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Effectiveness of Capture Techniques for Rails in Emergent Marsh and Agricultural Wetlands

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Abstract.—A reliable and effective technique for capturing rails would improve researchers' ability to study these secretive marsh birds. The time effectiveness and capture success of four methods for capturing rails in emergent marsh and agricultural wetlands in southern Louisiana and Texas were evaluated during winter and breeding seasons. Methods were hand and net capture from an airboat at night, an all-terrain vehicle (ATV) at night, an ATV during daylight rice harvest and passive capture using drop-door traps with drift fencing. Five hundred and twenty rails were captured (and 21 recaptures): 192 King Rails (*Rallus elegans*), 74 Clapper Rails (*R. longirostris*), 110 Virginia Rails (*R. limicola*), 125 Sora (*Porzana carolina*) and 40 Yellow Rails (*Coturnicops noveboracensis*). Methods used at night were effective at capturing rails: capture from airboats yielded 2.13 rails per hour each airboat was operated and capture from ATVs yielded 1.80 rails per hour each ATV was operated. During daylight, captures from ATVs during rice harvest (0.25 rails per hour each ATV was operated) and passive drop-door traps with drift fencing (0.0054 rails per trap hour) were both inefficient. *Received 5 May 2009, accepted 23 March 2010.*

Key words.—airboat, capture techniques, Clapper Rail, King Rail, Sora, Virginia Rail, Yellow Rail.

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Six species of rail occur in North America: King Rail (*Rallus elegans*), Clapper Rail (*R. longirostris*), Virginia Rail (*R. limicola*), Sora (*Porzana carolina*), Yellow Rail (*Coturnicops noveboracensis*) and Black Rail (*Laterallus jamaicensis*). Many are currently listed as either endangered or threatened throughout the United States and others have shown population declines (Eddleman *et al.* 1988; Conway 1995; Melvin and Gibbs 1996). Little is known about the life history traits of these rails and, for effective conservation, it is important to fill the knowledge gaps. However, one reason for the lack of knowledge is that rails are secretive birds inhabiting dense emergent marshes and rarely fly, making their capture difficult.

Commonly used capture methods include various unbaited traps with drift fences to lead rails into the trap. Trap types include drop-door traps (Roth *et al.* 1972; Zembal and Massey 1983; Conway *et al.* 1993; Flores and Eddleman 1993, 1995; Legare *et al.* 1999), funnel traps (Stewart 1951; Adams and Quay 1958) and cloverleaf traps (Meanley 1969; Kearns *et al.* 1998). Traps with recorded calls, mirrors or prey items have been used (Zembal and Massey 1983; Kearns *et al.* 1998). Also, seizing rails by hand or with dip nets has been an effective capture technique (Adams and Quay 1958; Meanley 1969). Robert and Laporte (1997) captured Yellow Rails with a dip net at night by locating calling rails or by luring them with calls. The use of an airboat and spotlights at night has been used to capture rails by hand or dip net (Blandin 1963; Cummings and Hewitt 1964; Hon *et al.* 1977). Hon *et al.* (1977) captured 2,066 Clapper Rails using airboats and spotlights at night at high tide on the Atlantic Coast.

Few studies have quantified these different techniques for capturing rails (Hon *et al.* 1977; Kearns *et al.* 1998; Legare *et al.* 1999); and no one technique has been determined reliable and effective. The difficulty in observing and capturing rails hampers research and population monitoring efforts. In this study, we evaluated techniques for capturing rails in salt, brackish, and freshwater marsh and agricultural wetlands in Louisiana and Texas. Although capture of King Rails was our primary focus, we attempted to capture all rails present: King Rails, Clapper

Rails, Yellow Rails, Virginia Rails, Sora and Black Rails (Sibley 2003).

METHODS

Capture techniques were used in public wildlife refuges and on private lands in coastal Texas and southern and central Louisiana. Study sites in Texas included McFaddin National Wildlife Refuge (NWR) and Anahuac NWR. In Louisiana, study sites included Rockefeller Wildlife Refuge, Marsh Island Wildlife Refuge, Sherburne Wildlife Management Area (WMA), Cameron Prairie NWR, Grand Cote NWR, Sweet Lake Land and Oil, Inc. and privately owned rice farms in Jefferson Davis Parish.

