

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

**Light-footed Clapper Rail Management, Study,
and Propagation in California, 2007**

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

On Behalf of

**Clapper Rail Recovery Fund
Ann McCarthy, Contract Administrator
Huntington Beach Wetlands Conservancy
P.O. Box 5903
Huntington Beach, CA 92615**

Final Report

To

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

and

Sandy Marquez
U.S. Fish and Wildlife Service
6010 Hidden Valley Road
Carlsbad, California 92008

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ABSTRACT

The twenty-ninth annual census of the Light-footed Clapper Rail in California was conducted from 9 March to 5 June 2007. Thirty coastal wetlands were surveyed by assessing call counts from Carpinteria Marsh in Santa Barbara County, south to Tijuana Marsh National Wildlife Refuge (NWR) on the Mexican border.

A total of 443 pairs of Light-footed Clapper Rails exhibited breeding behavior in 19 marshes in 2007. This is the largest statewide breeding population detected since the counts began in 1980, representing an 8.3% increase over the former high count in 2006 and a 36% increase over the 24-year high reached in 1996. This is the fourth year in succession of record-breaking high counts. Upper Newport Bay was once again the largest subpopulation in California and was back to its second highest total. Tijuana Marsh NWR was at an all-time high level of 142 pairs, a 39.2% increase over 2006. The Newport subpopulation comprised 37.3% of the state population in 2007 and the subpopulation in the Tijuana Marsh NWR comprised 32.1%, together accounting for nearly 70% of the breeding population of this rail in California.

The subpopulation on the San Dieguito River dropped 50% to 15 pairs but remains the largest ever recorded in a freshwater marsh. There were 15 pairs at Point Mugu, its third highest total and the Seal Beach tally was up slightly to 24 pairs. Batiquitos Lagoon held a record high

¹ Zembal, R., S. Hoffman, J. Konecny, C. Gailband, L. Conrad and M. Mace. Light-footed clapper rail management study, and propagation in California, 2007. California Department of Fish and Game, Wildlife Branch, Nongame Wildlife Program Report, 2008-02. Sacramento, CA 28 pp.

of 22 pairs, as did Los Penasquitos Lagoon and creek with 12 pairs. Three other small subpopulations were at record or recent highs including Buena Vista Lagoon with 8 pairs, San Elijo Lagoon with 12 pairs, and San Diego River with 6 pairs. The San Diego River total included two pairs discovered at Kumeyaay Lake about 8 miles inland of Mission Bay.

Additional nesting activity was observed in 9 of 15 breeding territories at Point Mugu. Incubation nests were found in 5 territories, brood nests in 3 territories, chicks were observed in 2 territories, and there was evidence of chick feeding in 9 territories. No egg translocations were accomplished because of the asynchrony in incubation timing between Newport and the target marshes. No eggs were taken from Newport to augment the captive flock because of limited Newport nesting and heavy egg losses to raccoons, *Procyon lotor*. On the Seal Beach NWR there were 22 nests and 19 brood nests on 41 rafts and 22 clutches of eggs, 1 of which was a second clutch. Hatching success was 88%. Nest searches at Upper Newport Bay revealed only 12 nests, 6 were active with 2 – 8 eggs each and 4 of those were depredated by raccoons. At the Kendall-Frost Reserve 11 of 17 rafts held nests with 4 clutches of eggs including 1 second clutch and hatching success was 75%. Finally, in Sweetwater Marsh NWR there was no use of the nesting rafts but at least 1 of 4 pairs nested successfully with the sighting of chicks with their parents.

Five of 6 captive pairs laid eggs in 2007. As a result, 18 Clapper Rails were released to the wild, 5 at Point Mugu, 4 into San Elijo Lagoon, 4 into Los Penasquitos Lagoon, and 5 into the San Diego River. This brings the total number of rails released to the wild since 2001 to 164.

All of the released rails were banded and the 5 in the San Diego River were fitted with tail-mounted transmitters weighing less than 1 gm. The Rails lost their radios within one week but 4 of the 5 were still in the river when they were last encountered.

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, although management efforts now offer some promise of eventual recovery. 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. This total has been exceeded annually since then.

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.

Although hundreds of wetland acres are planned for restoration, it could be too late for the Light-footed Clapper Rail since full functionality of a coastal wetland may take decades to achieve. The existing habitat base appears to be too small and degraded to support the recovery of these endangered birds without intensive management. In addition, all of the subpopulations have been through recent bottlenecks, presumably limiting their genetic variability and adaptability. Consequently, Clapper Rail management in southern California now includes translocation efforts, beginning in 1999. The genetic and demographic augmentation of the smaller subpopulations may be critical to overall population viability in the long term. To this end important partnerships have been developed beginning in 1998 with staffs of the Chula Vista Nature Center, and Sea World, San Diego, and beginning in 2005 with the Wild Animal Park in the development of a protocol for captive propagation.

Reported herein are the results of the 2007 statewide survey, management, other study efforts, and releases to the wild of Light-footed Clapper Rails resulting from the development of

a protocol for captive breeding.

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 acre) 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 9 ft. The tides are dampened by constrictions at Laguna Road and farther west, resulting in a tidal amplitude of only 4 - 5 ft. 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 acre) 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) Mean Lower Low Water (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, 9 - 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 twenty-ninth consecutive annual census of Light-footed Clapper Rails in California was conducted from March 9 through June 5, 2007. Thirty coastal wetlands were surveyed by mapping territorial pairs based on their calls (Zembal and Massey 1981, 1985; Zembal 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 5 wetlands wherein such data were gathered in 2007 and high tide counts were accomplished on November 6 and

October 9, 2006 on the Seal Beach NWR. This NWR is the only wetland inhabited by clapper rails that is inundated thoroughly enough during a 6.5 ft. tide or higher to get a relatively complete visual survey of the rails.

In the 4 marshes with abundant clapper rails, mapping spontaneous calls was the prevalent technique. In marshes with few 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 2007 counts, those at Seal Beach NWR, Tijuana Slough NWR and Sweetwater Marsh NWR.

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 (Zembal 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. 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 2 hrs before dark, but some are done at first light to about 2 hrs 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 (Zembal 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. In one instance, a clapper rail attacked and knocked over a decoy that was set near a repeating tape. In another instance, a male attacked another rail, presumably a female, forcefully copulating with her while pecking at the head and neck, dislodging feathers. Richard Zembal finally disturbed these birds to divert the male's aggression. Subsequently, playbacks have been used sparingly and with caution.

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 2 – 4 hr 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 2007 call counts were conducted on 34 dates and totaled approximately 300 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 9 males and 6 females were proposed 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 5 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 1 - 4 birds and resulted in successful breeding and recruitment (Allen et al. 1993). Site fidelity is also a factor that could jeopardize the success of translocation efforts. The Light-footed Clapper Rail is viewed as a highly sedentary species (Zemba et al. 1983) but the reaction of an adult to being moved is unknown. Which site, old or new, would be shown fidelity?

