

Management in Practice

Eradication of a black-tailed prairie dog (*Cynomys ludovicianus* Ord, 1815) colony in North Central Florida

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Abstract

Non-native black-tailed prairie dogs (*Cynomys ludovicianus* Ord, 1815) that had emigrated from a private colony were reported by property owners in rural North Central Florida in 2006. The Florida Fish and Wildlife Conservation Commission and U.S. Department of Agriculture Animal and Plant Health Inspection Service Wildlife Services (WS) initiated an assessment of the population to determine its current distribution and the feasibility of eradication. Multiple surveys, interviews with residents and observations of abandoned burrows confirmed movement of animals as far as 3 km from the source colony. WS personnel conducted an eradication program of the source colony from 23 March through 4 May 2009, primarily using a 0.17-caliber rifle along with cable restraint devices for particularly wary animals. A total of 85 prairie dogs were killed at the site of the source colony and one animal was killed on a separate property. Subsequent surveys from 2009 through 2012 confirmed the eradication was successful. Communication with the owner of the source colony and nearby residents throughout the project was critical to success.

Key words: prairie dog, rapid assessment, Florida, non-native species, eradication, human dimensions

Introduction

Florida has an extensive inventory of non-native species outside captivity. Over 100 species of non-native freshwater fishes, reptiles, mammals, birds, and amphibians are considered to be permanently established, i.e., consistently reproducing and with virtually no likelihood of extirpation (Hardin et al. 2011). The majority of these established populations resulted from the escape or release of exotic pets, many in the mid- to late-1900s when there was less awareness of the potential impacts of introduced species and little capacity to respond to incipient invasions.

In May 2006, a Florida Fish and Wildlife Conservation Commission (FWC) investigator was contacted by a resident of Bell, Gilchrist

County, Florida regarding black-tailed prairie dogs (*Cynomys ludovicianus* Ord, 1815, hereafter 'prairie dogs') that had moved onto his property. Apparently, these animals emigrated from an 18-ha property with an uncontained private colony that had been present since at least 1996 (Figure 1). The investigator confirmed prairie dogs in a farm field 1 km south of the source colony. In May 2007, a FWC biologist received another report of prairie dogs, approximately 2 km south of the source.

Prairie dogs are native to the American Great Plains from northern Mexico to southern Canada (Hygnstrom and Virchow 2005). This species has been subjected to population control programs because of its potential competition with livestock for available forage (Hyde 1981; Collins et al. 1984; Uresk 1984), alteration of rangeland species



Figure 1. Location of prairie dog (*Cynomys ludovicianus* Ord, 1815) colony and properties with reported prairie dogs in Gilchrist County, Florida.

composition (Whicker and Detling 1988), erosion due to overgrazing (Montana Dept. of Agriculture 2006), and as a potential threat to livestock and horses with riders (Hygnstrom and Virchow 2005).

Traditionally, the FWC attempted to eradicate recently discovered populations of non-native species outside captivity, if practical. Considering the potential for adverse impacts, FWC and the U.S. Department of Agriculture Animal and Plant Health Inspection Service Wildlife Services (WS) initiated an assessment of the distribution and abundance of prairie dogs that would ultimately

indicate a reasonable opportunity to eradicate this introduced population. We describe the interplay between technical challenges and human dimensions in the execution of a successful eradication.

Study area

Prairie dogs were found in Gilchrist County, a rural 907-km² county in North Central Florida (Figure 1). The area is primarily agricultural

with gently rolling topography and well drained sandy soils. Natural vegetation is scrubby flatwoods with slash pine (*Pinus elliottii* Engelm.) being the dominant tree (University of Florida 2006). Prairie dogs were observed in a 650-ha unincorporated area with mixed residential and agricultural use. The source prairie dog colony originated on an 18-ha farm immediately surrounded by a wooded residential area with smaller lots (ca. 0.4 ha) and a grid of unpaved roads. Outside this core area were larger agricultural fields (8 ha to 100 ha) with suitable burrowing substrate and open sight lines favored by prairie dogs together with residential lots generally < 5 ha.

The source colony property has a single-family residence and cross-fenced pasture to contain domestic cattle, miniature horses and goats. Approximately half of the property is heavily grazed pasture while the remaining part is mixed pasture and sparse slash pine. Two native burrowing species occur on the property. Gopher tortoise (*Gopherus polyphemus* Daudin, 1802), a State of Florida Threatened Species (http://myfwc.com/media/1515251/threatened_endangered_species.pdf), is abundant; burrowing owl (*Athene cunicularia* Molina, 1782), a State of Florida Species of Special Concern (http://myfwc.com/media/1515251/threatened_endangered_species.pdf) is present.

