   | 1#   | 2    | 2    | 4#   |
| San Diego River           | 2                            | 5    | 1a   | 5    | 5#   | 6b   | 5    | 5#   | 4    | 3    |
| Paradise Creek Marsh      | 0                            | 0    | 1a   | 0a   | 0    | 1    | 2    | 0    | 0    | 0    |
| Sweetwater Marsh          | 2#                           | 4a   | 4a   | 3a   | 7#   | 7    | 8    | 3#   | 4    | 3    |
| E Street Marsh            | 0                            | 1a   | 1a   | 1    | 0#   | 2    | 1    | 1    | 1    | 2    |
| F Street Marsh            | 0                            | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 1    | 0    |
| J Street Marsh            | 0                            | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Otay River Mouth          | 0                            | 0    | 0    | 0    | 0    | 1    | 3    | 3    | 2    | 1    |
| South Bay Marine Reserve  | 5                            | 2    | 3a   | 1    | 0    | 0    | 0    | 1#   | 1    | 0    |
| Dairymart Ponds           | 0a#                          | 0#?  | 0#   | 1a   | 0    | -    | -    | -    | -    | -    |
| Tijuana Marsh NWR         | 17a#                         | 47a  | 67a  | 63a  | 64   | 61   | 77   | 77#  | 68#  | 80#  |
| Total: pairs              | 189                          | 235  | 275  | 300  | 288  | 262  | 325  | 307  | 222  | 233  |
| marshes                   | 9                            | 11   | 13   | 13   | 11   | 14   | 15   | 16   | 17   | 14   |

- indicates that no census was taken.

\* indicates a fall or winter occurrence.

# indicates the detection of unpaired rails (used beginning in 1987).

a Paul Jorgensen Unpublished data; b 2 pairs are in Famosa Slough.

Table 1. Census of the Light-footed Clapper Rail in California, 1980 - 2010.  
(continued) Part III: 2000 - 2010.

| Location                  | Number of Pairs Detected In: |      |      |      |      |      |      |      |      |      |      |
|---------------------------|------------------------------|------|------|------|------|------|------|------|------|------|------|
|                           | 2000                         | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
| Santa Barbara County      |                              |      |      |      |      |      |      |      |      |      |      |
| Goleta Slough             | -                            | 0    | 0    | 0    | -    | -    | -    | -    | 0    | 0    | 0    |
| Carpinteria Marsh         | 1#                           | 1#   | 2    | 0#   | 0#   | 0    | 0    | 0    | 0    | 0    | 0    |
| Ventura County            |                              |      |      |      |      |      |      |      |      |      |      |
| Ventura River Mouth       | -                            | -    | 0    | 0    | -    | -    | -    | -    | 0    | -    | -    |
| Santa Clara River Mouth   | -                            | -    | 0    | 0    | -    | -    | -    | -    | 0    | -    | -    |
| Mugu Lagoon               | 7#                           | 7#   | 10#  | 14#  | 19#  | 14#  | 17#  | 15#  | 5#   | 9#   | 12#  |
| Los Angeles County        |                              |      |      |      |      |      |      |      |      |      |      |
| Whittier Narrows Marsh    | -                            | -    | 0    | -    | -    | -    | -    | 0    | -    | 0    | 0    |
| Orange County             |                              |      |      |      |      |      |      |      |      |      |      |
| Seal Beach NWR            | 10#                          | 11#  | 24#  | 23#  | 16#  | 15#  | 21#  | 24#  | 17#  | 19#  | 25   |
| Bolsa Chica               | 0                            | 0    | 0*   | 0    | 0    | 0    | *    | *    | *    | *    | 1    |
| Huntington Beach Wetlands | -                            | 0    | 0    | 0    | 0    | 0    | 4#   | 4    | 1#   | 5#   | 6#   |
| Upper Newport Bay         | 150#                         | 124# | 129# | 144# | 165# | 174# | 158# | 165# | 88#  | 148# | 131# |
| San Joaquin Reserve       | 0                            | 0    | 0    | 0    | -    | 0    | 0    | 0    | *    | 0    | #    |
| Carlson Rd Marsh          | 0#                           | 0    | 0    | 0    | -    | 0    | 0    | 0    | 0    | 0    | 0    |
| San Diego County          |                              |      |      |      |      |      |      |      |      |      |      |
| San Mateo Creek Mouth     | 0                            | 0    | 0    | 0    | 0    | -    | -    | -    | 0    | -    | -    |
| Las Flores Marsh          | 0                            | 0    | 0    | 0    | 0    | -    | -    | -    | 0    | -    | -    |
| Cocklebur Canyon Mouth    | 0                            | 0    | 0    | 0    | 0    | -    | -    | -    | 0    | -    | -    |
| Santa Margarita Lagoon    | 0                            | 0    | 1    | 2    | 1    | 2    | 1    | 1    | 1#   | -    | -    |
| San Luis Rey River Mouth  | 0                            | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 2#   |
| Guajome Lake Marsh        | 0                            | -    | -    | 0    | -    | -    | 0    | 0    | 0    | -    | -    |
| Buena Vista Lagoon        | 5#                           | 3#   | 6#   | 5#   | 5#   | 6#   | 8#   | 8#   | 9#   | 9#   | 6    |
| Agua Hedionda Lagoon      | 2                            | 2    | 1    | 4    | 5    | 4#   | 7#   | 4    | 7    | 6    | 2#   |
| Batiquitos Lagoon         | 2#                           | 3#   | 3#   | 5    | 11   | 16#  | 19#  | 22   | 22   | 26#  | 36#  |
| San Elijo Lagoon          | 1#                           | 1#   | 2    | 7#   | 7#   | 6#   | 15#  | 12#  | 5#   | 8    | 15#  |
| San Dieguito Lagoon       | 0#                           | 0#   | 0    | 0#   | 6    | 12#  | 31#  | 15#  | 21#  | 12#  | 28#  |
| Los Penasquitos Lagoon    | 1                            | 1    | 2    | 1#   | 2#   | 2    | 7#   | 12#  | 2#   | 4#   | 9#   |
| Kendall-Frost Reserve     | 4                            | 4    | 5#   | 6#   | 14   | 14   | 5#   | 4#   | 2#   | 7    | 10#  |
| San Diego River           | 3#                           | 4    | 6    | 6#   | 8#   | 5    | 4    | 6    | 4#   | 3    | 7#   |
| Paradise Creek Marsh      | 0                            | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | -    | 0    |
| Sweetwater Marsh          | 2                            | 3#   | 3#   | 1#   | 3#   | 1    | 4#   | 4#   | 3    | 5    | 6#   |
| E Street Marsh            | 2                            | 0    | 1    | 1    | 0    | 0    | 2    | 1    | 0    | 0    | 2    |
| F Street Marsh            | 0                            | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| J Street Marsh            | 1                            | 0    | 0    | 1    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Otay River Mouth          | 1                            | 1    | 1    | 0    | 0    | 1    | 2    | 1    | 0    | 1    | 1    |
| South Bay Marine Reserve  | 0                            | 0    | 0    | 0    | 0    | 0    | 1    | 2    | 0    | 1    | 1    |
| Dairymart Ponds           | -                            | -    | -    | 2    | 1    | 1    | 0    | 1    | -    | 0    | 0    |
| Tijuana Marsh NWR         | 61#                          | 52#  | 78#  | 64#  | 87   | 87#  | 102# | 142# | 47#  | 57#  | 76#  |
| Total: pairs              | 253                          | 217  | 274  | 286  | 350  | 360  | 408  | 443  | 234  | 320  | 376  |
| marshes                   | 16                           | 14   | 16   | 16   | 15   | 16   | 18   | 19   | 15   | 16   | 19   |

