To catch a Clapper Rail—twice

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Various techniques have been used to capture Clapper Rails *(Rallus longirostris)* with differing degrees of success, depending on the goals and constraints of particular studies. Techniques which worked well for a censusing project (Mangold 1974) did not for a study of renesting and multiple brooding (Blandin 1963). Mangold (1974) tried several capture methods before finding one that worked well in the New Jersey marshes. His study area was large and his objective was to band as many rails as possible. Shorebird traps gave poor results and herding birds into corral-traps on high ground during flood tides was more efficient but still too consumptive of time and personnel. The method that worked most efficiently was netting during high tides at night from a boat, using spotlights and long-handled dip nets. Over 300 rails were caught during one summer and over 500 were captured per year, in 1969 through 1973, with this technique.

Johnson (1973) also reported success using night-lighting, both on foot and by boat, to capture Clapper Rails in New York. Several other techniques, including capture by hand, herding into mist nets, and traps yielded poor results. The traps were large cloverleafs, designed like those used successfully by Stewart (1954), but were stolen before fully tested.

Blandin tried two types of traps in addition to netting during high tides before devising a drop-door trap that was placed directly on incubation nests. His study in South Carolina required that he locate the nests of the birds he trapped and marked, and the surest means of doing so was to trap birds on their nests. The nest trap was effective but many birds deserted their nests (56% of trapped adults), rendering this technique unacceptable for use with any of the endangered subspecies of Clapper Rails.

Several other trap designs and trapping techniques have been used to capture rails. Drop-door traps were used successfully by Bateman (1965) and by Roth and coworkers (1972) in Louisiana. Holliman (1978) had good success with box traps placed selectively along drift fences. In a study of population dynamics of the Water Rail *(Rallus aquaticus)* in the Netherlands, deKroon (1979) placed drop traps along the habitat transition zones frequented by foraging rails. The traps were used in conjunction with bait and taped calls.

We report here on capture methods we have used in a study of the Light-footed Clapper Rail *(Rallus longirostris levipes)* in Southern California. Although the rarity and consequent endangered status of this subspecies made us initially hesitant to use several of the above capture techniques we eventually tried nearly all of them, as well as several variations of our own design. Trapping was restricted to Upper Newport Bay, Orange County, California and concentrated on Shellmaker Island, a peninsula with about 10 ha of saltmarsh vegetation and a nearly equal area of fringing, open maritime scrub. Upper Newport Bay has had the state's single largest population of this subspecies since 1979 (Zembal and Massey 1981) and the nesting population on Shellmaker Island has fluctuated from about 12 to 15 pairs, 1979-1983. Our trapping goals were: (1) to capture and individually color band as many of the individuals on Shellmaker Island as possible; (2) to recapture an occasional banded individual for follow-up measurements and examination; (3) to capture individuals for radio-harnessing (Figure 1) and subsequent monitoring of movements and behavior; (4) and to recapture radio-collared birds for harness removal and follow-up examination. These goals necessitated a concentrated trapping effort over a relatively small area and attempts to capture or recapture specific individuals.

Our trapping efforts were initiated in February 1981 and are ongoing. Between 16 February 1981 and 9 September 1983, we spent about 307 hours over 85 different dates attempting to catch rails (Table 1). Although time-consuming, the use of drop-door traps proved the only reliable method and gave us coincidental captures of two Soras *(Porzana carolina)* and a Virginia Rail *(Rallus limicola)*.

We now use two methods routinely, drop-door traps for initial captures and mist nets for recapturing radio-collared birds. High-tide excursions in an inflatable boat are taken primarily to look for color-banded birds, with

Table 1. Results with several techniques for recapturing

	Hours Spent	Dates	No. of Traps/ Nets	Initial Captures	Recaptures
Drop-door traps[1]	220	54	8 - 14	52	4
Mist nets	26	10	1 - 5	0	7
High tide with dip nets	21	11	1	0	1
Miscellaneous	40	10	1	0	1
Totals	307	85	-	52	13

[1]A total of 1,905 trap-hours were accrued. One trap set for one hour is a trap-hour.

the hope of an occasional recapture. The following account of our successes and failures is given to help future researchers save time, effort, and discouragement with techniques for capturing rails.