In recognition of the many potential issues associated with the extreme rarity of this rail, we used the least intrusive method of genetic and demographic augmentation, egg translocation. Initially, eggs were moved from Upper Newport Bay, the subpopulation exhibiting the highest genetic variability, into the smaller wetlands. Using eggs, rather than adults greatly reduced effects on the donor subpopulation and gave maximum assurance of post-translocation site fidelity. One or two eggs were taken from a Newport nest and transported immediately in a portable incubator into a nest at the same stage of incubation in Mugu Lagoon, Seal Beach NWR, or the Kendall-Frost Reserve. The eggs for translocation were candled and floated to determine viability and stage of development. A maximum of 10 eggs could be moved into each of 5 potential recipient marshes per year. Eggs were marked with indelible ink and followed to hatching. The ultimate success of translocation will be determined by comparing subpopulation size trends, before and after, aided by 20 years of annual population surveys.

Nests that received Newport eggs were augmented to a maximum clutch size of 10. When adding one or two eggs would bring the total clutch to 10 eggs or more, one or two eggs would be removed when the Newport eggs were deposited. Undeveloped eggs, if present, would be removed first. Viable eggs removed from receiver marshes would be used to augment other clutches or hatched and raised in captivity and returned to the marsh as fledglings.

Potential egg translocations necessitated nest searching and monitoring at Upper Newport Bay and the 5 marshes to potentially receive eggs. Nest searches and observations were begun in February and continued into July 2007. 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 2 of the 6 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, probably because they offered no special protection under such a dampened tidal regime. Consequently, the intensive effort required to maintain and monitor them was put to other use. Although many marshes occupied by rails suffer from a poor supply of good nesting sites, artificial nesting rafts have been regularly used in only 3 of 7 marshes where they have been tried. Those three and the number of rafts in each during the 2007 season were the Seal Beach NWR with 80 rafts, Kendall-Frost Reserve with 17 rafts, and Sweetwater Marsh NWR with 7 rafts (that were not refurbished in 2007). The rafts in Kendall-Frost and Seal Beach were refurbished in February and early March and visited approximately every 3 weeks during the breeding season into July. Raft maintenance and monitoring involved a minimum of 230 field-hours.

A new stationary nesting site, a perched nesting basket was designed and deployed prior to the 2005 nesting season. These were designed to be stationary in the marsh and perched above most high tides for use in places with dampened tidal regimes. Seven baskets were deployed in the late summer of 2004 to field test their durability and potentially provide winter cover for the rails in the Kendall-frost Reserve (1), Sweetwater Marsh NWR (2), and Mugu Lagoon (4). The baskets are a 2 ft X 2 ft piece of outdoor plywood covered with a dome of welded wire that is entwined and covered with raffia except for the 4 side doors. The baskets were fixed 18 – 24 in above the ground, beginning level with the vegetation canopy and proceeding above it on two pieces of aluminum conduit driven securely into the substrate. Skinny bamboo rods were attached at various angles to and through the basket, protruding 36 in. in all directions above to deter raptor perching. After building a prototype, 5 nesting baskets were nearly completed by a group of 12 volunteers in 5 hours at the Huntington Beach Wetlands and Wildlife Care Center. About 20 students enrolled in a Natural History Class at Saddleback College finished off the outer raffia cover. In total about 100 hours were required to design and build the 5 baskets. A youth group put together another 5 baskets at the Chula Vista Nature Center.

Nest searches and monitoring were focused at Upper Newport Bay, Point Mugu, Seal Beach NWR, and Kendall-Frost Reserve in 2007. At Upper Newport Bay 33 field-days, 10 March – 25 November by up to 10 observers resulted in 270 field-hours of nest searching and observation. There were 37 dates at Point Mugu by 1 – 6 participants and 315 field-hours. On the Seal Beach NWR 2 - 8 observers accumulated 161 field-hours over 14 dates. There were 69 field-hours spent at the Kendall-Frost Reserve by 2 – 8 observers over 8 dates. The nesting and other activities at Sweetwater Marsh and of the captive rails at the Chula Vista Nature Center, Sea World, and the Wild Animal Park were monitored daily by one to 7 observers for a total of 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 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, 2001 – 2003, care had to be taken not to genetically swamp the Mugu rails. Consequently, there were 4 other marshes where captive-reared young could be released initially and 5 more that were added in 2004 and 2005 (Zembal et al. 2005).

There were six potential breeding pairs in captivity in 2007, two pairs at each of the three facilities. The CVNC housed rails #208/052 and 219/217; Sea World held #089/218 and 155/091; and the San Diego Zoo's Wild Animal Park kept #206/209 and 207/197. 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 pair #155/091 were hatched at Sea World on June 13, 2004 and June 5, 2003, respectively from Newport eggs. The male #206 was taken from Newport on September 18, 2005 and mated to #209, another 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.

Rail chicks that are hand-reared at Sea World are transferred from the hatcher to a brooder box wherein 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, graduating to whole live crickets as the chicks grow, 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 8 – 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 the Nature Center to prepare for release into the wild. The Sea World diet and protocol was appended to the 2005 annual clapper rail report (Zembal et al. 2005); there were refinements made to the protocol again in 2007.

In 2007, 1 - 7 observers monitored the captive rails from several minutes to many hours daily at the Chula Vista Nature Center, Sea World, and Wild Animal 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 there and approximately 15,000 students observed and studied them whereas the rails at the Wild

Animal Park are isolated from most human contact.

Banding and Telemetry

There was a single banding sessions conducted at Upper Newport Bay in 2007. 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 as in 2006. However, in 2007 reproduction was poor in Newport and depredation by raccoons was a major issue. Consequently, no eggs were taken. A female at the Wild Animal Park required replacement and 10 traps were deployed at Upper Newport Bay on November 25 by 6 trappers and numerous onlookers during an evening 3-hour trapping session.

All of the Clapper Rails raised in captivity and released to the wild were banded with a Federal aluminum band and a color plastic wrap-around band (see Zembal and Massey 1983 for a full discussion of trapping and banding techniques). The annual code for 2007 was a blue anodized metal band on the left leg. Although there have been multiple sightings of some of these banded rails, an attempt to develop more data on post-release dispersal was made in 2005 and continued in 2006 and 2007 with radio telemetry. Five RI-2c transmitters were purchased from Holohil Systems Ltd. The transmitters weighed 1.2 gram each, measuring 15 x 7 x 35 mm, about the size of a pencil eraser. The expected battery life was 42 days with a range of about one mile. All of the transmitters were designed for tail-mounting. They were attached to the three central tail feathers of the 5 rails released into the San Diego River with 12 lb monofilament and super glue. It was surmised that the tail-mounts would fall off with tail-molt or sooner with repeated jostling and preening.

