Tube traps and rubber padded snares for capturing American black bears

Rolland Lemieux[1,3] and Sophie Czetwertynski[2,4]

[1]*Mikin Inc, 2319 rue des Quenouilles, St-Émile, PQ G3E 1M8, Canada*
[2]*Department of Renewable Resources, University of Alberta, Edmonton, AB T6G 2H1, Canada*

Abstract: American black bears (*Ursus americanus*) are commonly captured for research purposes with Aldridge traps. Disadvantages of this method include the possibility of non-target species setting off traps or being captured, a lengthy installation time, the possibility of bears being captured by the toes, and hind-foot captures. Here, we describe the RL04 trap, used with rubber-padded snares and drags, designed to address these issues. The RL04 trap is built from sturdy PVC tubing, can only be triggered by a bear in most areas, requires 20 minutes of installation time for 2 people, rarely results in toe captures due to the distance between the trigger and the snare, and eliminates hind-foot captures. This trap design captured 38 bears in 2 study areas. Every trap triggered by a previously untrapped bear resulted in a capture, and all snares tightened proximal to the metacarpal pad. Between 2001 and 2005, we trapped 304 bears using rubber-padded snares in an effort to reduce cuts and swelling often caused by bare-wire snares. These snares, tightened around bear paws with various trap designs including ground sets, produced surface cuts smaller than 1 cm in only 12 bears. Rubber-padded snares were linked to custom-designed drags and shock absorbers to reduce the risk of shoulder injuries. We provide detailed design descriptions of the RL04 trap and the restraining mechanism, which includes the snare, shock absorber, and drag.

Key words: American black bear, capture efficiency, capture injuries, drags, humane trapping, rubber-padded snares, shock-absorbers, trap design, tube traps, *Ursus americanus*

Ursus 17(1):81–91 (2006)

American black bears are most commonly captured using either culvert traps or Aldrich traps for foot snares. Culvert traps are ideal in high human-use areas because they protect the public and allow for the easy transport and relocation of problem bears. However, the large-scale use of these traps for research purposes in more remote areas is not practical for reasons of cost and mobility. The Aldridge trap addresses these issues and has proven a very popular and successful design for capturing bears in a diversity of field situations (Johnson and Pelton 1980). However, the Aldridge trap may have a relatively slow trigger depending on the dimensions of the spring, which could increase the likelihood of toe captures and which prevents the trap from being buried and hidden from the bear.

Rolland Lemieux designed the L-83 trap in 1983 to improve on the Aldridge design (R. Lemieux and H. Jolicoeur, 1984, Comparaison de l'éfficacité de trois pièges utilisés pour la capture de l'ours noir et mise au point d'une technique de piègeage de l'ours noir; rapport préliminaire. Ministère du Loisir de la Chasse et de la Pêche, Service de la faune terrestre, Québec, Canada. [In French]) and won the 1988 Ontario Trapper's Association Innovation prize. The L-83 is presently endorsed by the Quebec Trapper's Association. This trap has a more powerful spring and a long lever which reduces the number of toe captures. Also, the trap can be completely concealed with a substantial amount of vegetation without affecting the performance of the snare. In boreal forests, the snare and trap can be covered with 10–20 cm of wet moss with no effect to performance. Another advantage of the L-83 is the flexibility to use a larger diameter snare than is used with the Aldridge trap, thus decreasing the likelihood of a large bear stepping on or beside the snare.

Both the Aldridge and L-83 traps have the disadvantage of being relatively unselective. Non-target species can set off the snare, leaving it non-functional until it is

[3]rolland.lemieux@fapaq.gouv.qc.ca [4]smc3@ualberta.ca

reset. There is always the possibility of injuries when trapping, which is of particular concern when non-target endangered species are present in the area. Reagan et al. (2002) designed a passively-triggered foot snare from PVC (polyvinyl chloride) pipe which reduced the capture of non-target species. However, the ratio of caught bears to triggered traps was only 0.20. This trap also requires digging a hole, which could be problematic in certain study areas.

Most bear injuries are caused by the restraining mechanism (the snare linked to a fixed attachment or drag) and not the trap (the mechanism that projects the snare). Snares can cause swelling and lacerations around the restrained area, and constant tugging by captured animals can cause fractures and muscle, tendon, nerve, and joint injuries. Public scrutiny concerned with the suffering of animals has placed increased pressure on the scientific community to continually improve capture methods and establish standards (Gilbert 1991). Our objective was to design a trap and restraining mechanism that would reduce the chance of injury and the capture of non-target species while not sacrificing efficiency. The RL04 is the latest in a series of bear traps and restraining mechanisms developed with these objectives in mind. Several prototypes were designed and tested before the development of the RL04 (R. Lemieux and A. Desrosiers, 2001, Deux nouveaux prototypes de piège servant à la capture des ours noirs, Société de la Faune et des Parcs, Direction de la Recherche sur la Faune, Québec, Canada [in French]). However, these traps were built from plastic 20-L pails making, them fragile and prone to destruction from captured bears. In this paper, we describe in detail the RL04 trap and accessories, which we believe to be a significant improvement over previous designs in both performance and injury prevention.

Study area

We tested RL04 traps in 2 study areas in Canada. The first study area was in the Cold Lake Air Weapons Range (CLAWR), a military zone operated by the Canadian Armed Forces in northeastern Alberta, and Conklin, an adjacent area north of the CLAWR border. Hunting and public access are prohibited in the CLAWR, and all entry points to the area are monitored. Although logging operations are not permitted within the CLAWR, the oil and gas sector is very active and has constructed an extensive network of cutlines throughout the area. Most of this 5,100 km^2 landscape consists of mixed-wood boreal forest composed of trembling aspen (*Populus tremuloides*), balsam poplar (*Populus balsamifera*), white spruce (*Picea glauca*), and balsam fir (*Abies balsamea*) at higher elevations. Black spruce (*Picea mariana*), tamarack (*Larix laricina*), and muskeg characterize lower elevations. Stands of jack pine (*Pinus banksiana*) are dispersed throughout the area where sandy soils are present. We captured bears in this area as part of a University of Alberta black bear study.