Methods

The source colony property and non-wooded residential and agricultural lots within the areas were surveyed from vehicles using binoculars. We interviewed residents as they were encountered regarding their observations or knowledge of prairie dogs in the vicinity. For residential properties in close proximity to reported prairie dogs, we sought access from the residents and, where granted, we walked the properties and conducted visual surveys to detect burrows.

To assess the distribution of prairie dogs within and outside the source property, FWC and WS conducted an initial survey on 23 February 2007 of the area where prairie dogs had been reported. A visual estimate of population size was made 13 November 2007. After receiving additional reports from residents, we surveyed several other properties 15 October 2008. On 20 January 2009, FWC and WS walked the source colony property and recorded GPS coordinates for prairie dog burrows (Figure 2) and for gopher tortoise burrows.



Figure 2. Prairie dog (*Cynomys ludovicianus* Ord, 1815) burrow locations, 20 January 2009.

Several methods are used for controlling prairie dogs including the toxicants zinc phosphide (Knowles 1986; Hygnstrom and Virchow 2005) and aluminum phosphide (Moline and Demarais 1987); fumigation; trapping; cable restraints; and shooting (Hygnstrom et al. 2011). Toxicants and fumigation were not considered due to concerns over non-target mortality of listed species as well as social conflicts that arise with their use in populated areas. Cage traps have been used extensively to control or eliminate nuisance or introduced wildlife populations, particularly solitary animals. However, with a colonial species, trap efficiency would be limited after the initial captures as other animals became trap-shy. Furthermore, baited cage traps placed near burrows would increase the opportunity to capture non-target gopher tortoises and burrowing owls. For these reasons, we chose shooting as the initial method to eradicate the prairie dogs from this small area.

The source colony property was visited by WS on 24 February 2009 to assess logistics of the eradication effort. Prairie dogs were killed by one of the authors (RLE), primarily using a rifle

equipped with a sound suppressor and 0.17-caliber HMR rimfire ammunition. The 0.17-caliber rifle has a flat trajectory and the bullets used were highly frangible, reducing the chance of passthroughs and ricochets. Initially, shots were taken from stationary blinds. Where this method restricted sight lines, the shooter crawled to positions that allowed for a field of operation of approximately 270° at a distance of 120 m and shot from a prone position. Accuracy of the low caliber ammunition was compromised by winds > 15 km/hr; therefore, shooting was limited to early morning or late evening except on calm days. To reduce the chance of conditioning the remaining prairie dogs to the presence of the shooter, we avoided shooting on consecutive days to increase the likelihood that the animals would venture out of their burrows. Shooting was conducted during the preliminary visit 24 February 2009 and between 29 March 2009 and 4 May 2009.

After the majority of prairie dogs had been removed by shooting, cable restraint devices were used from 29 April through 3 May 2009 to capture animals that retreated into burrows in response to the arrival of the shooter. Cable restraint devices are snares with 0.5 m of wire cable attached to an earth anchor driven into the substrate (Figure 3). Earth anchors are more effective in sandy substrates than metal rods (rebar) which can be pulled out of the ground by the captured animal. The devices were positioned so that the snare tightened around the neck and shoulders as the prairie dog's head passed through when exiting the burrow. Cable restraints were generally set and removed on the same day, although a few were placed the previous evening. Devices were set only in burrows where prairie dogs were observed and were placed in the interior of the burrow to avoid capturing non-target species.

Following the eradication effort, RLE conducted occasional surveys of the source property through the remainder of May 2009. Subsequently, visual surveys of the source colony and properties with prior evidence of prairie dogs resumed 11 December 2009 and continued bi-weekly through 21 June 2010. A comprehensive survey of the 650-ha area was conducted 20 January 2010. Post-eradication surveys required 60–150 minutes and followed the same procedures used in pre-eradication assessments. The Postmaster in Bell, Florida was contacted and provided with maps of prairie dog locations to provide additional opportu-

nities for observation. Additional visual surveys were conducted 3 February 2012 and 20 June 2012 to confirm the success of the eradication.

Results

During the initial survey in February 2007, prairie dogs were readily observed on the property where the source colony resided. However, we saw no evidence of animals or burrows in the nearby farm field where prairie dogs were reported in 2006; the field had been plowed and re-planted likely displacing the animals. No animals or burrows were seen in other residential or agricultural properties in the vicinity. We spoke to a resident who claimed to have shot prairie dogs at his property 0.8 km north of the source colony, but no animals or active burrows were observed on this visit.

In September 2008, the FWC investigator received information from another resident who claimed to have killed 10 prairie dogs on his 2.4-ha property 3 km south of the source colony, which was the southernmost observation of prairie dogs in the study area (Figure 1). FWC and WS surveyed this property 15 October 2008 and saw no prairie dogs or burrows. However, in a subsequent interview, the owner confirmed that he filled in the burrows after killing prairie dogs.