There were 18 rails released to the wild in 2007: 4 into San Elijo Lagoon on August 21; 4 into Los Penasquitos Lagoon on September 7; 5 into Point Mugu on July 13; and 5 that were radio-tagged and released into the San Diego River at Mission Bay on September 7. The radio-tagged rails were followed for 2 weeks for a total of approximately 164 field-hours.

RESULTS and DISCUSSION

Population Assessment

A total of 443 pairs of Light-footed Clapper Rails exhibited breeding behavior in 19 marshes in 2007 (Table 1). This is an 8.3% increase over the former high count in 2006 and a 36% increase over the longer standing high in 1996. This is the fourth consecutive year of record-breaking high counts. The subpopulation in Upper Newport Bay was once again the largest in California and was only 9 pairs lower than its record high in 2005. The Tijuana Marsh NWR subpopulation reached a record level with 142 pairs, a 39.2% increase over its former high set in 2006. The Newport subpopulation comprised 37.3% of the state total in 2007 and the Tijuana Marsh NWR subpopulation comprised 32.1%, together accounting for 69.4% of the breeding population of the Light-footed Clapper Rail in California. In addition, 6 marshes held 12 – 24 pairs each for a combined total of 100 pairs or 22.6% of the state total.

The spring of 2007 was not very conducive climatologically to consistent clapper rail breeding activity, or therefore successful call counts. The winter was the driest on record and the spring was cold. Many surveys were re-scheduled at least once due to poor calling activity. On

some days the rails were very vocal, on others there was little activity. Sites that would normally be completed in a single visit were re-visited twice or three times before vocalizing was

Table 1. Census of the Light-footed Clapper Rail in California, 1980-2007.

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, 1980-2007.
(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 - 2007.
(continued) Part III: 2000 - 2007.

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

- indicates that no census was taken.

* indicates a fall or winter occurrence.

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

consistent enough to justify confidence in the survey results. At Upper Newport Bay, for example the counts normally require 8 early mornings or late evenings to complete. In 2007, the Newport counts were started on March 9 and not completed until April 3 because of the extreme variability in vocalizing. In addition to the unusual cold, windy conditions, Newport was being

dredged to save it from filling in with sediment. No direct impact of the dredging operation was detected but the monitoring for impacts relied mostly on finding and watching active nests. Very few egg nests were found, the 5 that were discovered were found very late in the nesting season, and all but one was predated. At least one clutch and perhaps all 4 were predated by raccoons, *Procyon lotor*. Additionally, there were raccoon tracks along the length of Newport Bay, raising concerns of an unusually large population of these clever predators.

Tijuana Marsh's subpopulation was 87 pairs strong for two consecutive years prior to the 2006 high count of 102 breeding pairs. The 40-pair increase in 2007 is unprecedented at any marsh but Upper Newport Bay. The increase was not attributable to one single area but fairly well distributed throughout the marsh. What was unusual was the number of pairs calling from the very edge of the wetland and in the maritime scrub bordering the eastern edge of Oneonta Slough. As in 2006, there were more than usual numbers of rails manifesting territoriality on the western edge of the Oneonta Slough portion of the marsh, adjacent to the paved road and apartments; several more than usual were counted in the southern half of Oneonta Slough; again there were two in the cordgrass on the northern edge of the river south of Oneonta; and three in reed beds. Rails were again detected in the restoration area, the model marsh south of the river.

This record count at Tijuana Marsh occurred on an evening with no helicopter activity and so none of the usual associated noise interference. However, the count would have been high even with helicopter noise. The calling frequency at Tijuana Marsh that evening was more intense than most of the seasoned observers had ever experienced. It is also of interest that this extreme density of breeding rails comes at a time when the Mexican marshes occupied by Light-footed Clapper Rails are apparently under heavy siege by domestic animals being grazed directly in the salt marshes.

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 to be comprised of only 6 breeding pairs. That population estimate was probably low due to the lateness of the census and in 2005 there was evidence of at least 12 pairs, although this too was a conservative estimate. Finally in 2006, the survey on April 1st revealed a significantly large subpopulation with calling from 25 dueting pairs, 12 singles clapping, and 5 advertising males. Finally, the rails were extremely vocal during the 2006 survey giving confidence that the count was accurate and indicating 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.

We believe that this subpopulation is still significantly large in 2007 but calling was as poor as it was in most of the other marshes and the estimate was down by half. San Dieguito was surveyed three times in 2007 and during each visit, rails finally vocalized hours after having repeatedly ignored the playback broadcast of a duet quite near their positions. This lack of intense calling was observed at most marshes and probably indicated great disparity in readiness to breed within the subpopulations. The spottiness of intense calling in most of the marshes continued through the breeding season, probably indicating that some of the rails present in some marshes did not breed in 2007. In Upper Newport Bay, for example intensive nest searches over 17 days, perhaps 100 acres, and 300 field-hours revealed only 6 incubation nests, 4 of which were predated in the same areas that held 24 nests, 12 of which were active egg nests when discovered in 2006.

Re-examination of the call count and nest data for the Seal Beach NWR indicates that this subpopulation has probably been 20+ pairs for several consecutive years, including 2007. However, with so much marsh available to the rails, there ought to be a much larger breeding contingency there. The viability of this subpopulation is still questionable and there are no new clues about what limits the rails on the NWR. However, raptor predation is suspected and we may re-initiate monthly raptor monitoring sessions. This is the only marsh currently occupied by Light-footed Clapper Rails that gets fully inundated during a high tide of about 6.5 ft (MLLW), or higher. Tides of this height occur regularly in the late summer usually in darkness and in the fall or 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 predators and may be part of the problem at Seal Beach. However, the completeness of inundation also allows fairly dependable surveying of the subpopulation outside the breeding season. Accordingly, the rails were counted again from canoes on 9 October 2006 and 6 November 2006 and 103 and 95 individuals were sighted, respectively (Table 2). The higher count was the fourth highest of any high tide count on the NWR. With good survival through the winter, we would have expected a breeding population larger than 24 pairs in 2007. Unfortunately, the most recent count taken after the 2007 breeding season only revealed 32 rails. Either the rails had already moved undetected onto the edges or there were heavy losses at the end of the breeding season. Potential rail predators were out in abundance during the counts, 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*). 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 rafts and afforded much better protective cover thereby.

