

A CENSUS OF THE LIGHT-FOOTED CLAPPER RAIL IN CALIFORNIA

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The Light-footed Clapper Rail (*Rallus longirostris levipes*) is a reclusive resident of southern California's coastal saltmarshes. Historically the subspecies ranged from Santa Barbara, California, to San Quintin Bay, Baja California, Mexico (Bent 1926). Long known to be in jeopardy because of loss of habitat (Wilbur and Tomlinson 1976), the rail is on both federal and state lists of endangered species.

The secretive nature of the Clapper Rail has made it difficult to census. The most frequently used methods have been winter high-tide counts (Wilbur 1974) and the eliciting of vocal responses by playing tape-recorded calls (Tomlinson and Todd 1973). Searching for nests has been done at individual marshes where rail populations were under study (Jorgensen 1975) but has not been used as a regular censusing technique. Each of these methods has limitations. High-tide counts rarely give an accurate estimate of a wintering population, as even during the highest tide there are many places for rails to hide undetected. Nor do rails always respond to taped calls (Wilbur 1974), particularly when there are only a few in the area. Nest searching is extremely time consuming and can be destructive to saltmarsh vegetation.

An estimate of the California population of the Light-footed Clapper Rail was made in 1974 by Wilbur, who placed the population at 500-750 birds in marshes from Carpinteria, Santa Barbara County, to Tijuana Marsh, San Diego County (Wilbur 1974). In 1978 the estimate was reduced to about 300 individuals (Wilbur et al. 1979). Both surveys were based on a combination of the above three methods and were compiled from reports by many different observers.

In 1979 we began a comparative study of the Light-footed Clapper Rail populations at Anaheim Bay and Upper Newport Bay in Orange County (Zemba and Massey in prep.). One aspect of the study was to determine the population at the two marshes, and we began looking for a nondisruptive method like the winter high-tide count to use for censusing the nesting population. Summer high tides unfortunately occur almost invariably after dark and cannot be used for censusing. It has long been known that Clapper Rails "clapper" at dawn and/or dusk in the early spring, with one bird or pair beginning to call and others responding (Bent 1926, Johnson 1973). We listened for several evenings at Anaheim Bay and found that the birds clap-

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pered spontaneously, particularly on balmy evenings. We mapped locations of birds as they vocalized and found that results were reproducible on successive evenings. We decided to explore the possibility of using the evening round of clapping as a censusing technique, coupled with an exhaustive nest search at each marsh. The results were sufficiently encouraging for us to attempt a census by vocalizations of the California population in 1980, corroborated by a one-time nest search at most marshes.

METHODS

Censusing by vocalizations

Censusing was begun at a marsh about 2 hours before sunset and continued until vocalizing ceased (usually near total darkness). Tape recordings were used only once, at Goleta Slough; in all other instances we censused by listening to spontaneous vocalizing. In the case of a large marsh, integral portions were censused on successive evenings until the entire marsh was covered, or several observers participated and the marsh was censused in one or two evenings. The size of the area covered each evening by a single observer was small enough (usually 20 ha or less) so that all rails within the area could be heard and the locations of calling birds pinpointed without much movement by the observer. The locations of all different vocalizing (including "clapping," "keking," etc.) rails and birds that were sighted but not heard were plotted on a map. To insure that no bird was counted twice, maps were detailed enough (1" = 200') to allow for accurate plotting of locations. Mapping notations distinguished between pairs and single birds. (A pair would often clapper in such unison that only with practice could the listener accurately distinguish between the distant calling of a single bird and a pair. Also, some locations where single birds were originally heard would have pairs calling from them before the evening was over.) When two observers were censusing adjacent areas, each kept a record of times at which the different rails vocalized. Comparison of times and locations insured that no bird was counted twice.

During an evening of censusing each observer eventually plotted an appropriate number of points on a map to represent the locations of every different pair and isolated single rail within a defined area. The total represented the minimum number of rails present. A more precise estimate of the actual size of a population was made by considering each point as representing a territory or potential territory, thus representing a pair of rails. If 28 points were plotted on the map representing 19 pairs and 9 single birds, the population was estimated at 56 rails.