The second study area was located in the Laurentide Wildlife Reserve 100 km north of Quebec City, Quebec. The area trapped was located in the center of the reserve at 800 m of elevation. Forestry operations have been active in this area and have generated an extensive network of gravel logging roads. The forest is boreal, and cover is dominated by black spruce and balsam fir with trembling aspen regenerating in cutblocks. We captured bears in this area as part of a Quebec Ministry of Natural Resources, Wildlife, and Parks caribou (*Rangifer tarandus*) study.

Methods

RL04 trap specifications

The body of the RL04 trap consists of a 51-cm long PVC pipe (Royal Seal PVC 12454 type PMS SDR35) with a 20-cm diameter (0.7-cm wall thickness; Fig. 1). To close one end of the pipe, we drilled three 6.4-cm steel-plated roofing screws equidistantly into the pipe 2.0 cm from the edge. Then, a circular piece of tight-fitting plywood was placed on the screws to seal the opening (A, Fig. 1). Finally, we spread a thick layer of epoxy between the plywood and the end of the pipe to create a sturdy plug.

The trigger consists of a 2.54 x 1.27-cm wire screen (17 x 17-cm grid size) with rounded edges to fit within the pipe (B, Fig. 1). We removed several mesh squares so bears could easily grab the trigger with their claws. We left 1 to 2 cm of space between the wire screen and the pipe wall to allow the screen to tilt easily within the pipe. A 7.3-cm long nail, bent at a 90° angle and welded to the top of the screen, served as the attachment point for the spring. Finally, we welded the mesh trigger to a hinge fastened to the inside of the pipe 8-cm from the plywood plug.

Once the trigger was installed, we used a jig saw to cut several slits in the pipe (Fig. 2). The first slit, a 1.0 x 3.0-cm wide oval slit above the bent nail, provides an entry point for the spring to connect to the nail of the trigger. The second slit, a 2-cm wide T-shaped incision cut at the open end of the pipe, along the same lengthwise axis as the first incision, enables the snare to

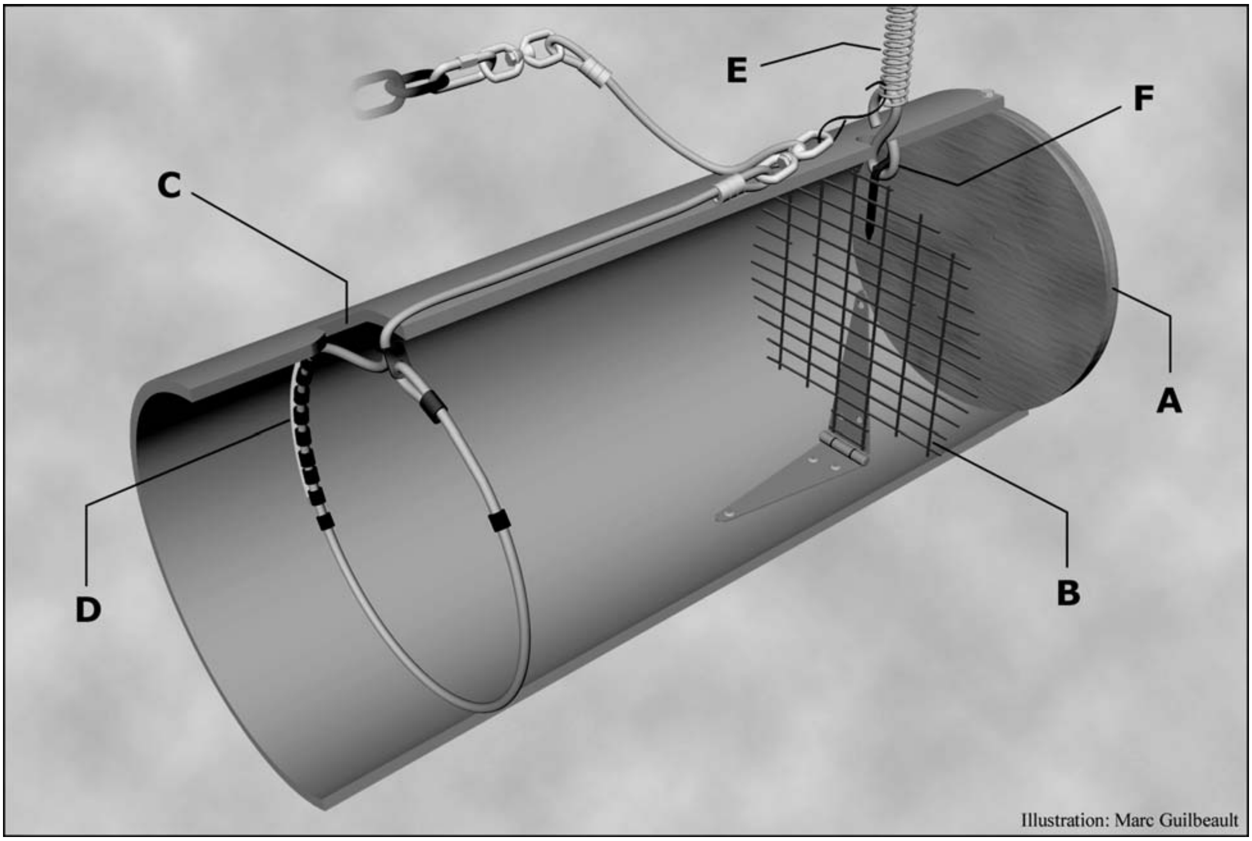

Fig. 1. The RL04 tube trap is constructed of PVC tubing closed at one end with plywood and epoxy (A). Bait is placed between the plug and a mesh trigger fastened to the tube with a hinge (B). The snare is fastened to the trigger and extends into the tube through a T-incision (C) where it is squeezed into slits (D). When a bear pulls on the trigger, the extended spring (E) shortens and tightens the snare.