Rockefeller Wildlife Refuge, Marsh Island Wildlife Refuge and McFaddin NWR are coastal sites which provide a range of habitats, including freshwater, intermediate and brackish marsh (Louisiana Department of Wildlife and Fisheries 2005a, 2005b; U.S. Fish and Wildlife Service 2007c). Capture techniques were implemented at these three locations primarily in *Spartina patens* marsh. These coastal study sites are influenced by tides; however, tidal amplitude along this region of the Gulf Coast is low (Nyman *et al.* 2009) and did not affect the capture techniques used.

Anahuac NWR is 138 km^2. Capture areas included the moist soil units and rice fields that comprise approximately 10% of the refuge area (Western Hemisphere Shorebird Reserve Network 2006). Study sites at Sherburne WMA consisted of a three km^2 moist soil unit at the north farm and a one km^2 moist soil unit at the south farm (S. Soileau, Louisiana Department of Wildlife and Fisheries, pers. comm.). Also, rails were captured at Cameron Prairie NWR, which consists of 39 km^2 of freshwater marsh and moist soil units (U.S. Fish and Wildlife Service 2007a), and Grand Cote NWR, which has a variety of habitat types including three km^2 of moist soil and eight km^2 of croplands (U.S. Fish and Wildlife Service 2007b). Capture techniques were also implemented on privately owned rice fields in Jefferson Davis Parish in southwestern Louisiana.

We implemented four techniques to capture rails: (1) capture by hand or net from an airboat at night, (2) capture by hand or net from an All Terrain Vehicle (ATV) at night, (3) capture by hand or net from an ATV during daylight rice harvests, and (4) drop-door traps with drift fencing. Most capture efforts were implemented from 24 September 2004 until 8 April 2005, and from 17 October 2005 until 23 March 2006. We also captured resident King and Clapper Rails during 14-24 May 2005 and 11-12 July 2006.

The technique of capturing rails from an airboat at night was implemented approximately 0.5 hour after sunset. For safety reasons, more than one airboat was used whenever possible. Each airboat had a driver and one or more rail catchers, and was equipped with spotlights to navigate the marsh and locate rails. To capture rails, airboats traveled at approximately 16 km/h through the marsh, and rails were either flushed from the vegetation or were seen running. If flushed, the rails were kept in the spotlight and followed. Rails running near the airboat were captured by hand or with a dip net by a catcher positioned in the bow. The catcher either leaned over the side or stepped out of the boat and chased the rail. Once a rail was captured in the dip net, the catcher immediately grasped the rail by hand to keep it from escaping. The nylon dip nets used in this study had 65 cm long handles, which extended to 105 cm; the net portion was 43 × 42 cm and 65 cm deep, with a mesh diameter of 2.5 cm. The capture rate for this technique was determined by dividing the total number of rails captured using this technique by the number of hours each airboat was operated.

During the second winter, ATVs were used at night, similar to the use of the airboats, in areas with shallow water and stable substrates, such as rice fields and moist soil units. We implemented this technique approximately 0.5 hour after sunset and each ATV had a driver and a catcher equipped with spotlights attached to a marine deep cycle battery. The ATV was driven slowly, in first gear, through the moist soil units or fallow and harvested rice fields, with the catcher sitting sideways on the back of the ATV. Rails detected with the spotlight were kept on the same side of the ATV as the catcher and captured by hand or with a dip net.

During daylight harvest of a ratoon (second) rice crop (late October to early November 2004), ATVs were used in a similar manner to capture rails flushed by rice combines. The ATV was driven parallel with the combine in the harvested rice. Rails flushed from the combine were followed with the ATV until they landed in the harvested portion of the field. Rails observed running through the vegetation were captured by hand or with a dip net. The capture rate for both ATV capture techniques was determined by dividing the total number of rails captured using each technique by the number of hours each ATV was operated.