- indicates that no census was taken.

\* indicates a fall or winter occurrence.

# indicates the detection of unpaired rails (used beginning in 1987).

The subpopulation of Light-footed Clapper Rail newly discovered in the San Dieguito River Valley in 2004, inland of the lagoon and El Camino Real, was first reported at six breeding pairs and then conservatively, at least 12 pairs in 2005. In 2006, there was abundant calling indicative of at least 31 breeding pairs. This ranked San Dieguito as the third largest subpopulation of Light-footed Clapper Rails in 2006 and the largest ever reported in a freshwater marsh system. Calling was poor in 2007 when only 15 pairs were detected but slightly better in 2008 resulting in a count of 21 pairs. The count was poor again in 2009 and the population estimate was only 12 pairs along with 13 advertising males. Finally in 2010, the second highest count for this little wetland was tallied when vocalizing during the surveys indicated a minimum of 28 breeding pairs. Two of these pairs were calling from habitat rimming ponds on the golf course. Additional Clapper Rail detections were still being reported from the San Dieguito Creek Watershed in 2010 and have yet to be thoroughly investigated. Reported locations have included Lusardi Creek, the pond at 4S Ranch Community Park on Dove Creek Road, and at 4 Gee Road just north of Camino Del Sur.

The Seal Beach NWR subpopulation has probably been 20 pairs or slightly more for most of the 2000s. Evening call count results have generally been dismal and we have had to rely upon nesting data obtained through monthly visits to the nesting rafts, upon which most of this subpopulation nests. With so much marsh available to the rails, there ought to be a much larger breeding population on the Seal Beach NWR. Raptor predation is suspected to be limiting rail survival and raptor monitoring sessions have been reinitiated; high tide counts have also continued. Seal Beach is the only marsh currently occupied by Light-footed Clapper Rails that gets fully inundated during a high tide of about 6.7 ft (MLLW) or higher, which would render the rails vulnerable due to reduced cover. Tides of this height occur regularly in the late summer, usually in darkness, and in the fall and winter in the early morning. The rails are forced onto debris or to the edge of the marsh where there is little cover and busy roads just beyond. This greatly exposes the rails to potential predation and vehicle collision. However, the completeness of inundation also allows fairly dependable surveying of the subpopulation outside of the breeding season. Accordingly, the rails were counted again from canoes before the 2010 breeding season; the post-breeding high tide count was on November 5 and 50 rails were sighted. The pre-nesting count was on 1 December 2009 and 50 individuals were sighted (Table 2).



Table 2. High Tide and Call Counts of Clapper Rails on the Seal Beach  
National Wildlife Refuge, 1975 - 2010

