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

Light-footed Clapper Rail Management, Study, and Propagation in California, 2006

By

Richard Zembal, Susan Hoffman, Charles Gailband, and Laurie Conrad

On Behalf of

Clapper Rail Recovery Fund
Lena Yee Hayashi, Contract Administrator
Huntington Beach Wetlands Conservancy
P.O. Box 5903
Huntington Beach, CA 92615

Nongame Wildlife Unit, 2007-02

Final Report

To

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ABSTRACT

The twenty-eighth annual census of the Light-footed Clapper Rail in California was conducted from 2 March to 1 June 2006. 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 408 pairs of Light-footed Clapper Rails exhibited breeding behavior in 18 marshes in 2006. This is the largest statewide breeding population detected since the counts began in 1980, representing a 13.3% increase over the former high count in 2005 and a 25.5% increase over the longer standing high in 1996. This is the third year in succession of record-breaking high counts. Upper Newport Bay was once again the largest subpopulation in California but was 9% smaller than in 2005. Tijuana Marsh NWR was at an all-time high level of 102 pairs, a 17% increase over 2005. The Newport subpopulation comprised 38.7% of the state population in 2006 and together with the subpopulation in the Tijuana Marsh NWR totaled 260 pairs, or 63.7% of the breeding population of this rail in California.

The subpopulation on the San Dieguito River became the third largest in the state with 31 pairs, the largest ever recorded in a freshwater marsh. Point Mugu was back up to 17 pairs, its second highest total, after inexplicably dropping from 19 pairs in 2004 to 14 pairs in 2005. The Seal Beach tally was up slightly at 21 pairs, and Batiquitos Lagoon with 19 pairs and San Elijo Lagoon with 15 pairs were at their highest recorded levels. Three other small subpopulations were at record or recent highs including Buena Vista Lagoon with 8 pairs, Agua Hedionda with 7

[1] Zembal, R., S. Hoffman, C. Gailband, and L. Conrad. 2007. Light-footed Clapper Rail Management, Study, and Propagation in California, 2006. California Department of Fish and Game, Wildlife Branch, Nongame Wildlife Unit Report, 2007-02. Sacramento, CA. 31 pp.

pairs, and Los Penasquitos with 7 pairs. In addition, another new subpopulation was documented in the Santa Ana River Marsh comprising a minimum of 4 breeding pairs.

Nesting activity was observed in 14 of 17 breeding territories at Point Mugu. Incubation nests were found in 4 territories, brood nests in 2 territories, chicks were observed in 1 territory, and there was evidence of chick feeding in 14 territories. No egg translocations were accomplished because of the asynchrony in incubation timing between Newport and the target marshes. However, 4 eggs were taken from Newport nests incubated, hatched, and reared at Sea World to add to the captive flock. On the Seal Beach NWR there were 31 nests and 20 brood nests on 48 rafts and 32 clutches of eggs, 11 of which were second clutches. Hatching success was 92%. Nest searches at Upper Newport Bay revealed 24 nests, 12 were active with 4 – 8 eggs each. At the Kendall-Frost Reserve 9 of 15 rafts held nests with 8 clutches of eggs including 2 second clutches 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 9 two-week old chicks with their parents.

Only 2 of 6 captive pairs laid eggs in 2006 perhaps due in part to cold, wet weather persisting into the early summer. As a result, only 8 Clapper Rails were released to the wild, 3 at Point Mugu and 5 into San Elijo Lagoon. This brings the total number of rails released to the wild since 2001 to 146.

All of the released rails were banded and fitted with tail-mounted transmitters weighing less than 1 gm. The San Elijo birds quickly scattered in all directions to separate points 0.35 – 1 mile from the release site but then maintained positions within a few hundred meters in those new locations. All of the rails survived to drop their transmitters 13 – 45 days post release. The rails released at Mugu roamed more widely with locations that spanned up to about 3,700 ft. All 3 were found dead 9 – 33 days after release. Two were most likely taken by raptors.

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 annual surveys were begun in 1980. This former record high has now been exceeded in three consecutive years, 2004 – 2006 and was 408 pairs in 18 wetlands in 2006 (Zembal et al. 2006).

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 these efforts go far beyond this single species. These endangered birds thrive in our most productive 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 bottlenecking, 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 2006 statewide survey, management, other study efforts, and translocations 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 Base Ventura County Point Mugu (NBVC, also Point Mugu, Mugu Lagoon), 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) 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-eighth consecutive annual census of Light-footed Clapper Rails in California was conducted from March 2 through May 31, 2006. 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 abundant calling activity. 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 2006 and high tide counts were accomplished before and after the 2006 breeding season on the Seal Beach NWR, November 15, 2005 and October 9, 2006. 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. The counts involved 12 observers each over about 3 hours.

