

DISTRIBUTION OF TWO WESTERN CLAPPER RAIL RACES AS DETERMINED BY RESPONSES TO TAPED CALLS

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Seven races of the Clapper Rail (*Rallus longirostris*) are presently recognized from the western United States and the Pacific coast of México (Oberholser 1937; Friedmann et al. 1950; A.O.U. Check-list 1957). Two of these races, the "Yuma" Clapper Rail (*R. l. yumanensis*) and the "Sonora" Clapper Rail (*R. l. rhizophorae*), were studied through observations and surveys conducted by the authors and others during the period 1968-70. The information was gathered as part of a joint research study of *yumanensis* by the Bureau of Sport Fisheries and Wildlife, and the Arizona Game and Fish Department.

Unlike most Clapper Rails, members of the Yuma race can be found, during the breeding season, in freshwater habitat inland from coastal areas. The birds are very secretive by nature and inhabit dense marsh habitat where they are seldom seen. Few documented sight observations had been made of *yumanensis* prior to 1968, and only 16 specimens of the subspecies are known to have been taken (Tomlinson, unpubl. data). This race is listed as "endangered" in the Bureau of Sport Fisheries and Wildlife Redbook (1968).

The Yuma Clapper Rail was first described by Dickey (1923) from one of three specimens collected for him along the Colorado River near Laguna Dam, California (fig. 1). Moffitt (1932) observed that the same form inhabited the southern part of the Salton Sea, and Sechrist (Abbott 1940) confirmed that the bird nested there. Oberholser (1937) and Ridgway and Friedmann (1941) summarized the known range to that time as the freshwater marshes and adjacent irrigation canals along the Colorado River above Yuma north to Laguna Dam and west to the Salton Sea.

Phillips et al. (1964) updated the distribution of *yumanensis* in Arizona. Using 19 sight

observations by Gale Monson (coauthor and longtime manager of Imperial National Wildlife Refuge), they defined its range along the Colorado River as the area from Laguna Dam north to the Bill Williams Delta above Parker Dam.

In 1966, observations of Clapper Rails were made north of the Bill Williams Delta for the first time (BSFW memo from Havasu Lake NWR Manager, Blayne Graves, Jan. 1968). In late June 1966, Havasu Lake NWR personnel saw one bird in an area of Topock Marsh called Beal Lake. On 2 and 3 July, a bird was observed in a backwater marsh of Topock Gorge; and sometime during the summer of 1966, clappers were seen on the north side of Topock Marsh.

The Sonora Clapper Rail was described by Dickey in 1930. This race is described as inhabiting saltwater swamps along the Gulf of California coast of México from Guaymas, Sonora, south to northern Sinaloa (Dickey 1930; Oberholser 1937; Ridgway and Friedmann 1941). Prior to the present study, 20 museum specimens of this race were known to exist at three institutions (Tomlinson, unpubl. data). The birds in these collections were taken at the following locations, from north to south: Estero Cochore near Guaymas, Sonora; Viejo Yaqui Lagoon, Sonora; Tobarí Bay, Sonora; Agiobampo Bay, Sonora; Higuera de Zaragosa, Sinaloa; and Topolobampo Bay, Sinaloa. In addition, six specimens for which the subspecific designation is in doubt were collected in the same general area of mainland México. Little information about this race has been added to the original description.

The purpose of this paper is to describe the habitat and distribution of the Yuma race and to introduce new records of the distribution of Sonora Clapper Rails north of Guaymas, Sonora.

¹ Assigned to a field station in Tucson, Arizona.

TABLE 1. Summary of calls given by Yuma Clapper Rails along the Colorado River.

Name of call	Description	Probable sex of bird giving call	Corresponding King Rail call ^a
Kek	Variable-speed kek-kek-kek-kek. . .	Male	Mating call
Agitated Kek	Same as kek but higher pitched and more insistent	Male	None
Clatter	Loud and rapid kak-kak-kak. . . Descending in both speed and loudness.	Both sexes	Primary advertising call
Purr	Much like purr of a cat. Very low in volume.	Female & possibly male	Purr call
Agitated Purr	Modified purr call tending toward more syllablization and louder.	Female & possibly male	Tuk call?
Hoo	Very low "ghost-like" hoo or boo sound.	Probably male	Booming call
Kek-burr	First note like kek call. Last note trilled "brr" sound and more emphasized. Sometimes more than one kek.	Probably both sexes	Kik-kik-kurr

^a After Meanley 1969.