| Date        | Tidal<br>Height | Clapper<br>Rails<br>Counted | Breeding Pair<br>Members |       | Notes  |
|-------------|-----------------|-----------------------------|--------------------------|-------|--|
|             |                 |                             | Before                   | After |  |
| 2 Dec 1975  | 7.0             | 22                          | -                        | -     |  |
| 31 Dec 1975 | 6.7             | 12                          | -                        | -     |  |
| 21 Nov 1976 | 7.1             | 24                          | -                        | -     |  |
| 20 Dec 1976 | 7.1             | 35                          | -                        | -     |  |
| 21 Dec 1976 | 7.0             | 34                          | -                        | -     |  |
| 10 Dec 1977 | 7.1             | 16                          | -                        | -     |  |
| 11 Dec 1977 | 7.1             | 40                          | -                        | -     |  |
| 18 Jun 1978 | 6.8             | 16                          | -                        | 42    | +6 youngsters  |
| 30 Nov 1978 | 6.7             | 38                          | -                        | 42    |  |
| 1 Dec 1978  | 6.7             | 32                          | -                        | 42    |  |
| 3 Sep 1979  | 6.4             | 20                          | 42                       | 60    | Tide too low   |
| 3 Nov 1979  | 6.6             | 56                          | 42                       | 60    |  |
| 2 Dec 1979  | 6.7             | 32                          | 42                       | 60    |  |
| 3 Dec 1979  | 6.7             | 44                          | 42                       | 60    |  |
| 21 Nov 1980 | 6.9             | 55                          | 60                       | 38    | First red fox den found  |
| 29 Jun 1981 | 7.0             | 34                          | 60                       | 38    | Tide too late, dark  |
| 12 Nov 1981 | 6.9             | 43                          | 38                       | 56    |  |
| 29 Dec 1982 | 7.0             | 23                          | 56                       | 40    |  |
| 18 Jan 1984 | 6.9             | 23                          | 40                       | 48    |  |
| 21 Nov 1984 | 6.7             | 5                           | 48                       | 22    | + 7 red foxes  |
| 13 Nov 1985 | 7.1             | 2                           | 22                       | 10    | + 2 red foxes  |
| 12 Dec 1985 | 7.2             | 2                           | 22                       | 10    | + 2 red foxes  |
| 30 Dec 1986 | 7.2             | 7                           | 10                       | 14    | Begin red fox trapping, 59<br>foxes removed in 1986            |
| 28 Jan 1987 | 7.0             | 7                           | 10                       | 14    | 63 red foxes removed in 1987                                   |
| 8 Aug 1987  | 7.3             | 8                           | 14                       | 14    | Tide too late, dark  |
| 22 Nov 1987 | 6.7             | 12                          | 14                       | 28    |  |
| 21 Dec 1987 | 7.0             | 8                           | 14                       | 28    | + 2 red foxes  |
| 16 Feb 1988 | 6.8             | 10                          | 14                       | 28    |  |
| 22 Nov 1988 | 6.9             | 6                           | 28                       | 12    | 128 red foxes removed in '88                                   |
| 16 Oct 1989 | 6.9             | 59                          | 12                       | 32    | Record High Tide Count; 25<br>red foxes removed in 1989        |
| 5 Oct 1990  | 6.4             | 57                          | 32                       | 56    | Tide too low   |
| 2 Nov 1990  | 6.8             | 69                          | 32                       | 56    | Record High Tide Count   |
| 22 Nov 1991 | 6.9             | 98                          | 56                       | 72    | Highest Population Total                                       |
| 26 Oct 1992 | 6.8             | 159                         | 72                       | 130   | Highest Population Total                                       |
| 15 Oct 1993 | 6.8             | 143                         | 130                      | 132   | Highest Population Total                                       |
| 4 Nov 1994  | 7.0             | 150                         | 132                      | 102   | 220 Red-tailed Hawks counted<br>On the NWS on 11 December 1994 |
| 25 Oct 1995 | 6.5             | 53                          | 102                      | 104   | Tide too low   |
| 22 Nov 1995 | 6.9             | 55                          | 102                      | 104   |  |
| 10 Dec 1996 | 6.7             | 55                          | 104                      | 74    |  |
| 17 Oct 1997 | 6.6             | 40                          | 74                       | 32    |  |
| 04 Nov 1998 | 6.8             | 30                          | 32                       | 30    |  |

Table 2 (continued). High Tide and Call Counts of Clapper Rails on the Seal Beach National Wildlife Refuge, 1975 - 2010

| Date        | Tidal Height | Clapper Rails Counted | Breeding Pair Members |       | Notes                |
|-------------|--------------|-----------------------|-----------------------|-------|----------------------|
|             |              |                       | Before                | After |                      |
| 23 Nov 1999 | 7.0          | 17                    | 30                    | 20    |                      |
| 11 Dec 2000 | 6.9          | 30                    | 20                    | 22    |                      |
| 15 Nov 2001 | 6.7          | 35                    | 22                    | 48    |                      |
| 04 Dec 2002 | 7.1          | 62                    | 48                    | 46    |                      |
| 26 Oct 2003 | 6.7          | 96                    | 46                    | 32    |                      |
| 12 Nov 2004 | 6.7          | 52                    | 32                    | 30    |                      |
| 15 Nov 2005 | 6.7          | 57                    | 30                    | 42    |                      |
| 09 Oct 2006 | 6.6          | 103                   | 42                    | 48    |                      |
| 06 Nov 2006 | 7.0          | 95                    | 42                    | 48    |                      |
| 26 Oct 2007 | 7.1          | 32                    | 48                    | 34    |                      |
| 12 Nov 2008 | 6.9          | 20                    | 34                    | 38    |                      |
| 01 Dec 2009 | 6.8          | 50                    | 38                    | 50    | Fogged out on Nov. 3 |
| 05 Nov 2010 | 7.0          | 51                    | 50                    | -     |                      |

The post-nesting high tide count in 2009 was about what would be expected given a subpopulation level of around 20 breeding pairs. Most of the recent high tide counts have been lower. Since the subpopulation has been steady at about 20 pairs, lower counts may be indicative of some of the rails moving undetected into the marsh edges as the tide moves in, prior to being counted by the observers in canoes. In addition, there are patches of marsh that are not entirely inundated and some of the rails flatten out on the water surface and virtually disappear as observers approach; several of them could go undetected, as well. As usual, potential rail predators were out in abundance during the count, hunting the marsh and edges, including red-tailed hawks (*Buteo jamaicensis*), northern harriers (*Circus cyaneus*), Peregrine falcon (*Falco peregrinus*), Cooper's hawk (*Accipiter cooperi*) and American kestrels (*Falco sparverius*). Every so often short-eared owls (*Asio flammeus*) are also observed in the marsh. Continued upgrading and maintenance of the artificial rafts on the Seal Beach NWR is essential to the protection of the wintering rails and success of the breeding rails. Usually at least half of the rails counted during the winter high-tide counts have been sequestered on the rafts.