Although the Clapper Rail numbers in Seal Beach were relatively stable at 24 breeding pairs in 2007, this subpopulation was again most heavily male-skewed. Both the extraordinary abundance of unmated males and the inability of this subpopulation to return to mid-1990s levels are of concern. In the past there has been evidence of heavy, probably female-skewed winter losses. The Seal Beach subpopulation has had the advantage of genetic augmentation through translocations of adults and eggs but heavy predation or a similar inimical factor continues. Seal Beach NWR received 6 captive-bred rails in 2002; 8 eggs from Newport stock were swapped and hatched by a Seal Beach pair and their 7 eggs were incubated, the young were reared, and returned to Seal Beach in 2003; and 5 captive-bred rails were released into the NWR in 2004. No additional augmentation has happened since 2004 because of the extreme male-skew and continued uncertainties about the inimical factors operating in this marsh.

The subpopulation in Batiquitos Lagoon at 22 pairs was nearly tied for fourth largest in the state in 2007. The rails are thriving and the subpopulation is increasing gradually because the ecological functionality of the wetland is improving dramatically over time due to the major restoration project implemented there. In December 1996, the mouth of the lagoon was opened to the ocean, the final step in a \$57 million restoration project and since then the carrying capacity for Clapper Rails has been on the rise. 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. In 2007 there were at least 6 breeding pairs vocalizing from the edge of the

Table 2. High Tide and Call Counts of Clapper Rails on the Seal Beach National Wildlife Refuge, 1975 - 2007.

Date	Tidal Height	Clapper Rails Counted	Breeding Pair 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 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 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 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	
23 Nov 1999	7.0	17	30	20	

Table 2 (continued). High Tide and Call Counts of Clapper Rails on the Seal Beach National Wildlife Refuge, 1975 - 2007.

Date	Tidal Height	Clapper Rails Counted	Breeding Pair Members		Notes
			Before	After	
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	-	

western tern island; 6 pairs along the western half of the north edge of the inner lagoon; 8 pairs along the southern edge; a pair again in the northeast corner of the basin just west of the freeway; and a pair on Encinitas Creek about 0.5 miles south of La Costa Boulevard, just downstream of LeVante Street. The cordgrass in the west basin is extensive and looks vigorous, although much of it appears to be regularly over-washed. There was one pair there in 2007 in the northeast corner in a reed bed bordered by the tallest cordgrass in the west basin. Marsh restoration appears to be working for this endangered bird in Batiquitos Lagoon, increasing expectations for a large, thriving population there within a decade or so. In support of this possibility 16 captive bred rails have been released into this marsh since 2004.

Since doubling in size between 2001 and 2003, the Point Mugu subpopulation has fluctuated between 14 and 19 pairs, 2003 - 2007. This subpopulation fluctuated between 3 and 7 pairs for nearly 20 years until recent augmentations fostered its growth. There is an efficient predator management program in place, consistent rail and marsh management, and the Clapper Rail breeding population is stable, although not as large as would be hoped for in this, the biggest contiguous patch of potential habitat in the state. Again in 2007, rails were observed attempting to breed in the eastern arm of the lagoon. Intensive monitoring, demographic and genetic augmentation, and provision of additional nesting cover should continue to add stability or foster the growth of this northern subpopulation.

That 2007 was a year of unusually intermittent vocalizing and late or reduced breeding activity was also observed at Point Mugu. Between May 14 and June 19 over 200 hours of systematic field observations were accrued, mostly by the same observer, both in the early morning and late afternoon. During these observations “kecking” was the most common rail vocalization heard. There were only 8 duets recorded from 5 locations, 15 single “clapperings” from the same 5 plus 3 additional locations, and 124 incidents of “kecking” from all over the marsh. Less than half of the usual nesting activity was directly observed in the field and at least one pair was still incubating eggs on July 13, 2007.

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. However, at least one of them, a female banded 1035-8878 did not. 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* (Zemba 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.

The San Elijo Lagoon subpopulation was at its second highest level in 2007 with 12 pairs of breeding Clapper Rails. Although San Elijo Lagoon has had major efforts to restore tidal function, the lagoon still closes to the ocean with regularity. Seven of the rail pairs were in the inland lagoon in fresh water marsh; 5 pairs were in the central lagoon west of the freeway; and none revealed themselves in 2007 along Escondido Creek. San Elijo received an augmentation of 8 captive-bred rails in 2004 and 5 in 2006 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, 6 months following release, and one of the 2006 rails was observed repeatedly over 6 months off of the Rios Avenue trail.

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 habitat increasingly. The detection of 12 pairs is a record high for this wetland. There were 10 pairs in the freshwater marsh in the southeastern third of the lagoon and an additional 2 pairs and 3 advertising males along Sorrento Valley Creek, inland of the 805 freeway. Five captive-bred rails were released in 2004 but there have been no re-sightings.

The 2007 count in Buena Vista Lagoon indicated that this wetland's high of 8 pairs had been maintained for a second year. Totals of 5 pairs, 5 singles, and 5 males were detected. Of these 4 pairs were in the central lagoon, 3 were in the inner lagoon, and there was 1 pair detected in the little outer lagoon. 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 humans.

There was a sewage spill in 2007 that raised concern for the rails in Buena Vista Lagoon. The spill entered the inner lagoon. During surveys on 17 and 28 March, there were 3 singles, 1 pair and, an advertising male detected in the inner lagoon. One of the singles was directly adjacent to the little parking lot in the southeast corner of the lagoon, right on top of remediation activities for the spill. After the spill, Richard Zemba went back to do another survey to see if the commotion associated with spill remediation had resulted in the rails moving around. On this post-spill date, 2 pairs, 2 singles, and an agitated kecker were documented in the inner lagoon. One of the pairs called from a new location but because there were still only 4 points of clapping, it was not counted as an additional pair. The single that had been detected at the spill remediation activity site was still there.

The marsh at Agua Hedionda Lagoon has held a maximum of 7 pairs of Light-footed Clapper Rails, once in 1983 and again in 2006 but was back down to 4 pairs in 2007. 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 5 pairs located in 2004 was the highest level observed since then and this level was probably sustained in 2005 when 4 pairs and an advertising female were detected during an early season count. Given the usual

presence of unmated males in Agua Hedionda, 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. Five captive-bred rails were released into Agua Hedionda Lagoon in 2004 on the inland edge of the inner lagoon but none has been re-sighted since.

The subpopulation in the University of California Reserve at Kendall-Frost rebounded significantly in 2004 and 2005 but was significantly reduced in 2006 and 2007. Although this marsh is small, totally isolated, and surrounded by urban housing, it is managed under the University of California Reserve System. The stewardship includes appropriate predator management, habitat restoration, and people, particularly researcher management to assure minimal 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 breeding populations of 14 pairs, the highest total there since 1985 but it was not sustained. In spite of the appropriate management of the marsh, it may always be a struggle for the rails in such a tiny, isolated wetland. For example, a Cooper's Hawk was observed powering through the main tidal channel; just one such animal remaining local and hunting from the adjacent high-rise condominiums would have excellent visual access to the entire wetland and take a major toll on the rails. A Cooper's Hawk was video-taped in 2006 tenaciously crashing into pickleweed after a Clapper Rail at Bolsa Chica.

