A Comparison of Trapping Techniques for Montezuma Quail

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Abstract

*Montezuma quail (*Cyrtonyx montezumae*) are one of the least understood upland game birds in North America. The lack of ecological studies on Montezuma quail may be attributed to the inability of researchers to capture the secretive bird. We evaluated techniques that are commonly used for capturing other upland game of North America including funnel traps, trained dogs and hand-nets, audio calls, portable mist nets, and night-netting in the Chihuahuan Desert of Texas, USA, 2000–2001. The modified mist net was the most successful technique employed for capturing nonradiotagged Montezuma quail; however, its application may be limited to grassland and savannah communities. Researchers attempting to capture Montezuma quail should employ a variety of capture techniques and then bolster sample sizes using night-netting.* (WILDLIFE SOCIETY BULLETIN 34(4):1212–1215; 2006)

Key words

Chihuahuan Desert, Cyrtonyx montezumae*, funnel traps, hand-nets, Montezuma quail, Texas, trained dogs, trap success.*

Montezuma quail (*Cyrtonyx montezumae*) are secretive birds that occur in the upper elevations of the Chihuahuan and Sonoran desert regions of Texas, New Mexico, and Arizona, USA; and Mexico (Harveson et al. 2007). Although their life history has been documented (Stromberg 2000, Harveson et al. 2007), most accounts have been based on anecdotal observations (Fuertes 1903) or harvested samples (Leopold and McCabe 1957). In fact, only Stromberg (1990) collected data from Montezuma quail using contemporary techniques (i.e., radiotelemetry, mark–recapture techniques). The lack of information on Montezuma quail may be attributed to several factors including their secretive nature, the inaccessibility of their primary habitats (e.g., steep slopes and high elevations), and researchers' inability to capture Montezuma quail.

Questions regarding the life history of Montezuma quail, including covey dynamics, movements, mating system, nesting ecology, and survival rates are best evaluated by capturing and monitoring live birds. Montezuma quail have been captured by hand (Leopold and McCabe 1957, Stromberg 1990) using funnel traps (Stromberg 1990), and using hand-nets and trained dogs (Brown 1976). Aside from these accounts, little information exists on the successes or failures of capturing Montezuma quail. We provide information on various trapping techniques we evaluated for capturing Montezuma quail in the Chihuahuan Desert of Texas.

Study Area

The Trans-Pecos ecoregion is located within the Chihuahuan Desert Biotic Province and is approximately 7.3 million ha (Hatch et al. 1990). Mountains are scattered throughout the Trans-Pecos with elevations ranging between 762–2,667 m. In general, mountain ranges received more precipitation (30–46 cm/yr), primarily in the form of monsoonal rains, than the lowlands and basins (20–30 cm/yr). Average annual rainfall was approximately 33 cm with peak rainfall occurring during July–August (Harveson 2007). Soils in the region varied with deep sands occurring along desert washes, gravel mulch in desert lowlands, and shallow rocky soils on slopes and mountains. We attempted to capture Montezuma quail from 2 study sites in the Chihuahuan Desert of Texas: Sul Ross State University Ranch and Elephant Mountain Wildlife Management Area (WMA). Sul Ross State University Ranch was 2.5 km^2 and located in Alpine, Texas in northwestern Brewster County, and Elephant Mountain WMA was located 41.8 km south of Alpine on State Highway 118 and encompassed approximately 93.1 km^2. Chihuahuan desert scrub dominated the lower elevations with typical vegetation consisting of creosote bush (*Larrea tridentata*), *Acacia* spp., *Yucca* spp., and various grasses. Desert grasslands and savannahs occurred at higher elevations and were dominated by juniper (*Juniperus* spp.), pine (*Pinus* spp.), oak (*Quercus* spp.), and various grasses.

Methods

During field reconnaissance we scouted areas for Montezuma quail as verified by repeated sightings, locating characteristic diggings (Harveson et al. 2007), and by auditory calls. Trapping took place under scientific permit SPR-0592-525 issued by the Texas Parks and Wildlife Department using protocols approved by the Animal Use and Care Committee, Sul Ross State University.