MATERIALS AND METHODS

The use of magnetically taped bird calls is becoming a more popular technique in studying populations of birds. Levy et al. (1966) used female mating calls of three species of quail to locate males of those species during the breeding season in Arizona. Tomlinson (unpubl. data) subsequently used the same technique to locate populations of the endangered Masked Bobwhite (*Colinus virginianus ridgwayi*) in Sonora.

Since rails are secretive birds, it was thought that taped clapper calls could be used to survey *yumanensis* in its Colorado River habitat. In early 1968, a taped copy of two different calls of eastern Clapper Rails (*R. longirostris* ssp.) was procured from the Cornell University Laboratory of Ornithology; George B. Reynard made the original recordings. Using Sony TC-800 portable tape recorders (use of brand names does not imply endorsement by the Federal Government), the calls were played in spring and summer of 1968 in areas of possible clapper habitat along the Colorado River to determine if Yuma clappers would respond to them. Subsequent investigations were made in 1969 and 1970. Responses were first obtained during the last week of April, and the technique continued to be effective during the breeding season in May and June. The method became somewhat less effective in July, but the birds continued to respond until about 1 October. No responses were obtained during the winter. As will be discussed later, we believe that birds of the Yuma race are not present to answer the calls along the Colorado River during the winter.

Reaction to the calls during the breeding season varied considerably. Some birds answered but did not approach; some would approach and not answer; others would both approach and answer. Most Yuma clappers were extremely shy, but some would come within full view of the observer who was only a few feet away from the recorder.

Several different types of calls were heard from Yuma clappers in response to the tape. These calls were at least similar and possibly identical to those described for the King Rail (*Rallus elegans*) by Meanley (1969). To simplify discussion of the calls,

we named each one according to how it sounded to us (table 1), rather than describing the function of the call. The functions of the calls were not positively determined, but for most of them we agreed with the functions given by Meanley (1969). The first and third calls that are listed in table 1 ("kek" and "clatter" calls) were the types we originally received on tape from Cornell University. All of the calls have since been recorded in the wild for the Yuma race. As far as we could determine, the "kek" and "clatter" calls given by Yuma Clapper Rails were identical to those given by eastern clappers.

Clappers are more prone to answer any call during the mating season in May and June, but they will answer certain calls at any time of year. Both the "kek" and "clatter" calls were effective in eliciting responses from Yuma clappers in May and early June, but the "clatter" call was perhaps the most efficient at all times. From late June to October, the "clatter" and "kek-burr" calls were definitely superior to the "kek" call in achieving results. This was also true for the Sonoran race during the winter. In early May, Yuma clappers occasionally answered with a "kek" call, but they most frequently answered with a "clatter" call, particularly as the mating season progressed. Answers with the "clatter" call were often given in unison by two birds, presumably mated pairs, during May and June; sometimes a whole marsh would come alive with "clatter" calls, with or without stimulation from the taped calls.

Yuma Clapper Rails rarely responded to taped calls of rail species other than the eastern clapper, but both Sora (*Porzana carolina*) and Virginia (*Rallus limicola*) Rails frequently answered or approached taped clapper calls. This was particularly true during the fall and winter.

Early experiments using the taped-call method in May and June 1968 indicated that most of the birds in a specific area could be called in repeatedly. It was therefore decided that the use of taped calls would make feasible a survey of Yuma clappers during the spring of 1969.

In early May 1969, a survey of the distribution of Clapper Rails along the Colorado River was initiated. Prior air flights and ground reconnaissance provided

information on the areas most likely to contain the birds. Several sections of the river did not contain suitable habitat and were therefore scheduled to be covered only superficially or not at all. In May and June, three men systematically covered the river from Davis Lake south to the International Border between the United States and México. Total river distance covered by the survey was slightly less than 240 miles. Selected sections of the river were covered each day between daylight (about 05:05 MST) and 10:30, and again from about 18:15 to dark (about 20:30). A boat was usually used in the morning, and a car in the evening. Although boats allowed easier access to river marshes, both means of transportation proved to be effective.