The San Elijo Lagoon subpopulation was back up to its record high level of 15 nesting pairs in 2010. Although San Elijo Lagoon has had major efforts to restore tidal function, the lagoon still closes to the ocean with regularity resulting in wide fluctuations in habitat suitability for Clapper Rails. All of the vocalizing rails detected in 2010 were in fresh water marsh growth along the lagoon edges; four pairs were in the east basin (only one was directly off the weir) and 11 pairs were in the central basin. The only rails detected on Escondido Creek were advertising males. San Elijo received an augmentation of eight captive-bred rails in 2004, five in 2006, four in 2007, and 16 in 2009 at the dike in the inner lagoon. One of the 2004 rails was re-sighted near the railroad tracks in the central lagoon on December 13, 2004, six months following release, and one of the 2006 rails was observed repeatedly over six months off of the Rios Avenue trail. However, there have been no reported re-sightings of live banded rails since then. A dead rail

was retrieved in May of 2010 that was banded and released into San Elijo on June 16, 2009. Since doubling in size between 2001 and 2003, the Point Mugu subpopulation fluctuated between 14 and 19 pairs, from 2003 to 2007. It had fluctuated between three and seven pairs for nearly 20 years until augmentations with captive-bred rails fostered its growth. There was a crash in 2008 back to five pairs but the population was back up to nine pairs in 2009 and 12 pairs in 2010. There is an efficient predator management program in place, consistent rail and marsh management, and the Clapper Rails are still breeding, although this subpopulation is not as large as would be hoped for in the biggest contiguous patch of potential habitat in the state. Again there was no breeding detected in the eastern arm of the lagoon but a pair vocalized from the vicinity of the rafts in the Central Lagoon and a small number of rails bred in freshwater marsh vegetation along a ditch on the west side near Perimeter Road.

There have been occasional re-sightings of banded rails at Point Mugu, indicating that some of the captive-bred rails remained local after being released into the marsh. In 2008, Martin Ruane resighted a banded rail four days after its release on August 22 near the release site. However, at least one banded rail (a female banded 1035-8878) did not stay at Point Mugu. A photograph was taken of this rail at Upper Newport Bay on December 12, 2004 by Steve Metz. This female was captive-bred at the Chula Vista Nature Center and released into the eastern arm of Point Mugu on August 28, 2004, 106 days before her picture was taken at Newport. This shatters the old long-distance movement of 13.5 miles recorded for the subspecies *levipes* (Zembal et al. 1983). The distance from Point Mugu to Upper Newport Bay is approximately 90 miles along the coast. This indicates that at least one and probably others of the captive-bred rails are more prone to movements between marshes than was previously observed in wild birds. It also indicates that at least one of the released rails chose not to stay at Point Mugu; others may have behaved similarly. For instance, there have been recent sightings of Clapper Rails on the Santa Clara River at the Freeman Diversion Dam and at Ormond Beach. In 2010, a female released at Point Mugu in 2009 traveled the 160 miles back to Sweetwater Marsh NWR and the Chula Vista Nature Center where she was hatched and reared.

The subpopulation in the University of California Reserve at Kendall-Frost rebounded well in 2004 and 2005 but was significantly reduced in 2006 to 2008. At seven pairs in 2009 and 10 pairs in 2010 it has recovered again. The height of rail occupation of the Reserve was in the early 1980s; 24 pairs bred there in 1984. This marsh is small, totally isolated, and surrounded by urban housing, but it is well managed under the University of California Reserve System. The stewardship includes appropriate predator management, habitat restoration, and research management to assure minimal human disturbance to the rails and their habitat. Additionally, nesting rafts have been provided and used heavily by the rails since 1987. There have also been translocations of eggs and adults. This culminated in 2004 and 2005 with breeding populations of 14 pairs, the highest total there since 1985. In spite of the appropriate management of the marsh, it may always be a struggle for the rails in such a tiny, isolated wetland.

Clapper Rail vocalizations were reported for Bolsa Chica and the San Joaquin Reserve in 2010. The calling reported in the Reserve was most likely an unmated male. Attempts to elicit

responses to a tape-playback of a duet were unsuccessful at the Reserve in 2010 but were successful finally on March 31, 2010 at Bolsa Chica where a pair called in duet from freshwater reeds just up-coast of the walking bridge over the outer lagoon. This is the first recent affirmation of Clapper Rail breeding behavior in the Bolsa Chica. As with this 2010 detection, nearly all of the rails seen and heard at Bolsa have been on the marsh edge adjacent to Pacific Coast Highway (PCH), which is a death trap for the rails. The near constant noise masks predator cues and the fast moving vehicles would dispatch any rail that flushes that way. Unfortunately, a flushed rail would fly low and tend to flush into the adjacent uplands, which is PCH at Bolsa Chica.

One of the highlights of the 2006 survey of Light-footed Clapper Rails was the discovery of yet another breeding location in the Santa Ana River Marsh, also previously known as Newport Slough and listed in Table 1 under the Huntington Beach Wetlands. Four pairs were detected there in 2006 and 2007, only a single pair in 2008, 5 pairs again in 2009, and 6 pairs in 2010 (including one pair in the Brookhurst Marsh). The Santa Ana Marsh is at the southern terminus of the Huntington Beach Wetland Complex, comprised of several wetland patches strung along the coast totaling more than 200 acres. The 92-acre Santa Ana Marsh was restored as part of the Federal Flood Control Project on the Santa Ana River. Dampened tidal influence was re-established and cordgrass was planted primarily along a narrow eastern portion of the marsh that lies between an oil field and the south dike of the river. This cordgrass marsh is extremely well developed and patches have grown in the main marsh that are currently suitable for rails but are apparently unoccupied. This may have something to do with regular romping by neighborhood dogs from just across the main channel.

Restoration of the Huntington Beach Wetlands (HBW) is continuing and one of the pairs counted in the tally for this marsh complex was actually in the Brookhurst Marsh. Lena Hyashi reported a pair on April 19, 2010 vocalizing and observed along the larger stand of spiny rush (*Juncus acutus*) near the dunes and PCH. Other than the rails in the Santa Ana Marsh, this is the first record for a Clapper Rail in the HBW Complex since the 1970s. RZ investigated the pair again in May and was only able to elicit “kecking” from the male.

