

## VOCALIZATIONS OF THE LIGHT-FOOTED CLAPPER RAIL

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**Abstract.**—Eight calls have been distinguished in the repertoire of the Light-footed Clapper Rail. The major calls are the *clapper*, *kek*, *agitated kek*, and the *kek-burr*. The *clapper* is the basic species call, used both for general territorial pronouncements and in contexts where mutual recognition of mates is important. Both sexes *clapper*. The *kek* and *kek-burr* are advertising calls of non-mated males and females respectively. The *agitated kek* is a response to intrusion or disturbance.

All calls are variants on a single note; differences in sounds are due to changes in pitch, length of notes and of intervals between notes, and intensity.

### VOCALIZACIÓN EN *RALLUS LONGIROSTRIS LEVIPES*

**Sinopsis.**—Ocho llamadas han sido identificadas en el repertorio de *Rallus longirostris levipes*. Las principales son: “*clapper*,” “*kek*,” “*kek*” alborotado y el “*kek burr*.” El llamado básico es el “*clapper*” utilizado por el ave para proclamar su territorio y cuando el reconocimiento entre parejas es necesario. Ambos sexos producen el llamado “*clapper*.” El “*kek*” y el “*kek burr*” son vocalizaciones para llamar la atención, producidos por machos no apareados y hembras, respectivamente. El “*kek*” alborotado es una respuesta a intrusos o perturbación.

Todas las llamadas son variantes de una sola nota; las diferencias en sonido se deben a un cambio en el tono, largo de la nota e intervalos entre notas e intensidad.

La eficacia del sistema de vocalización de estas aves en un ambiente anegado se discuten en este trabajo.

There are few published accounts of the vocalizations of the Rallidae, presumably because of the difficulty in relating call to function in this reclusive family. Meanley (1969) described and phoneticized the calls of the King Rail (*Rallus elegans*) in east-coast marshes, and Tomlinson and Todd (1973) identified 7 calls made by the Yuma Clapper Rail (*R. longirostris yumanensis*) along the Colorado River. Displays and associated vocalizations of captive Virginia Rails (*R. limicola*) and Soras (*Porzana carolina*) were reported by Kaufmann (1983).

We have been observing, and listening to, the Light-footed Clapper Rail (*R. l. levipes*) in southern California since 1979 and have identified eight vocalizations and their behavioral contexts. The most common call, the *clapper* (Dawson 1923), can be heard at dusk throughout the year and is the basis for most censusing techniques for Clapper Rails (Mangold 1974, Tomlinson and Todd 1973, Zembal and Massey 1981). The *kek* (Tomlinson and Todd 1973) is also heard frequently, but almost

only during the breeding season (Zembal and Massey 1987). The other six calls described in this paper are used less frequently and in special contexts.

#### STUDY AREA AND METHODS

The saltmarshes of Anaheim Bay (in the Seal Beach National Wildlife Refuge) and Upper Newport Bay (State Ecological Reserve, California Department of Fish and Game) in northern Orange County, California, were the sites for this study. Since 1979, more than 5000 h have been spent in the field. Thirteen rails were followed by radio-telemetry for periods of 2–7 wks. This technique enabled us to locate a rail and observe its behavior as it pursued its daily activities in the marsh. Live-trapping for purposes of banding (Zembal and Massey 1983) and close monitoring of nests (Massey et al. 1984) enabled us to place seldom heard calls like the *screech* and *churr* in a behavioral context.

The three calls heard regularly during the breeding season (*clapper*, *kek*, *kek-burr*) were taped on a Sony Cassette-Corder TC 110A using a hand held microphone. Five other calls occurred so unpredictably we could not pre-arrange for their recording. Sound spectrograms were made on a Kay Elemetrics Co. Sona-Graph, Model #6061B, with wide-band setting. The calls have been described using the terminology of Davis (1964). Copies of the taped calls have been deposited with the Bioacoustic Archive and Laboratory, Florida State Museum, Gainesville, Florida.

#### RESULTS

We were able to distinguish eight different calls and place them in a behavioral context. There were other calls in the bird's repertoire, but they occurred infrequently and in situations where we could not interpret their meaning.