The survey was conducted by playing the eastern clapper "kek" call at the highest volume possible with the portable recorders we used. Our methods varied with conditions. If there was a good river current, the recorder was played continuously, and the boat was allowed to drift adjacent to suitable habitat. If there was no water current or if a road vehicle was used, the call was played for a period of 3-6 min at selected stops. In this manner, marsh habitat along the entire river and adjacent marshes and lakes was covered. Those areas where marsh habitat was absent were generally ignored during the survey.

Our main objective was to determine the distribution of Yuma Clapper Rails rather than to make a complete census of the birds. To achieve the objective and to stay within the time limitations, we did not cover all suitable areas thoroughly. When it was ascertained that clappers were within a small marsh or at a specific location in a large marsh, we moved to the next location. As a result, certain marsh areas probably would have yielded much higher counts if they had been completely covered. Therefore, the relative numbers of birds counted at specific locations were not necessarily indicative of the densities of the clapper populations there.

During the winter of 1969 and the spring, summer, and fall of 1970, we again covered many of the areas that were checked in summer 1969, as well as other areas suspected of harboring Yuma Clapper Rails.

On 18 June 1969, a Clapper Rail was collected in Cibola NWR. This specimen, a female identified as *R. l. yumanensis*, is now in the collection of the National Museum of Natural History in Washington, D.C.

RESULTS

Most of the responses to our 1969 and 1970 late spring surveys were vocal, but some of the birds were also seen. Approximately 10-15% of the birds we counted gave unsolicited calls; the rest of the birds responded to the tapes. Unsolicited calls were seldom heard after 08:00 MST. After the second week in June, very few unsolicited calls were heard at any time of the day.

Preferred habitat of *yumanensis* was found to consist of shallow-water marshes containing dense stands of cattail (*Typha latifolia*) and big bulrush or tule (*Scirpus acutus*). The birds were found in both brackish and fresh-water situations. However, shallow-water areas and areas where mud flats were readily

TABLE 2. Location and number of Yuma Clapper Rails heard or seen along the Colorado River south from Needles, California, to the International Boundary, May-June 1969 and 1970^a.

Location	River miles	No. marshes or areas with birds	No. birds
Upper Topock Marsh		7	16
	10.0		
Lower Topock Marsh		10	23
Topock Gorge	14.0	12	23
Havasu Lake	24.0	0	0
Bill Williams Delta	1.0	1	4
Lake Moovalya	11.0	0	0
Headgate Dam to 2 miles below Lost Lake	20.0	2	4
2 miles below Lost Lake to Palo Verde Diversion Dam	24.0	0	0
Palo Verde Diversion Dam to Hwys. 60-70 Bridge	12.5	0	0
Hwys. 60-70 Bridge to Taylor Ferry	15.0	0	0
Taylor Ferry to Adobe Ruin	23.0	0	0
Palo Verde Lagoon	—	3	5
Davis Lake	—	1	6
Three-Fingers Lake	—	1	6+
Cibola Lake	—	1	14+
Adobe Ruin to Draper Lake	4.5	3	5
Draper Lake	—	1	2
Draper Lake to Adobe Lake	14.5	0	0
Adobe Lake	—	2	5
Adobe Lake to Island Lake	1.0	0	0
Island Lake	—	1	3
Island Lake to Ferguson Lake	8.5	3	4
Ferguson Lake to Martinez Lake	1.5	1	1
Martinez Lake to Imperial Dam	8.0	7	16
Mittry Lake	—	4	10+
Imperial Dam to Laguna Dam	6.0	2	6
Laguna Dam to Yuma, Arizona	12.0	2	3
Yuma, Arizona to Morelos Dam	8.0	0	0
Morelos Dam to Border	19.0	1	2
Totals	238.5	65	158+

^a All totals were obtained in 1969 except for the area from Mittry Lake south to the border. The totals for this section were augmented with 1970 results.

available for feeding grounds apparently were selected over areas where water was deep and steep banks were prevalent. Stands of cattails and tules that were dissected by narrow channels of water 5-20 ft wide appeared to contain the densest clapper populations.