The salt marsh at the mouth of the Santa Margarita River typically held a single pair of nesting rails for many years and occasionally there have been two. These pairs are invariably in the same spot(s) year to year; at the river mouth in freshwater marsh in the Sweetwater section of the estuary and/or between Stuart Mesa Road and the railroad tracks on the north side of the river in the freshwater marsh that rims a pond. However, in 2008, a single pair was located on the channel surrounding the least tern island at the junction of the inlet channel. Hopefully, Clapper Rails were still there and bred; we did not gain access to do the survey in 2009 or 2010. The Marine Corps has circulated a request for proposals for Camp Pendleton-wide Clapper Rail surveys in 2011. A synopsis of the resulting information will be included in the 2011 report.

The highest rail count on record for Buena Vista Lagoon was nine pairs in both 2008 and 2009. The number was lower by one-third in 2010. The rail’s distribution was two pairs on the north side of the central lagoon between PCH and the 5 Freeway, three were in the inner lagoon, and

there was a pair detected in the little lagoon between PCH and the railroad. There are many management issues at this little freshwater marsh and they are shared with most of the other coastal wetlands including abundant non-native trees and shrubs that harbor perching predators and homeless people. The trash and trailing associated with the homeless camp off State Street near Laguna Drive were worse than last year.

The marsh at Agua Hedionda Lagoon has held a maximum of seven pairs of Light-footed Clapper Rails during three different years, most recently in 2008. The count was down to six pairs in 2009 and dropped to only two pairs and a lone male in 2010. The brackish marsh inland of the inner lagoon was greatly impacted by a change in drainage in the mid-1980s and the rails were barely detectable through the 1990s. The five pairs located in 2004 were the highest level observed since then and this level was probably sustained in 2005 when four pairs and an advertising female were detected during an early season count. Given the usual presence of unmated males in this little wetland, the female likely found a mate and bred. With the recently increased street runoff from adjacent housing, the main freshwater marsh has rejuvenated to some extent, perhaps to the benefit of the rails, as evidenced by the record number in 2006 and again in 2008. This subpopulation was augmented with the release of five captive-bred rails in 2004 on the inland edge of the inner lagoon, although none of these banded rails has been re-sighted since.

Los Penasquitos Marsh is dominated by vegetation indicative of prolonged closure to the ocean, particularly pickleweed. However, fresh water influence and freshwater marsh edge are increasing and the rails appear to be using the freshwater marsh habitat increasingly. The detection of 12 pairs was a record high for this wetland in 2007. This number plummeted to only two pairs in 2008, back up to four pairs in 2009, and to nine pairs in 2010. In 2009, there were four advertising males mixed in with the breeders; unfortunately in 2010, there were 2 advertising females, generally indicative of untoward predation of males. Four captive-bred rails were released in 2004, four in 2007, and nine in 2009. There was a re-sighting of a banded female hatched at the Wild Animal Park and released in 2007 at Los Penasquitos. She was photographed with her mate and three downy chicks on the edge of the pond below the San Diego Water Utilities Pump Station on Sorrento Valley Road on July 10, 2009 by Eric Kallen.

The cordgrass continues to expand and dominate a significant portion of the mouth of the San Diego River and an all-time high of eight pairs of breeding Light-footed Clapper Rails were there in 2004. The numbers have varied greatly since then and in 2010 there were seven breeding pairs detected, one of which was all the way out east of the 8 Freeway, north of Robb Field. A previously unknown population of Salt Marsh Bird's Beak, *Cordylanthus maritimus maritimus*, was also discovered in this area just off one of the foot trails. There were several hundred plants, but unfortunately they are being smothered out by the clumped invasive Algerian Sea Lavender, *Limonium ramosissimum*.

Based upon the extent and condition of the habitat in the San Diego River west of the 5 Freeway, it should abound with rails. However, regular high flows may limit the habitat suitability for the

rails there. Additionally, during the installation of five nesting rafts in 2008, heavy trailing was noted into the marsh from the adjacent riprap. There appears to be an extremely large infestation of rats living in the riprap and venturing into the marsh to feed. Any eggs laid in the marsh would be extremely vulnerable to predation by rats prior to the initiation of incubation. Raccoons are also extremely abundant and apparently the site is a feral cat feeding station. As usual, there were multiple reports of Clapper Rail detections 13 miles inland at Kumeyaay Lake. Again, reports from the lakes could not be verified probably because these inland rails have been conditioned by rampant over-use of playback tapes by birders. There was also a report of a Clapper Rail sighting at Famosa Slough; the rail was “drawn out” by an unpermitted birder playing a rail tape incessantly.

Two of the breeding pairs of Clapper Rails reported for the Sweetwater Marsh NWR were actually inland along the Sweetwater River in freshwater marsh. The extent of occupation of the salt marsh became known only after nest searching was included in the assessment. There was a pair in the main marsh, a pair on the northwest edge of Vener Pond, and two pairs in the E Street Marsh parcel. Nests were found for all of these territories, including active brood nests in Vener Pond and the main marsh, and two eggs in an E Street nest that were left after hatching. The Sweetwater Marsh Complex has a thriving raptor population, fully in evidence on every visit with ample good hunting perches spaced regularly along the marsh edge. The marsh growth is low and the rails are quite vulnerable. Eleven captive-bred Clapper Rails were released into Sweetwater in 2005 and six more were released in 2008 but none has been re-sighted.

An adult Clapper Rail and a chick were observed in the South Bay Marine Reserve in 2005 after the survey report was compiled. In 2006, there was a strong clapping response to the tape by a single rail with no following advertising, indicating that for the second consecutive year there were breeding rails in the Reserve. In 2007, both a pair and a single responded to the tape; there was silence in 2008; and a single pair again in 2009 and in 2010. This small isolated marsh will likely be regularly occupied when the habitat base in the south bay is greatly increased 7 to 10 years or more after the implementation of the proposed restoration of the new NWR, depending upon how much planting is accomplished.

