Using Snares to Live-Capture Beaver, *Castor canadensis*

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Hancock and Bailey traps are typically used to live-capture Beaver (*Castor canadensis*) but are expensive and bulky. As an alternative capture method, we used steel cable snares to trap Beaver for a transplanting program from 1994 to 1997. Snares were used to capture 132 Beaver at 18 locations throughout Wyoming. Literature sources and communications with other live-trappers initially led us to believe that trapping with snares was not feasible or would lead to high mortality. Trapping success during our four years of trapping was 11.9 trap nights/Beaver. Mortality of Beaver captured in snares was 5.3%. Snares allowed us to saturate an area with traps and capture a large number of animals within a few days. Snares captured all size classes of Beaver, although we targeted larger animals by using larger snare sizes and setting the traps away from the lodge. Although our trap mortality rates with snares were higher than other researchers using Hancock and Bailey traps, snares are effective at live-capturing Beaver and may be useful where an effective, low-cost method of trapping is needed.

Key Words: Beaver, *Castor canadensis*, Bailey trap, Hancock trap, live-trapping, snares, trap.

Beaver are often live-trapped for transplanting (Brayton 1984; Butler 1991) or research purposes (Lancia et al. 1982; Dyck and MacArthur 1992; Nolet and Rosell 1994; van Deelen and Pletscher 1996). The most common methods of live-trapping Beaver are either Hancock or Bailey live-traps (Rawley 1954; Olson and Hubert 1994; Smith et al. 1994). Padded leg-hold traps have also been used but they often inflict permanent injuries (Phillips et al. 1996). Snares have been suggested as a kill method by several authors (Barringer 1992; Collins 1993; Olson and Hubert 1994; Krause undated) but they have not been reviewed as a viable method for live-trapping.

In 1994 we began a transplanting project in Wyoming to establish Beaver in areas where land-managers wanted to create lentic habitat in otherwise lotic systems. We originally planned to trap Beaver exclusively with Hancock and Bailey live-traps because communications with other researchers and trappers led us to believe that snare trapping would be lethal to Beaver. Predation and emigration of our transplanted Beaver exceeded 80% (McKinstry and Anderson 1997; McKinstry and Anderson *in press*) and we found that Beaver establishment was more likely if we released > 10 Beaver at each site. Since we needed a large number of animals to increase our probability of success, and we were holding the animals for several days before their release, we required a substantial trapping effort. Hancock and Bailey traps were cumbersome and expensive, thus preventing us from using a large number of traps to saturate a trapping area and capture a large number of Beaver. We therefore decided to evaluate the effectiveness of using snares to live-trap Beaver.

Methods

We trapped Beaver from 1994 to 1997 at 18 creeks and streams throughout Wyoming (Table 1). Trapping locations were concentrated on Beaver dams and ponds, although we also trapped in irrigation canals. Beaver were not trapped from free-flowing portions of rivers or in areas where dams and lodges had not been constructed. Stream flow at all trapping locations was less than 1.5 m^3/sec.

Snares (Figure 1) were constructed of 7 by 7 strand or 7 by 19 strand (7 by 19 preferred but more expensive) 2.38 mm (3/32 in) stainless steel aircraft cable. Snare leads, which allowed the animal some freedom to move around yet still remain anchored, were constructed of 7 by 7 strand, 6.35 mm (1/4 in) cable (Figure 1). Snare cables were cut 1m long and leads were 1m or greater. Swivels (M and M Fur Company, Bridgewater, South Dakota, USA; reference to trade names or companies does not constitute endorsement), which allowed the snare to remain tangle-free after an animal was captured, were installed at both (1) the end of the snare cable where they were held in place with a washer and cable stop and (2) at the end of the lead where they were used as an attachment to the stake (Figure 1). Snares were stripped of parts (which often could be re-used) and discarded after a capture, while leads were re-used to reduce trapping costs. Various snare locks were used including modified washer locks (Burkshire Products Inc., Sheffield, Massachusetts, USA), KAM locks (Slutker Furs, Edmonton, Alberta, Canada), and BMI cam and slide-free locks (Butera Manufacturing Industries, Willoughby Hills, Ohio, USA) (Figure 1). Aluminum cable sleeves and stops were crimped in the field with a swaging tool which allowed us to customize snares for different trapping conditions.