Sixty-five marshes or locations accounted for 158 birds that were heard or seen (table 2). Observations of clappers were not evenly distributed along the river, and the actual distribution of the birds probably reflects this pattern. Certain sections of the river had been channelized and contained little, if any, marsh habitat. As expected, these areas contained no birds.

Along the Colorado River in the United States, Yuma Clapper Rails are restricted mainly to three National Wildlife Refuges and one Arizona State Wildlife Refuge. These are Havasu Lake NWR, Cibola NWR, Imperial NWR, and Mittry Lake ASWR (fig. 1).

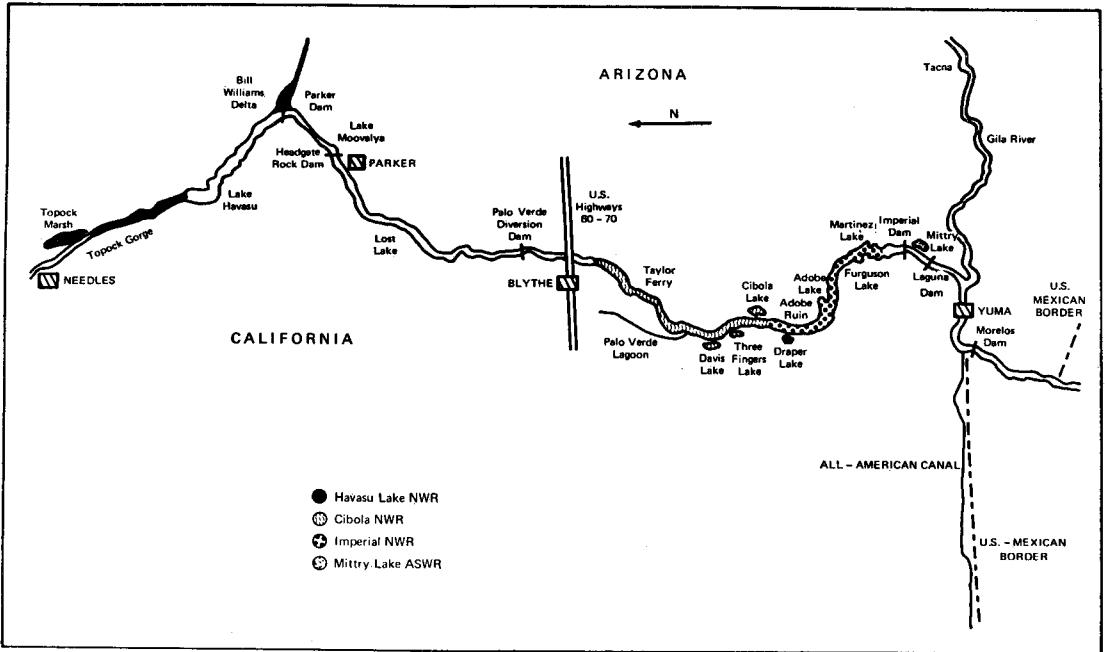


FIGURE 1. Lower Colorado River from Needles, California, south to the border.

Much of the suitable habitat is found in small lakes that are now disconnected from the river. The main locations where marsh habitat is important in the river itself are in Topock Gorge (Havasu Lake NWR) and in Imperial NWR. These areas appear to be particularly important since they contain large stands of cattail and tules.

In addition to the areas along the Colorado River in the United States, Clapper Rails (presumably all *yumanensis*) were discovered at the following locations during the summers of 1969 and 1970: the Salton Sea in California; two small marsh areas adjacent to the Salt River near Phoenix, Arizona; two marsh areas along the Gila River near Tacna and Antelope Hill, Arizona; and the Colorado River Delta near Riito, Sonora, México.

As reported by Moffitt (1932), populations of Yuma Clapper Rails at the Salton Sea in 1969 appeared to be confined to the extreme southern end, where cattail-tule marshes were not limited by a high salt content of the water. The areas near Phoenix and Tacna contained a few small stands of cattails and tules. It seems likely that Yuma clappers would become well established along the Gila and Salt rivers in that part of Arizona if the proper marsh habitat were available. However, present water management practices do not permit more than a handful of such marsh areas within those drainages, and thus severely limit opportunities for clappers there.