link properly to the trigger (C, Fig. 1). The shorter section of the T-shaped opening allows the snare to tighten within the pipe, while the longer section allows the bear to retract his restrained paw from the trap. The last set of slits are 2 narrow 10-cm long incisions cut 7.5-cm from the open edge of the pipe on either side of the T-shaped incision (D, Fig. 1). The width of these slits is later adjusted to make a tight fit with the rubber pieces of the snare, thus securing it tightly along the inside wall of the pipe and making it less visible to the bear. The last component of the RL04 trap is a 40-cm long and 1.5-cm wide spring to which we attached a 3.8-cm S-hook (E, Fig. 1). The snare and S-hook connect to the nail of the trigger (F, Fig. 1).

Restraining mechanism

The snare used in the RL04 trap was designed so that the expanded loop fit precisely within the PVC pipe and the extremity extended to the trigger device. A longer or shorter snare would prevent the trap from operating properly. The snare for the RL04 consists of 2 sections of wire (75.0 and 27.5 cm in length) joined by 0.635-cm galvanized-steel swivels with 386 kg of rupture strength (Fig. 3). We used 0.20 cm swivels in our original snares, but after 2 of them were broken by captured bears, we replaced all swivels with the larger model described above, and none broke in subsequent captures. The snare cable is 0.476 cm in diameter and constructed of 7 x 19 wire with 1900 kg of rupture strength. This cable is more rigid and frays less than the 7 x 7 aviation cable often used for snare assembly. All cable pieces were electrocut to prevent fraying from the extremities.

We used the Mikin BL02 lock (Fig. 3 insert; Mikin Inc., Quebec, Quebec, Canada) on all bear snares. This lock is 5.5 cm long and made of 4-mm thick steel bent at a 110° angle with holes drilled at either end. The hole, in

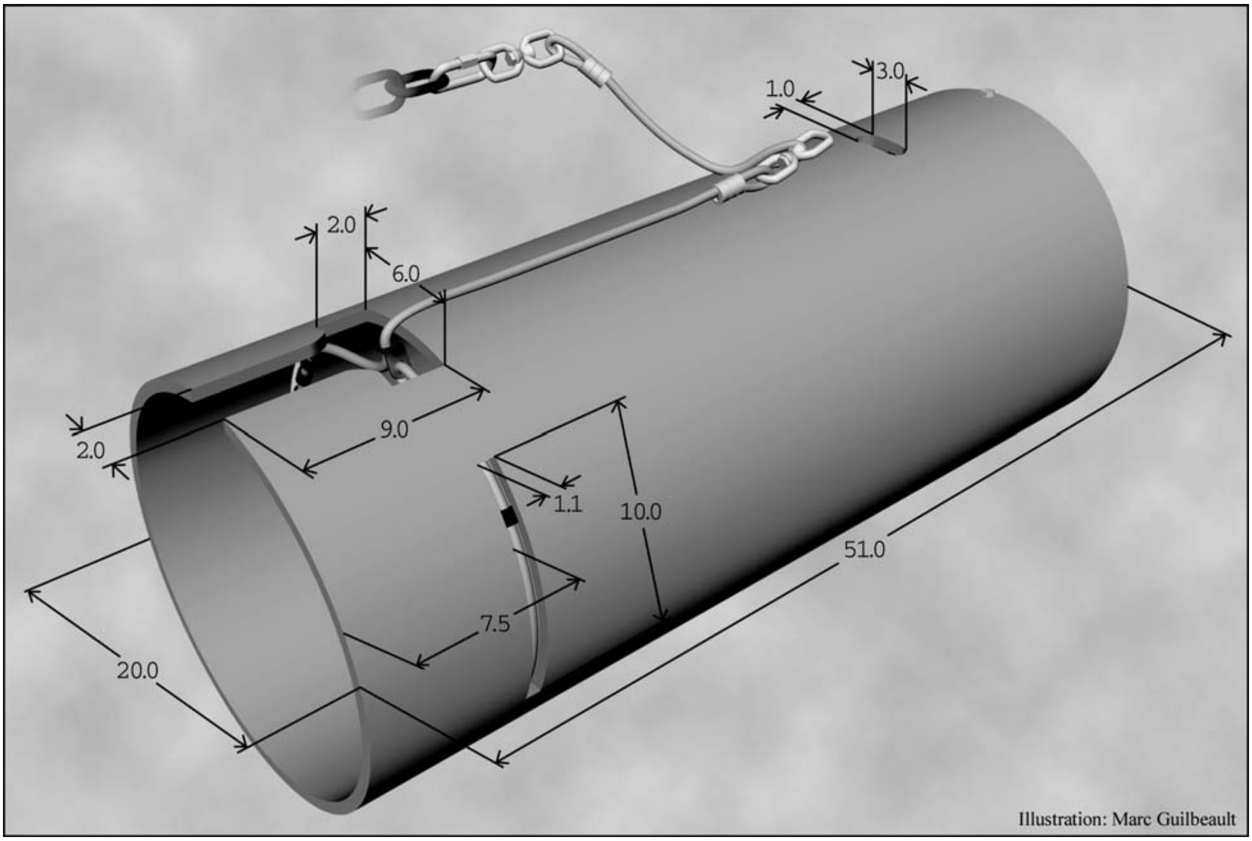

Fig. 2. RL04 trap design measurements in cm.

the shorter 2-cm arm of the lock, has a diameter slightly larger than the cable, whereas the longer 2.5-cm arm has a larger hole. This design allows for a more rapid tightening of the snare. All rough edges and corners of these locks are rounded and polished to reduce chaffing and cuts to the limbs of restrained animals.