Three of the breeding pairs of Clapper Rails in the Sweetwater Marsh NWR and environs were in the Vener Pond section of the main marsh, including a pair in the pond east of the volunteer parking lot, one was in the "E" Street Marsh, and one pair and an advertising female were on the river upstream of the freeway. The pair in the pond was observed on June 28 with 6 chicks swimming from the island to the east shore by Tina Matthias and David DiDonato. The totals for the Sweetwater complex had not been up to 4 pairs since 1998. Eleven Clapper Rails were released to Sweetwater in 2005, so the adult rails sighted were checked for bands but none was seen.

The cordgrass continues to expand and dominate a significant portion of the mouth of the San Diego River and an all-time high of 8 pairs of breeding Light-footed Clapper Rails were there in 2004. However, this was not sustained in 2005 when only 5 pairs were detected but the channel was full with heavy runoff caused by the second wettest year on record. Although the cordgrass survived these high flows, the numbers of breeding rails detected in 2006 and 2007 were low. Otherwise, based upon the extent and current condition of the habitat, it should abound with rails. However, regular floods may limit the habitat suitability for the rails there. It should be noted that multiple call counts were attempted on the channel in 2006 and 2007 and none was very convincing; responses to the tape were very brief and distant. Two of the pairs reported here for 2007 were actually detected 13 miles inland at Kumeyaay Lake. This is the second year of multiple reports of sightings and audio detections of Clapper Rails in freshwater marsh at this lake.

The salt marsh at the mouth of the Santa Margarita River typically held a single pair of nesting rails for many years. However, in 2002 and 2003 there were two pairs, one at the river mouth and another between Stuart Mesa Road and the railroad tracks. Both were in brackish marsh in the midst of salt marsh patches. In 2004 only the pair at the river mouth was detected, both pairs were back in evidence again in 2005, but only one was detected in 2006, at the more inland site and one in 2007 at the river mouth.

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.

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. Four 4 pairs again were detected there in 2007 and are listed in Table 1 under the Huntington Beach Wetlands. The Santa Ana Marsh is at the southern terminus of the Huntington Beach Wetland Complex, 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. In both 2006 and 2007, the rails inexplicably occupied only the western half of this cordgrass marsh.

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 2007 the silence persisted. 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 but the wherewithal and interest appear to be lacking. A local resident recently reported red foxes actively denning at the southern end of the dirt road extension of Esteros Way on the very edge of the marsh. Without dealing with the foxes in particular through consistent predator management, the chances for a viable subpopulation in Carpinteria Marsh are non-existent.

Ten of the 19 marshes with breeding Clapper Rails in 2007 had skewed sex ratios and 8 of those were male-skewed. A total of 57 advertising males and 5 females were heard during the call counts including 10 unmated males at Point Mugu, 17 single males on the Seal Beach NWR, 16 males and 2 females at Upper Newport Bay, 5 males in Buena Vista, 1 female in San Elijo, 1 male in the San Dieguito River Valley, 3 males in Los Penasquitos Lagoon, 2 males in the Kendall-Frost Reserve, 1 female in Sweetwater Marsh, and 3 males and a female in Tijuana Marsh. As in 2007, the usual condition has been a slight male bias during most years in most marshes. An extreme male skew like that at the Seal Beach NWR indicates major ongoing issues, unfortunately of an unknown nature.

Additional reports of Clapper Rail detections were investigated in 2007; the following is the most noteworthy of them. Mary Beth Stowe reported hearing three individual clapper rails at Kumeyaay Lake on 25 April 2006 in Mission Trails Park on the San Diego River. Several additional reports came in for 2007 and two pairs likely bred there. The further investigation of Los Penasquitos Creek, east of the freeway led to the detection of 3 additional breeding pairs of clapper rails in 2006 and two pairs in 2007. The continued annual release of additional captive-bred Clapper Rails appears to be resulting in increased numbers of rails and increased occupation of inland sites. Clapper Rail vocalizations were reported for Bolsa Chica and the San Joaquin Reserve in 2007. However, breeding is not suspected to have occurred. Several attempts to elicit responses to a tape-playback of a duet were unsuccessful.

There is one, large viable subpopulation of Light-footed Clapper Rails in existence in California today. Only the subpopulation at Upper Newport Bay has demonstrated the resilience to rebound quickly following weather-induced catastrophes in the past 30 years. The subpopulation in the Tijuana Marsh NWR has grown significantly but the lack of sediment control in the Tijuana River Watershed, other water quality issues therein, and the lack of an emergency response plan and funding to deal quickly with river mouth closure are problematic. Major sediment deposition occurred in the area of the river mouth in 2004/2005 and the marsh restoration site that held 5 breeding pairs of Clapper Rails in 2004 before the causative storms was devoid of breeding rails in 2005 but abounded with thick, newly deposited sediment (it should be noted that breeding rails were back in the restored habitat in 2006 and 2007). There were 6 other subpopulations with 12 - 24 pairs each in 2007 and 11 with 1 – 8 pairs each. Those 11 totaled 36 pairs of rails or 8% of the state population. Five wetlands held just one or two pairs each; these smallest subpopulations are in serious jeopardy. Without restoration and species-specific management in these wetlands, there is little likelihood of the Clapper Rail's recovery in them.

The Light-footed Clapper Rails in California have reached a population high for the fourth consecutive year. This has been the result of management efforts for the rails and major habitat restoration. With significantly greater management efforts and restoration, we could likely recover the Light-footed Clapper Rail.

Management and Monitoring of Nesting Sites

Nesting was late and sporadic in 2007. The 33 nest-searches conducted by 1 - 10 observers at Upper Newport Bay, April 5 - July 19 revealed half as many nests as in 2006, only 12 nests. Six nests held 2 – 8 eggs when found. One was hatching when discovered, one hatched subsequently and 4 were predated by raccoons. Because of late, asynchronous nest initiations, heavy depredation, and the differences noted above in the timing of incubation, no eggs were taken for egg translocation or for the captive propagation program.

Twenty of the 80 rafts available in 2007 on the Seal Beach NWR held Clapper Rail egg nests, and 1 of the incubation nests had a second clutch for a total of 21 clutches of eggs. This is close to the level of reproductive activity documented in 2003 – 2005 when total clutches laid were 24, 19, and 23, respectively but 34% lower than observed in 2006. There were totals of 22 nests and 19 brood nests built on 41 rafts in 2007. Six clutches were probably incubated in marsh vegetation, 5 were brooded on rafts. Whereas 9 brood nests built on rafts in 2005 were indicative of successful nests in nearby natural cover, only one such case was evident in 2006. Since rafts were first deployed in the NWR there has been little evidence of off-raft nesting other than in 2005. Hatching success was 88% in 2007.