The last known Clapper Rail call from Carpinteria Marsh was from an unmated female vocalizing constantly with no answering call in 2003. In 2004, there was total silence until April 13 when two males were released in the hope that the female was still alive. Unfortunately, in 2005 through 2010, no rails were detected. This northern wetland is plagued with domestic cats in the marsh and other predators of concern. The Carpinteria subpopulation and wetland are in major need of intensive management. Apparently, red foxes still actively den at the southern end of the dirt road extension of Esteros Way on the very edge of the marsh. Without dealing with the foxes through consistent predator management, the chances for the rejuvenation of a viable subpopulation in Carpinteria Marsh are non-existent.

Eight of the 19 marshes with breeding Clapper Rails in 2010 were male-skewed; three were female-skewed; and two had both advertising males and females. A total of 36 unmated males

and 11 females were heard during the call counts including: four advertising males at Point Mugu; seven single males on the Seal Beach NWR; one male in the Huntington Beach Wetlands; four males and six females at Upper Newport Bay; one male in Agua Hedionda; one male in Batiquitos Lagoon; one male and one female in San Elijo Lagoon; six males in the San Dieguito River Valley; two females in Los Penasquitos Lagoon; one female in Kendall-Frost Reserve; 1 female in the San Diego River; one male in Sweetwater Marsh; and 10 males in Tijuana Marsh. The usual condition has been a slight male bias during most years in most marshes. An extreme male skew or even a slight female skew could indicate major issues, unfortunately of an unknown nature.

The continued annual release of additional captive-bred Clapper Rails is co-occurring with increased detections of rails in new locations, particularly inland sites. Some of the recent detections of interest are as follows. Rachel Woodfield photographed a single Clapper Rail at the Ballona Wetlands in August 2008; however, a portion of the marsh was checked in 2009 with negative results. Three Clapper Rails were reported in poor habitat on the Santa Clara River in 2010 at the Freeman Diversion Dam and there have been repeated sightings on the edge of Point Mugu at Ormond Beach. A Clapper Rail was heard and observed in Bolsa Chica at the foot bridge in October 2009 and bred near there in 2010. There was also a rail reported in brackish marsh on Aera Energy property below Sea Point Avenue. Sue Hoffman flushed a single Clapper Rail adjacent to the mouth of the Santa Ana River in the plover yard at the Huntington State Beach California Least Tern nesting colony in 2008; a dead rail was reported between PCH and the Tern Colony in July 2009. Clapper Rails are still reportedly vocalizing from in the reeds at Kumeyaay Lake on the San Diego River but the calls are not well described and DZ could not get them to call back probably due to conditioning by over-use of unpermitted call-back playing. Jan Nordenberg is still reporting Clapper Rails in the San Dieguito River Watershed well inland of the Polo Club (see description above). Paul Lehman reported seeing a Clapper Rail at the northern end of Upper Otay Lake on April 20, 2009. Finally, the longest movement ever recorded for this subspecies was observed in 2010 when a female released at Point Mugu in 2009 made her way back 160 miles to the Chula Vista Nature Center where she had been hatched and reared in captivity.

The Light-footed Clapper Rail population in California rebounded with a 37% increase in 2009 from a crash in 2008 and another 17.5% increase in 2010 to the third highest total since 1980. It has been greatly reinforced during the past many years of annual counts that the more time that can be spent at an individual wetland, the higher the likelihood of a good count. The typical Clapper Rail subpopulation today is small; 14 subpopulations were 15 pairs or smaller in 2010 and in many of those places it is tough to get them to call back and forth. If the rails in a small subpopulation just did a round of calling a few minutes before the counter arrives, they just may not call again together for a while, if at all that day.

#### Management and Monitoring of Nesting Sites

Nest searches at Upper Newport Bay revealed seven incubation nests in roughly the same area

where six nests were found in 2009, but only two egg nests were found in 2008. Five of the 2010 nests were active when found with two to nine eggs each; one clutch was hatching when discovered, and two were depredated by raccoons, *Procyon lotor*. Four eggs were taken from Newport for relocation in the face of heavy egg losses to raccoons. One of the two 2008 nests was depredated, the other was still active on July 17 which is later than the last re-nest date in usual years. In 2009, three egg nests were depredated and the eggs were not viable in a fourth. In 2007, intensive nest searches over 17 days, perhaps 100 acres, and 300 field-hours revealed only six incubation nests, four of which were depredated in the same areas that in 2006 held 24 nests, of which 12 were active egg nests when discovered. Nesting activity and hatching results have gravely deteriorated recently in Upper Newport Bay. There is raccoon, *Procyon lotor* sign well out into the marsh, spanning the bay, and stirring of sediments, habitat disturbance, and noise associated with the ongoing dredging activity. How this subpopulation rebounded and is maintaining its numbers is not clear.

On the Seal Beach NWR there were 25 clutches of eggs laid on 19 rafts in 2010. This compares to last year's 19 clutches and 17, 20, and 32 clutches found on rafts in 2008, 2007, and 2006, respectively. There were an additional four unused nests found on rafts and 28 brood nests built on 28 rafts in 2010. Overall nesting success was 90%. Sixteen of the estimated 25 pairs in the NWR nested on rafts and all of them brooded on rafts. The large number of brood nests built on rafts makes us suspicious that there may have been additional undetected incubation nests in natural habitat.

Rafts were instrumental in the rebounding of the Seal Beach NWR subpopulation in the early 1990s. For example, in 1993 there were 79 nests, 73 clutches of eggs, nine additional brood nests, and 79% hatching success on the 100 rafts available in the NWR. However, since the mid-1990s, the numbers have fallen off from unknown causes but heavy raptor predation is suspected. We continue to modify the raft design for better durability and function and provide several times the number of rafts as there are nesting pairs. The rafts are heavily monitored and there have been no indications of unusually severe problems or extremely high predation rates during the nesting season. Post-breeding season survival has been poor on the NWR, perhaps due in part to the huge wintering raptor population. Continued efforts to provide enhanced cover, both natural and artificial, may make a positive difference over time. Cordgrass cover was greatly enhanced in years following unusually high rainfall, as in the winter of 2004 to 2005. This may have added enough additional predator-protection to increase rail survival and productivity in 2006. December of 2010 brought record rainfall, which will perhaps be reflected in enhanced nesting cover for the 2011 season.