Censusing by vocalizations was carried out between 24 March and 17 May 1980.

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Nest Searches

Two large marshes in Orange County where major rail populations were known to exist (Anaheim Bay and Upper Newport Bay) were subjected to multiple nest searches. The rail populations at these two bays were under special study and were thus closely watched throughout the nesting season (Zemba and Massey in prep.). Nest searching began in Upper Newport Bay on 26 March and in Anaheim Bay on 27 March. Searches were conducted approximately every other week through June. A final search was done in August to insure that no late nests were missed. Tijuana Marsh, the third site of a known large population of rails, was searched on 20 April; subsequent searches in May and June were done by Paul Jorgensen.

One-time nest searches were conducted during periods of low tide at other marshes in late May and early June. They were timed for the period when initial nesting was complete and complexes of incubation and brood nests were in evidence. All areas of a marsh where nests would be secure from high tides were searched. Two to four people usually participated. Nests were marked on maps in the same way that vocalizing pairs were recorded.

RESULTS

Fifteen southern California saltmarshes were censused during the period from 26 March to 13 June 1980 (Figure 1). Censusing by vocalizations resulted in an estimate of 203 pairs of nesting Light-footed Clapper Rails (Table 1). Nest searches were conducted at 13 of the marshes, and the number of nesting pairs corresponded very closely with the number identified by vocalizations (Table 1).

The 1980 population was concentrated in five coastal saltmarshes, with 93% of the nesting pairs at Carpinteria Marsh, Anaheim Bay, Upper Newport Bay, Kendall-Frost Reserve and Tijuana Marsh. No other marsh had more than four pairs.

The findings at each marsh, plus a brief description of the habitat, are given below. Unless otherwise noted, marsh sizes are from reports in the *Coastal Wetland Series* published by the California Department of Fish and Game.

Goleta Slough. The slough contains approximately 146 ha of saltmarsh vegetation, almost all of which is upper marsh with dominant Pickleweed (*Salicornia virginica*). There are about 3 km of leveed channels with tidal action via an ocean entrance. Several pockets of freshwater marsh (2-5 ha each) exist along the north and west sides of the slough. Lower marsh is very poorly developed at best and we found no California Cordgrass (*Spartina foliosa*). No sightings of Clapper Rails have been reported since June 1974 when a family of two adults and three downy chicks was seen in the freshwater marsh west of Los Carneros Road (Brad Schram pers. obs.).

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Census: We visited the slough on 17 May. A nest search along the creek edges failed to uncover any evidence of nesting. No rails were heard at dusk. (Goleta was the only marsh where we tried to elicit a response to taped calls.) There appeared to be suitable nesting habitat along the creek edges; the limiting factors may be poor food supply and easy access by predators. The possibility that a few pairs may nest at Goleta has not been ruled out; a very large effort would be necessary to detect a very small population there.

Table I. Census of the Light-footed Clapper Rail population in California, 26 March - 13 June 1980.

LOCATION	CENSUS BY VOCALIZATIONS (pairs)	CENSUS BY NEST SEARCHING (pairs)
<i>Santa Barbara Co.</i>		
Goleta Slough	0	0
Carpinteria Marsh	16	13
<i>Orange Co.</i>		
Anaheim Bay	30	29
Bolsa Chica	0	0
Upper Newport Bay (entire bay)	98	- ¹
Upper Newport Bay (3 islands ²)	34	35
<i>San Diego Co.</i>		
Santa Margarita Lagoon	0	0
Agua Hedionda Lagoon	1	- ³
Kendall-Frost Reserve	18	14
Paradise Creek	1	- ³
Sweetwater Marsh	4	4
E St. Marsh	3	4
F St. Marsh	0	0
Otay River mouth	3	1
South Bay Marine Reserve	3	4
Tijuana Estuary (Oneonta Lagoon Section)	26	17 ⁴
Total	203	

¹Nest searching in Upper Newport Bay was confined to three islands.

²Shellmaker, Middle and Upper islands. Total for these three islands is included in total for entire bay.

³No nest search.

⁴Nest searching at Tijuana Estuary done by Paul Jorgensen.