Even though we did not observe prairie dogs outside the source colony during surveys over 20 months, the collection of anecdotal reports was considered sufficient evidence that animals had left the owner's property. This was in violation of Florida regulations, and continued emigration constituted a risk of establishment of a potentially invasive species over a larger area. Furthermore, we concluded that the source colony was sufficiently localized to afford a reasonable chance of eradication.

Although Florida regulations prohibit possession of uncontained prairie dogs, FWC has no authority to access private property to control this class of captive wildlife without landowner permission. On 21 October 2008, FWC legal staff sent a certified letter to the landowner requesting permission to access the property to survey prairie dogs and to develop a plan to eradicate the colony. On 24 October 2008, the property owner contacted one of the authors (SH) to authorize access. The owner was assured that we would communicate with her throughout the project.

In November 2007 FWC estimated approximately 100 prairie dogs in the source colony,

although accuracy of counts was compromised by the movement of animals through the network of interconnected burrows. On 20 January 2009, 338 prairie dog burrows were observed, primarily in the northern and western pastures with fewer animals in the lightly wooded area in the northeastern quadrant (Figure 2). Animals and burrows were found near the perimeter and the boundary fence, but there was no evidence of prairie dogs at any adjacent properties despite the fact that the fence was not adequate to contain the colony. Residents we encountered had not seen prairie dogs other than on the source property.

In the vicinity of the southernmost reported location (Figure 1), a resident claimed to have seen 3–4 prairie dogs but we found no evidence of animals or active burrows. At the property where prairie dogs had been reported in May 2007 (Figure 1), residents indicated there had been numerous prairie dogs present for about a year, but they had all been killed. We observed approximately 30 inactive burrows in an adjacent agricultural field but saw no prairie dogs. Based on these surveys and efforts by local property owners to remove prairie dogs, we concluded that the population was confined to the source colony. Accordingly, eradication efforts were focused solely on this property, with concurrent surveys on the southernmost property where the owner had previously killed 10 prairie dogs.

Five prairie dogs were removed by shooting on 24 February 2009 during a preliminary assessment. RLE noted the animals were already skittish, and the property owner suggested that neighbors had been shooting prairie dogs from their own properties or from the road. Based on this and earlier surveys, we estimated the population to be 100–150 prairie dogs, although typically no more than 30 individuals were observed during a visit.

Eradication began 23 March 2009. Initially shots were taken from the perimeter of the property within 120 m of active burrows. After shooting began, the number of prairie dogs observed declined quickly. However, by 02 April 2009 perimeter shooting was becoming ineffective, forcing RLE to crawl to the interior of the pasture. The removal of prairie dogs by shooting continued until 16 April 2009 when 65 prairie dogs had been killed and all of the larger groups had been eliminated.

Cable restraint devices were set to capture the remaining groups of 2–6 prairie dogs that were

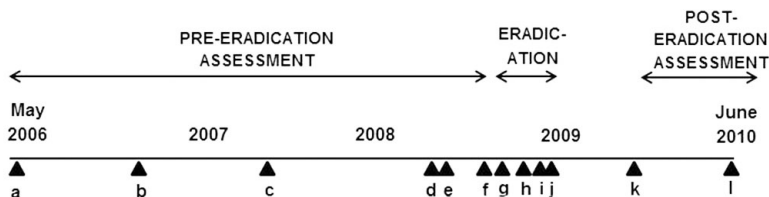
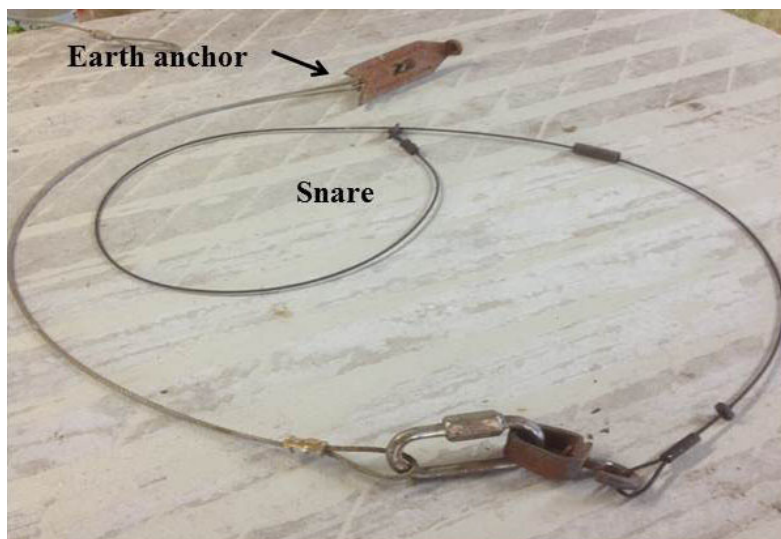
scattered around the interior of the property. By the last week of April 2009, only 4 prairie dogs were observed utilizing a small number of burrows. On 29 April 2009, 3 prairie dogs were removed using a combination of snaring and shooting. The final prairie dog from the source colony was captured 3 May 2009 using a cable restraint device. Altogether 85 prairie dogs were removed from the source colony in 11 visits during the 6-week eradication effort. A single prairie dog was observed at the location 3 km south of the source colony (Figure 1); this animal was shot on 4 May 2009.