In 2010, at the Kendall-Frost Reserve, 16 of 21 rafts held nests with 11 clutches of eggs and an additional three clutches were in nests off rafts; hatching success was poor at 64% but also was poorly documented. Of the 14 clutches, seven hatched, one was predated, and six were partial hatches or unknown. Kendall-Frost is small, extremely isolated, and therefore plagued by mesopredator release. Furthermore, irresponsible pet owners allow their cats and dogs to roam into the marsh and misguided animal control officers have apparently released stray animals into



the marsh and/or adjacent campground in the past. It is imperative that predator management be continued annually and be started before nesting actually begins each year. It is paramount that a reliable source of funding be found for the program. Even with the program operational there were fresh cat (*Felis domesticus*) and opossum (*Didelphis virginianus*) tracks on the saltpan and evidence of raccoon (*Procyon lotor*) along the main tidal creek. This little wetland has high potential and should be a focus of management efforts for rail recovery.

Finally, in Sweetwater Marsh NWR there was no use of the nesting rafts in 2010, but seven nests were found in the habitat including evidence of hatching at four nests. Sweetwater Marsh is another high marsh that is largely not influenced by the tides except for the extremely-high tides, particularly those that are storm-driven. Most of this marsh is high and dry enough to provide excellent foraging opportunities for predators and many species of raptors and terrestrial predators take full advantage, as evidenced by the high rate of depredation observed of released rails there in 2005 (Zembal et al. 2005). The rails documented in the marsh in recent years were in those parts of the wetland most-regularly influenced by tidal inundation or ponded water. However, it also became evident in 2010 that a full assessment of the Sweetwater subpopulation will require annual nest searching. Call counts in 2010 resulted in a population estimate of only four pairs; and there was evidence of two additional pairs during nest searching.

Evidence of breeding activity, in addition to territorial manifestation by calling, was observed in 11 of the 12 breeding territories at Point Mugu in 2010. That evidence included: four egg nests, each with at least a partial hatch; four additional hatched nests in four territories; and chick-feeding in 11 territories. Unique to 2010 was the discovery of nesting rails along a fresh water ditch and largely in reeds in the far western arm, where three of the 11 pairs bred.

Although natural nesting cover was thought to be a limiting factor for the rails at Point Mugu, artificial nesting rafts placed there in 1988 were not used over the several years they were maintained and monitored; the marsh is simply so high that there is significant acreage of natural cover that is not inundated by high tides. However, artificial rafts were tried again in 2008 and one was used successfully by a nesting pair with some evidence of partial use of two others. Given the years of experience at Point Mugu with the rails, the new rafts were placed more strategically. Because of the use observed in 2008, five additional rafts were added in 2009, bringing the total to 10 rafts. The same raft that was used by a nesting pair in 2008 was used again in 2009. An eight-egg clutch hatched but four of the chicks were discovered dead in or near the nest. They were collected and delivered to the Contaminants Division of the U.S. Fish and Wildlife Service, Carlsbad Field Office to check for contaminants issues; that analysis is pending. Unfortunately, there was no rail use of the rafts detected in 2010 and one of the rafts in the Central Arm is gone.

### Captive Breeding

The captive Clapper Rails at the CVNC bred successfully for the first time in 2001, after we brought in a second pair of rails and switched their mates. Each pair laid a single clutch, one of

eight eggs and the other of seven eggs. The eight-egg clutch was taken to Sea World to be hatched and reared, hoping that the pair would lay another clutch; however, they did not. Seven captive-reared rails were released into Mugu Marsh that first year. Additional rails have been added to the captive breeders and their progeny have been released to the wild annually ever since.

There were six potential breeding pairs in captivity in 2010, two pairs at each of the three facilities. The CVNC housed rails #208/052 and 219/217; Sea World held #089/218 and 359/366; and the San Diego Zoo Safari Park kept #362/209 and 207/246. The male #208 was banded 103544891 (L) at Newport on October 8, 2005 and mated with female #052 captured from Newport on September 20, 2002. The pair 219/217 were hatched at Sea World on May 23 and 15, 2006, respectively from eggs taken from two different nests at Upper Newport Bay. The male #089 was hatched at Sea World on June 3, 2003 from a Newport egg and mated to #218, a Sea World hatchling on May 22, 2006 from an egg taken from Newport. The male #359 was hatched from a Newport egg at Sea World on June 11, 2009. The female #366 was trapped from Tijuana Estuary on October 5, 2009. The male #362 was hatched at Sea World on June 19, 2009 from a Newport egg and mated to #209, a Newport capture from November 29, 2005. The male #207 was trapped from Newport on September 19, 2005 and mated to #197 from a Newport egg hatched at Sea World on May 19, 2005. The female #197 was the only casualty during fire evacuation at the Safari Park and was replaced with a female #246 captured at Upper Newport Bay on November 25, 2007 and banded #103544924. Captive breeding results for 2010 are summarized below and in Tables 3 - 5.

SWC Breeding Pair I LFCR359/366: Produced no eggs or chicks in 2010. The female from Tijuana Marsh died in captivity before reproducing in 2010.

SWC Breeding Pair II LFCR089/LFCR218: Produced three clutches and eight chicks in 2010, all of which survived to be released to the wild. Male #089 was released to the wild in Sweetwater Marsh on 22 September 2010. Non-viable eggs had no development, and were examined by candling only.

CVNC Breeding Pair I LFCR219/217: Produced three clutches and 22 chicks in 2010, 15 of which survived to be released to the wild. Ten of those have been released, and five are being held for future release.

CVNC Breeding Pair II LFCR208/052: Produced no eggs or chicks in 2010. The female LFCR052 died in captivity.

SDZSP Breeding Pair I LFCR362/209: Produced no eggs or chicks in 2010.

SDZSP Breeding Pair II LFCR207/246: Produced nine eggs but no chicks in 2010.