The population estimates for the NWR based upon the call counts have been slightly lower than indicated by call counts augmented by observed nesting activity. Given the nesting season observations, the actual population at Seal Beach has probably been about 24 pairs annually since 2003 (Hoffman 2006). However, based upon reduced nesting activity in 2007 and the low high tide count on October 26, the breeding population going into 2008 appears to be smaller.

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, 9 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 dramatically from unknown causes. We continue to modify the raft design for better durability and function and to provide up to 5 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, natural and artificial will perhaps make a positive difference over time. Cordgrass cover was greatly enhanced by the unusually high rainfall in the winter of 2004/2005. This may have added enough additional predator-protection to increase rail survival and productivity in 2006. Unfortunately, this was not sustained into 2007.

The Kendall-Frost subpopulation plummeted by 64% in 2006 from its recent high of 14 pairs in 2004 and 2005 and remained at low levels in 2007. Ten of the 17 rafts held nests and one additional raft, although nest-less held signs of chick brooding and feeding; there was no nesting activity on 6 rafts or in the single perched nesting basket. Since the basket has been up since 2004 and never used, it was removed. There were egg clutches on 5 rafts, 3 of which hatched. One was depredated by a small bird and another by rats. There was one second clutch that hatched and the beginnings of two very late clutches, one of one egg and the other of two eggs on July 7. The one egg disappeared and the two were taken by rats. There were brood nests in the marsh, directly adjacent to two rafts. Additionally, Forster's Terns (*Sterna forsteri*) again nested in the outer marsh with about 120 individuals defending in June.

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. Even with the program operational there were fresh cat (*Felis domesticus*) and opossum (*Didelphis virginianus*) tracks on the saltpan and raccoon (*Procyon lotor*) passage on the far outer bank of the marsh. This little wetland had 24 breeding pairs of rails in 1984, evidence of its high potential. This subpopulation has foundered since but then it rebounded significantly in 2004 and 2005; it should be a focus of management efforts for rail recovery.

Certain of the predator issues that arise cause difficult management dilemmas. A Cooper's Hawk (*Accipiter cooperi*) probably caused some of the problems for rails in Kendall-Frost prior to the 2006 breeding season. A large individual was observed launching from the condominiums perfectly positioned hunting perches, speeding low along the main channel, and crashing into the marsh after unseen quarry. A Cooper's hawk was video-taped at Bolsa Chica in 2006 attacking a rail, repeatedly crashing into thick vegetation, and reminding one of how persistent and lethal this species can be. One such regular hunter could take a heavy toll but trapping and relocating raptors is very specialized work and extremely labor intensive. Other alternatives including removing the suitability of perches, increasing escape cover, or hazing the hunters would be very labor intensive, costly, and might not be workable. However, we will only learn to manage such a situation with someone out there trying. The Cooper's Hawk, a large female was observed hunting in the marsh again in 2007. It would not be surprising if the terns were the hawk's regular fare and the rails incidental victims.

None of the rafts or nesting baskets at the Sweetwater Marsh NWR was used by Clapper Rails for nesting in 2007. The only nesting documented in the marsh was again on the little

island in the pond located directly below the volunteer parking lot and rail aviary. This pair was one of 5 that vocalized in response to the tape on March 28 south of the Nature Center and aviary. Both of the adults were observed with 6 chicks on June 28.

Sweetwater Marsh is another high marsh that is largely not influenced much by high tides, except the extreme highs, particularly when they 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 few rails documented in the marsh in recent years were in those parts of the wetland most regularly influenced by tidal inundation or ponded water.

During the early spring call counts in 2007, a minimum of 15 breeding territories were in evidence at Point Mugu along with 12 unmated males. By the end of the breeding season further evidence of breeding activity had been discovered in 9 of those territories. Eight nests were found at Point Mugu in 2007. One was a late, active incubation nest, 4 were found after hatching, and 3 were brood nests. Egg fragments were discovered in 3 territories, young rails were observed in 2 territories, and there was evidence of chick-feeding in 9 territories. All 5 nests manifest successful hatches with chick rearing in those territories.

Again in 2007, the most common evidence of successful reproductive activity was remnants left in territories indicating chick feeding. Adults feeding young chicks will break open and apart small crabs that the adults would always swallow whole for themselves. Holes are pecked into the carapace of the crab and tiny bill-tip quantities of crabmeat are delivered, bit-by-bit to the chicks. Small, dismembered crabs are left in the marsh at regular feeding spots. The nature of the excavated crabs and other evidence at these sites indicates that chicks were fed there recently. The crabs are small-sized and broken open. Crab limbs that the adult did not bother to swallow (as they typically do when not distracted by chicks) are usually strewn about, and there are often tracks of young and adults. Sometimes there are downy feathers and regurgitated pellets.

Locating active incubation nests was a much higher priority when egg translocation was the only possible means of introducing Newport genotypes into Point Mugu. Now that the development of a protocol for captive breeding has become more active and successful, the release of captive-reared rails has largely replaced the egg translocations and nest searching has been reduced at Mugu. Opportunities for the transfer of additional eggs were still sought but the asynchronous timing of incubation among the Point Mugu subpopulation, Newport, and the captive rails continued to be significantly limiting. Mugu is a focus for these efforts because it is the largest of the coastal wetlands available to Light-footed Clapper Rails in California.

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 never used over the several years they were maintained and monitored. Even if rails discovered such structures during high tides, they would not be drawn to them for nesting at Point Mugu because of the significant acreage of natural cover that is not inundated by most of the high tides. However, many of the nests discovered at Point Mugu have been elevated in the tops and sides of spiny rush. Additionally, clapper rails have nested successfully there in elevated duck blinds in the past. Consequently, there was reason to believe that the rails might use an elevated nesting basket. Unfortunately, there has been no use of the baskets for nesting. However, one banded rail was observed in 2006

perched on top of the basket near L Avenue.

These earlier attempts with artificial, floating nest rafts were concentrated in the tidally dampened western arm. Floating rafts might be of greater utility now in the more fully tidal central arm along Calleguas Creek where expansive cordgrass cover has developed.

Development of a Protocol for 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 8 and the other of 7 eggs. The 8-egg clutch was taken to Sea World to be hatched and reared, hoping that the pair would lay another clutch. 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 since then (Table 3).

Table 3. Clapper Rail Egg, Chick, and Fledgling Production in Captivity, 2001 – 2007.