We assembled snares taking into account the natural curvature of the cable for the main loop of the snare (Fig. 3). First, we bent the cable 8 cm from one end in the opposite direction of its natural curve. Next, we inserted a 1-cm long and 0.6-cm wide piece of rubber tubing followed by the BL02 lock using the larger of the 2 holes. A 3-cm aluminum sleeve closed the loop with the lock; the loose end of the cable was pushed completely within the sleeve to prevent cuts from the extremity of the cable. We polished the aluminum sleeve and covered it with rubber tubing to further reduce abrasions. Once completed, the elbow of the lock faced the outside of the snare. Then, we alternately strung 1-cm long rubber pieces of 0.50 and 0.60-cm diameter through the open end of the cable ending with a larger diameter piece which secured the snare within one of the slits in the trap (Fig. 1, 2). We used 19 rubber pieces for black bears to avoid skin contact with bare wire of the snare. Finally, we threaded the snare cable through the smaller hole of the BL02 lock and attached the cable to a swivel using a 3.0-cm long sleeve.

For the second part of the snare, we used the shorter 27.5-cm long cable (Fig. 3). We attached one end of the cable to the swivel (described above) using a 3.0-cm long sleeve and attached a second swivel to the other end of the cable. We used a 0.635-cm long zinc-plated quick-link to connect the snare to the drag chain.

We custom designed drags from a 120-cm long and 17-mm thick steel rod twisted to take on the shape of an anchor (Fig. 4). Once formed, the drag was 39-cm wide by 39-cm long and weighed 3 kg. The tips of the drag were cut diagonally and twisted to increase resistance when pulled through vegetation. We attached the drag to a 3-m of chain (0.635 cm diameter and 477 kg of resistance) with a quick-link. The length of the chain can be adjusted based on the density of vegetation in the