*Kek*.—The *kek* is the simplest of the calls, consisting of one short note repeated many times (Fig. 1). The note is a complex sound with the fundamental barely evident and the major harmonic usually between 3.5–4.0 kHz. There can be variation in pitch between individuals; Figure 1c is pitched lower than 1a or 1b with the strongest harmonic at 2.0–2.5 kHz. The note is short ( $\bar{x} = 0.05$  s, SE = 0.009,  $n = 20$ ) but often has a decay transient—a fading away of the major resonance bands, as seen in Figure 2b and 2c. (Davis 1964).

The *kek* is heard throughout the breeding season and rarely otherwise (Zembal and Massey 1987). Starting in early February, single males begin monotonous, repetitious *keking*, particularly in late afternoon and evening. Often they roam through their territories while *keking*. The call can continue for hours, at rates of 70–125 keks/min with periodic pauses. It is very penetrating and can be heard for a long distance (1–2 km). The tempo of the call quickens in response to external stimuli, e.g., the *clapping* of neighboring birds.

*Clapper (or clatter)*.—This call, which gave the bird its common name (Choate 1985), also consists of single, repeated notes. There is no fixed

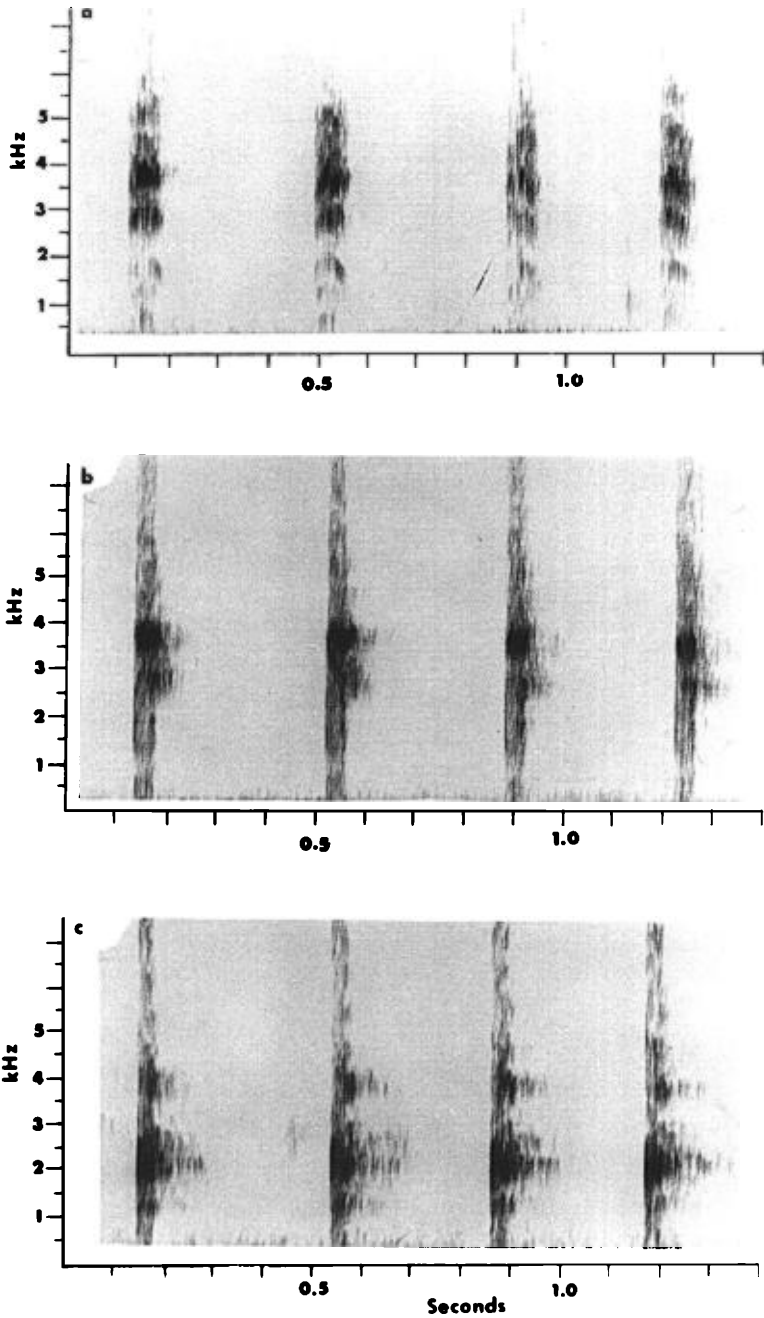


FIGURE 1. *Kek* notes of three individual male Light-footed Clapper Rails (a, b, c) recorded in March at the onset of the breeding season.