TABLE 1. Latitude and longitude, dominant vegetation, and stream classifications (using Rosgen's [1994] classification) for 18 creek Beaver trapping locations in Wyoming.

Stream Name	Latitude, Longitude	Dominant Vegetation	Stream Classification
Barrett Creek	41°20′N, 106°31′W	Willow (*Salix* spp.)	B3
Brush Creek	41°37′N, 106°37′W	Cottonwood (*Populus* spp.) and willow	B3
Brush Creek	41°38′N, 106°33′W	Willow	
Calf Creek	41°14′N, 106°54′W	Conifer and willow	A3
Cheyenne River	43°27′N, 104°30′W	Cottonwood	F5
Cheyenne River	43°32′N, 104°43′W	Cottonwood	F5
East Fork, Medicine Bow River	41°32′N, 106°25′W	Aspen (*Populus tremuloides*) and willow	B3
Flat Creek	43°28′N, 110°47′W	Willow	D/A4
Henry's Fork, Green River	41°03′N, 110°13′W	Cottonwood and willow	C3
Middle Branch, Middle Lodgepole Creek	41°43′N, 105°25′W	Willow	B4
Middle Fork, Little Laramie River	41°14′N, 106°5′W	Willow	C4
One Mile Creek	41°36′N, 106°12′W	Willow	B3
Mill Creek	41°31′N, 106°25′W	Willow	C4
Sourdough Creek	44°14′N, 107°58′W	Willow	B3
Turpin Creek	41°31′N, 106°25′W	Aspen, conifer, and willow	B3
Wagonhound Creek	41°37′N, 106°19′W	Willow	B4
Wolf Creek	44°50′N, 107°41′W	Cottonwood and willow	C3

Snares were set so that an approximately 27 cm diameter loop was resting on the ground perpendicular to travel and were supported by wrapping bailing wire around both the swivel end of the snare and a support stick that was placed perpendicular and upright to the trail (Figure 1). Beaver are very habitual in their use of travel corridors. We found trails and runs located throughout Beaver territories and it was easy to predict trails that were being used by examining the trail for wet areas, disturbed sediment, footprints, and drag marks. Snares were placed in Beaver runs over dams, in Beaver-excavated canals, in runs out of the water (generally leading to feeding areas), and at underwater lodge entrances. We often used sticks or other materials to "funnel" Beaver into a snare, although too much material often forced the animal around the run into a different trail.

We began trapping after ice-off in the spring (usually mid May) and concluded trapping by the second week in October depending upon ice and snow conditions. All traps were set between 1600 and 1900 h each day and were checked by 0930 h the following morning to minimize the time spent captured. We usually set between 10 and 15 snares/ trapper/night; more than that and it was difficult to both check them early enough and find them in the thick willows (*Salix* spp.) where we were trapping. Animals captured in snares were first restrained using a 1.5 m catch pole (M and M Fur Company, Bridgewater, South Dakota), then transported from the trap site using a 114 -l plastic garbage can bolted to a backpack frame. We sexed and measured Beaver while they were restrained with the catch pole and weighed and eartagged

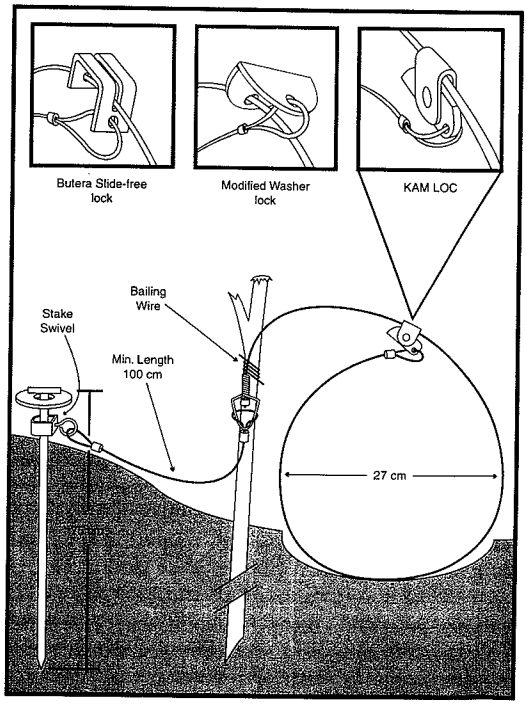

FIGURE 1. A completed snare showing several types of locking mechanisms, swivels, lead, and stake.