YEAR	#BREEDING PAIRS	#EGGS	#HATCHED	#FLEDGED
2001	2	15	15	10
2002	3	35	30	21
2003	4	54	43	26
2004	5	58	47	42
2005	4	74	48	36
2006	6	27	10	7
2007	6	37	23	18
Total	-	273	206	160

In 2007, 18 more captive-bred rails were released, 5 into Mugu Marsh, 4 into San Elijo Lagoon, 4 into Los Penasquitos, and 5 into the San Diego River (Table 4). This brings the total number of captive-reared Light-footed Clapper Rails released to the wild since 2001 to 164. Point Mugu remains the priority for releases because of the size of the potential habitat base there but lineages must be watched to avoid swamping the genetic pool at any of the release sites (Table 5).

Although the propagation program has largely been a great success to date, survival has been extremely poor for early first clutches and broods. Early season egg and chick deaths appeared to be the results of exposure due to poor parental care during cold, wet conditions. One female in particular, ignored the chicks almost immediately and prepared to lay her next clutch. One male was destroying eggs as they were laid. As a result, at least half and sometimes entire early first clutches have been pulled and artificially incubated to secure higher survival.

Table 4. Number of Captive-reared Light-footed Clapper Rails Released into Target Marshes, 2001 – 2007.

Marsh	2001	2002	2003	2004	2005	2006	2007	Total
Point Point Mugu	7	11	20	12	17	3	5	75
Seal Beach NWR	-	6	-	5	-	-	-	11
Sweetwater Marsh	-	4	-	-	11	-	-	15
Kendall-Frost	-	-	5	-	-	-	-	5
Batiquitos Lagoon	-	-	-	8	8	-	-	16
San Elijo Lagoon	-	-	-	8	-	5	4	17
Agua Hedionda	-	-	-	5	-	-	-	5
Los Penasquitos	-	-	-	4	-	-	4	8
Carpinteria Marsh	-	-	-	2	-	-	-	2
San Diego River	-	-	-	-	5	-	5	10
Total	7	21	25	44	41	8	18	164

Table 5. Number by Lineage of Captive-reared Clapper Rails Released into Target Marshes 2001 - 2007.

Marsh	2001	2002	2003	2004	2005	2006	2007	Total
Point Mugu	3a4b		1a14b5d	6a6d	7a1b9d	1a1e 1w	5e	23a25b20d 6e1w
Seal Beach NWR	-	6c	7wild*	5b	-	-	-	5b6c7wild*
Sweetwater Marsh	-	1a3b	-	-	11b	-	-	1a14b
Kendall-Frost Res	-	-	5a	-	-	-	-	5a
Batiquitos Lagoon	-	-	-	3a2b3d	8b	-	-	3a10b3d
San Elijo Lagoon	-	-	-	1a4b3d	-	5a	4e	6a4b3d4e
Agua Hedionda	-	-	-	5b	-	-	-	5b
Los Penasquitos	-	-	-	4b	-	-	4f	4b4f
Carpinteria Marsh	-	-	-	2wild		-	-	2 wild
San Diego River					2a1b2d	-	5f	2a1b2d5f
Total	3a4b	6a9b 6c	6a14b 5d7w	10a20b 12d2w	9a21b 11d	6a1e 1w	9e9f	40a68b6c 28d10e9f10w

*The 7 wild young released into Seal Beach NWR were from eggs taken from Seal Beach during a clutch-swap.
 Pair "a" is 716-93332 (CVNC 003 male) X 605-09842 (CVNC 002 female);
 Pair "b" is 605-09841 (CVNC 001 male) X 605-09850 (CVNC 004 female);
 Pair "c" is 945-65863 (CVNC 017 male) X 945-65856 (CVNC 009 female);
 Pair "d" is 945-65854 (CVNC 007 male) X CVNC 052 female (no Service band);

Pair "e" is 183-54489 (CVNC 208 male) X CVNC 052 female.
Pair "f" is WAP 207/197

LFCR155/091 were housed at Sea World in the rail aviary along the back access road near the Penguin Encounter. The aviary contained a small pool and was heavily planted with grasses. The birds were fed two times a day. Routine maintenance was kept to a minimum to lessen disturbance to the pair. Keepers suspected a nest in one of the grasses at the front of the enclosure. The female appeared to be incubating. The female abandoned the nest on April 6. The nest was checked and shell fragments and fresh albumen was found. There was evidence of rat activity in the aviary. The pair was moved to a new enclosure during the egg laying period. Two new eggs were dropped in the new enclosure. The pair never incubated. The dropped eggs were placed in an incubator for artificial incubation after sitting in the enclosure for several days. Early development was documented, but the eggs died in the early stages of embryonic development. The second pair of rails (LFCR089/218) was also moved to an alternate site. No nest activity occurred after the move.

Plans are in place at Sea World to refurbish the two original rail pens. Completion of construction is scheduled for the end of January in preparation for the 2008 breeding season. Each enclosure will have concrete footings around each perimeter. All of the hardware cloth will be replaced by 1" x 1/2" vinyl clad weld wire. The entire back portion of the enclosure will be replaced with new vinyl clad weld wire. All of the trees in the enclosure were cut down to 2 feet below the top wire. The top wire will be replaced with new weld wire.

Sea World officially endorsed involvement in the Clapper Rail Recovery Program early on and completed the construction of an aviary in 2005 to house two pairs of breeding Clapper Rails adjacent to their new educational facility. The plight of the Clapper Rail and the importance of coastal wetlands have been incorporated into their educational program. The educational facility accommodates about 15,000 students per year. Sea World participation has been instrumental in the success of the rail program. When there were predation problems or opportunities to maximize the output of the captive rails, the Sea World Avian Staff were there to do whatever needed to be done. Corporate recognition and the beginning of an educational component are welcomed and exciting additions to the program as was the partnership of the Wild Animal Park in 2005.

Since the captivity of the first pair of rails, there has been concern about the level of disturbance caused by visitors. Over 40,000 people go through the exhibit annually, passing within a few meters of the rails' cage. Exposure of the public to the rails, their plight, and the importance of their habitat is a top priority of this program. Although this disturbance could impact the rails, they are breeding and thriving at CVNC.

At Sea World on the other hand, the nature of the constant human activity at the Educational Aviary may have been a component in the lack of reproductive output there this year. As a result, Sea World staff has determined to use that aviary as a retirement facility for pairs past prime. The breeders will be housed in the side pens where Clapper Rails had successfully bred in past years.

The timing of nesting, hatching, and chick rearing are summarized for the Nature Center and Wild Animal Park in Tables 6 and 7. The rails housed at both facilities yielded four clutches and broods from three pairs, one at Chula Vista and both pairs produced at the Wild Animal

Park.