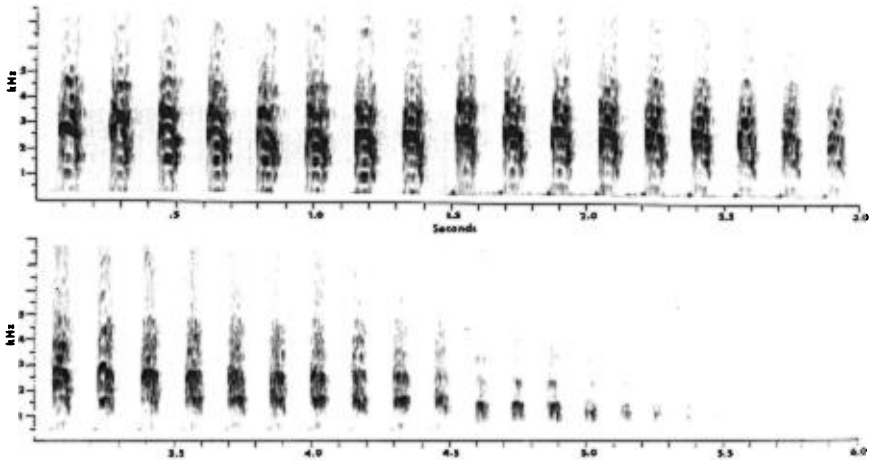


FIGURE 2. The *clapper* call of a male during the breeding season. The call was 6.0 s long and contained 39 notes.

number; we have counted as few as 12 notes in a call, but some are prolonged for as long as 10 s and contain about 100 notes. The call usually begins on a higher pitch than it ends, and also diminishes in volume as it nears the end. Figure 2 is the *clapper* of a mated male during the breeding season. The first 6 notes are sharp and loud with the strongest harmonic around 3.5 kHz, then the pitch drops slightly, as does the volume. After another dozen notes, the call fades out with about 12 diminishing notes, lower in pitch and volume than the preceding ones. It is not, however, a three part call, but a continuum. The intervals between the notes are the same but the quality of the sound changes—it begins sharply and loudly and fades almost to inaudibility at the end. There are 39 notes in this particular call, which lasted for 6.0 s.

The notes are complex tones with at least 11 harmonics above a weak fundamental. At the beginning of the call there are several strong harmonics, but as the call progresses they disappear and by the end there is only a weak, low sound registering at around 1 kHz.

The calls of males and females are indistinguishable. Figure 3a shows a call begun by one bird, then joined by its mate at about the 6th note. By the 13th note, the two calls can be seen as separate entities, and look very much alike.

*Agitated kek.*—This call is a variant of the *kek*, but higher pitched and faster. It is associated with disturbance or distress, and often made by juveniles in chase sequences, when it is given by the bird being chased. Chases are frequent occurrences among juveniles in late summer, when they are beginning to move away from their natal territories and roam through the marsh.