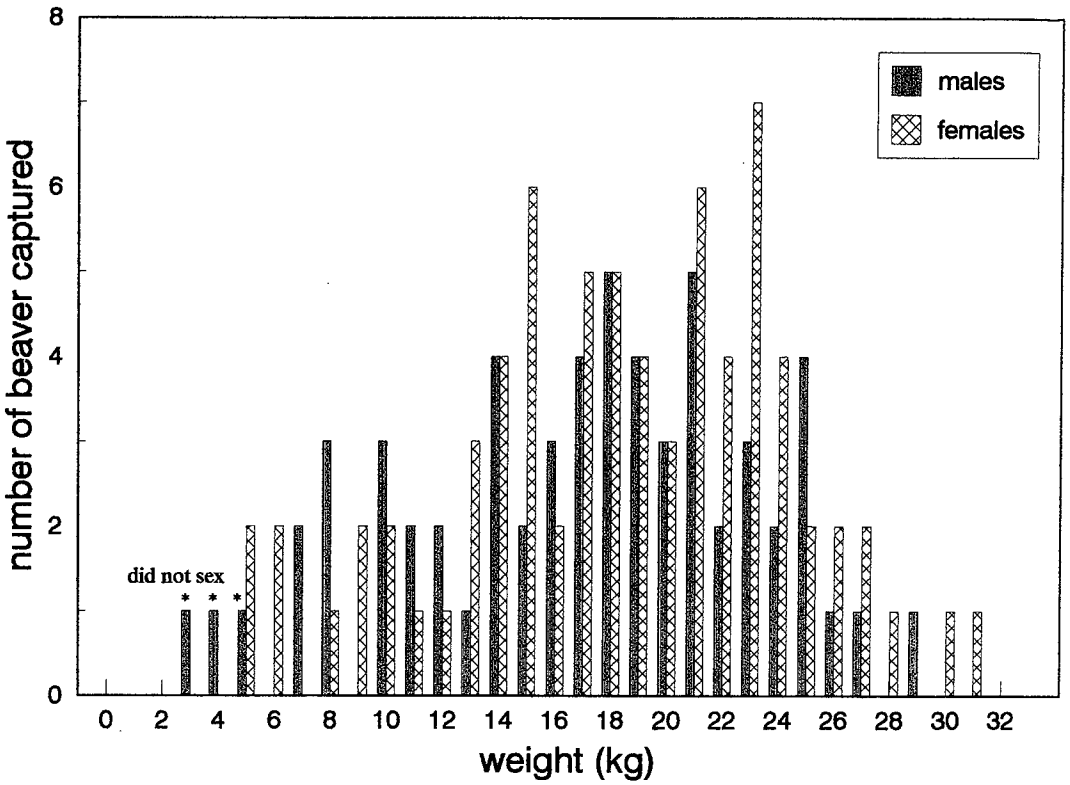

FIGURE 2. Frequency of Beaver captures per weight (kg) and sex categories.

them while they were in the garbage can. Snares were removed from Beaver with a pair of cable cutters (M and M Fur Company, Bridgewater, South Dakota).

We used a z test (Jandel Scientific 1994) to test proportional differences in captures of males versus females. Tests were considered significant at $P \leq 0.05$.

Results

We captured a total of 132 Beaver in 1568 trap nights. Catch-per-unit-effort averaged 11.9 trap nights/Beaver or 8.4% (the probability of an individual trap's capture). Average weight of animals captured in snares was 17.7 kg (range 2.7 to 31 kg, SD = 6.07) and there was no difference in proportion of males (0.44) or females (0.56) captured (z = 1.23, P = 0.22) (Figure 2). Only five kits (< 4.5 kg) were captured in snares. Sets made at dam crossovers accounted for 74 percent of all snare captures. Runways on dams are relatively easy to identify and are used heavily by Beaver in their daily activities. Snares set in land runways, generally areas where Beaver were exiting the water to feed, were also productive, accounting for 16 percent of snare captures.