In fact, new reclamation projects threaten the existing habitat. The Colorado River Delta in México appeared to support fairly high densities of clappers during the spring months of 1969 and 1970. However, in October 1970, the delta marsh habitat was dry. We assume that this is a temporary annual occurrence, which limits the residence of clappers in the delta to the spring and summer seasons.

In an effort to locate possible wintering areas for the race *yumanensis*, the authors visited coastal swamps along the Gulf of California in Sonora, México, during 1970 and 1971. Populations of Sonora Clapper Rails were located in five separate mangrove (*Avicennia* sp. and *Rhizophora* sp.) swamps north of Guaymas. All of these areas are farther north than any locations heretofore reported for *R. l. rhizophorae*. The areas are listed below in order from north to south:

1. Punta Sargento (29°20' N, 112°18' W)
2. Punta Arenas (29°12' N, 112°13' W)
3. Unnamed marsh about 0.5 mile N of a semipermanent Seri Indian encampment (29°02' N, 112°10' W)
4. Punta Santa Rosa, about 5 miles N of Kino Bay (28°58' N, 112°10' W)
5. Kino Estuary immediately S of Kino Bay, Sonora (28°49' N, 111°55' W)

The Punta Sargento swamp marks the northernmost distribution of mangroves on the west

coast of mainland México. Coastal swamps to the north do not consist of mangrove trees, and to our knowledge, do not contain Clapper Rails.

One or more of the coastal mangrove swamps were visited during February, March, April, July, August, October, and December 1970, and in January and February 1971. Using the taped "clatter" and "kek-burr" calls of Clapper Rails, responses were elicited during each trip. Since birds were present during all seasons of the year, it is probable that at least some individuals are year-round residents of these areas. Indirect evidence of breeding was obtained when a young bird, approximately half-grown, was observed with an adult at Site No. 4 on 1 August.

Six Clapper Rail specimens were collected from the five marshes on 31 July and 1 August 1970. They were prepared as study skins and are now stored in the ornithological collection of the University of Arizona. They have been identified recently as *R. l. rhizophorae* at the U.S. National Museum (Banks and Tomlinson, unpubl. data).

The saltwater swamps where the Sonora Clapper Rails were found are characterized by an overstory of mangrove trees with an understory of glasswort (*Salicornia* spp.), in conjunction with iceplant (*Mesembryanthemum* sp.) and saltgrass (*Distichlis* sp.) on the drier sites. The marsh areas vary in size from about 2 hectares to several kilometers square. Tidal actions in the Gulf of California affect all of the marsh areas, alternately exposing and covering mud flats where the birds were observed to feed. The relative degree of tidal action influences the depth of the water at high and low tides in the estuaries. The swamps generally consist of narrow, unvegetated channels or "guts," which surround and dissect "islands" containing the plant cover. The "islands" are of such a low elevation that incoming tides sometimes cover them to a depth of 10–20 cm. The largest marsh, Kino Estuary, contains fewer channels and consists more of a continuous, shallow-water, mangrove swamp along the entire edge of the estuary.

DISCUSSION

Although accurate indexes to breeding population numbers of the Yuma Clapper Rail were not obtained, the major concentration areas were located during our investigations. Generally, the areas containing the most cattail-tule habitat also contained the largest numbers of birds. An exception was the large

population in the Colorado River Delta, where cattails and bulrush were scarce because of the salinity of the water. The areas of highest concentrations of Yuma Clapper Rails in the United States (from north to south) were as follows: Upper Topock Marsh, Lower Topock Marsh, Topock Gorge from Devil's Elbow to 0.5-mile below Castle Rock (all in Havasu NWR); Davis Lake, Three-Fingers Lake, and Cibola Lake (all within Cibola NWR); Fence Lake and the extensive marsh areas immediately north of Imperial Dam; and the marshes at the north end of Mitty Lake, south of Imperial Dam.

The Colorado River Delta in México appears to support fairly high densities of clappers during the breeding season. A more recent study (Banks and Tomlinson, unpubl. data) has confirmed that these birds are *R. l. yumanensis* as suggested in the past by Bent (1926) and van Rossem (1929). However, there are some important habitat differences. The water in the delta is salty, and the growths of cattails and tules appear to be limited to small, fresh or brackish sloughs. The vegetation is characterized by an overstory of saltcedar (*Tamarix* sp.) and an understory of iodine-bush (*Allenrolfia occidentalis*). Although the plant species are different, this estuarine habitat approximates that for *R. l. rhizophorae* and other western clapper subspecies and differs substantially from the normal Yuma clapper habitat along the Colorado River.