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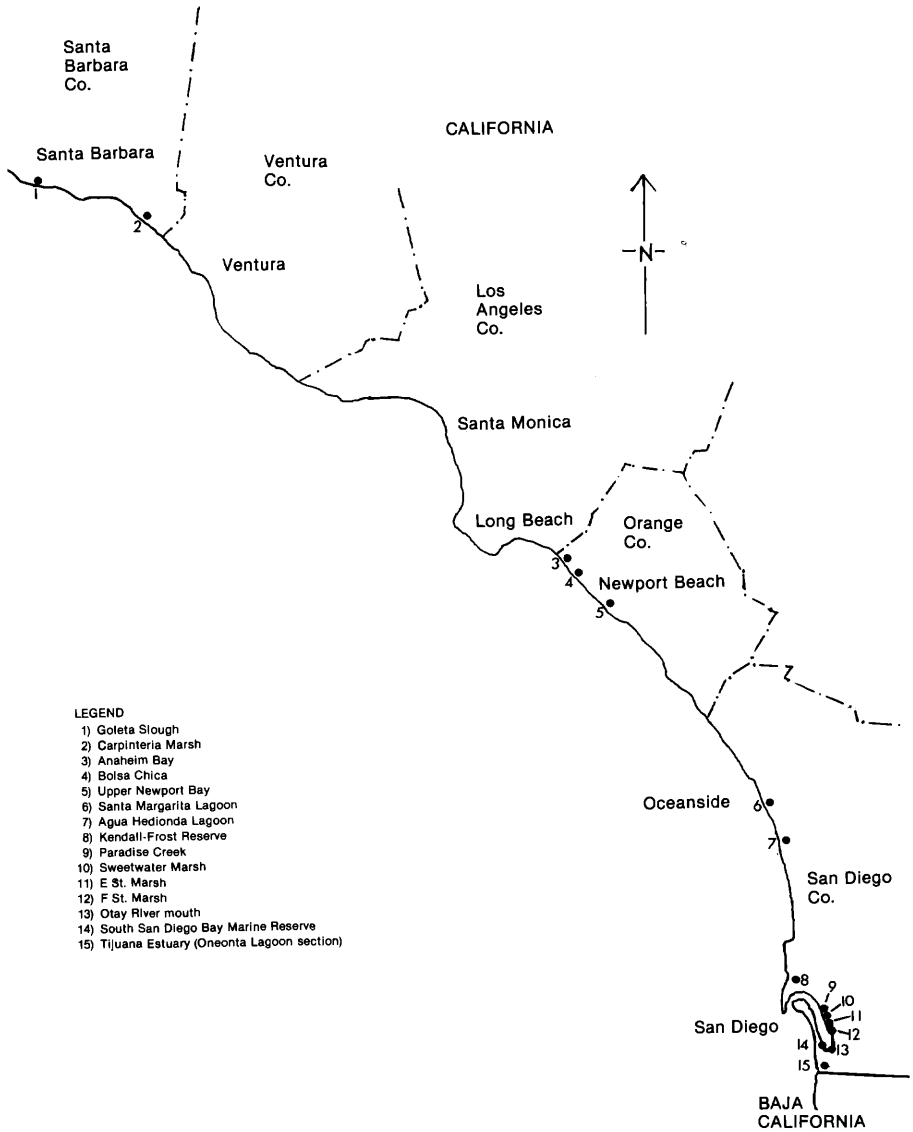


Figure 1. Locations of Light-footed Clapper Rails nesting in California in 1980.

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Carpinteria Marsh. The slough has approximately 53 ha of saltmarsh vegetation, dominated by *Salicornia*. There is no *Spartina*. Freshwater marsh vegetation (1.3 ha) borders the east side, mostly *Scirpus* sp. and *Typha* sp. There are 8-9 ha of sand and mudflat and a good tidal prism via an ocean entrance. Previous to 1980 the rail population at Carpinteria was estimated at 10 birds (Wilbur et al. 1979).