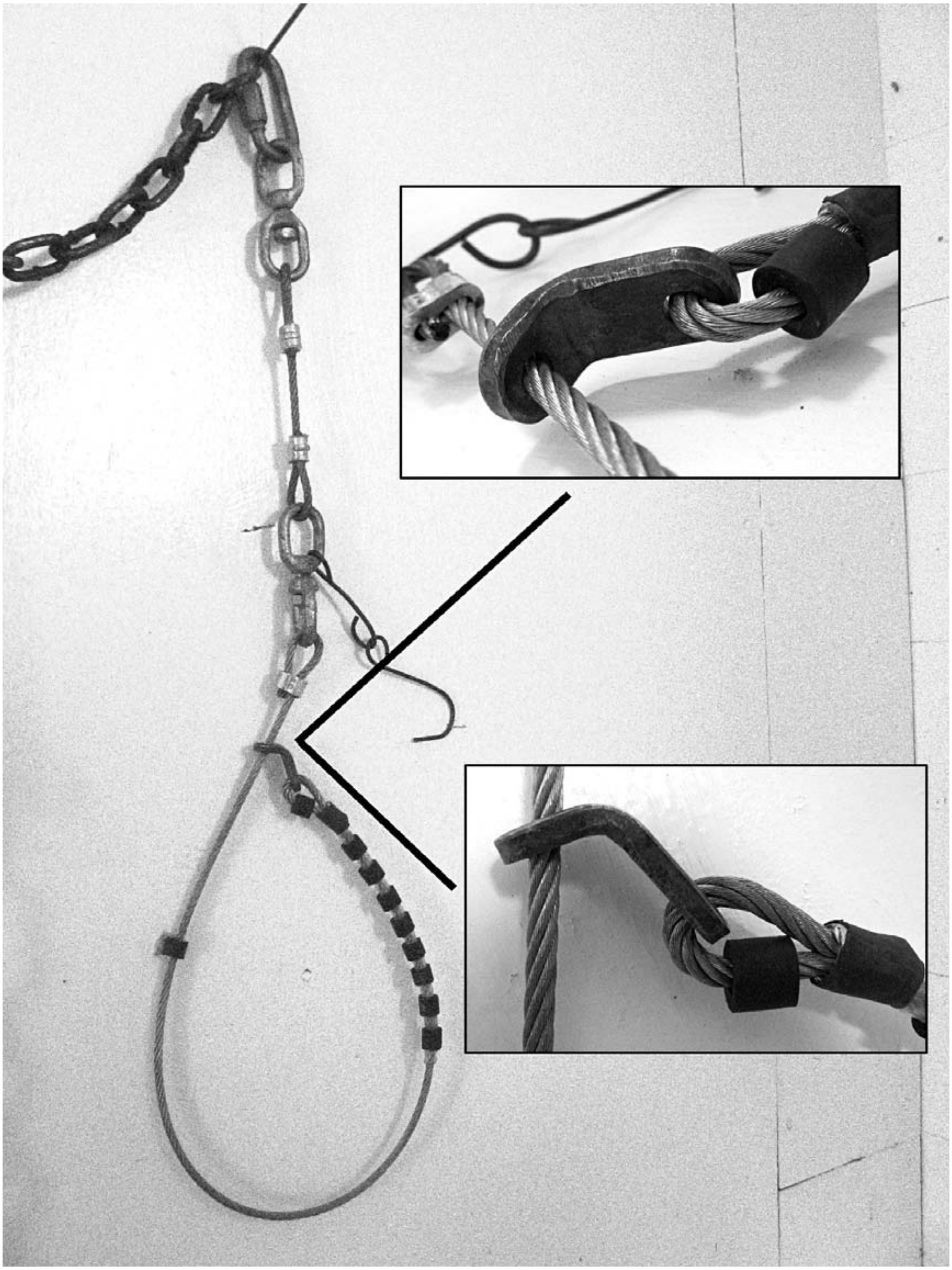

Fig. 3. Rubber-padded snare used to capture bears with insert of the Mikin BL02 rounded lock. Snares are constructed of 0.476-cm diameter cable constructed of 7 × 19 wire with 1900 kg of rupture strength, 0.635-cm galvanized steel swivels with 386 kg of rupture strength, and 19 1-cm long rubber pieces of 0.5 and 0.6-cm diameter.

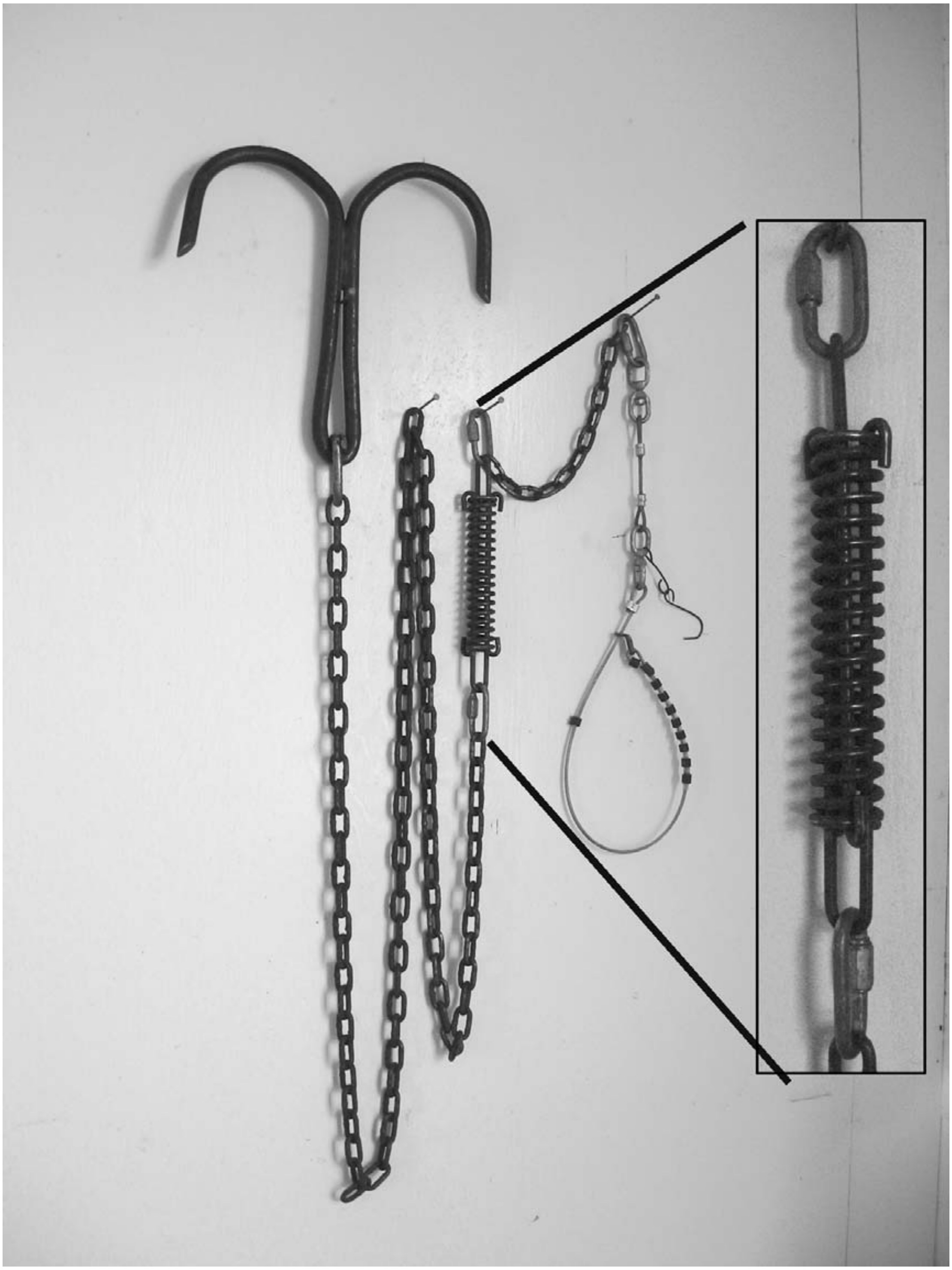

Fig. 4. Components of the restraining mechanism include the rubber-padded snare attached to 30 cm of chain followed by the Mikin SA03 shock absorber (insert). The length of chain between the shock absorber and drag depends on the density of surrounding vegetation (3.0-m chain shown here).

trapping area; the longer the chain, the faster the animal is likely to get tangled.

The last component of the restraining mechanism is a 35-cm long Mikin SA03 shock absorber (Fig. 4 insert). We fastened one end of the shock absorber to the 3-m chain and drag. We fastened the other end to 30-cm of chain and the snare (Fig. 4). The shock absorber is made of steel, has 18 coils, and has an external diameter of 3.66 cm. The design is closed at both ends to prevent bears from pulling it apart.