Table 3. Clapper Rail Breeding Activity at Sea World, 2010.

|  |                 |                 |                 |
|--|-----------------|-----------------|-----------------|
| <b>Parent IDs</b>                                    | 089/218         | 089/218         | 089/218         |
| <b>Clutch # (1<sup>st</sup>, 2<sup>nd</sup> ...)</b> | 1 <sup>st</sup> | 2 <sup>nd</sup> | 3 <sup>rd</sup> |
| <b>Date Clutch Initiation</b>                        | 2/17            | 4/4             | 5/20            |
| <b># Eggs</b>  | 7               | 9               | 9               |
| <b>Hatch Dates</b>                                   | 3/11            | 4/29            | 6/10            |
| <b># Moved to Conditioning</b>                       | 1               | 4               | 3               |
| <b># Released to Wild</b>                            | 1               | 3               | 3               |

Table 4. Clapper Rail Breeding Activity at the Chula Vista Nature Center, 2010.

|                                |                 |                 |                 |
|--------------------------------|-----------------|-----------------|-----------------|
| <b>Parent IDs</b>              | 219/217         | 219/217         | 219/217         |
| <b>Clutch #</b>                | 1 <sup>st</sup> | 2 <sup>nd</sup> | 3 <sup>rd</sup> |
| <b>Date Clutch Initiation</b>  | 2/21            | -               | -               |
| <b># Eggs</b>                  | 9               | 9               | 7               |
| <b>Hatch Dates</b>             | 3/23            | 5/12-15         | 6/22-23         |
| <b># Moved to Conditioning</b> | 6               | 6               | 5               |
| <b># Released to wild</b>      | 5               | 5               | Holding         |

Three of six captive pairs produced eggs in 2010, one pair each at each of the three facilities resulting in the release of 19 additional Clapper Rails into two marshes (Table 5). This brings the total number of captive-reared Light-footed Clapper Rails released into the wild since 2001 to 271. Point Mugu has been the priority for releases up until 2009 with 107 rails released. However, 2009 was the final release date there since the Biological Opinion from the Fish and Wildlife Service mandating U.S. Navy participation in the captive breeding program only required their participation through 2008.

The propagation partners noted declines in egg viability at Sea World and the Safari Park where nine eggs were produced in three clutches but none made it to hatching. Some were infertile and some were broken by the adults. These and other data suggest that the breeding rails have a short reproductive life. Infusion of new breeding stock and rotation of breeders in a more regularly scheduled fashion may better address decreased production, nest failure, and abnormal breeding behavior (egg breakage).

Eggs were collected in Upper Newport from wild nests and transferred to Sea World in June 2010 after a translocation opportunity did not work out. Eggs were incubated in a Humidaire incubator at 99° F with a wet bulb of 82-84° F, transferred to a Grumbach hatcher at 98° F with a wet bulb of 88° F on 15 June and hatched unassisted on 19 June. The birds were hand-raised using modified puppet rearing techniques. Of the four chicks, there were two females (385, 386) and two males (384, 388), and all but 388 were from the same clutch.

Table 5. Number of Captive-reared Light-footed Clapper Rails Released into Target Marshes, 2001 – 2010.

| Marsh             | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | Sum |
|-------------------|----|----|----|----|----|----|----|----|----|----|-----|
| Point Mugu        | 7  | 11 | 20 | 12 | 17 | 3  | 5  | 27 | 5  | -  | 107 |
| Seal Beach NWR    | -  | 6  | -  | 5  | -  | -  | -  | 13 | 5  | -  | 29  |
| Sweetwater Marsh  | -  | 4  | -  | -  | 11 | -  | -  | 6  | -  | 14 | 35  |
| Kendall-Frost     | -  | -  | 5  | -  | -  | -  | -  | -  | 7  | -  | 12  |
| Batiquitos        | -  | -  | -  | 8  | 8  | -  | -  | -  | -  | -  | 16  |
| San Elijo         | -  | -  | -  | 8  | -  | 5  | 4  | -  | 16 | -  | 33  |
| Agua Hedionda     | -  | -  | -  | 5  | -  | -  | -  | -  | -  | -  | 5   |
| Los Penasquitos   | -  | -  | -  | 4  | -  | -  | 4  | -  | 9  | -  | 17  |
| Carpinteria Marsh | -  | -  | -  | 2  | -  | -  | -  | -  | -  | -  | 2   |
| San Diego River   | -  | -  | -  | -  | 5  | -  | 5  | -  | -  | 5  | 15  |
| Total             | 7  | 21 | 25 | 44 | 41 | 8  | 18 | 46 | 42 | 19 | 271 |

Going into the breeding season in 2011, the three propagation facilities will continue to house two breeding pairs each although the goal is to get four pairs going at the Safari Park. Sea World will house pairs LFCR359/218 and LFCR403/404; Chula Vista Nature Center will have pairs LFCR219/217 and LFCR208/243; and the Safari Park has pairs LFCR207/246 and LFCR362/346 and will receive two new pairs LFCR407/386 and LFCR 405/406.

### Banding

The banding session at Upper Newport Bay yielded two males and two females. Because of the advanced ages of the captive rails, reproductive successes of some, reproductive failure of others, and the deaths of two, all four of the new captives were kept for the 2011 season. Because they were headed for captivity, we did not band them. All but one of the 15 rails released to the wild in 2010 were banded; band numbers are noted in the Methods section herein. Trapping efforts at Tijuana Slough NWR were postponed because of weather and other logistic issues in 2010.

Re-sightings of banded rails were numerous in 2010 as noted under survey results above with highlights as follows. A banded female was observed with chicks in freshwater marsh at Point Mugu; a rail banded in 2009 was recovered at San Elijo Lagoon; two banded rails were observed closely at the San Diego River; a rail was in Famosa Slough; and a female released at Point Mugu in 2009 traveled the 160 miles back to Sweetwater Marsh NWR and the Chula Vista Nature Center where she was hatched and reared.

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