Census: On 16 April a vocalization census at dusk documented 16 pairs of Clapper Rails. On 18 May 13 nests were found, most of them along the edges of the main channel. None were found in freshwater marsh vegetation nor on the west side of the slough in what appeared to be good nesting habitat except for accessibility to land predators.

Anaheim Bay. Saltmarsh vegetation covers 226 ha of Seal Beach National Wildlife Refuge in Anaheim Bay. All littoral zones are represented and *Spartina* grows densely in several parts of the bay. Freshwater marsh vegetation is almost nonexistent. There is a full tidal prism and 24 ha of mudflats are exposed at low tide.

The Clapper Rail population has fluctuated over the past 30 years, but in 1979 was estimated at 60 birds (minimum) based on several years of winter high-tide counts (Wilbur et al. 1979).

Census: A vocalization census was completed in six evenings — 1, 3, 5, 6, 10 and 13 April; 30 pairs of Clapper rails were counted. Nest searches were done regularly from 26 March to 5 July, with a late-season check on 4, 5 and 8 August. Evidence of 29 nesting pairs was gathered throughout the season. Details of nest locations, renesting, etc. are reported elsewhere (Zembal and Massey in prep.).

Bolsa Chica. The 121 ha ecological reserve (Schulenberg 1979) in Huntington Beach has little habitat suitable for nesting Clapper Rails. Tidal flow is restricted and water is ponded in a large body behind culverts. *Spartina* grows only marginally and *Salicornia* is low-growing. All saltmarsh vegetation is accessible to land predators.

A Clapper Rail was seen at the north end of the reserve in freshwater marsh vegetation (*Juncus acutus*) several times during winter, 1980 (K. Novick pers. comm.), the first sighting in several years.

Census: No rails were heard calling on 5 May. A nest search of the most likely looking habitat on 1 June failed to reveal evidence of nesting.

Upper Newport Bay. Approximately 100 ha of the bay are covered by saltmarsh vegetation (1971 Orange County survey map). All littoral zones are represented and there are large stands of dense, tall *Spartina*. Tidal flow is unrestricted. At low tides, extensive mudflats are exposed. Freshwater marsh vegetation grows abundantly around the periphery of the bay.

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The Clapper Rail population has increased significantly since 1972 when the maximum number seen during a series of winter high-tide counts was 27 (Sexton 1972). In November 1979, 99 rails were counted during a high tide (Massey and Zembal 1980).

Census: Because of the large amount of nesting habitat in the bay, nest searches were confined to three islands — Shellmaker, Middle and Upper. The vocalization census was done for the entire bay, and the results on the three islands were extrapolated and compared with the nest searches. A detailed account of the breeding biology of the Clapper Rails in the bay is reported elsewhere (Zembal and Massey in prep.).

Censusing by vocalizations was completed in eight evenings in early spring — 24 and 26 March; 4, 8, 9, 10, 11 and 15 April. We estimated the total population at 98 pairs; of this total, 34 pairs were counted on the three islands.

Nest searches on the three islands were made regularly from 26 March to 6 July; a late-season check was done on 23 August. The nesting population on the three islands was estimated at 35 pairs.

Santa Margarita Lagoon. The 40 ha saltmarsh (Mudie 1970) is dominated by *Salicornia*. Tidal influence is usually by seepage under the barrier beach; the ocean entrance is rarely open. There have been no reports of Clapper Rails at Santa Margarita in recent years.

Census: No rails were heard on 28 March in the marsh west of Interstate 5. A nest search in the same area on 13 June uncovered no evidence of nesting activity. The marsh east of I-5 was not searched and might possibly harbor a few pairs.

Agua Hedionda Lagoon. A small *Salicornia* marsh covers 6.4 ha at the east end of the lagoon. It grades into brackish water habitat where *Typha* sp., *Juncus* sp. and *Scirpus* sp. grow on about 2 ha. A Clapper Rail was heard in the freshwater marsh vegetation in the spring of 1976 (Massey pers. obs.) and in subsequent years (E. Copper pers. comm.)

Census: No Clapper Rails were heard on the evening of 28 March, but one was sighted in the freshwater marsh vegetation on 29 March. No nest was found during a cursory search of the vegetation on 29 March, but the date was early for nesting.