Installation

Installation of the RL04 trap requires 3 trees forming a tight triangle. Ideally, the pipe would fit snugly between 2 of the trees, and the back of the trap should have slight contact with the third tree (Fig. 5). When a perfect fit could not be located in the area, we selected a tighter triangle of trees and thinned the front trees to fit the pipe. We nailed 2 pieces of wood (A, Fig. 5) lateral to and 85 cm from the ground on either side of the 2 front trees. The pipe should fit between the trees with the T-incision facing up. Using 6.4-cm steel-plated roofing screws, we secured the pipe to each of the lateral pieces of wood and the 2 front trees. Next, we secured the pipe from above by nailing a third piece of wood (B, Fig. 5) diagonally between the 2 front trees. We attached the spring to another piece of wood with a tie-rap and nailed the wood behind the 2 front trees 1.10 m above the pipe. To protect the spring and trigger from curious bears, we nailed 2 pieces of wood (C, Fig. 5) across the 2 front trees above the pipe. A 20-cm space left between the trap and the lower piece of wood (D, Fig. 5) permitted the snare to slide freely until it was fully tightened. Lastly, we covered the back of the trap with vegetation to encourage bears to visit the front end of the pipe (Fig. 6). During trap installation, we placed bait bags (a mixture of sweet cookies, molasses, and honey in transparent 10-L bags each weighing approximately 1 kg) behind the mesh trigger and sprayed them with anise oil; sometimes, we placed an additional bait bag at the front of the trap (Fig. 6). We sprayed seal (*Phocidae* spp.) blood and oil onto trees during daily trap visits to attract bears to the sites.

We activated the trap by attaching the spring to the bent nail of the trigger (F, Fig. 1). Next, we hung the quick-link in the snare end of the shock absorber on a nail placed 34 cm above the pipe on the left side of the front-right tree (E, Fig. 5). This prevented the spring from having to lift the drag when tightening the snare. Lastly, we placed the snare inside the pipe with the rubber pieces squeezed into the long slits and connected the snare to the trigger with a #14 non-galvanized steel rod pressed into a figure 8 (F, Fig. 1). Thus, when a bear pulls on the screen, the nail is released from the S-hook, activating the spring to tighten the snare around the bear's paw.

In both study areas, when possible, we selected dense black spruce stands so bears would get tangled in shady and humid areas with little human activity. All traps were checked daily.

Results

Between 2001 and 2005, we trapped 304 bears in the CLAWR and Conklin areas in rubber-padded snares using a variety of bucket-type trap designs and L-83 traps. Injuries included 1 bear killed by another bear while in a snare and 12 bears (4%) with surface cuts smaller than 1 cm located where the lock rubbed against the paw. Snares were attached to drags unless there were tall trees in the surrounding area. In such circumstances, the restraining mechanism was tied around a large tree, leaving just enough chain length to allow the shock-absorber to function properly. We did not measure the distances traveled by bears with drags, but we estimate the average distance to have been 10 m from the trap site. The longest distance any of the bears moved with the drags was approximately 20 m.

Bears were trapped in the CLAWR using the RL04 trap from 1–10 September 2004. Forty traps were set along a 40-km stretch of gravel road at approximately 1-km intervals, alternating between the east and west side of the road. This area was previously trapped with plastic bucket traps (Lemieux and Desrosiers 2001 unpublished) and L-83 traps (Jolicoeur and Lemieux 1984 unpublished) in 2001 and 2002. Therefore, many of the bears in the area had been handled more than once. We trapped 11 bears, including 6 bears captured in previous years. Nine bears were captured using the RL04 trap, whereas 2 of the previously trapped bears were captured with the L-83 traps that were set after the RL04 traps had been ripped out from between the trees (Table 1). There were no capture-related injuries from either trap (i.e., cuts, broken teeth, etc.).

Trapping occurred in the Laurentide reserve from 20 May–5 June 2005 (session 1) and 17–23 June 2005 (session 2). During the first capture session 30 RL04 traps were set and 12 bears were captured; 2 were bears trapped the previous year with different trap designs, and 3 had been captured that spring. During the second capture session, we set 30 RL04 traps and captured 15 bears, 3 of which were bears captured that same year.