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 2006 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 were 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 "clappering" 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 those closely related rails 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. However, on some days the rails in certain small subpopulations were extremely responsive to the tape at all hours.

Sometimes the response to the tape was non-vocal investigation by the pair or one member. Repeated playbacks have elicited 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. We finally disturbed these birds (RZ) 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.

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 "clappering" 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 2006 call counts were conducted on 37 dates and totaled 329 field-hours.

Management and Monitoring of Nesting Sites and Egg Translocation

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 (Zembal 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 2006. 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 3 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 2006 season were the Seal Beach NWR with 79 rafts, Kendall-Frost Reserve with 15 rafts, and Sweetwater Marsh NWR with 10 rafts. The rafts were refurbished in February or early March and visited 3 – 4 times each during March through July. On the Seal Beach NWR, there were raft checks approximately every 3 weeks during the breeding season. Raft maintenance and monitoring involved a minimum of 280 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). They were still in place for the duration of the 2006 breeding season. 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 2006. At Upper Newport Bay 16 field-days, 13 April – 11 July by up to 10 observers resulted in 162 field-hours of nest searching. There were 68 dates at Point Mugu by 1 – 6 participants and 283 field-hours. On the Seal Beach NWR 2 observers accumulated 113 field-hours over 14 dates. There were 62 field-hours spent at the Kendall-Frost Reserve by 1 – 11 observers over 6 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 2004).

There were 6 potential breeding pairs in captivity in 2006, two pairs at each of the three facilities. The Nature Center housed rails #003/002 and 208/052; Sea World held #089/009 and 155/091; and the Wild Animal Park kept #206/209 and 207/197. Rail #003 was banded 716-93332 (L), captured at Upper Newport Bay, and relocated to the Nature Center on November 2, 2000; the female #002 was banded 605-09842 (R), captured at Upper Newport Bay, and relocated to the Nature Center on December 19, 1998. 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 male #089 was hatched at Sea World on June 3, 2003 from a Newport egg and mated to #009, a Sea World hatchling on May 8, 2001 (003/002). The pair #155/091 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 2006 at the CVNC.

One - 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 during the year 2006. 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 were no banding sessions conducted at Upper Newport Bay in 2006. The primary purpose for trapping at Newport has been to refresh the captive flock. Old breeders were replaced with young raised from wild eggs, alleviating the need for trapping this year. However, all of the rails released into the wild were banded and fitted with radio transmitters.

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 2006 was a red plastic 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 with radio telemetry. Ten RI-2c transmitters were purchased from Holohil Systems Ltd. The transmitters weighed slightly less than one 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 two central tail feathers 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 8 rails released to the wild in 2006, all were radio-tagged, 5 in San Elijo Lagoon and 3 in Point Mugu. The San Elijo release was a precursor of the Mugu efforts to develop familiarity with the new transmitters and monitoring techniques. Monitoring of the San Elijo birds involved 1 – 14 observers over 292 field-hours on 55 dates, July 28 – September 24, 2006. The Mugu rails were followed by 1 – 5 observers during 240 field-hours on 29 dates, October 11 – November 12, 2006.

Results and Discussion

The twenty-eighth annual census of the Light-footed Clapper Rail in California was conducted 2 March – 1 June 2006. Thirty coastal wetlands were surveyed by assessing call counts from Carpinteria Marsh in Santa Barbara County, south to Tijuana Marsh on the Mexican border. Reports of additional recent sightings were solicited and investigated.

A total of 408 pairs of Light-footed Clapper Rails exhibited breeding behavior in 18 marshes in 2006 (Table 1). This is a 13.3% increase over the former high count in 2005 and a 25.5% increase over the longer standing high in 1996. This is the third consecutive year of record-breaking high counts. The subpopulation in Upper Newport Bay was once again the largest in California but was 9% smaller than its record high in 2005. The Tijuana Marsh NWR subpopulation reached a record level with 102 pairs, a 17% increase over the former high set in

2004 and 2005. The Newport subpopulation comprised 38.7% of the state total in 2006 and together with the Tijuana Marsh NWR totaled 260 pairs or 63.7% of the breeding population of the Light-footed Clapper Rail in California. In addition, 5 marshes held 15 – 31 pairs each for a combined total of 103 pairs or 25.2% of the state total.