Kendall-Frost Reserve. The 8.4 ha saltmarsh at the north end of Mission Bay has unrestricted tidal influence and all littoral zones. *Salicornia* is abundant and vigorous, and there are good stands of tall, dense *Spartina*. Small patches of freshwater marsh vegetation occur at the north end of the marsh. This last remaining saltmarsh in Mission Bay hosts the only known population of Clapper Rails in the bay. In 1977 Jorgensen saw 12 on a winter high-tide count (Wilbur et al. 1979).

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Census: On 30 March, 18 pairs were heard vocalizing at dusk, and the birds were spaced throughout the marsh. On 25 May we found evidence of 14 nesting pairs. Nests were on high ground in *Salicornia*, in freshwater marsh vegetation and in *Spartina*. Many nests in low marsh were placed in tumbleweeds (*Salsola kali*, *Amaranthus* sp. or *Chenopodium* sp.), but there were also classically built nests in *Spartina*.

Paradise Creek. At the creek mouth, 20 ha of saltmarsh comprise one parcel of the Sweetwater Marsh complex on the east side of San Diego Bay in Chula Vista. *Salicornia* dominates the marsh vegetation; there is very little *Spartina*. Tidal influence is poor.

Census: On 19 April one pair was heard calling. The marsh was not searched for nests.

Sweetwater Marsh. The marsh has about 52 ha of vegetation, dominated by *Salicornia*. There is a full tidal prism in the large channels, but there are very few small, natural tidal creeks. *Spartina* is very local but dense where found, and freshwater marsh vegetation is not present. The marsh is subject to heavy human trespass. A few Clapper Rails were seen and heard in the marsh throughout the 1970s (Wilbur et al. 1979).

Census: Four pairs were calling on the evenings of 30 March and 19 April. A nest search on 26 May gave evidence of four nesting pairs in the western half (and least accessible portion) of the marsh.

E Street Marsh. Part of the Sweetwater Marsh complex, this 12 ha saltmarsh near the west end of E Street in Chula Vista is separated from Sweetwater Marsh by a causeway. *Salicornia* is dominant, with very little *Spartina*. Tidal influence is unrestricted and nourishes a healthy system of small and large creeks. There is no freshwater marsh.

Census: Three pairs were heard on 20 April. A nest search on 26 May gave evidence of four nesting pairs, with nests in *Salicornia* along the channel edges.

F Street Marsh. Between F and G streets, south of and discontinuous with the Sweetwater Marsh complex, this remnant *Salicornia* marsh is the smallest (about 3 ha), and probably the most heavily impacted, of the known Clapper Rail nesting sites. Tide water flows sluggishly through one main channel. All parts of the marsh are easily accessible to people, dogs, cats, etc. Nevertheless Jorgensen (pers. comm.) found an active Clapper Rail nest here in June 1979.

Census: No Clapper Rails were heard on 20 April, and a nest search on 26 May gave no evidence of nesting activity.

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Otay River mouth. A narrow margin of *Salicornia* and a few stands of *Spartina* exist along the edges of the Otay River near its mouth at the south end of San Diego Bay. A few Clapper Rails have been seen here regularly in recent years (M. Evans pers. comm., Wilbur 1974).

Census: No rails were heard on 20 April although one was sighted. On 25 May we heard three pairs and found one nest in a patch of *Spartina*.

South San Diego Marine Reserve. A small but healthy remnant saltmarsh on the west side of the south end of San Diego Bay covers about 5.2 ha (G. Wheeler pers. comm.). *Salicornia* is the dominant plant; *Spartina* is present, but sparse and low-growing. Full tidal influence nourishes a network of creeks. A few Clapper Rails have been seen regularly (Wilbur 1974).

Census: Three pairs were heard on 14 and 19 April. We found four nests on 25 May, all in *Salicornia* on high ground separated by creeks from the trails and parking lot along State Highway 75.

