

DISTRIBUTION AND DENSITY OF BLACK RAIL POPULATIONS ALONG THE LOWER COLORADO RIVER

CHARLES F. REPKING

AND

ROBERT D. OHMART

Black Rail (*Laterallus jamaicensis*) populations appear to be declining in the west because of habitat destruction (Wilbur 1974). The discovery of an inland population near Yuma, Arizona was, therefore, of great interest. Black Rails were first verified by Snider (1969) in California near Imperial Dam and later were seen by R. L. Todd (pers. comm.) and by R. E. Tomlinson (1970, 1971), who reported a "small population" at Mittry Lake, Arizona, also near Imperial Dam. Previously the species was listed in Arizona as hypothetical (Phillips et al. 1964). Interested persons had gotten responses to taped recordings, but little was known about the biology of the species on the lower Colorado River.

We present data on numbers and distribution of Black Rails from an intensive survey in 1973-74 along the lower Colorado River from Davis Dam south to the Mexican border. Our study of the habitats used by Black Rails is in progress.

STUDY AREA AND METHODS

Following a spring 1973 reconnaissance of the Colorado River from Davis Dam S to the International Boundary and discovering no birds north of Imperial Wildlife Refuge, we selected a primary study area consisting of a 30-km section of river banks, marshes, and backwaters bordered on the south by Laguna Dam (18 km NE of Yuma, Arizona) and on the north by Clear Lake, about 48 km N of Yuma, Arizona (Fig. 1). Approximately 2,060 ha of marsh and marsh-related habitats are in this area, of which 1,732 ha are north and 326 ha are south of Imperial Dam.

Other areas censused included marshes near Yuma Territorial Prison; confluence of the Gila and Colorado Rivers; marshes and backwaters near Poston, Arizona; Blankenship Bend area; and parts of Topock Marsh (322 km of the lower Colorado River).

Rails readily answered tape-recorded calls during the breeding season and were located with such calls (primarily the *kic-kic-keer* and *grr*) on a cassette recorder. Censusing was begun approximately one-half hour before sunrise during the two spring-summer census periods and at sunrise during the winter.

During the summer, we obtained responses at almost any time of day or night; however, they were more frequent and easily obtained during the cooler early morning hours. After 10:00 winds usually exceeded 18 kmph and calling was curtailed. During the winter rails were more responsive between sunrise and early to mid-afternoon.

We censused by walking the periphery of the

marsh areas and stopping every 40 m to play the recordings. The recorder was played at maximum volume for three to five min. Censusing was halted when the wind velocity exceeded approximately 18 kmph. While the tape was playing, the observer moved about 20 m away from the recorder in order to hear responses more clearly. After the tape was stopped, we waited two more minutes for delayed responses. The recorder was then moved about 40 m and the process repeated.

We used a boat for access to backwaters and fast water areas upriver where censusing on foot was not possible. In strong currents the tapes had to be stopped frequently in order to hear responses before drifting out of range.

When a response was heard, the bird's location was plotted on maps or aerial photos. The time of day, type of response, and description of the habitat were also recorded.

RESULTS

The number of individual responses increased in five areas from summer 1973 to summer 1974, decreased in six areas, and remained constant in one (Table 1). During the winter census, the birds did not respond as readily as in the breeding season. For all three census periods, the rails were most numerous in seepage areas below Imperial Dam. In the spring of 1973, densities were 1.14 rails per ha; in 1974, 1.58 rails; and in the winter of 1973-74, 0.73 rails.

The 236 rails that responded during the three census periods were a mean distance of 23 m from a permanent edge such as a road, desert or open water (range 1-92 m). The birds appeared to use the 0-4 m perimeter of the marsh habitat extensively. Individually calling birds were slightly closer together in the spring of 1974 than in the spring of 1973.

DISCUSSION

The Black Rail population on the lower Colorado River fluctuated among areas from summer to summer, but the total for the two years was similar (Table 1). The majority of the birds were within a 6.5 km radius of Imperial Dam; the most preferred habitat was immediately below the dam. Total numbers obtained in the winter months were probably below the true density because the birds did not call as loudly or often. Our data show habitat