The spring of 2006 was not very conducive climatologically to consistent clapper rail breeding activity, or therefore successful call counts. The winter was relatively dry but it was unseasonably wet and cold through most of spring. Surveys planned for Baja California, Mexico were postponed twice and finally cancelled due to the weather. Many surveys were re-scheduled at least once due to rain. 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 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 2006, the Newport counts were started on March 2 and not completed until March 23 because of the extreme variability in vocalizing. Furthermore, at least one of the areas of concentrated rail activity in Newport may have been under-counted because of the lack of synchrony in breeding condition among the birds rather than an actual 9% decrease in their numbers.

Tijuana Marsh's subpopulation totaled 87 pairs for two consecutive years prior to the 2006 high count of 102 breeding pairs. The 15-pair increase was not attributable to one single area but fairly well distributed throughout the marsh. There were several more rails manifesting territoriality on the western edge of the Oneonta Slough portion of the marsh, adjacent to the paved road and apartments; a few more were counted in the southern part of Oneonta Slough; there were two on the northern edge of the river; and three in reed beds. Rails were again detected in the restoration area, the model marsh south of the river.

When a new Light-footed Clapper Rail subpopulation was recently discovered in the San Dieguito River Valley in 2004, inland of the lagoon and El Camino Real, the number reported was 6 breeding pairs. That population estimate was probably low due to the lateness of the census. There is about one mile of fresh water marsh habitat along the river between a golf course and the Polo Club that was surveyed again on March 31, 2005. Estimating the breeding population in 2005 at 12 pairs was still conservative; a total of 15 clappering singles, 7 dueting pairs, and 6 advertising males were heard during the survey. Most of the single clappering was well away from any advertising male and probably represented breeding pairs. In the absence of more focused study, this subpopulation was comprised of 10 – 20 pairs in 2005 and conservatively estimated at 12 pairs. Finally in 2006, the survey on April 1st revealed 25 dueting pairs, 12 singles clappering, and 5 advertising males. The rails were extremely vocal during the survey, making them easy to count, and another swath of occupied habitat was discovered on the southeast side of the Morgan Run Golf Course. Although most of the singles were well removed from advertising males, conservatively half were counted as paired for a total breeding population estimate of 31 pairs. This ranks San Dieguito as the third largest subpopulation of Light-footed Clapper Rails in 2006 and the largest ever for a freshwater marsh system.

Although the Seal Beach NWR subpopulation nearly maintained its size in 2003 after more than doubling from 2001 to 2002, it suffered a 30% decline in 2004 and a 6% decline in 2005 but was

Table 1. Census of the Light-footed Clapper Rail in California, 1980-2006.
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 Riv F. C. C.	-	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

\- 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, 1980-2006. (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 Riv F. C. C.	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 - 2006. (continued) Part III: 2000 - 2006.

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

- indicates that no census was taken.
* indicates a fall or winter occurrence.
# indicates the detection of unpaired rails (used beginning in 1987).

up to near 2003 levels in 2006. There is still major concern for the viability of this subpopulation and no new clues about what limits the rails on the NWR although raptor predation is suspected. 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 15 November 2005 and 57 individuals were sighted. Potential rail predators were also out, 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. Forty of the rails counted during the winter high-tide count were sequestered on rafts and afforded much better protective cover thereby. A post-breeding count was done on 9 October 2006 and 103 Clapper Rails were sighted. This is strong proof of good productivity in 2006 and of high survival rates, at least into the Fall.

Although the clapper rails in Seal Beach increased to 21 breeding pairs (and perhaps as many as 24 pairs, based upon nest analysis) in 2006, this subpopulation was again most heavily male-skewed with 30 advertising males. 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 poor winter survival.

The subpopulation in Batiquitos Lagoon at 19 pairs was the fifth largest in the state in 2006. 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 2006 there were at least two breeding pairs vocalizing from the edge of the western tern island and the rails were well distributed around the inner lagoon, although concentrated in the western third (10 pairs) and southeastern corner (4 pairs). The cordgrass in the west basin is extensive and looks vigorous, although much of it appears to be regularly over-washed. There was one detection there in 2006 in the northwest corner in a reed bed bordered by tall cordgrass. 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.

Whereas Point Mugu comprised the third largest subpopulation in the state with 19 pairs in 2004, it dropped to 14 pairs in 2005, and is back up to 17 pairs in 2006. 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 expanded in 2002 through 2004. For example, for the first time in many years, a pair of rails was observed attempting to breed in the eastern arm of the lagoon in 2004 and again in 2006. Intensive monitoring, demographic and genetic augmentation, and provision of additional nesting cover should continue to foster the growth of this northern subpopulation.

