# BREEDING BEHAVIOR AND DISPERSAL OF RADIO-MARKED CALIFORNIA CLAPPER RAILS

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The San Francisco Bay estuary is highly urbanized, and as a result roughly 80% of its historic tidal marshes have been lost (Goals Project 1999). The California Clapper Rail (*Rallus longirostris obsoletus*), now restricted to the San Francisco Bay estuary (Gill 1979), is listed as endangered by both the U. S. Fish and Wildlife Service (1973) and California Department of Fish Game (Leach et al. 1976). Secretive birds found in the dense vegetation of tidal salt marshes, California Clapper Rails forage on crustaceans and other salt-marsh invertebrates (Eddleman and Conway 1998). California Clapper Rails usually lay eight eggs and often renest after failed nesting attempts (Eddleman and Conway 1998). The sexes are similar in plumage, but males tend to be larger. Recent estimates of the population range between 1200 and 1500 individuals (Harvey 1988, Garcia 1995, Albertson and Evens 2000). Because California Clapper Rails are difficult to observe little is known about their dispersal and breeding behavior. Radio telemetry on individual birds, however, provides a valuable tool for investigating these and other aspects of California Clapper Rail ecology.

In January 2007, we initiated a radio-telemetry study to track California Clapper Rails. The effects of radio transmitters on Clapper Rails have not been well documented, although Eddleman and Conway (1998) suggested that radio-marking reduced the ability of Yuma Clapper Rails (*R. l. yumanensis*) to fly and avoid predation. California Clapper Rails have been recorded at scattered locations away from their normal habitat (Grinnell and Miller 1944), but there are few records of point-to-point dispersal, critical for determining metapopulations and conservation of the subspecies (Foin et al. 1997). In this paper, we report the first published observation of copulation and long-distance dispersal of radio-marked California Clapper Rails.

We captured nine California Clapper Rails from January to February 2007 at the confluence of Colma and San Bruno creeks (i.e., Colma Marsh), north of San Francisco International Airport in San Mateo County, California. The birds were sighted from boats or from land and caught with a dipnet or by hand. Each bird was aged, sexed, and banded. Feathers and blood were taken for diet and contaminant analyses. We marked the rails with a 10-g transmitter with a lifespan of 14 months (model A1120, Advanced Telemetry Systems, Isanti, MN), affixed to their back with a Teflon harness as described by Albertson (1995). We released them within an hour near where we captured them .

Clapper Rails vocalize frequently with various distinctive calls (Eddleman and Conway 1998). Zembal and Massey (1985) described the use of the *kek-burr* call by the female Light-footed Clapper Rail (*R. l. levipes*): *kek-burr* is the primary attractant call used by both mated and unmated females to either find ("rally") their mate or attract males in general (Zembal and Massey 1985). Initiation of the vocalization by a mated female appears to be triggered by a period of the male's absence. After the female

calls, the male responds, often returning quickly to the location of the female (Zembal and Massey 1985). We observed similar behavior by California Clapper Rails during the peak of their breeding season.

Beginning at 10:07 on 5 April 2007, along Colma Creek, we photographed a radio-marked female California Clapper Rail copulating during an observation lasting 23 minutes. We observed the event from an adjacent parking lot on the opposite channel bank approximately 30-40 m from the radio-marked bird. We initially observed her drinking and bathing at the edge of the creek. She then moved to an exposed patch of matted smooth cordgrass and spent the next 22 minutes alternating between preening and resting. At 10:29, the female stood erect with her head and neck extended vertically and began to call (Figure 1A). Her call consisted of 3 kek-burr vocalizations with the first call lasting 4 seconds and the two subsequent calls lasting 2 seconds spaced by 1-second intervals. Three nearby rails responded with multiple kek vocalizations, otherwise known as the male's primary attractant call (Eddleman and Conway 1998). Immediately after the response calls, we observed a male California Clapper Rail moving guickly toward the radio-marked female from 40–45 m away. He moved through rather than around vegetation and other obstacles during his hurried approach. When the male arrived, the female leaned forward while extending her head and neck toward the ground. Copulation commenced almost immediately with minimal display or greeting (Figure 1B and C). Copulation lasted 10-12 seconds, and the female appeared to terminate the activity by standing up to cause the male to disengage (Figure 1D). The male then moved to the creek, drank from the channel, and moved back toward his original position.

Our radio-telemetry study documented the greatest known dispersal distance of a California Clapper Rail. Foin et al. (1997) recognized the importance of dispersal data for rail conservation and marsh-restoration planning and the potential usefulness of such data in modeling the rail's population dynamics on a geographic information system. In the only previous radio-telemetry study of California Clapper Rails (Albertson 1995), the longest movement documented was of a female rail that moved 2.1 km over a span of 3 days during the early breeding season. We observed a much greater distance dispersal of a radio-marked male captured on 29 January 2007. This bird remained at Colma Marsh until early April 2007, when it disappeared between 21:30 on 2 April and 07:00 on 3 April. For the next month, we were unable to locate the bird in South San Francisco Bay during our regular searches from the ground. It was later detected by radio telemetry during an aerial survey on 15 May 2007 in a tidal salt marsh near John McInnis County Park on San Pablo Bay in Marin County (Figure 2). We confirmed the presence of the bird by radio detection and visual observation during reconnaissance from the ground. This male traveled a distance of 44.8 km. If this distance is averaged over the 43 days between 3 April and 15 May, its average daily movement was >1 km per day. A movement of >20 km in a single flight, however, is more likely, as there are no sizable marshes (>4 ha) likely to serve as a stopover location between the southern edge of San Francisco and Sausalito to the north. Though 44.8 km is the farthest documented dispersal of a California Clapper Rail, on North America's east coast Clapper Rails from the northern end of the breeding range are suspected of migrating as far as 120-160 km per day (Adams and Quay 1958), and we suspect that this male may have moved from Colma Marsh to McInnis County Park in one flight or with only a few stopovers.

Our results suggest that radio telemetry may be a key tool for investigating the ecology and behavior of California Clapper Rails. Although marking birds with transmitters may cause behavioral effects (Eddleman and Conway 1998, Ackerman et al. 2004), the activities we observed could not be documented otherwise. Our radio telemetry did not reveal any negative effects of radio-marking on dispersal and breeding behavior and provided unique and critical insights for the conservation of a secretive species. Expanding studies to determine movements within and among remnant fragments of



Photos by Ken Navarre

Figure 1. Vocalization and mating sequence of a radio-marked female California Clapper Rail. Red arrow indicates placement of radio transmitter. (A) Radio-marked female rail calling from an exposed patch of matted smooth cordgrass. (B) Posturing of the female rail upon approach by the male (copulation commenced almost immediately). (C) Copulation. (D) The female terminates the copulation by standing erect, causing the male to disengage.

## NOTES



Figure 2. Breeding-season dispersal (44.8 km) of a male radio-marked California Clapper Rail from Colma Creek in South Bay (San Mateo County) to McInnis County Park in San Pablo Bay (Marin County), representing the longest documented movement of a Clapper Rail on the west coast of North America.

tidal marshes in San Francisco Bay will be critical to ensuring the California Clapper Rail's survival through identification and protection of its major metapopulations.

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