Tijuana Marsh. Just north of the Mexican border lies Tijuana Marsh, with 157 ha of saltmarsh and about 40 ha of tidal creeks and mudflats (Jorgensen 1975). An ocean outlet allows a full tidal prism, and all littoral zones are represented. *Spartina* grows in tall, dense stands. The slough has long hosted one of the largest concentrations of Light-footed Clapper Rails in the state although population levels have fluctuated (Wilbur et al. 1979). In 1973-74 Jorgensen studied the rails' habitat preferences in the marsh and found 90% of the nesting pairs in the northern half of the slough (Jorgensen 1975).

Census: We censused the northern half of the marsh on the evening of 29 March and heard 26 pairs. A nest search of the same area on 20 April revealed 8 nesting pairs; subsequent searches by Jorgensen brought the total to 17.

The area south of the ocean entrance was not censused by either method. Fewer than five pairs have been found in the southern section in previous years and there has been no recent increase in rail nesting habitat there (Jorgensen 1980). Time limitations caused us to exclude this area from the census. The 26 pairs heard on 29 March presumably represent at least 90% of the rails in Tijuana Marsh.

Marshes not censused. No rails have been found at Los Penasquitos Lagoon, San Diego Co., for several years (Wilbur et al. 1979) or in the *Salicornia* marshes at the Santa Ana River mouth, Orange Co. (Zemba and Massey pers. obs.). Neither of these sites was censused in 1980 because the time and effort needed to do so were not proportionate to the expected return, but the possibility of a few pairs at either place cannot be ruled out. There may also be a few pairs in freshwater marsh vegetation at the east end of Batiquitos and San Elijo lagoons, San Diego Co. At Mugu Lagoon, Ven-

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tura Co., the sighting of a Clapper Rail by Richard Webster in January 1980 was the first since 1971 (Wilbur et al. 1979), and there is hope that the recent restoration of saltmarsh in the western arm of the lagoon will result in development of rail nesting habitat there.

DISCUSSION

The 1980 census revealed a somewhat larger population of Light-footed Clapper Rails than the 300 birds estimated in 1978 (Wilbur et al. 1979). Although there may be a few more than the 203 pairs we documented in 1980, this figure is based on firmer and more direct evidence than previous surveys and we are confident that it reflects the true population with reasonable accuracy.

Censusing by vocalizations correlated very well with censusing by nest searching. Nest searches yielded information on rail biology not obtainable by listening, such as clutch size, location of nests, and hatching success, but were time-consuming and damaging to saltmarsh vegetation. Censusing by vocalizations had no impact on the birds or their habitat. The effective application of the vocalization census in areas with few rails sometimes required several visits. At the mouth of the Otay River, for example, no birds were heard on 19 April but on 25 May three pairs were vocalizing. At marshes with large populations of rails, vocalizing was somewhat weather-dependent. The birds called regularly at dusk on pleasant evenings, but tended to be less vocal when it was cold and windy. With an awareness of these limitations, the method should prove useful for routine surveying of the Clapper Rail population.

An unexpected finding of the 1980 census was the presence of Clapper Rails in marshes where there was no *Spartina*. Although the birds have been known to nest in *Salicornia* on higher ground in the marshes (Bent 1926, De Groot 1927), they have been typically associated with the *Spartina* belts at lower elevations (Jorgensen 1975, Massey and Zembal 1980). In 1980 many nests were placed in *Salicornia* on high ground even in marshes where *Spartina* was available. At five marshes where *Spartina* was virtually absent (Carpinteria Marsh, Paradise Creek, Sweetwater Marsh, E Street Marsh and South Bay Marine Reserve) and where we did not anticipate finding significant populations of nesting rails, the combined nesting population was 27 pairs, or 13% of the total population in the state. The factors responsible for this shift in habitat preference are discussed elsewhere (Zembal and Massey in prep.).

Certain populations of the Light-footed Clapper Rail have apparently fluctuated widely over the past several years. In Upper Newport Bay, the winter population in 1972 was estimated at 32 individuals with 27 the largest number seen on any one count (Sexton 1972); in 1979, 99 rails were seen on a single winter count (Massey and Zembal 1980). Nest searches of the

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three islands in the bay in 1977 revealed only 12 active nests (Jurek 1977) whereas 38 nesting pairs were documented by us in 1979 and 35 in 1980. Differences in censusing techniques could not account for this population change; the trend at Upper Newport Bay has apparently been upward during the past decade. One major reason for the increase has been the newly available prime *Spartina* habitat at the north end of the bay (Zemba and Massey in prep.), where about 40% of the rail population of the bay has been found during the past 2 years.