Funnel Traps, Modified Funnel Traps, and Feed Stations

From 15 May through 31 August 2000, we placed 15 standard funnel traps (Smith et al. 1981) that measured 73 × 64 × 30 cm in areas of known use. We baited traps with

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chicken scratch or milo and checked them twice daily. From 1 May through 31 August 2001, we modified the funnel traps by including large (73 × 64 × 30 cm) external funnels and drift fences (30 × 200 cm) leading to the funnel traps. Additionally, we established 10 permanent feeding stations in areas used by Montezuma quail. We constructed the external funnels and drift fences of chicken wire and 1.3-cm steel bars. Similarly, we checked traps twice daily and moved them every 2–3 weeks to areas where fresh sign had been located.

Dog and Hand-Nets

We made attempts to capture Montezuma quail using trained hunting dogs and hand-nets as described by Brown (1976). During morning or evening hours, researchers followed behind the trained dogs until they held on point. Once a dog was on point, researchers walked slowly to the dog's location, scanned for Montezuma quail, and then slowly placed a hand-net over the quail or in their path of flight. In December 2000 and January 2001, we implemented this method using 2 researchers and 1 dog, and in August 2001 we used 2 observers and 2 dogs.

Audio Call-Backs

Audio call-backs have been used to successfully determine the presence of secretive birds (Johnson et al. 1981) and lure birds into traps (Nesbitt et al. 1982). We used a Montezuma quail assembly call (Stromberg 2000; both by whistling and recorded from captured birds to an audio tape) to try to lure Montezuma quail to traps and hand-nets. While scouting the area, we mimicked the Montezuma quail assembly call. We also chose strategic locations near traps and played a recorded assembly call in attempts to capture Montezuma quail.

Portable Mist Nets

Mist nets are an effective method for capturing a variety of small passerines and have been used successfully while driving several gallinaceous species (Schemnitz 1996). However, mist nets have not been used for Montezuma quail. We modified a 12 × 3-m mist net and affixed 2 small (2.5 × 300-cm) plastic poles to the ends to make the mist net more flexible and mobile. Once we visually located Montezuma quail, we stretched the portable mist net between 2 observers and slowly placed it over the quail.

Night-Netting

Various researchers have used the night-netting technique as described by Labisky (1959, 1968) for capturing gallinaceous birds. Typically, night-netting is conducted in conjunction with radiotelemetry. In general, researchers locate a radiotagged bird that has coveyed with other quail. The researchers home in on the transmitter, hold a spotlight on the covey, and slowly maneuver a net over the covey. We implemented this technique when birds were radiotagged.

Results

Funnel Traps, Modified Funnel Traps, and Feed Stations

We logged 10,605 trap-nights using standard funnel traps and 3,780 trap-nights using funnel traps with external funnels and drift fences but caught no Montezuma quail. We did capture a variety of nontarget species that were subsequently released, including scaled quail (*Callipepla squamata*) and passerines.

Dog and Hand-Nets

Collectively, we spent 61 dog-hours and 82 man-hours in the field searching for Montezuma quail, resulting in the capture of one adult male on 26 January 2000. We encountered an additional 2 coveys, averaging 3–5 birds/covey. Encounter rate was approximately 1 covey/2–3 hours. We did not observe Montezuma quail prior to flushing them.

Audio Call-Backs

We were frequently successful in eliciting responses to our mimicking of a Montezuma quail assembly call but not to the play-back audio tape. However, rarely were we able to observe the birds approach our position. On one occasion a male Montezuma quail approached within 20 m of our location in response to our mimicking. On another occasion, mimicking an assembly call resulted in a female Montezuma quail flying approximately 100 m to within 30 m of our location and then walking another 10 m in our direction. We captured neither bird.

Portable Mist Nets

We captured 5 Montezuma quail (2 juv F, 2 ad F, 1 ad M) using portable mist nets. On 22 January 2001, we observed a covey of 9 Montezuma quail in open habitat. A group of 4 researchers caught 2 Montezuma quail by laying the mist net over the quail prior to flushing. Two other birds were captured as they flew into the mist net. Researchers caught an additional bird by hand after it flew up and barely missed the net. One bird from the covey died after flying into a building and 3 escaped capture. Total effort used for the portable mist-net technique was 6 man-hours.

Night-Netting

We captured an additional 3 Montezuma quail while night-netting. On the evening of 26 January 2001, we homed in on 2 radiotagged birds and night-netted the remainder of their covey (2 ad M, 1 juv F). Total effort used for the night-netting technique was 6 man-hours.