Table 6. Clapper Rail Breeding Activity at the Chula Vista Nature Center, 2007

Parent ID	Male/Female 208/052	Male/Female 208/052
Clutch #	Clutch 1	Clutch 2
Date Clutch Initiation	March 9	April 26
Date Clutch Completion	March 18	May 6
# Eggs	7	7
Date Incubation Initiation	March 13 (?)	uncertain
Hatch Dates (# eggs)	April 6 (2) April 7 (4) April 8 (1)	May 26 (1 mortality) May 27 – (1) May 28 – (5)
# Eggs Hatched	7	7
# Juveniles Moved To Conditioning Pen	5	4
Age of Juveniles When Moved	~ 71 days	~54 days
# Juveniles Released To the Wild	5	4
ID of Released Clapper Rails	LFCR 223 - 227	LFCR 231 - 234
Age at Release	~ 99 Days of age	~79 days
Release Location	Mugu Lagoon	San Elijo

Generating public awareness of the plight of the Light-footed Clapper Rail and their connection to salt marsh habitat is an important aspect of the activities associated with breeding and release efforts. Sea World, the Wild Animal Park, and CVNC have developed programs and educational opportunities to increase public awareness of this endangered bird. CVNC exhibits the rail, allowing 40,000 to 60,000 guests a year to see the elusive, secretive bird up-close. Sea World has brought the story of the Light-footed Clapper Rail into the homes of millions by featuring the rail and reintroduction efforts on their educational television series *Shamu TV*. Sea World and Bush Gardens have also facilitated featuring the rail on a segment of *Jack Hanna's Animal Wise*. The Wild Animal Park describes their breeding efforts in several of their web site blogs. The web site stories have been effective in generating awareness and concern for the rails and their habitat. A great example of these far reaching effects were the calls and emails San Diego Zoo staff fielded during the San Diego wildfires in October 2007. Concerned individuals, even some from out-of-state, inquired about the fire-threat to the habitat of the released captive bred rails and whether the rails survived the fires.

Another aspect of the program that creates public awareness is the involvement of local volunteers for Light-footed Clapper Rail studies and reintroduction efforts. We have always made an effort to incorporate people who live near a wetland in a variety of activities like censuses, artificial nest construction and maintenance, rail releases, and even radio telemetry

tracking. Including residents of nearby wetlands has resulted in increasing their sense of “ownership” of the resource and their willingness to be stewards and advocates for wetlands and the Light-footed Clapper Rail.

Table 7. Clapper Rail Breeding Activity at the San Diego Zoo Wild Animal Park, 2007.

Parent IDs	Male/Female 207 / 197	Male/Female 207 / 197	Male/Female 206 / 209
Clutch #	1st	2nd	1st
Date Clutch Initiation	7-10 May	31 May – 7 June	8 June
Date Clutch Completion	18 May	13-14 June	12 June
# Eggs	8	6	5
Date Incubation Initiation	12 May	7 June	8-11 June
Hatch Dates (# eggs)	2, 5, 6, 8 June	N/A	~3-6 July
# Eggs Hatched	6	0	3
# Chicks 1 wk old	6	0	3
# Chicks 2 wks	6	0	3
# Chicks 3 wks	6	0	3
# Juveniles Moved To Conditioning Pen	6	0	3
Age of Juveniles When Moved	34-40 days (July 11 th)	N/A	41-44 days
# Juveniles Released To the Wild	6	0	3
ID of Released Clapper Rails	#237 - 242	N/A	#243 - 245
Age at Release	97-103 days	N/A	66-69 days
Release Location	Los Penasquitos (1), San Diego River (5)	N/A	Los Penasquitos Lagoon (Sept 7)

Note: The first clutch of 207/197 was incubated and reared artificially at Sea World.

The captive breeders in 2008 will be the same rails at the same facilities as in 2007 except for the female #197. As noted above she was the only casualty in fire evacuations from the Wild Animal Park on October 22. She has been replaced with a female, band #103544924 caught in Upper Newport Bay on November 25.

Banding and Telemetry

There was one banding session conducted at Upper Newport Bay in 2007. The primary purpose for trapping at Newport in recent years has been to refresh the captive flock. Old breeders will typically be replaced with young raised from wild eggs, alleviating the need for trapping adults out of Upper Newport Bay. However, one of the females at the Wild Animal Park, rail #197 perished during the fire evacuations on October 22 and required replacement prior to the 2008 breeding season. The first 2007 trapping session at Newport on November 25 yielded a male and a female. She was banded with a blue metal band on the left leg and Service Band #103544924 on the right leg, and was taken to Chula Vista until she could be transported to

the Wild Animal Park.

All of the rails released into the wild were banded and 5 were also fitted with radio transmitters. The 2007 band combination was anodized blue metal band on the left leg and the Service Band on the right. The 5 Clapper Rails released at Point Mugu on July 13 were banded #103544906 – 910; the 4 released into San Elijo Lagoon on August 21 were banded #103544911 - 914; the 4 released into Los Penasquitos Lagoon on September 7 were banded #103544920 – 923; and the 5 released into the San Diego River on September 7 were banded #103544915 – 919 and were fitted with radio-transmitters with frequencies of 150.900, 150.917, 150.941, 150.961, and 150.981 MHz. The transmitter-harnessed rails were not observed in the conditioning pens for any potential problems prior to release in 2007. They were fitted with radios the day of release to avoid the disturbance of capturing and releasing them in the conditioning pens one extra time. The concern has been that they are traumatized by being chased for capture and have sustained injury during this process in the past. However, not watching them with their radios attached for a time may have been a mistake.

There were 3 males and 2 females released into the river with radios. Upon release, one of the females flew to the edge of the river and hid in the riprap there. On the very evening of her new freedom she flew north across a busy road and was herded back into the river habitat. By the following morning her signal was gone and never picked up again, although the entire bay and coast north to Orange County was searched. The other 4 rails dispersed in the river marsh but stayed within approximately 1 km of the release site. The rails were monitored morning and evening and by the 9th day of monitoring, all had lost their transmitters. Incredibly, the Sea World crew was able to retrieve all 4 of the transmitters from the marsh and each was still attached to three central tail feathers. There was no other evidence at the sites and all 4 rails appeared to have simply dropped their radios along with the feathers that held them.

Light-footed Clapper Rails have short little tails and although the radios are light, they may outweigh the anatomic carrying capacity there. In the past the tail mounts have been tied with monofilament to two tail feathers at the very base of the tail and super-glued partly to skin and partly to two feathers. We can only surmise that some subtle difference in the attachment led the birds to work them off or perhaps there is enough annual variation in molt that these first-year birds dropped their tails and the transmitters. This leaves us in a quandary for future telemetry. The back pack units are bulky and obstructive with Teflon straps above and below the wings and now there was this issue with quick loss of the tail mounts in 2007. We intend to attempt telemetry in the San Diego River again in 2008 and will attempt to find an attachment technique that will render longer life and more data.

There were multiple Clapper Rail sightings in 2007 associated with at least 4 territories at Point Mugu. None of the well-viewed rails at Mugu or elsewhere was banded.

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