

Success and Cost of Capturing Coyotes, *Canis latrans*, from All-Terrain-Vehicles

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Three-wheel All-terrain-vehicles were effective for capturing Coyotes in open (prairie) habitats in Colorado. Using cow-carcasses as bait the pursuit time for nine Coyotes captured was 19.0 ± 5.5 (S.D.) minutes/animal; without bait three were captured in 26.7 ± 11.6 minutes/animal; but capture success was 100% and 25%, respectively. Cost was \$67.62/Coyote captured compared to \$271 to \$383 for other methods reported in the literature. Four wheel All-terrain-vehicles should be as effective as speed, not maneuverability, is important in the method.

Key Words: Coyote, *Canis latrans*, capture success, cost, all-terrain-vehicle.

Free-ranging Coyotes (*Canis latrans*) have been captured for research purposes with steel leg-hold traps (Linhart and Dasch 1992; Linhart et al. 1986), aerial darting (Andelt 1980; Baer et al. 1978), aerial net-gunning (Barrett et al. 1982; Geese et al. 1987), manual capture from helicopters (Geese et al. 1987), and manual capture from snowmobiles (Nellis 1968). These methods can be time intensive (e.g., running trap lines) and estimated costs range from \$271 to \$383/animal captured (Andelt 1980; Geese et al. 1987). We present an alternative capture method that is effective and relatively inexpensive using all-terrain-vehicles (ATV) for capturing Coyotes on shortgrass prairie in southeastern Colorado.

Study Area and Methods

We Captured coyotes on the 1040-km² Pinon Canyon Maneuver Site (PCMS), northeast of Trinidad, Las Animas County, Colorado (37°20'N, 103°40'W). Elevations on the PCMS varied from 1310 to 1740 m. Topography consisted of open grasslands, limestone breaks, and deep canyons. Two main habitats existed on the study area: shortgrass prairie and Pinyon (*Pinus edulis*)-Juniper (*Juniperus monosperma*) woodland communities (U.S. Department of Army 1980).

We attempted to capture Coyotes on the shortgrass prairie only. The prairie allowed us to maintain visual contact with the animal and provided open terrain where obstacles were visible. We employed two methods to capture Coyotes. The first method involved the placement of a cow carcass to attract Coyotes. The cow carcass was placed >1 km from dense woodland vegetation on open terrain where potential hazards and obstacles were known to the pursuers. The cow carcass was situated on a slope that allowed the pursuers to approach from the other side of the hill and surprise any Coyotes at the car-

cass. A Coyote sighted feeding or resting at the carcass was pursued by two to three persons driving 3-wheel ATV's (American Honda Motor Co., Inc., Gardena, California; use of commercial trade name does not imply endorsement by the University of Wisconsin-Madison or the U.S. Fish and Wildlife Service). The ability of the ATV's to overtake the gorged Coyote was the main advantage, not tight maneuverability. Coyotes at the carcass were typically satiated from feeding, were slow in running from the pursuers, and tired quickly. We pursued a Coyote until it tired and hid under a ledge, tree, or bush, or was captured with a noose-pole from an ATV. The Coyote was pinned with a forked stick and a noose-pole secured around the animal's neck. Its mouth was taped shut and its legs tied, securing the Coyote for processing and radio collaring.

The second method was similar to the first, but did not involve the placement of a cow carcass. Areas were searched until a Coyote was sighted. We then pursued and captured the Coyote as described previously. Attempts to capture Coyotes by both methods included preventing the animal from escaping into dense vegetation or rough terrain, or losing sight of the animal. The use of two to three ATV's helped prevent the animal from escaping by constantly placing an ATV at a position that forced the animal to turn away from cover. Attempts to pursue Coyotes were terminated whenever the animal ran into rough terrain or dense vegetation where the ATV's could not safely follow. All personnel riding an ATV were experienced drivers and wore protective equipment at all times (i.e., helmet, boots, gloves, eye protection, and heavy trousers).

Results and Discussion

Twelve Coyotes (5 males, 7 females) were captured from 19 September to 13 November 1986. A total of

39.3 man-hours were spent searching for and capturing Coyotes. Pursuit time for capturing Coyotes near the cow carcass averaged 19.0 ± 5.5 (*SD*) minutes/animal ($n = 9$); pursuit time for those captured Coyotes not involving the cow carcass averaged 26.7 ± 11.6 minutes/animal ($n = 3$) ($t = 1.01$, 10 df, $P > 0.30$). Whereas pursuit time did not differ significantly, capture success was 100% (9 out of 9 attempts) when catching Coyotes engorged on meat from the carcass, and only 25% (3 out of 12 attempts) when catching coyotes not near a cow carcass ($X^2 = 11.83$, 1 df, $P < 0.005$). Six attempts were aborted when the animals escaped into terrain too rough for the ATV's to safely follow; three attempts were terminated when we lost sight of the Coyote. One Coyote mortality occurred during capture when a Coyote from near the cow carcass died suddenly during a 15-minute pursuit. Autopsy of the Coyote indicated that cardiac arrest was the cause of death. Among the other captured animals, no delayed mortality had occurred by one to two weeks after capture.

Our small sample size precluded an accurate comparison of mortality to other capture techniques. However, the 8% (1 out of 12) mortality from ATV captures was similar to the 8% mortality found in trapping (Andelt 1980), 5% for net-gunning (Gese et al. 1987), and 3% for manual capture (Gese et al. 1987). Barrett et al. (1982) lost no animals net-gunning, Baer et al. (1978) and Andelt (1980) had no mortality from aerial darting, Nellis (1968) had no mortality while capturing 14 Coyotes with snowmobiles, Balser (1965) lost 1 (2%) Coyote during trapping with tranquilizer tabs, while snaring had the highest mortality (19%) of all capture techniques (Nellis 1968).