No prairie dogs were observed or reported at the source colony property and the residences to the south during opportunistic surveys through the remainder of May 2009. We saw no evidence of prairie dogs during surveys from 11 December 2009 through 21 June 2010, and received no reports from letter carriers in the area. Accordingly, visits to the area were discontinued until 2012 when surveys in January and June of that year failed to reveal evidence of prairie dogs or active burrows and the eradication was deemed successful.

Discussion

Eradication of non-native species is frequently labor-intensive, costly, and requires a long-term commitment, particularly for the last animals that are exceptionally wary, trap-shy or otherwise behaviorally different. Consequently, there have been few successful attempts to eradicate terrestrial species in Florida. The WS eliminated a population of black-tailed jack rabbits (*Lepus californicus* Gray, 1837) that was confined to the Miami International Airport grounds and extirpated black rats (*Rattus rattus* Linnaeus, 1758) from an island off the west Florida coast (Witmer et al. 2010). Other projects proved less successful, including a failed eradication of purple swamphens (*Porphyrio porphyrio* Linnaeus, 1758) in south Florida (Hardin et al. 2011), and a coordinated effort to eliminate Gambian pouched rats (*Cricetomys gambianus* Waterhouse, 1840) from a small Florida Key is now in its eighth year (Engeman et al. 2007; Witmer and Hall 2011). By contrast the elimination of a prairie dog population from a relatively small area required only 6 weeks and 12 visits. However, the duration of the entire project, including pre- and post-eradication assessment, was over four years (Figure 4). Our ultimate success was abetted by relatively small emigration from the source colony, removal

Figure 3. Cable restraint device used in prairie dog (*Cynomys ludovicianus* Ord, 1815) eradication project. Earth anchor is embedded in the substrate the full length of the cable below the connectors. The wire loop is supported by vegetation or soft wire at the burrow entrance. As a prairie dog exits, its head enters the loop and its shoulders dislodge the loop from its supports. Gravity and the force of the animal close the cable restraint device around the neck/shoulder area with the anchor remaining in the substrate.



- a – prairie dogs reported to Florida Fish and Wildlife Conservation Commission
- b – initial survey of source colony and property reporting prairie dogs in May 2006
- c – visual estimate of population size at source colony
- d – visual survey of source colony and properties with reported prairie dogs
- e – source colony owner grants permission to access property for eradication
- f - GPS coordinates recorded for burrows at source colony
- g – site survey for shooting logistics
- h – shooting begins (3 March 2009)
- i – cable restraint devices deployed (29 April – 3 May 2009)
- j – shooting concludes (4 May 2009)
- k – post-eradication surveys begin for source colony and reported prairie dog locations
- l – post-eradication surveys conclude

Figure 4. Timeline of significant events during eradication of a black-tailed prairie dog (*Cynomys ludovicianus* Ord, 1815) colony in North Central Florida.

of prairie dogs by residents on neighboring properties, and ongoing plowing and re-planting of suitable prairie dog habitat in agricultural fields.

Typically, a decision to attempt to eradicate an introduced population of animals is based on a rapid assessment of abundance, distribution, habitat, and property access, as well as public acceptance which is a significant issue in much of Florida. Our pre-eradication assessment was prolonged by equivocal evidence of migration from the source property. Ultimately, it required 2 years to assemble a combination of anecdotal

reports, observation of vacant prairie dog burrows, and convincing evidence of removal on another property to provide justification to request permission to access the source colony property for the eradication project.

The social aspect of non-native species management is critical to success. Our request to the owner of the source colony was direct in its assertion that prairie dogs were illegally leaving the property, but we made every effort to communicate openly throughout the process in consideration of their property rights and that these animals descended from personal pets. The shooter developed a

working relationship with the property owner and nearby residents, which facilitated the eradication effort and provided us with reliable sources to corroborate that no prairie dogs remained after we concluded our removal efforts.

Although data collection is essential to a successful eradication effort, information may be incomplete or unavailable and managers must balance the benefit of acquiring precise and accurate information against the cost of delay in removing potentially invasive populations. In our project, we relied on a collection of anecdotal accounts that were ground-truthed as much as possible to provide a reasonable basis for action. A conscious effort to reach out to the public can result in valuable information as well as minimize resistance to lethal control programs.

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