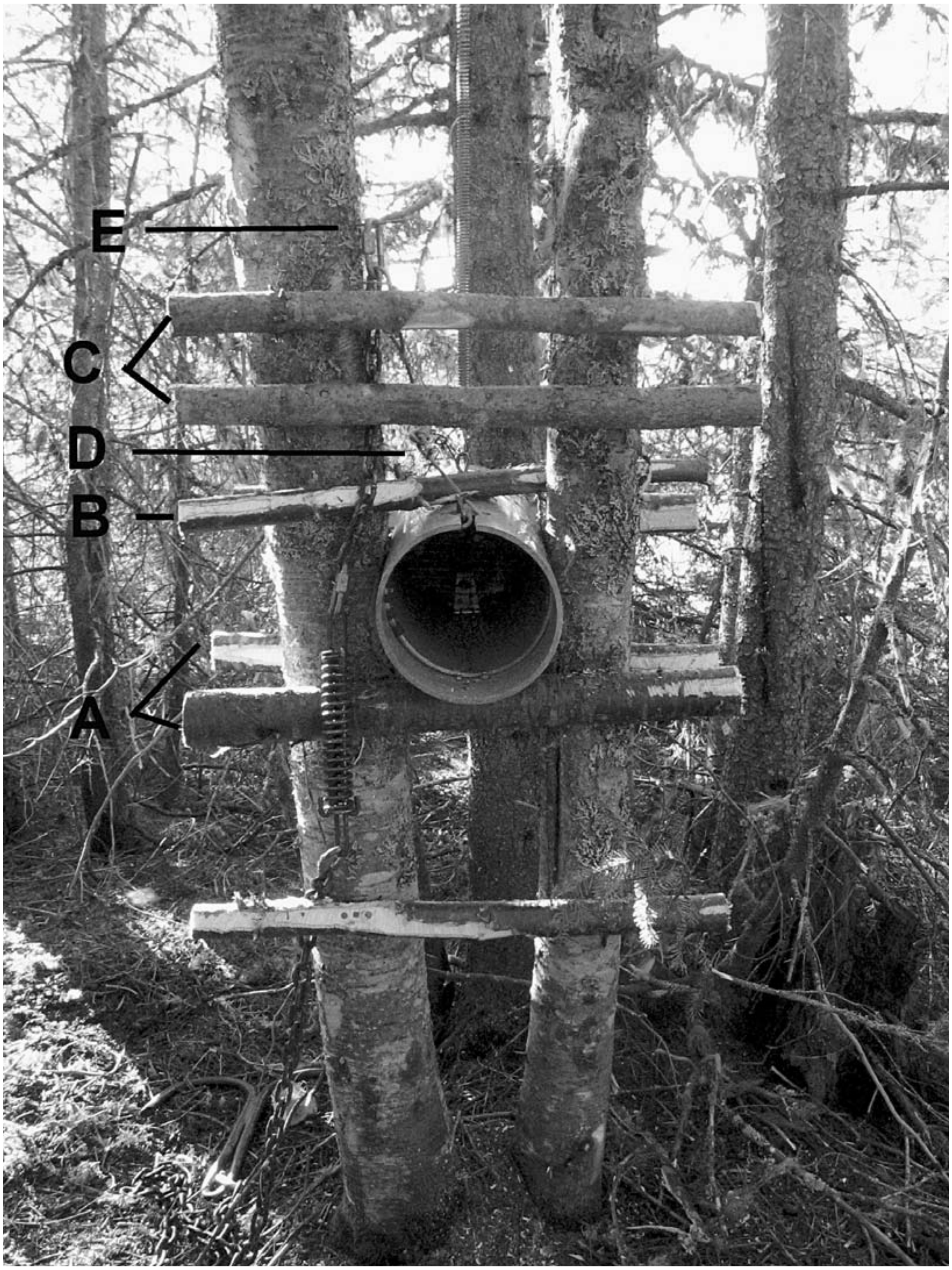

Fig. 5. Skeleton installation of the RL04 trap between 3 trees forming a triangle. The tube trap is set 85 cm from the ground on 2 pieces of wood (A), screwed in place using 4-cm steel-plated roofing screws, and further solidified with a diagonal piece of wood (B). Two lateral pieces of wood (C) were nailed above the trap to protect the trigger and spring, leaving a 20-cm gap to allow the snare to tighten (D). The quick link joining the snare to the chain hangs on a nail placed 34 cm above the pipe on the left side of the front-right tree (E) and prevents the spring from having to lift the drag when tightening the snare.

Fig. 6. Completed installation of the RL04 trap. Dense vegetation placed around the trap and additional bait bags placed near the trap opening directed bears to the front of the trap.

Table 1. Age, sex, and weights of American black bears captured using the RL04 trap with rubber-padded snares in 3 trapping sessions in Quebec and Alberta, Canada, 2004–2005.

	Bears from all areas combined	
	Males (*n*)	Females (*n*)
Total captures	20	18
Total unique bears	14	17
Mean weight (kg)	78 (14)	62 (17)
Range of weights (kg)	29–140 (14)	40–100 (17)
Mean age (yrs)	6 (14)	8 (12)
Range of ages (yrs)	1–12 (14)	2–24 (12)

The only visible injury observed during either capture session was minimal swelling of restrained paws.

In 2 instances, bears ripped RL04 traps out from between the trees to extract the bait and avoided being captured. In both cases, we verified that these bears had previously been captured by capturing them the subsequent day using L-83 traps with a well camouflaged snare. None of the extracted RL04 traps had damage beyond claw marks, and all silicone plugs withstood the bear attacks. Due to the distance between the snare and the trigger and the speed of the spring, all captured bears had snares tightened proximal to the metacarpal pad of the front paw. Except for these 2 instances, every triggering event of an RL04 resulted in capture of a bear.

Discussion

We found the RL04 trap to be very successful in capturing bears. Several bears previously captured in bucket sets were recaptured with the RL04, possibly because of the lack of a lid and a better camouflaged snare; lids with cut out holes were used in previous plastic bucket sets in both study areas (Lemieux and Desrosiers 2001 unpublished). Similarly to the Reagan trap (Reagan et al. 2002), the RL04 prevented non-target species from triggering the traps due to either the height of the pipe in the tree (coyotes [*Canis latrans*], foxes [*Vulpes vulpes*], wolves [*C. lupus*]) or the resistance of the elastic on the mesh (squirrels [*Tamiasciurus hudsonicus*], martens [*Martes americana*]). Small mammals are unlikely to be able to trigger the trap because it requires a strong tug to be activated. If this were to occur, the distance between the trigger and the snare is likely long enough to prevent the capture of animals such as martens and fisher (*M. pennanti*). We did capture fishers around their waist with previous bucket designs; however, the rubber-padded snares prevented suffocation and all were successfully released.