*Kek-burr.*—This call has been a subject of debate for many years and

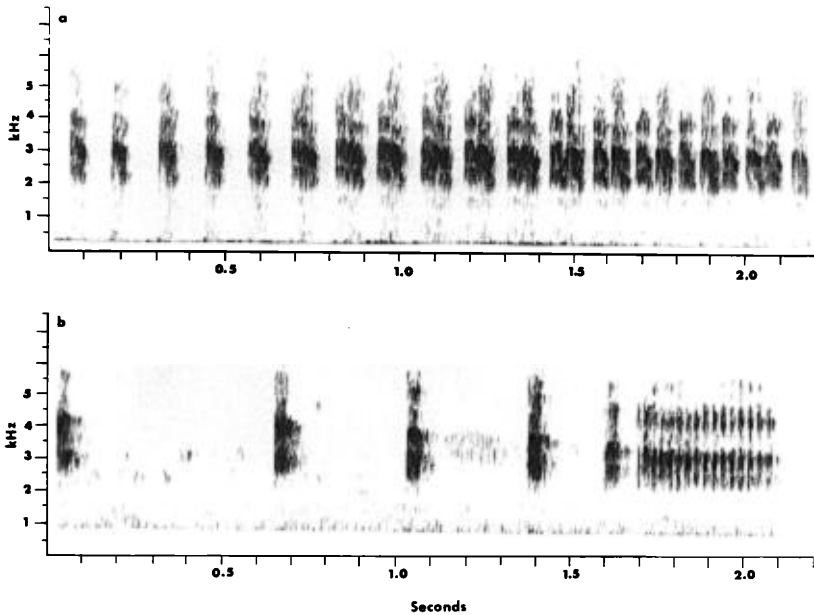


FIGURE 3. a) Duet *clapping* by a mated pair. One bird began calling and was joined by its mate. The calls become separate entities by the 13th note. b) *Kek-burr* call of a female who lost her mate during the nesting season. She began to advertise for another mate two days later.

was dubbed an “ornithological mystery call” (Manolis 1981). It is heard only during the breeding season, when a female utters it repeatedly, the way an unmated male uses the *kek*. It is the only call in the repertoire that is complex, having two dissimilar components—a series of *keks* (1–5) followed by a trill, the *burr*. In Figure 3b five *keks* precede the *burr*. The interval between *keks* decreases progressively and the final one is followed almost without pause by the *burr*. The *burr* is comprised of two strong resonance bars and is lower in pitch than the *keks*, although the drop in pitch is not well shown by Figure 3b. The lower pitch may be caused by a change in resonance rather than by the frequency of the strongest harmonic (Davis 1964).

*Chase-squeal*.—The *chase-squeal* resembles a chicken’s squawk. It is usually uttered just once by a startled bird, and often precedes a chase. The call has sometimes been followed by *agitated keking*, less frequently by *duet clapping*. In the latter case, the sudden appearance of a bird’s mate would elicit a squeal out of the startled bird, but the call would be cut short and *clapping* substituted, implying that recognition had occurred. In August and September juveniles uttering this call often chase each other across the mudflats in Upper Newport Bay.

*Screech (or shriek)*.—This intense call was used in situations where behavior alternated between aggressiveness and flight. It was given by

birds flushed off nests where there were newly hatched chicks, and by several rails in traps, at our approach. On one occasion a pair gave this call at their nest as they alternated flying 1–1.5 m straight up toward marauding American Crows (*Corvus brachyrhynchos*). The pair's *screeches* were as intense as we have heard, and were explained by a visit to the nest the next day when we found evidence of recent hatching. The unsuccessful raid by the crows was during hatching.

*Churr*.—This low-pitched, soft trill is audible only within about 30 m. It is heard infrequently and may be an exclusively female call. The only time we observed the context in which the call was made was when a female was calling to her mate from a short distance away and he responded by approaching her. Although *churring* differs slightly in quality and pitch from *burring*, it might be considered the diminutive of that call. Rarely, after extended *churring*, the call would gradually harshen, intensify, and turn into a *kek-burr*.

*Purr*.—This call sounds like the purr of a cat and is delivered at extremely low volume. *Purring* was seldom heard during the study, probably because it was only audible within a few meters of the vocalizing bird. It is a contact call, given between mates at close quarters, particularly near the nest. During a video-taping session, when a camera was placed within a few meters of a nest, the rail approaching the nest was heard giving this call. It has also been heard after instances of minor disturbance. Such a disturbance was once created near a nest by playing a tape of the *kek* call. The female of a pair under observation responded by *clapping*. Further playing of the tape brought the male scurrying from 50 m away. He went straight to the female, they both *purred* for a few seconds, and then the male moved quietly away again. *Purring* was heard from Yuma Clapper Rails in the same type of situation (S. Wilbur, pers. comm.).

An agitated version of the *purr* was heard during several video-taping sessions. It only occurred when the camera was close—a meter from the nest, where the lens reflected the bird's image. The attending adult roamed around the box voicing an agitated *purr*. When the box was repositioned about 3 m from the nest and the lens was covered, *purring* was resumed.

#### DISCUSSION

Rails of the genus *Rallus* are not renowned for their vocal virtuosity; their calls are usually described as *kik*, *kek*, *chup*, *churr* and *purr* sounds (Ripley 1977). The exception is the Virginia Rail, which has at least seven calls, all very different from each other in both sound and sonographic appearance (Kaufmann 1983).