As indicated previously, winter habitat of the Yuma Clapper Rail is unknown. Phillips et al. (1964) speculated that the Yuma subspecies might be migratory since no sight records of the birds had been made along the Colorado River between October and May. Our records tend to substantiate this theory. During the winters of 1969–70 and 1970–71, use of taped calls along the Colorado River in the United States failed to locate a single Clapper Rail, although clappers along the coast of Sonora, México, readily answered the same calls during all winter months. On 18 September 1970, a few responses to taped calls and the sighting of a Clapper Rail in Topock Marsh verified a reduced population at that time. By 6 October, no responses from clappers could be obtained in prime habitat along the Colorado River. At the same time that clappers failed to respond along the Colorado River during the winters of both years, Soras and Virginia Rails (known winter residents) were stimulated to call by tapes of both their own and clapper calls. It is therefore con-

cluded that Yuma Clapper Rails probably were not present north of the border during the winter. Present evidence indicates that most or all Yuma clappers migrate from their U.S. habitat in September and return to breed during the last week in April. Possibly the birds winter along the coasts of Sonora and Baja California. If so, *yumanensis* and *rhizophorae* may occupy the same habitat during the winter months. Further study is being given to this aspect of the life history of Clapper Rails.

There is evidence that reclamation projects along the Colorado River have both created and destroyed marsh habitat (Tomlinson 1969). Dam construction may have generally increased the habitat by creating marshes, and therefore the distribution of *yumanensis*. Indeed, birds of this race might now be at the farthest northward extension of their historical range. In contrast, reclamation projects have been and are currently eliminating marsh habitat along the Colorado and Gila rivers. For example, since the 1969 survey, both Three-Fingers and Davis lakes, which contained dense populations of clappers, have been dried up and are no longer maintained. Beginning in 1963, a large area near Yuma, which was at one time called California Swamp, has also been eliminated through channelization. Other reclamation projects are scheduled that will eliminate still more marsh habitat. These changes must be followed to ensure that Yuma Clapper Rails are not extirpated.

An annual or periodic index to the abundance of Yuma Clapper Rails will be important in view of the constant change in the rivers through these reclamation projects. We feel that the taped-call technique could be used for obtaining such an index. However, it would probably be too costly and otherwise impractical to maintain. Since cattails and tules are so important as habitat for Yuma Clapper Rails, we believe that estimates of clapper population size can be determined better from inspection of aerial photographs taken periodically by land-use agencies. Prior research could determine an average density figure for the specific habitat types and sizes. These figures could then be applied to total marsh acreage to arrive at a population estimate. Spot checks on the ground would enable game managers to correct for inaccuracies. The resulting information would be used as a base population figure. Thereafter, annual or periodic changes in habitat size could be used to monitor numbers of Yuma clappers.

SUMMARY

During 1969 and 1970, surveys of the endangered Yuma Clapper Rail were conducted using taped calls to elicit responses from the birds. During the two summers, more than 158 Yuma clappers were located in cattail-tule marshes along the Colorado River south of Needles, California, to the International Boundary, a distance of about 240 miles. Clappers (probably of the same race) were also found in estuarian marshes of the Colorado River Delta of México; in the Salton Sea; in two freshwater marsh areas near Phoenix, Arizona; and in two freshwater marshes adjacent to the lower Gila River near Tacna, Arizona.

Populations of Sonora Clapper Rails were discovered as permanent residents in five separate mangrove swamps along the west coast of México in the vicinity of Kino Bay, Sonora. These observations were farther north than any heretofore reported for the race *R. l. rhizophorae*, and the swamps also represent the extreme northward limit of mangroves in Sonora.

During the winter, Yuma clappers did not respond to taped calls north of the International Boundary, whereas clappers along the coast of Sonora readily answered the calls during the same period of time. We conclude that most Yuma Clapper Rails migrate from their summer habitat along the Colorado River in September and do not return to the breeding areas until late April.

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