Another problem encountered with bucket-type designs is the capture of cubs by the neck. We captured 4 cubs by the neck with previous bucket designs because they were able to trigger them with their head. In these cases, the rubber-padded snares prevented strangulation and we were able to release the animals. Initial triggers used in some of our bucket designs were very sensitive and were activated when they were pushed. The mesh trigger in the RL04 trap requires a significant amount of force to be activated and needs to be pulled, which is difficult for a bear to do with its teeth because of the mesh design (the trap will not be activated if the animal pushes on the mesh trigger). Bears are quite ingenious, and our sample sizes are relatively small, so we acknowledge that although we did not encounter such problems during our trapping sessions, they may occur and further modifications may be required. However, we believe that this trap design significantly reduces the likelihood of trapping cubs by the neck. Furthermore, the use of rubber-padded snares should prevent strangulation for cubs managing to trigger the trap with their teeth. Larger bears are not able to trigger the trap with their head due to the distance between the mesh trigger and the trap opening (43 cm).

The fact that only bears could disturb the trap significantly increased the number of trap-nights that sets were operational for and reduced the amount of bait needed. Other advantages of the RL04 trap are simple assembly, low cost because a commercial trap is not required for the trigger, and the elimination of hind-foot captures. Hind-limbs have a smaller range of motion than fore-limbs and could sustain more severe injuries if a bear fights to get free. Most importantly, the trigger is fast enough to tighten before the bear is able to retract its paw, yet gentle enough that a person can set off the trigger with a bare arm and not receive any bruising from the snare tightening.

We believe the use of rubber-padded snares was the most important innovation of the RL04. Snare-related injuries are best reduced by minimizing the time animals are restrained. However, bears trapped at night can spend many hours in a snare before being released and could benefit from any modification reducing the constriction and abrasiveness of the snare. The use of varying sizes of rubber pieces minimizes the surface area of the snare squeezing the paw of the bear and thus potentially reduces swelling. Only 4% of captured bears exhibited small 1-cm cuts due to contact with the lock of the snare (Fig. 3, insert). All injured bears were captured with the L-83, which has more powerful springs to tighten the snare than bucket sets and RL04 traps. We have no measurements comparing the swelling of paws with and without padding on the snares; however, swelling appeared to be reduced compared to previous captures with bare-wire snares. In most cases, it was difficult to identify which foot had been restrained once the snare was removed. Having previously captured bears with non-padded snares, we found a substantial improvement in the condition of restrained paws in rubber-padded snares (minimal cuts and chaffing). Initially, we had concerns about charging bears slipping out of the snares. However, in over 350 captures with padded snares, this has never occurred. We encourage all researchers and wildlife officials involved in black bear captures to experiment with this design.

Bears are extremely powerful animals, and when captured, have the potential to injure not only the restrained area but to inflict serious damage to limbs and joints (broken bones, dislocations, pulled muscles, nerve damage). We used drags at all trap sites unless there was a danger of bears climbing tall trees because we believe they offer several advantages over fixed-point attachments. First, captured bears are able to travel away from the trap site, thus leaving the installation intact and significantly reducing time to reset the trap. Second, bears can retreat from the capture site which may reduce stress, particularly for animals trapped for the first time. In general, we found that bears restrained at the trap site caused more damage to the surrounding area than bears on drags. In fact, bears captured with drags were often found sleeping and only became destructive when discovered. Third, drags can dampen the strain on the limbs of a bear by acting as a shock-absorber when tangled in the vegetation. The Mikin SA03 shock absorber can act either in consort with the drag or provide most of the elasticity when an animal is tangled. However, we did not specifically measure stress levels and have no data comparing injury rates between bears restrained with drags versus solid anchors, so these comments are based only on personal observation. Lastly, when tying the restraining mechanism to a tree in areas with tall trees, the drag served as an additional safety restraint in case the bear were to fell the tree. Using only a fixed-point attachment was a concern in our boreal study areas where large diameter trees were rare. We acknowledge that the use of drags is a controversial issue and that many researchers prefer to use solid anchors as a safer alternative for capture crews, particularly where capturing grizzly bears (*U. arctos*) is a possibility. For this reason, we recommend that traps with drags be set in areas with low human use and only by experienced field staff as more precautions are necessary during trap visits.

We found the RL04 trap easy to install. Two people can build and set the trap in approximately 20 minutes once an appropriate trap site is located, less time than we required to set up a ground snare and build a cubby for the bear to approach the trap from the appropriate angle. Although we developed this trap for American black bears, it could be modified for any sized bear by strengthening the snare components and by adjusting the diameter of the PVC tube and the distance between trigger mesh and snare. It would also be possible to use this trap with scented lures instead of bait. We did not test using lures only with this trap design but suggest placing small branches sprayed with lures behind the mesh trigger to create the illusion of bait; we have trapped several bears in other bucket trap designs using only anise oil and branches when bait was not available. It is important for traps to keep evolving so as to minimize potential injuries to bears and non-target species. We hope that these designs and some of the lessons we've learned may be of use to other researchers and that they will spawn further developments.

Acknowledgments

We thank M. Boyce, University of Alberta, and R. Courtois, Quebec Ministry of Natural Resources, Wildlife, and Parks, for allowing us to use the black bear capture results presented in this paper. We are very grateful to M. Guilbeault for his trap illustrations and to K. Lisgo for her helpful comments on the manuscript.

Literature cited

GILBERT, F.F. 1991. Trapping—an animal rights issue or a legitimate wildlife management technique—The move to international standards. Transactions of the North American Wildlife and Natural Resource Conference 56:400–408.

JOHNSON, K.G., AND M.R. PELTON. 1980. Prebaiting and snaring techniques for black bear. Wildlife Society Bulletin 8:46–54.

REAGAN, S.R., J.M. ERTEL, P. STINSON, P. YAKUPZACK, AND D. ANDERSON. 2002. A passively triggered foot snare design for American black bears to reduce disturbance by non-target animals. Ursus 13:317–320.

Received: 16 October 2005
Accepted: 9 January 2006
Associate Editor: R. Waller