The vocal capability of the Light-footed Clapper Rail appears to be very limited. Its repertoire is built from one note that shows on a sound spectrogram as a vertical bar with a series of harmonic bands above a weak fundamental. From this note come three sounds, the *kek*, *clapper* and *burr*, which in turn are the bases for the 8 calls we have described. The variations in sound generated from this one note are created by

changes in intensity, duration of the note, length of the intervals between notes, and pitch.

The *kek* call apparently advertises a male's unmated status, and is reported to serve the same function in several eastern sub-species of Clapper Rails (Meanley 1985) and the King Rail (Meanley 1969). If pairing occurs the male ceases to *kek*, but unmated males have continued to *kek* throughout the breeding season.

The *clapper* call appears to have multiple functions. It serves as a greeting when a pair meets during foraging, with both birds *clapping* simultaneously. We have also observed duet *clapping* during nest exchanges and as a prelude to copulation where it appears to aid in mutual recognition.

The call is given in response to the *clapping* of birds in other territories (and to tape recordings), and can be elicited by loud noises such as an airplane overhead, a car door slamming, hand clapping, or even loud conversation. In these contexts it appears to be a territorial pronouncement.

The evening round of *clapping* noted by many listeners (Dawson 1923, Johnson 1973, Mangold 1974, Simmons 1914) also appears to be a territorial statement. A single bird or a pair initiates the calling and neighboring rails respond to make a round. There may be many rounds of calling in the period around dusk.

The *kek-burr* call has recently been documented as the advertising call of the female (Zembal and Massey 1985). Use of this call by a female who had lost her mate caused the male in the adjacent territory to make repeated visits to her. When his own mate began to use the call, he would then return to his own territory, and to her.

Most of the rail's calling is related to territoriality and to breeding behavior. We have heard no feeding calls or aggressive agonistic calls (the *chase-squeal* is given by the bird being chased and not the aggressor). If there are such calls they are inaudible to an observer 10 m away. Confrontations with other (adult) rails during territorial intrusions are generally silent chases. Reactions to intrusion or danger are seldom vocal; when we find a nest with eggs, the incubating bird has usually slipped away silently before we arrive. Only if the eggs are hatching has the parent stayed and voiced alarm. Alarm calls—the *agitated kek*, *chase-squeal* and *screech*—are usually associated with sudden encounters that startle a bird.

Clapper Rails are ground-loving birds that fly only when pressed and are usually hidden, even from each other. Their calls must carry fairly long distances through dense cordgrass in order to be heard outside their own territories. Low frequency sounds travel farther before attenuating than high notes (Konishi 1970), and complex low sounds like buzzes carry more effectively than pure tones in tall grass habitats (Morton 1975). Clapper Rail calls meet both criteria.

The species call—the *clapper*—has fewer functions than observed in other species. It is not used as an advertising or agonistic call (e.g., Willet

*Catoptrophorus semipalmatus* [Sordahl 1979] and Long-billed Curlew *Numenius americanus* [Forsythe 1970]). Neither does it serve to identify parents to their chicks, as in the case of colonially nesting waterbirds like gulls (Beer 1969, Evans 1970) and terns (Massey 1976, Stevenson et al. 1970).

Differences in the use of calls can be explained by the difference in life-style between rails, which lead secretive lives, and waterbirds that nest in the open and have aerial displays like shorebirds, gulls, and terns. Unmated Clapper Rails generally advertise for mates from well-hidden sites in their territories, sending only vocal signals (we have never heard the *clapper* call from a bird in flight). Thus there is no need for an individualized call; the message that there is an unmated bird available is conveyed by the fact that an advertising call is coming from a defined territory. The only other information needed is the sex of the individual, and that is conveyed by the sex-specificity of the advertising calls. Individual recognition of parents and chicks is not necessary for Clapper Rails. In colonially nesting species, parents leave their chicks to forage, and when they return with food for the chicks they must be able to identify them in the colony. Vocalizations play a key role in this identification. Clapper Rail families forage close together for at least 6 weeks after the chicks hatch and stay within the home range of the parents; they do not mingle with other families. There is no apparent need for parent-chick identification. If vocalizations are used, they are only audible at very close range.

#### ACKNOWLEDGMENTS

We are grateful to the California Department of Fish and Game for granting us access to the marshes of Upper Newport Bay, and to Kern National Wildlife Refuge for allowing us to listen to Clapper Rails in Anaheim Bay.

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Received 25 Apr. 1986; accepted 10 Sept. 1986.