The San Elijo Lagoon subpopulation was the seventh largest in the state in 2006 with a record 15 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. Eight of the rail pairs were in the inland lagoon in fresh water marsh; 4 pairs were in the lagoon west of the freeway on the north side; and 3 pairs were found along Escondido Creek. San Elijo received one augmentation of 8 captive-bred rails in 2004 at the dike in the inner lagoon. Although one of these rails was re-sighted near the railroad tracks in the central lagoon on December 13, 2004, 6 months following release, none has been observed since.

Several additional of the small subpopulations were at their highest recorded levels in 2006 including Buena Vista Lagoon, Agua Hedionda Lagoon, and Los Penasquitos Lagoon. It was unexpected that these little subpopulations could persist as long as they have without much more intensive management. Genetic bottlenecking (poor genetic diversity due to inbreeding) is undoubtedly an issue for each of these little subpopulations, and two have received captive-bred rails.

The actual 2006 count in Buena Vista Lagoon was 5 pairs, 7 singles clappering, and 4 unmated males. At least 3 of the singles were most likely paired bringing the total to a minimum of 8 pairs. 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.

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. 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. Given the early count date and abundant, interfering rain, the female likely found a mate and bred. With the recently increasing 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.

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. Each of the record high of 4 pairs was in freshwater reed beds on the eastern edge of the marsh. However, for the first time in many years a single and an advertising male were heard west of the railroad. The single was not counted as a pair because it could have been the same bird that advertised shortly after the single clappering was heard. In addition to the 4 pairs in the main marsh a minimum of 3 pairs and an advertising male were detected on Los Penasquitos Creek east of the freeway. The two of these pairs furthest upstream are in a 20-acre+ mitigation site that is only one year old. Five captive-bred rails were released in 2004 but there have been no re-sightings.

The subpopulation in the University of California Reserve at Kendall-Frost rebounded significantly in 2004 and 2005 but was significantly reduced in 2006. 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 management of the foot traffic in the marsh 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 2006. 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 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 on the eastern end of the marsh, including two in the "E" Street Marsh, and three were on the river upstream of the freeway. Subsequent visits led to observations of successful breeding by the pair in the pond just east of the volunteer parking lot. Charles Gailband observed the pair and 9 chicks 10 – 14 days old swimming across the pond on 28 May and 8 chicks at the same location on 7 June. The numbers for the Sweetwater complex were up slightly and because 11 clapper rails were released to Sweetwater in 2005, the adult rails sighted were checked for bands but none was seen.

The cordgrass continues to expand and dominate a significant portion of the San Diego River Flood Control Channel 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 with the channel full of heavy runoff caused by the second wettest year on record. Although the cordgrass survived these high flows, the number or breeding rails detected in 2006 was 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 rail calling activity was very poor each time; responses to the tape were very brief and distant.

The salt marsh at the mouth of the Santa Margarita River typically held a single pair of nesting rails. 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 of the two sites.

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 clappering response to the tape by a single rail with no following advertising, indicating that for the second consecutive year there are breeding rails in the Reserve.

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. The 4 pairs detected there are noted on 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. The rails were detected there on the morning of 16 March and re-visited to fully survey that same evening when 4 pairs, 1 single, and 1 keck-burring female were heard. Subsequent visits to the marsh revealed successful reproduction when on 28 May at least one 2 – 3 week-old juvenile was following an adult along the edge of the cordgrass.

The last know 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 and 2006 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.

Thirteen of the 18 marshes with breeding Clapper Rails in 2006 had skewed sex ratios and 11 of those were male-skewed. A total of 79 advertising males and 4 females were heard during the call counts including 6 unmated males at Point Mugu, an incredible 30 single males on the Seal Beach NWR, 1 female in the Santa Ana Marsh, 10 males and 2 females (having both there is a great indicator of how disrupted breeding synchrony was in 2006) at Upper Newport Bay, 4 males in Buena Vista, 1 female in Agua Hedionda Lagoon, 1 male in Batiquitos Lagoon, 4 males in San Elijo, 5 males in the San Dieguito River Valley, 2 males in Los Penasquitos Lagoon, 8 males in the Kendall-Frost Reserve, 2 males in Sweetwater Marsh, and 7 single males in Tijuana Marsh. As in 2006, 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; this is one of several marshes in need of additional observation.

Additional reports of clapper rail detections were investigated in 2006; the following is the most noteworthy of them. Mary Beth Stowe reported hearing three individual Clapper Rails at Kumeyaay Lake on 25 April in Mission Trails Park on the San Diego River. A follow-up visit on 30 April to determine the breeding status of the rails she heard was unsuccessful; the only respondents to the taped calls were Virginia rails. The continued annual release of additional captive-bred Clapper Rails is expected to result in increased numbers of rails including increased incidental occupation of inland sites. The further investigation of Los Penasquitos Creek, east of the freeway led to the detection of 3 additional breeding pairs of Clapper Rails and 1 advertising male.