Ground traps

Our initial trapping efforts were with noose-mats, rectangular pieces of wire mesh with upright monofilament nooses tied densely over the flat surface. This type of trap has been used very effectively on a variety of species including Snowy Plovers *(Charadrius alexandrinus)*. A flexible 13 cm. spring with bells on the free end was secured upright to each mat, to notify us at a distance of foot-snared birds. The traps were set on the mudflat adjacent to dense cordgrass *(Spartina foliosa)* and in tidal creeks, where rails had been seen foraging. One to three traps were tried on three different dates for a total of about 20 trap-hours and one or two of the traps were baited with tethered crabs *(Pachygrapsus* sp. or *Hemigrapsus* sp.). We abandoned this method abruptly after observing a rail walking across the trap without becoming ensnared. The rails' usual gait, with toes spread wide to place the foot straight down and compressed to lift it straight up, made foot-snaring with vertical nooses seem very unlikely.

Our next and many subsequent attempts to trap rails were with drop-door traps. The design of these traps was similar to that used by Roth et al. (1972). The traps are rectangular boxes, constructed of welded wire mesh with a door at each end. Although four different tripping mechanisms were devised, all are activated by depression of a treadle located on the central floor of the trap. The simplest mechanism involves two monofilament lines that suspend the free end of the treadle and run through small wire loops to pins holding the doors open. Most of the traps were of two sizes, 32 cm. X 41 cm. tall X 43 cm. deep, and 30 cm. X 31 cm. tall X 41 cm. deep. No difference was obvious in the trapping effectiveness of the two sizes, although having different shapes and sizes of traps was important for fitting traps snugly into specific trapping locations.

The traps were set in tidal creeks and on small trails, mostly in dense cordgrass (Figure 2). The rails forage along small creeks and also use them as thoroughfares through dense vegetation. In August 1981, for example, 6 different first-year birds were taken from one 20-m stretch of a single creek, 4 of them from a single spot. Where creeks were lacking or poorly developed, trails through dense cordgrass were found in areas where unbanded rails had been observed and such trails were later trapped successfully. It appeared that an active bird would go through a trap readily, if the easiest path of travel was through rather than around the trap (Figure 3). This points out the utility of laying drift

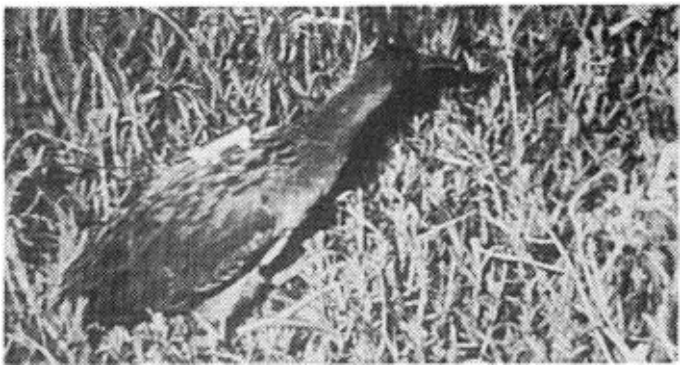

Figure 1. A radio-harnessed Clapper Rail, just after release. (Photo by J.M. Fancher)

Figure 2. Setting a trap in cordgrass. (Photo by D. Echols)

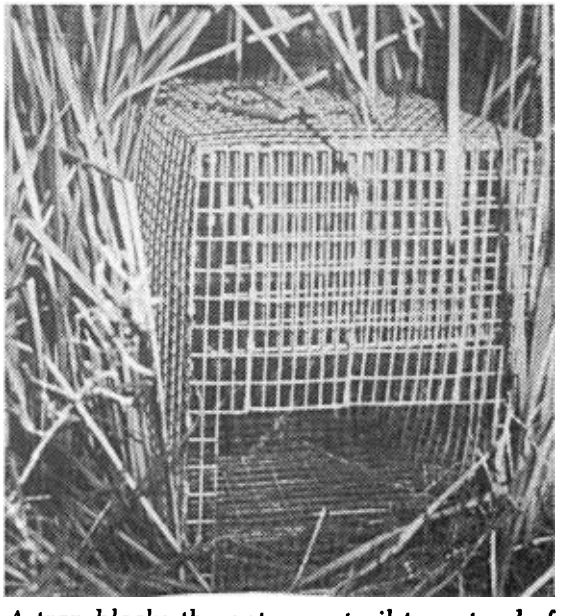

Figure 3. A trap blocks the entrance trail to a stand of reeds. (Photo by J.M. Fancher)

fences to direct rail movement. We found it less time consuming and less damaging to marsh vegetation, however, to use suitably sized chunks of flotsam to block travel along the sides of a trap where necessary (for example, in a creek that was wider than the trap).