The cost incurred capturing Coyotes with ATV's was low. Our costs included \$314.40 for personnel (39.3 man-hours \times \$8/hour), \$242.00 for equipment (noose-pole and three helmets), \$62.88 for the ATV's (cost of \$2500 for an ATV depreciated over an estimated 10 hours/week over three years of use \times 39.3 man-hours), \$24.56 for gas (0.5 gallon/hour \times 39.3 man-hours \times \$1.25/gallon), and \$100 for the cow carcass, giving a total cost of \$743.84 for all attempts and captures (\$67.62/Coyote captured).

Safety must be stressed when attempting to capture Coyotes from ATV's. Both the Canadian Government and the U.S. Consumer Product Safety Commission have banned the sale of new 3-wheel ATV's due to the risk of death or severe injury in certain circumstances. Our evaluation was done prior to this ban, however, we believe that 4-wheel ATV's would work equally well because speed rather than maneuverability is required for success of this technique and the 4-wheel ATV's are safer. All our drivers were instructed in the proper, safe use of the ATV through a certified course taught by the ATV manufacturer.

The use of ATV's for capturing other animals is unreported but we believe that ATV's can be used to capture Coyotes in areas with suitable open terrain (i.e., open grassland and prairie in the United States and Canada). The technique is inexpensive compared to other capture techniques and safe as long as researchers are familiar with ATV's and the terrain. While ATV accidents can result in injury, other techniques used in wildlife research such as ultralights (Knight et al. 1986; Looman et al. 1985; Quigley and Crawshaw 1989) and helicopters (Barrett et al. 1982; Gese et al. 1987) pose significantly higher safety risks. Consequences of engine failure or pilot error (i.e., crashing) would likely be far less extensive when using an ATV compared to an ultralight or helicopter.

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High Incidence of the Edible Morel *Morchella conica* in a Jack Pine, *Pinus banksiana*, Forest Following Prescribed Burning

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Mushrooms of the ascomycetous fungus *Morchella conica* Fr. were observed at a density as high as 2860 kg/ha in a *Pinus banksiana* Lamb. stand in May 1991 at the Petawawa National Forestry Institute, Chalk River, Ontario. This forest stand had been treated with prescribed fire the previous fall. Mushrooms were found singly or in clusters within a radius of 2-3 m around dead *Pinus banksiana* trees but not around dead specimens of *Pinus resinosa* Ait. and *Pinus strobus* L.

On a observé des champignons ascomycètes *Morchella conica* Fr. à une densité aussi grande que 2860 kg/ha dans un peuplement de *Pinus banksiana* Lamb. à l'Institut national forestier de Petawawa en mai 1991 à Chalk River en Ontario. Ce peuplement forestier avait subi le brûlage dirigé l'automne précédent. Les champignons ont été trouvés seuls ou en groupes uniquement à l'intérieur d'un rayon de 2-3 m autour de spécimens morts de *Pinus banksiana* mais pas autour de spécimens morts de *Pinus resinosa* Ait. et *Pinus strobus* L.

Key Words: Jack Pine, *Pinus banksiana*, edible morel, *Morchella conica*, fire, phoenicoid fungi, ascomycetes, mushrooms.

Phoenicoid fungi are those that colonize forest sites soon after fire. Comprising a large number of mushroom species from different taxonomic groups (Carpenter and Trappe 1985), they play an important role in nutrient cycling and nutrient trapping in fire-disturbed ecosystems (Carpenter and Trappe 1985; Carpenter et al. 1987). They also contribute to plant growth and survival through mycorrhizal symbiosis.

Morels are valuable in European or Asian markets where their wholesale value can be as high as \$180/kg dry weight (J.A. Fortin, personal communication). The knowledge that morels are often associated with fire (Apfelbaum et al. 1984; Weber 1988) leads to substantial commercial harvests in Western Canada and United States where professional mushroom pickers visit recently burned-over forest sites (J. Brown, personal communication). Whereas the fruiting of morels in western Canada and United States after forest fires is well known, the phenomenon has not been documented for eastern Canada. This note reports the high incidence of *Morchella conica* Fr. (synonym: *Morchella angusticeps* in Weber (1988)), an edible mushroom, in a plot of Jack Pine (*Pinus banksiana* Lamb.) treated with prescribed burning.

The Site

The *Pinus banksiana* stand is at the Frontier Lake experimental site (latitude 46°00'N and longitude 77°33'W) which is approximately 5 km east of the Petawawa National Forestry Institute in Chalk River, eastern Ontario. This area is within the Middle Ottawa section (L.4c) of the Great Lakes St-Lawrence Forest region (Rowe 1972). The topography is relatively flat, the surface deposit a fine-grained deep sand (10-30 m) (Gadd 1962), and the soil an humo-ferric podzol (Weber 1988). The stand was clear-cut in 1942 and 1943 leaving behind trees with stump-height diameters of 17.5 cm or less. Dendrochronological analyses of dominant trees and snags with multiple fire scars suggest that the site experienced multiple fires; the most recent was in 1943, presumably from slash burning following clear-cutting (E. Stechishen, personal communication).

Jack Pine, Red Pine, *P. resinosa* Ait., and White Pine, *P. strobus* L., comprise most of the biomass of this forest stand with an average age of 53, 105, and 55 years, respectively. Additional species observed in the vicinity were *Amelanchier* spp., *Comptonia peregrina* (L.) Coult., *Gaultheria procumbens* L., *Kalmia angustifolia* L., *Lycopodium complanatum*