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 is the second most viable 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 at least 2 single rails were back in the restored patch in 2006). There were 5 other subpopulations with 15 - 31 pairs each in 2006 and 11 with 1 – 8 pairs each. Those 11 totaled 45 pairs of rails or 11% of the state population. Four 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 third 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

During the early spring call counts in 2006, a minimum of 17 breeding territories were in evidence at Point Mugu along with 6 unmated males. By the end of the breeding season further evidence of breeding activity had been discovered in 14 of those territories. Two active egg nests and two brood nests were discovered in 2006. Egg fragments were discovered in 4 territories, young rails were observed in 1 territory, and there was evidence of chick-feeding in 14 territories.

Six nests were found at Point Mugu in 2006. Two were active incubation nests, two were found after hatching, and two were brood nests. All 6 nests manifest successful hatches and chick rearing in those territories. However, one of the egg nests had only a partial hatch. When

discovered, the nest held two warm eggs, but there were 6 eggs scattered outside the nest, partially depredated. One month later there was evidence that the two eggs had hatched and chicks were being fed and brooded.

Again in 2006 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 just did not bother to swallow (as they typically do when not distracted by chicks) are usually strewn about, there are often tracks of young and adults, and sometimes there are downy feathers and regurgitated pellets.

There were multiple Clapper Rail sightings in 2006 associated with at least 6 territories. Four of the sightings were of rails banded and released at Mugu in previous years (see Banding and Telemetry below). Unfortunately, one was of a dead Clapper Rail discovered on April 17 in the marsh between south J and L Avenues. It was unmarked and had been dead for several days. The cause of death was not evident. When cause of death has been discernable in the past, it has often been depredation by raptors.

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. 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.

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. 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, we began field-testing elevated nest baskets in late summer/fall 2004. Seven baskets were installed in 2004, 4 at Point Mugu, 2 in Sweetwater Marsh NWR, and 1 in Kendall-Frost Reserve. The artificial cover provided by the rafts and elevated baskets should be considered a short-term management tool for use while restoration of natural cover is planned, implemented, and matures. Unfortunately, there was no use of the nesting baskets during 2006 except by one banded rail that was observed perching on top of one of the baskets near L Avenue.

Twenty-one of the 79 rafts available in 2006 on the Seal Beach NWR held Clapper Rail egg nests, and 11 of the incubation nests had second clutches for a total of 32 clutches of eggs. This is more reproductive activity than documented in 2003 – 2005 when total clutches laid were 24,

19, and 23, respectively. There were totals of 31 nests and 20 brood nests built on 48 rafts in 2006. All but one of the brood nests most likely supported young hatched on those rafts or adjacent ones. 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 92% in 2006. Two clutches were depredated and the outcome of a third was uncertain.

The population estimates for the NWR based upon the call counts has been slightly lower than indicated by call counts and nesting activity. Given the nesting season observations, the actual population at Seal Beach has probably been about 24 pairs annually since 2003 (Hoffman 2006).

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 into the 2006 breeding season as indicated by the high level of breeding activity and good survival, at least up to the October 2006 high tide count.

The 16 nest-searches conducted by 1 - 10 observers at Upper Newport Bay revealed 24 nests, 12 of which held 4 – 8 eggs when discovered. Because of the differences noted above in the timing of incubation, the clutches found were not good matches for egg translocation into a target marsh. However, 4 eggs from Newport nests, 2 each from 2 different nests were taken to Sea World for incubation, rearing, and incorporation into the captive breeders. The eggs were taken to Sea World in a portable incubator on May 10, 2006. One male and three females hatched from these eggs on May 15, 22 and 23, 2006.

The Kendall-Frost subpopulation plummeted by 64% in 2006 from its recent high of 14 pairs in 2004 and 2005. Nine of the 15 rafts held nests and one additional raft, although nest-less held signs of chick brooding and feeding; there was no nesting activity on 5 rafts or in the single perched nesting basket that was first deployed in 2004. There were egg clutches on 6 rafts, 4 hatched one was depredated, and the outcome of the 6TH was uncertain. There were two second clutches, both of which hatched. There were also brood nests on three rafts. Additionally, Forster's Terns (*Sterna forsteri*) again nested in the outer marsh with about 200 individuals defending in May.