Seven (5.3%) Beaver died while restrained in snares. Two of these were killed by Coyotes (*Canis latrans*) and another was killed by a second Beaver. The remaining four Beaver were entangled in vegetation and the animal either suffocated (2) or drowned (2). While we have no information on health of Beaver captured in snares, 111 Beaver captured in snares were eventually released at transplant locations, of which 58 were equipped with transmitters and monitored. Fifty-five transmittered Beaver lived > 7 days post-release. The other three Beaver were killed by predators (conclusions based upon bite marks, subcutaneous hemorrhaging, and hair and tracks found at the site) within four days of release. All Beaver that we captured actively fed while they were held in captivity (< 5 days) until release and appeared healthy at the time of release.

Captured animals were usually located out of the water when the traps were checked. Often the vegetation within the radius of the snare had been cut during the animal's attempts to extricate itself. Beaver were aggressive when we attempted to remove them from the snare and caution was needed to prevent being bitten. Generally, Beaver were snared around the chest or abdomen although several animals were snared at the base of the tail.

We also captured two Muskrats (*Ondatra zibethica*), one Coyote, one Raccoon (*Procyon lotor*), and two Common Mergansers (*Mergus merganser*) in our snares. Except for one Muskrat, which appeared to have died from strangulation, none of the non-target animals were physically impaired.

Discussion

Except in the fur-trapping literature, little mention is made of the use of snares for capturing Beaver. Organ et al's. (1996:16) coverage of trapping and furbearer management only mentions "box (cage-type) traps and foothold traps" as viable live-trapping techniques. Rawley's (1954) manual, while somewhat dated, makes no mention of the use of snares for live-trapping Beaver. Similarly, Harris and Aldous (1946), Townsend (1953)), and Olson and Hubert (1994) give significant coverage to live-trapping Beaver with Hancock and Bailey traps but do not mention other methods of capture. Anecdotal mention of catching Beaver live in snares is made in both Krause's (undated) and Barringer's (1992) books, but they imply that it is an uncommon occurrence. Riedel (1988) focuses on snares as a lethal means of Beaver control, but does not mention their use as a live-trapping method. Riedel's (1988) snares were different from ours in that his did not have leads, entanglement opportunities were emphasized to hasten mortality, and snares were tied off with heavy wire or hung from trees or branches and did not release to allow the animal some movement.

Mortality in our snares was higher than that reported by other researchers using Hancock or Bailey traps. Smith et al. (1994) experienced 4.2 % predation (Black Bears [*Ursus americanus*]) of Beavers captured in Hancock traps on an island in Lake Superior and Smith and Peterson (1988, *in* Smith et al. [1994]) only had one Beaver killed (Black Bear) in over 1500 captures in Voyageurs National Park. Using Hancock and Bailey traps, Collins (1976) captured over 100 Beaver in and around the Snake River in northwest Wyoming with no mortalities. Hancock and Bailey traps do offer some protection and it might be difficult for a predator smaller than a Black Bear to kill a Beaver restrained in one. Mortality from predators is difficult to eliminate but could be reduced by checking traps frequently (e.g., every four hours). Entanglement accounted for four mortalities in our research. Two Beaver were entangled in sets at underwater lodge entrances and two more in areas with dense vegetation. Snare sets made in these locations are risky and mortality can be reduced by avoiding these sets. We were trying to catch mated pairs and family units in 5 days or less, so we were willing to accept higher mortality rates in the hope of catching a specific animal. In situations where mortality would bias research results or is socially unacceptable, trappers should eliminate entanglement possibilities when making sets or forgo the use of snares altogether.

We captured all size classes of Beaver in snares (Figure 2) although kits were not captured as frequently as the larger adults. Our difficulty in capturing kits was probably due to the large loop size in the snares we were using. We were not targeting kits for capture but the use of a smaller snare loop could increase kit captures if that is a goal; although it would probably reduce the capture of larger animals since they would not fit through the smaller snare loop. Additionally, kits primarily use habitat that is in close proximity to the lodge and generally do not travel away from the den pond during their first year (Hodgdon and Lancia 1983). The majority of our snares were not located near the lodge where the kits would be more susceptible to trapping.

We wanted to trap a large number of Beaver, generally > 6, in a short period of time (< 5 days), at each site for later transplanting. We found that Hancock and Bailey traps, due to their cost and bulk, did not provide the trapping capabilities and efficiency that we needed. Snares allowed us to saturate an area with traps and increased the opportunities for catching more Beaver. We feel this method is suitable for use where the higher mortality risk for Beaver is acceptable.

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