Discussion

We were unable to capture Montezuma quail using funnel traps despite seeing Montezuma quail in the immediate region, prebaiting, and using modifications (i.e., funnels, drift fences). Unlike other quail species, Montezuma quail are foraging specialists and almost exclusively consume subterranean plants (Stromberg 2000). Despite this, Stromberg (1990) was successful in using funnel traps for Montezuma quail but reported a low capture success (0.008–0.012 birds/trap-day). Although Montezuma quail have been known to frequent bait sites (Stromberg 1990; Davis Mountains State Park, unpublished data [Fort Davis, Tex.]), it appears to take a considerable amount of time for the birds to be accustomed to baiting. The high availability

of natural forage (e.g., *Oxalis* spp.) in our study (Hernandez 2004) likely minimized trap success. If natural forage was less abundant, Montezuma quail may have been more prone to capture using funnel traps.

Brown (1976) was the first to describe the use of dogs in surveying for or capturing Montezuma quail. Since that publication, several others have implemented modifications to that technique for determining distribution (Holdermann 1992) and abundance (Bristow and Ockenfels 2000) of Montezuma quail. The use of trained bird dogs appears to have promise for not only surveying Montezuma quail but for capturing them. When we employed dogs to trap Montezuma quail, only 2 researchers accompanied dogs. Since our encounter rate was relatively high (1 covey/2–3 hr), we believe that having an additional 2–3 people with large hand-nets would have increased our likelihood of spotting quail prior to flushing and increased capture success. However, because their habitats are very dry, researchers should survey for Montezuma quail during wetter times. Specifically, scenting conditions for locating Montezuma quail with trained dogs will be better in early mornings and during the monsoonal season when there is more dew on the ground.

Audio call-back techniques have been successful in luring, capturing, and surveying a variety of birds (Johnson et al. 1981). However, few studies have documented their use on gallinaceous birds. Although we repeatedly were able to elicit response to our whistling or audio call-backs, we had little success luring Montezuma quail to our location. Because Montezuma quail are not very vocal and are not known to establish territories, they are not likely to be lured to traps using these techniques. However, auditory call-backs may be suitable for presence–absence surveys for Montezuma quail (Sorola 1986).

The modified mist net was the most successful technique we employed for capturing nonradiotagged Montezuma quail. However, the modified mist net is restricted to open vegetation (e.g., desert grasslands and savannahs) and Montezuma quail have to be located prior to netting. Once located, the mist net is used as a seine, where 2 researchers hold the ends of the open net and walk around the target quail. If the quail do not flush, the observers can easily lower the net on the Montezuma quail. This technique also could be applied by researchers working with dogs or walking for quail. Loos and Rohwer (2002) described a long-handled net for capturing nesting waterfowl in open grasslands. Their technique was similar to the modified mist-net employed in this study. However, their design may be better than the one we used because it allows for capturing birds at longer distances. Additionally, the long-handled net could be used while working with dogs.

Historically, the use of night-netting has been used primarily to supplement other capture methods (e.g., funnel traps). In our study night-netting was very successful and had the lowest effort:capture ratio. However, night-netting is only successful when $\geq$1 bird in the covey is already radiotagged. One problem with night-netting is that once birds are captured and radiotagged, they are either released at night or have to be kept overnight and released in the morning. Birds that are released at night may experience high predation, whereas birds that are kept overnight and released in the morning may be subject to greater stress. Despite these short-comings, night-netting is a successful method for capturing or recapturing radiotagged Montezuma quail.

Management Implications

Montezuma quail are difficult to capture because of their unique life history (foraging habits, defense mechanisms, and limited distribution). The scarcity of literature on Montezuma quail may be attributed to the inability of researchers to capture Montezuma quail. Based on our efforts to capture Montezuma quail, researchers should be adaptable in their implementation of capture techniques and not limit themselves to only one technique. Specifically, researchers should use play-back audio tapes to determine the presence of Montezuma quail; work trained dogs to identify key Montezuma quail habitat; capture Montezuma quail using a combination of trained dogs, modified mist nets, or hand-nets; and use night-netting to bolster sample size once a representative member of a covey is radiotagged.

Acknowledgments

We thank Texas Parks and Wildlife Department, Houston Live Stock Show and Rodeo, San Antonio Livestock Expo, United States Department of Agriculture, and the Coypu Foundation for providing financial support. We are also grateful for the volunteers who assisted with this project. We thank J. M Mueller and R. J. Kinucan for reviewing early drafts of this manuscript.

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