Traps were set during tides that were low enough to expose foraging substrate and good trapping locations in the lower marsh. About 76% of all 1982-1983 captures were made during sessions with tides that rose to, or near the elevation of the trapping sites at the end of the sessions. Casual observations suggest that at least some foraging birds favor areas just above the water line, which during rising tides would direct some individuals to the traps.

We have found that Light-footed Clapper Rails have two regular peaks of daily activity, in early morning and late afternoon. Morning trapping proved unsuccessful, with no captures in 179 trap-hours (9.4% of total effort) between dawn and noon over 7 different dates. Thus, we abandoned morning trapping early in the study. Successful trapping sessions were begun about 4 hours before sunset and concluded just before dark. The average time of capture was 95 minutes before sundown and with but one exception, birds were not trapped earlier than about 3 hours before sunset. Fading afternoon light provided increasing camouflage for the traps (which were set deeply in dense vegetation) and may have contributed, along with increased rail activity, to greater trapping success in the late afternoon. There also appeared to be a lag-time, associated with disturbance to the rails by trappers in the marsh, during which the trapping area was avoided. Morning trapping required enough daylight for us to see where we were going. By the time that rails might have ventured back into the trapping area, the traps were becoming conspicuous in the increasing light and the birds were becoming less active, resulting in poorer chances for morning captures.

Although the traps were checked hourly, most of the first rails trapped showed signs of abrasion about the base of the bill and some bleeding. The traps were subsequently coated with a silicone-rubber compound which alleviated the problem.

Our effectiveness with drop-door traps grew as we learned to use the tides, time of day, and specific trapping locations (Table 2). Yet it remained a time-consuming occupation, requiring about 29 trap-hours per capture.

Light-footed Clapper Rails became trap-shy very quickly. This was well demonstrated by two birds that were trapped and radio-harnessed for telemetry. Traps were again placed in the two territories, 1 and 4 weeks after harnessing and when the closely monitored rails were

Table 2. Summary of the effort with drop-door traps by year.

Number of:	1981	1982	1983	Total
Trapping sessions	30	14	10	54
Successful sessions	13 (43%)	9 (64%)	7 (70%)	29
Trap-hours	937	541	427	1905
Rail captures	22	19	15	56
Trap-hours/capture	42.6	28.5	28.5	

far enough away to avoid disturbance. Both birds eventually approached a trap, turned abruptly, and moved well away, one of them quickly to the opposite end of its territory. Only 4 of 50 rails (8% of all captures) initially captured in drop-door traps were retaken later in those traps, although over half of all banded birds were later observed near their capture sites and all of those sites have been retrapped more than once. Three of the 4 recaptures occurred 8, 9, and over 26 months after the initial capture. The fourth bird, a fledgling, was retrapped after only 2 weeks. This bird was initially trapped on the mudflat in traps modified with mirrors and the first experience may have been sufficiently different for a youngster that trap avoidance wasn't evoked during the second encounter with a trap.

We tried various lures to enhance the traps and increase the capture rate; none proved particularly effective. The use of bait (including very active prey such as California Killifish, *Fundulus parvipinnis* and House Mice, *Mus musculus*), taped calls, and calls plus mirrors gave no consistent added incentive for Light-footed Clapper Rails to enter traps. When baited and unbaited traps were used simultaneously, there was no apparent difference in capture rate and we never saw evidence that the bait was touched. We abandoned the routine use of bait about halfway through the trapping done in 1981 and, in spite of this, our trapping success has increased.