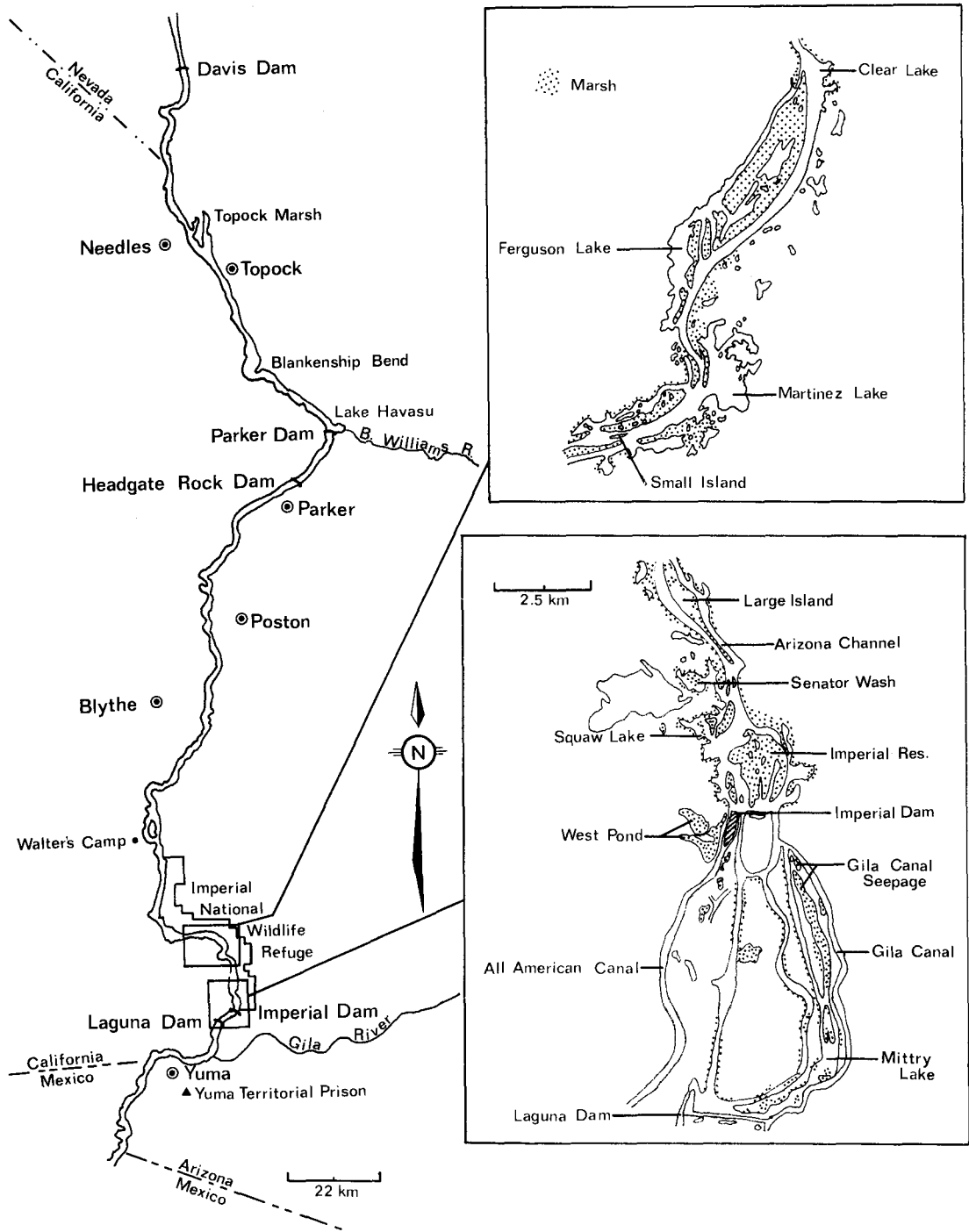


FIGURE 1. Map of the lower Colorado River. Inserts are enlargements of areas containing Black Rails.

occupancy year round which suggests a resident population.

Fluctuation in water level appears to be a critical factor, especially in the spring months (when the males are calling vigorously) and possibly the breeding season. Rail densities in habitats above Imperial Dam may be explained partly by water fluctuations. During

the spring of 1974, water flow was greater than previously at both Parker and Imperial Dams. At Parker Dam, water flow increased 1,220 cubic feet per second (CFS) in April, 1,568 in May and 2,087 in June. Imperial Dam had increases of 844 CFS in April, 895 in May and 1,672 in June. The large amount of water impounded behind Imperial Dam,

TABLE 1. Distribution and density of Black Rail populations along the lower Colorado River.

Location	No. of birds recorded		
	Spr-Sum 1973	Winter 1973-74	Spr-Sum 1974
California			
West Pond	16*	11	22
Imperial Reservoir	2	1	1
Squaw Lake	10	4	6
Senator Wash	21	2	10
Small Island	1	0	0
Ferguson Lake	5	0	5
Unnamed areas	5	2	10
TOTAL	60	20	54
Arizona			
Mittry Lake	9*	8	10
Gila Main Gravity Canal seepage	9*	4	12
Imperial Reservoir	14	2	9
Large Island	14	0	3
Imperial National Wildlife Refuge	0	0	8
TOTAL	46	14	42
GRAND TOTAL	106	34	96

* Mean from three surveys.

combined with the extensive amount of shoreline provided by numerous backwaters, yields a stable water level and much potentially suitable habitat for Black Rails. Normal water fluctuations above Imperial Dam are within about 0.1 m, but fluctuations were greater during the spring of 1974 as flows were increased. The small stature (7-8 cm) of the Black Rail, combined with a strong preference for habitats with only moist surfaces or very shallow water, indicate that high water levels would probably drive the birds into less suitable habitats. When water levels were high above Imperial Dam (spring 1974), some birds may have moved farther upriver, as indicated by the increased population in the Imperial National Wildlife Refuge area, or downriver to more stable marsh situations.