Drop-door traps with drift fencing were used to capture rails during the first winter. Two different trap types were used to capture rails of different sizes but because the King Rail was our focal species, large traps were used most often. The large traps (22.9 cm × 22.9 cm × 61 cm with 2.5-cm mesh) had double drop-doors with a release pedal in the center of the trap. Initially, some traps were covered with 0.64-cm mesh chicken wire to prevent rails from injuring themselves when sticking their bills and heads through the trap mesh. Because rails continued to injure their bills and faces, the chicken wire was subsequently removed. Also, we used single drop-door traps (17.8 cm × 17.8 cm × 48.2 cm with 2.5-cm mesh) with a release pedal in the center of the trap. Drift fences were placed in a V-shape extending from one m to 16 m from the traps, often ending in openings (open water, roads or mowed grass). Drift fences were made from 61-cm high plastic garden fencing with 2.5-cm mesh, attached to 91-cm high wooden stakes placed every 2.5 m along the fence. Occasionally, drift fences extending in a V-shape were placed at the back of the trap as well. Traps were opened at or just before sunrise and checked every three - four hours until sunset. Three to twelve traps were opened for two - six days then moved to a new location. The capture rate for this technique was determined by dividing the total number of rails captured using this technique by the number of hours that each trap was open.

Captured rails were banded, weighed and measurements of wing, tail, tarsus and exposed culmen were taken. King and Clapper Rails were identified in the field based on coloration, size and habitat where captured; rails >400 g or captured in freshwater marsh were considered King Rails (Eddleman and Conway 1998), whereas those captured in tidal salt marsh were considered Clapper Rails. At each capture site we recorded wa-

ter depth and salinity using a YSI model 63 pH and conductivity instrument (Yellow Springs Instrument Co., Yellow Springs, OH). All trapping and handling methods conformed to the Louisiana State University Animal Care and Use Committee policies under protocol AE04-07.

RESULTS

We captured 520 new rails and 21 recaptured rails. The new rail captures consisted of 184 King Rails, 68 Clapper Rails, 107 Virginia Rails, 123 Soras and 38 Yellow Rails. The recaptured rails consisted of eight King Rails, six Clapper Rails, three Virginia Rails, two Soras and two Yellow Rails.

Using airboats at night yielded a capture rate of 2.13 rails per hour of airboat operation and resulted in 432 rail captures (Table 1). Using ATVs at night yielded 1.80 rails per hour of ATV operation, yielding 87 rails (Table 1). Using ATVs during rice harvest resulted in the capture of only three rails and yielded a capture rate of 0.25 rails per hour of ATV operation. Using drop-door traps with drift fencing resulted in the capture of 18 rails and a capture rate of 0.0054 rails per hour that each trap was open (Table 1).

Mean water depth at capture locations for the different species was: King Rails 10.2 ± 8.6 cm, Soras 10.0 ± 10.0 cm, Virginia Rails 9.8 ± 9.1 cm, Clapper Rails 5.6 ± 6.8 cm and Yellow Rails 4.5 ± 4.8 cm. The average water depth at capture locations for all rails was 8.0 cm with a maximum depth of 45.7 cm, but these results were influenced by birds moving before capture. Salinity at the capture sites ranged from 0 to 29.2 ppt.

DISCUSSION

The results indicate that large numbers of rails can be captured efficiently using airboats at night in coastal marshes, freshwater impoundments, flooded rice fields and moist soil units. In Georgia, Hon *et al.* (1977) found using an airboat at night to be an effective capture technique for rails, capturing an average of 16 rails per hour. Our preferred method was to have a skilled airboat driver and two catchers on the airboat, each equipped with spotlights. The catchers captured the rails over the side of the bow. The presence of open water or short or downed vegetation was important for spotting rails since they tended to run through the vegetation instead of flushing when disturbed. We used a variety of airboats but all were light, powerful and easily maneuvered through dense emergent marsh vegetation. Rail capture using airboats was done at night because rails were disoriented and slower moving, making them easy to capture. A preliminary study showed the technique to be ineffective during daytime because the rails moved quickly and were able to find cover.

The use of an ATV and spotlights at night was found to be an effective technique for capturing rails in moist soil units and flooded rice fields. The technique was most successful when used in areas where the topography was flat and soils were sufficiently stable for the ATV to be driven easily. The presence of open water or short or downed vegetation was also important for spotting running rails using this technique.