It was actually past observations of Clapper Rails nesting perched off the ground in non-native mangroves at Kendall-Frost and duck blinds at Point Mugu that led to the idea of the perched nesting baskets. Unfortunately, none of the baskets deployed in 2004 has been used for nesting

to date. However, a rail was observed again in 2006 on 4 eggs perched about 2 feet off the ground in a gray mangrove in Mission Bay out from Campland on May 17. The eggs hatched. Predation was not a major issue during the 2004 or 2005-breeding seasons in the Kendall-Frost Reserve but it has been in the past and was again in 2006. 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.

None of the rafts or nesting baskets at the Sweetwater Marsh NWR was used by Clapper Rails for nesting in 2006. 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 three that vocalized in response to the tape on March 27 south of the Nature Center and aviary. Both of the adults were observed with chicks in May and June. The male swam across the pond followed by 6 chicks and the female. The female returned to the little island and swam out moments later followed by 3 more chicks. The chicks were 10 – 14 days old when first sighted. Eight of them were re-sighted with the adults a week later.

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 standing water.

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.

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. As a result, at least half and sometimes entire early first clutches have been pulled and artificially incubated to secure higher survival.

This was exacerbated by unusual weather conditions in 2006 when winter came late and lingered long into the breeding season. Only 2 (those at the CVNC) of the 6 captive pairs laid eggs, probably because of the late cold and rain. One of the two pairs that produced eggs destroyed many of them before they could be rescued (Table 2). The other producing pair (003/002) had been reproductive since 2001. Their eggs and chicks were stunted in 2006 and they were retired after the season to the Educational Facility Aviary at Sea World.

Table 2. Clapper Rail Egg, Chick, and Fledgling Production in Captivity, 2001 – 2005.

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
Total	-	236	183	142

In 2006, 8 more captive-bred rails were released, 3 into Mugu marsh and 5 into San Elijo Lagoon (Table 3). Point Mugu remains the priority for releases but because of the lineage of the 5 rails, they went to San Elijo; 22 rails with that same blood line had already gone to Mugu (Table 4).

LFCR003/LFCR002 have been paired and produced chicks every year since 2000. LFCR003 (Federal band # 716-93332) was wild collected from Newport Bay in November 2000. LFCR002 (Federal band # 605-09842) was wild collected from Newport Bay in December 1998. The pair was housed in Shorebird A at CVNC and produced two clutches of eggs in 2006. The first egg of the first clutch was laid on March 29. The second egg of the clutch was not laid until April 4, 5 days later - a long span between eggs for this pair. The first clutch consisted of 8 eggs

and was transferred to SeaWorld for artificial incubation and hand rearing. All of the eggs were smaller in size than normal and several of the hatchlings exhibited foot and balancing abnormalities. These abnormalities could have been the result of several factors. Rail diets at the Nature Center were modified to include more vitamin supplementation, primarily Vionate®.

Table 3. Number of Captive-reared Light-footed Clapper Rails Released into Target Marshes, 2001 – 2006.

	2001	2002	2003	2004	2005	2006	Total
Point Mugu	7	11	20	12	17	3	70
Seal Beach NWR	-	6	-	5	-	-	11
Sweetwater Marsh	-	4	-	-	11	-	15
Kendall-Frost Reserve	-	-	5	-	-	-	5
Batiquitos Lagoon	-	-	-	8	8	-	16
San Elijo Lagoon	-	-	-	8	-	5	13
Agua Hedionda Lagoon	-	-	-	5	-	-	5
Los Penasquitos Lagoon	-	-	-	4	-	-	4
Carpinteria Marsh	-	-	-	2	-	-	2
San Diego River FCC					5	-	5
Total	7	21	25	44	41	8	146

Table 4. Number by Lineage of Captive-reared Clapper Rails Released into Target Marshes 2001 - 2006.

	2001	2002	2003	2004	2005	2006	Total
Point Mugu	3a4b	5a6b	1a14b5d	6a6d	7a1b9d	1a1e 1w	23a25b20d 1e1w
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	6a4b3d
Agua Hedionda	-	-	-	5b	-	-	5b
Los Penasquitos	-	-	-	4b	-	-	4b
Carpinteria Marsh	-	-	-	2wild		-	2 wild
San Diego River					2a1b2d	-	2a1b2d
Total	3a4b	6a9b 6c	6a14b 5d7w	10a20b 12d2w	9a21b 11d	6a1e 1w	40a68b6c 28d1e10w

*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.