Rails often investigated taped calls and mirrors, but only once did a bird enter the trap. Consequently, we experimented with two other types of trap which were more open and influenced a larger area. These were tried with mirrors, taped calls, bait, and decoys (J.M. Fancher unpublished manuscript). One was a large basket of net propped on a stick, and the other was a modified bow-net trap, similar to that described for use on raptors (Tordoff 1954). The traps have been tried on 7 different dates for about 20 trap-hours but thus far neither has captured a rail. The bow-net trap seems to hold the greatest promise but would have to be heavily camouflaged in dense marsh debris to be effective. We still need an enticement that consistently lures Clapper Rails, for use with this trap.

Netting and capture by hand

After attempting to retrap radio-harnessed rails and observing unmistakable avoidance of traps, we began herding the birds into mist nets. Seven of the 9 radio-collared birds were recaptured this way, and mostly with relative ease. The 7 rails were retaken with 1-3 nets set for a total of about 16 hours on 6 different dates. The first attempt was with 3 nets set in a triangle with one kept down near the ground, ready to be pulled up once the rail was inside the triangle. The bottoms of the nets were secured flush to the ground with 46 cm. lengths of small-diameter bamboo stakes. This first bird became entangled in the lowered net and was captured without closure of the net triangle. Subsequently, just 1 or 2 nets were used, without a closing net. It now takes us only 1-2 hours to recapture a radio-harnessed bird.

Birds were easiest to herd in dense *Spartina*. Where the cordgrass belt was narrow enough, a single net was strung loosely across the belt and then tightened up and made to form a shallow "V" by placement of a third pole in the center. As long as there were no major breaks in the vegetation and a bird wasn't pushed too hard, it would run low to the ground and become entangled at the base of a net. A total of 3 drivers was adequate, with one flanker on either side of the person with the radio-receiver. The drives were conducted slowly with much talking, hand-clapping, and shaking of the grass with sticks. The last 15-20 m. to the net was done in a noisier rush, to prevent the bird from detecting and avoiding the net.

The herding technique, described above, could probably be used effectively for initial captures. The only additional suggestions would be to stall the drive and increase the noise level before passing tidal creeks or deposits of wrack, places where rails will sequester themselves and then try to double back; set the nets at least one hour before the drive; and use enough drivers to be able to space them only 5-10 m. apart.

Rails were occasionally observed hiding in small remnant patches of vegetation during high tides at Upper Newport Bay (Figures 4 and 5). Two mist nets were once set from a boat behind such a hidden bird and the rail was then flushed into the nets with the boat. This technique might prove most useful at marshes with an abundance of open water, particularly if a towable floating net-rig was developed. The technique allows advantage to be take of higher tides that occur during daylight hours. However, the time necessary to set nets and the few chances for trial of the technique at Upper Newport Bay kept us from pursuing it further.

Netting from an air-boat during high tides is a good technique at marshes where large numbers of rails can be encountered on a single visit, as at San Francisco Bay. We have not yet tried an air-boat in Upper Newport Bay, since an abundance of non-inundated vegetation remains there to hide rails during even the highest tides. We have, however, tried night-lighting from an inflatable boat during summer high tides. On 9 evenings we encountered only 18 rails in places suitable for netting attempts. Six of the 18 birds were on nests and were left undisturbed, 11 eluded our attempts to net them, and one was caught (a recapture). Without the

Figure 4. A Clapper Rail moving to cover during a high tide. (Photo by R. Zembal)

Figure 5. A Clapper Rail camouflaged in remnant vegetation during a high tide. (Photo by R. Zembel)

practice provided by ample opportunity, it is difficult to develop much facility with the use of the dip-net.

On rare occasions during our 4 seasons of examining nests, we came upon an incubating bird so tenacious it had to be lifted off its nest to examine the eggs. We did not band these rails for fear of causing desertion. This extreme tenacity appears to be more of a rare individual trait, rather than one associated with the closeness to hatching time. More than 200 incubation nests have been examined and only 4 incubating rails were handled.

In summary, how does one capture the same Light-footed Clapper Rail twice? Use two very different trapping techniques; trust to mist nets, netting at high tide, or capture by hand and some luck; radio-telemeter the rail, so that later it can be found and effectively herded; develop a consistently effective lure; or use drop-door traps several times each year for a few years and be very patient.

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