Table 1. Rail capture effort and number of rail captures in Louisiana and Texas using an airboat at night, an ATV at night and during daylight rice harvest and drop-door traps with drift fencing. Parenthesis indicates the number of recaptured rails.

Time	Technique	Season[1]	Hours	King Rail	Clapper Rail	Virginia Rail	Sora	Yellow Rail
Night	Airboat	Winter	164	139(7)	32(3)	71(1)	82(2)	23
		Summer	39	32	33(3)	0	3	0(1)
	ATV	Winter	49	0	0	35(2)	36	14(1)
Daylight	Trap	Winter	3312	13(1)	3	0	1	0
	ATV	Harvest	12	0	0	1	1	1

[1]Capture seasons: winter, 24 Sep 2004-28 Mar 2005 and 17 Oct 2005-23 Mar 2006; summer, 7 Apr 2005-24 May 2005 and 11 and 12 Jul 2006; harvest, 28 Oct-8 Nov 2004.

Using ATVs during diurnal rice harvest resulted in a low capture rate. Numerous rails were flushed from the combines during harvest, but flushed rails often landed in inaccessible areas, such as other rice fields or nearby ditches. Also, rails were fast moving and found refuge quickly.

Passive drop-door traps captured 18 of the 541 total rails caught during this study. Previous studies also suggest low capture rates using traps (Zembal and Massey 1983; Conway *et al.* 1993; Flores and Eddleman 1993, 1995; Legare *et al.* 1999). As these studies did not document trapping effort, we cannot directly compare their results to our study. Also, their efforts were directed at rare or endangered rails, thus trapping may have been implemented in areas of low rail density. A factor that may explain our poor capture rate using drop-door traps is trap placement. Often, traps were placed along road and canal sides because these areas were easily accessible. However, it may have been better to place traps in the marsh interior, in small paths or in creeks, as in Zembal and Massey (1983). Twelve of 18 rails captured with passive trapping were caught during September, October and May; suggesting that time of year may influence capture rates. In addition to low capture rates, eleven of the 18 rails captured in traps were released with injuries, which included bleeding scrapes on the head and chin.

Comparing the effectiveness of the capture techniques used in this study is difficult, in part, because drop-door traps with drift fencing is a passive technique while airboats and ATVs are active techniques. Also, these different techniques require capture sites with distinct characteristics. The use of an airboat at night captured the most rails with the least amount of time expended. However, this technique requires an airboat and driver, plus, the habitat must also be suitable for an airboat to operate. Airboats can create noise problems near private residences, particularly when used at night. Costs of operation are likely to be higher than the other techniques and include fuel for the airboat and maintenance.

Use of an ATV at night also captured many rails without a large time expenditure. The cost of an ATV is less than an airboat and it does not require as much training for operation. ATVs require less fuel than airboats and maintenance costs are likely to be lower. However, the technique can only be used in areas with shallow water and sturdy soils, and areas with obstructions or submerged ditches would be too dangerous to allow use of an ATV.

Drop-door traps with drift fencing caught few rails and required a larger time commitment. Since this technique is passive, man-hours were not required for all hours of operation. However, trap placement required considerable effort; positioning the drift fencing so that it was flush to the ground often took more than one hour per trap. Also, since the traps were open from sunrise to sunset and checked three - four times per day for months at a time, the man-hour commitment was significant. Costs for this technique are likely to be lower, including drop-door traps, fencing and stakes. In spite of limited success, passive trapping may be a viable technique in areas inaccessible to airboats or ATVs.

Many birds nest in the emergent marsh habitat and the use of these techniques should be minimized during the nesting period. Caution is also advised during winter, as waterfowl may use capture sites as refugia from hunting and the impact on waterfowl of driving an airboat through these refuges at night is unknown. Safety precautions should be taken before implementing any of these rail capture techniques. Sites should be visited during daylight hours to identify hazards such as ditches, logs, posts or other obstructions. Sites with less than ~15 cm of standing water and clay or other non-muck soils are recommended for ATVs. Whenever possible, two or more airboats should be used in case one breaks down or becomes stuck.

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