Additionally, soaked dog food was added to the diet to increase protein. Six of the 8 eggs hatched. All of the hatchlings were smaller than normal. One of the hatchlings never ate on its own and died after several days of intensive care. The surviving chicks were hand reared using modified puppet rearing techniques to avoid imprinting on people. Five chicks were transferred to the Nature Center at 38 days of age for pre-release conditioning. The rails were released to the San Elijo Lagoon at 87 days of age.

LFCR003/LFCR002 laid a second clutch of eggs beginning May 18. The second clutch was small in both size and number of eggs, only 5. Only 2 of the 5 eggs hatched. One of the hatchlings was found dead on day 5 of life. The expired chick weighed a mere 10 grams, very light for that age. The single surviving chick was reared by its parents. The chick was transferred to the conditioning enclosure at 90 days of age and released at Mugu Lagoon at 131 days of age. The pair produced 13 eggs, hatched 8 chicks, and 6 of their offspring were introduced to the wild.

LFCR003/LFCR002 were retired from breeding at the conclusion of the 2006 season. Both birds were transferred to the education facility at Sea World for limited educational exhibition. The pair sired 40 rails that have been introduced into wild populations. Any more releases of their offspring into the wild is not desirable. Additionally, their ages could have been a contributing factor to decreased egg quality and hatchling survivability. LFCR003 and LFCR 002 developed significant, debilitating foot and leg conditions. The birds were euthanized after poor prognosis by Sea World veterinary staff. LFCR03 was put down on December 16, 2006, LFCR002 on January 11, 2007.

LFCR208/LFCR052 was a newly formed pair housed in Shorebird B at CVNC. LFCR208 (Federal band # 103544891) was wild captured from Newport Bay in December 2005. LFCR052 (no Federal band) was wild captured from Newport Bay in September 2002. LFCR052 was previously mated with LFCR007, a second-generation male sired by LFCR003/LFCR002. LFCR007 was removed from the breeding to optimize the genetic diversity of captive produced rails released to the wild. LFCR208/LFCR052 laid 2-3 clutches worth of eggs, beginning April 29, with no distinct interval between the clutches. LFCR208, the newly wild captured male destroyed many eggs as they were laid. Nature Center staff found shell remnants to account for approximately 8 eggs, but there could have been more. LFCR208 was observed carrying a single egg to the waterline and pecking at it. Two damaged eggs were salvaged before they were completely destroyed. The salvaged eggs had small cracks that were covered with Tagaderm® and artificially incubated; neither was viable. LFCR208 stopped destroying eggs after May 18. A new nest with 2 intact eggs was found on May 30, after a Gopher snake *Pituophis cateniter annectens* was removed from the enclosure on May 23. We are unsure if the Gopher snake attributed to LFCR208 destroying eggs, but it is possible. The nest of intact eggs totaled 6. Only 3 of the 6 eggs hatched. Of those, one hatchling died during the first evening. The 2 remaining chicks were parent-reared on exhibit. The chicks were transferred to the conditioning enclosure at 49 days of age. One of the juveniles, LFCR221, died during capture for banding/radio tagging. The other surviving juvenile was released at Mugu Lagoon at 75 days of age. The pair produced approximately 15 eggs, hatched 2 chicks, had 1 offspring introduced to the wild.

LFCR155/LFCR091 were housed in the newly constructed aviaries at Sea World's education facility. LFCR155 (no Federal Band) was artificially hatched and hand-reared from an egg collected at Newport Bay in June 2004. LFCR091 was artificially hatched and hand-reared from an egg collected at Newport Bay in June 2003. The birds showed no sign of nesting. The pair was provided with an artificial nest similar to those deployed at Sweetwater Marsh. The nest platforms were removed after 2 of 4 rails (one bird from this pair and one bird from Sea World's second pair) got their legs entangled in the raffia grass that covered the structure.

LFCR089/009 were housed in the newly constructed aviaries at Sea World's education facility. LFCR089 (no Federal band #) was artificially hatched and head reared from an egg collected at Newport Bay in June 2003. LFCR009 (Federal band # 94565856) was artificially hatched and hand-reared from an egg produced by LFCR003/LFCR002. The birds showed no sign of nesting. LFCR009 was removed from the breeding stock at the conclusion of the 2006 season because of lack of productivity. Additionally, it was determined that the bloodline was well represented since the bird was a second-generation bird. The rail developed a serious leg problem and was euthanized after a poor prognosis for recovery. LFCR089 is now paired with LFCR218. LFCR218 was artificially hatched and head reared from an egg collected at Newport Bay in May 2006.