Below Parker Dam the habitat is periodically inundated to supply water and power, and water level fluctuations may be >1 m in a 24 hour cycle. This 1.0-1.5 m daily fluctuation appears to discourage use of this habitat by Black Rails. In Topock Marsh (Havasui Wildlife Refuge) water levels are relatively stable but very little habitat is available.

Higher rail densities around Imperial Dam in 1973 may have been related to more insecticide applications in 1973 in the Mittry Lake area than in 1974.

Reynard (1974) reported different calls for

each sex on the East Coast. He noted the *kic-kic-kerr* as being the call of the male, and a cuckoo-like *croo-croo-croo* as that of the female, the latter being rarely heard. Wilbur (1974) speculated that the *kic-kic-kerr* was the call of the male along the Colorado River. We only heard the *croo* call on three separate occasions in the early summer months.

If only males give the *kic-kic-kerr* call (Reynard 1974), then males were the more vocal of the sexes throughout the year. This would then indicate that our population estimates were based solely on male responses, yielding minimum population estimates. However, definite information on breeding is lacking for the Colorado River population. The paucity of *croo* calls recorded during the study does not yet warrant enlarging the population estimate.

We found Black Rails in close association with three-square bulrush (*Scirpus olneyii*), which in pure or mixed stands occupies about 150 ha in our study area. Three-square bulrush is most dense (stems/m²) in shallow water or saturated soil moisture situations on gentle slopes. The area below Imperial Dam provides shallow marshes which support the highest densities of three-square bulrush and Black Rails. Habitat supporting the highest Black Rail densities was found around West Pond, the edges of the north end of Mittry Lake, the slough north of Mittry Lake, Senator Wash and Ferguson Lake. The 40 ha of habitat which appear suitable at the farm area of the Imperial National Wildlife Refuge are managed for waterfowl, and timing of controlled water level fluctuations appears to be the primary reason for the absence of Black Rails in this area. We found rails in adjacent habitats in 1974 but not in the waterfowl management block.

Three-square bulrush stands, shallow water depth, gently sloping shorelines, and minimum water fluctuations appear to be necessary components for supporting Black Rail populations along the lower Colorado River.

SUMMARY

Censusing Black Rails through the use of recorded calls proved effective in locating 106 birds in spring-summer 1973 and 96 in the same seasons of 1974 along the lower Colorado River.

Calling occurred earlier in the day during the spring and summer months, ranging from one-half hour before sunrise until approximately 10:00. In winter, responses were frequently heard later in the day. Males were

thought to be the major responders yielding a minimum population estimate. Black Rails were found in the censused areas year round. Annual variations were observed between sites but totals were similar.

Most of the approximately 150 ha of suitable Black Rail habitat is located above Imperial Dam. However, the highest densities of 1.58 rails per ha occurred below the dam, where vegetation is denser, more robust, and occurs in large tracts. These tracts are more heavily matted by fallen vegetation, and rails occur here in colonial-like situations.

Water fluctuations appear to be associated with Black Rail movements and habitat preferences. Habitats above Imperial Dam were intermittently flooded, whereas lateral seepage from impoundments and canals below the dam provided constant soil saturation. The latter produced denser bulrush stands and probably provided the rails and their food source with cooler substrates and ambient temperatures as well as higher relative humidities.

ACKNOWLEDGMENTS

We thank the Arizona Department of Game and Fish for providing living quarters in the study area and for allowing entrance to Mitty Lake Refuge during periods of closure. We also thank the Bureau of Reclamation for supplying aerial photos, and the

refuge personnel of the Imperial National Wildlife Refuge for their cooperation.

We extend special thanks to Richard Todd of the Arizona Department of Game and Fish, who kindly supplied recordings of Black Rails, and Roy E. Tomlinson of the U.S. Fish and Wildlife Service, who provided early field assistance, a boat and motor the first year of the study, and also reviewed the manuscript.

This study was supported by the U.S. Fish and Wildlife Service, grant no. 14-16-0008-724.

LITERATURE CITED

- PHILLIPS, A., J. MARSHALL, AND G. MONSON. 1964. The birds of Arizona. Univ. Ariz. Press, Tucson.
- REYNARD, G. 1974. Some vocalizations of the Black, Yellow and Virginia Rails. *Auk* 91:747-756.
- SNIDER, P. R. 1969. Southwest region. *Audubon Field Notes* 23:681.
- TOMLINSON, R. E. 1970. Preliminary studies—endangered wildlife of southwestern U.S. Unpubl. Annu. Prog. Rep. U.S. Fish Wildl. Serv.
- TOMLINSON, R. E. 1971. Preliminary studies—endangered wildlife of southwestern U.S. Unpubl. Annu. Prog. Rep. U.S. Fish Wildl. Serv.
- WILBUR, S. R. 1974. The literature of the California Black Rail. U.S. Fish Wildl. Serv. Spec. Sci. Rep. Wildl. No. 179.

U.S. Fish and Wildlife Service, 2930 W. Fairmount, Phoenix, Arizona 85017. Address of second author: Department of Zoology/Center for Environmental Studies, Arizona State University, Tempe, AZ 85281.
Accepted for publication 22 March 1977.