The population at Anaheim Bay has also fluctuated. In 1971 the estimated population was 100-200 birds, but by 1975 very few rails could be located in the bay (Browning and Smith 1976). A nesting season census in 1977 failed to locate a single Clapper Rail nest (Jurek 1977). Annual winter high tide counts were begun in 1975 and 22 rails were observed that year. By 1979 the winter count had risen to 56 and this level was maintained in 1980, indicating a gradual comeback after a population crash in the early 1970s.

Population crashes may have been natural phenomena in the life history of the Clapper Rail, but with the very reduced population now in existence they are cause for alarm. A crash has recently been observed in the population at Tijuana Slough where only 10 nesting pairs were found in 1979 and 17 in 1980, as compared to 25 located there in 1974 (P. Jorgensen pers. comm.). Jorgensen associated the decline, at least in part, with a reduction in vigor of *Spartina* growth in 1979, and damage to marsh vegetation by floods in 1980. Although Clapper Rails are thought to be quite sedentary, the possibility that they may move locally when conditions at their "home" marshes are poor should not be discounted. Regular censusing of the total population and continued research are needed to interpret population changes at individual marshes.

The prime objective of the Light-footed Clapper Rail Recovery Plan (1977) is "To increase the breeding population to at least 400 pairs by preserving and restoring approximately 4000 acres [1600 ha] of wetland habitat in at least 15 marshes . . ." in California. The status of the rail in 1980 is far from that goal, with only about 203 pairs in the state, and 188 (93%) pairs concentrated in 5 marshes covering 1300 acres (520 ha). The concentration of the population in so few marshes makes the rails extremely vulnerable to natural or man-induced calamities at any of the major sites, and emphasizes the importance of protecting *all* of the marshes where rails are now found. It is a matter of some urgency to enhance and restore saltmarsh habitat of suitable quality for this endangered species.

SUMMARY

A survey of the California population of the Light-footed Clapper Rail was conducted in spring 1980. Censusing was done by listening to spontaneous vocalizations of the rails at dusk and plotting locations of calling pairs on

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maps. Nest searches of the marshes corroborated the findings of the vocalization census. Fifteen coastal saltmarshes were censused and 203 nesting pairs were found. The birds were concentrated in five marshes — Carpinteria Marsh, Anaheim Bay, Upper Newport Bay, Kendall-Frost Reserve and Tijuana Marsh.

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ADDENDUM

Twenty-three southern California marshes were censused during spring 1981 and 173 pairs of Clapper Rails were detected. The total was down approximately 15% from 1980. This reduction was primarily ascribable to population declines at Anaheim Bay (from 30 to 19 pairs) and Upper Newport Bay (from 98 to 66 pairs). Clapper Rails were detected at 15 marshes in 1981. The four newly documented populations were observed in San Diego County at F Street Marsh, Chula Vista (one pair), J Street Marsh, Chula Vista (one pair), San Diego River Flood Control Channel (three pairs), and San Elijo Lagoon (five pairs). The San Diego River Flood Control Channel and San Elijo Lagoon marshes are primarily freshwater marshes with dominant *Scirpus* sp. and *Typha* sp. and fringing upper saltmarsh vegetation. At the remaining nine marshes where Clapper Rails were detected in both 1980 and 1981, the population estimates were similar for both years, with a slight increase to 31 pairs in 1981 at Tijuana Estuary.

An examination of the status of the Light-footed Clapper Rail in Baja California, Mexico, was begun during spring 1981. We censused no more than one-fourth of the suitable habitat at El Estero, Ensenada, and heard 68 pairs of Clapper Rails, and less than one-fifth of the saltmarsh at Bahía de San Quintín and heard 107 pairs. Projection of these partial counts yields a rough minimum estimate of 800 pairs of Clapper Rails residing in the two saltmarshes.

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