LFCR207/LFCR197 were housed at the Wild Animal Park's breeding facility. LFCR207 (Federal band #103544882) was wild captured at Newport Bay in September 2005. LFCR207 was paired with LFCR197. LFCR197 (no Federal band) was artificially hatched and hand-reared from an egg collected at Newport Bay in June 2005. The pair showed no sign of breeding.

LFCR206/LFCR209 were housed at the Wild Animal Park's breeding facility. LFCR206 was wild captured at Newport Bay in September 2005. LFCR206 was paired with LFCR209. LFCR209 was wild captured at Newport Bay in November 2005. The pair showed no sign of breeding.

Sea World officially endorsed involvement in the Clapper Rail Recovery Program in 2001 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 like 003/002. The 2007 breeders will be housed in the side pens where Clapper Rails had successfully bred in past years.

Banding and Telemetry

There were no banding sessions conducted at Upper Newport Bay in 2006. The primary purpose for trapping at Newport has been to refresh the captive flock. Old breeders were replaced with young raised from wild eggs, alleviating the need for trapping this year. However, all of the rails released into the wild were banded and fitted with radio transmitters.

There were 29 sightings of Clapper Rails at Point Mugu in 2006. Most of these encounters were too brief or otherwise limited to be certain whether or not the rail was banded. However, 4 of the sightings were of banded birds that had lost their color bands. Consequently, they were banded and released in 2005 or earlier. The banded rails were encountered near Beach Road and L Avenue, near Beach Road and M Avenue, north of south J Avenue, and off Calleguas Creek. Seven additional of the re-sightings were of the rails released in 2006.

Eight Clapper Rails were fitted with radio-transmitters prior to release from captivity into the wild. Three rails were released at Point Mugu on October 11 and 5 went to San Elijo Lagoon on July 28. The transmittered rails were observed in the conditioning pens for any potential problems for several days prior to release. It quickly became apparent that the miniature nature of the transmitters resulted in the rails ignoring them.

The rails released at San Elijo Lagoon were banded 1035-44898 – 44902 on the right legs with red plastic on the left and radio frequencies of 150.010, 150.029, 150.048, 150.071, and 150.091 Mhz. The 5 rails immediately dispersed from the release site but within a few days, each had settled into a location that then did not vary by more than a few hundred meters. The rails fanned out to separate locations over the east and central basins that were approximately 0.35, 0.5, 0.6, 0.85, and 1 mile from the release site. The rails dropped their transmitters 13 – 45 days following release. The transmitters kept going and the signal life varied from 47 to 60 days. One of the radio-harnessed birds was sighted on 10 dates, August 14 – September 22. One of the 5 was found unmarked but dead at the release site on November 14, 2 months and 10 days after it dropped its transmitter.

The three rails released at Point Mugu were banded 1035-44903 – 44905 right, red left with radio transmitter frequencies of 150.171, 150.151, and 150.189 Mhz, respectively. They were released between south J and L Avenues. The rail with frequency 150.171 stayed sequestered on day 1, dispersed a maximum of 1,284 ft on day 2, but returned to within about 120 ft of the release site by day 5. It remained in this vicinity until day 9 when it was taken by a raptor. The rail with frequency 150.189 dispersed to the south edge of the main channel by day 2 and 3, a distance of about 1,070 ft; moved a maximum of 3,424 ft west from the release site by day 5; then returned east to the edge of L Avenue where it traversed an area spanning about 535 ft from day 7 until it was found depredated on day 13. The rail with frequency 150.151 roamed the most

widely of the three rails released in 2006. The span of its travels from near the corner of Beach Road and L Avenue to the vicinity of Le Mar Avenue was 3,695 ft. By day 11 it confined its travels to a smaller area, spanning about 2,131 ft of marsh until it was found dead on day 33. At least two of the three dead rails were probably killed by raptors.

Because the marsh canopy is relatively open at Point Mugu and the substrate is often dry, a significant part of the marsh comprises good foraging habitat for raptors. Most of the raptor kills would go unobserved well out in the marsh. Finding a raptor-killed rail that was not telemetered would be somewhat remarkable, given the relatively small number of rails and the large size of this wetland. Having so many of the radio-fitted rails depredated by raptors shows raptors to be a larger inimical factor at Point Mugu than is otherwise readily observable.

While looking for banded rails, 9 different species of birds of prey were observed in and adjacent to Mugu Marsh. These included at least three that have been known to prey on Clapper Rails, the Peregrine Falcon (*Falco peregrinus*), Red-tailed Hawk (*Buteo jamaicensis*), and Northern Harrier (*Circus cyaneus*). The abundance of these raptors probably accounts for the heavy use of spiny rush stands at Mugu, comprising the tallest, thickest cover available there.

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