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FIELD EVALUATION OF THE NUMBER 1½ STEEL-JAWED LEGHOLD AND THE SAUVAGEAU 2001-8 TRAPS TO HUMANELY CAPTURE ARCTIC FOX

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Trapping arctic foxes (*Alopex lagopus*) represents a major source of income for many people of the Northern Hemisphere, in particular for the Inuit living in coastal settlements on the North American mainland (Graves and Hall 1988). The species is captured primarily in leghold traps (Proulx et al. 1993*a*), but animal welfare organizations claim that these devices are cruel and have requested that they be banned (Proulx and Barrett 1989).

Although no national or international standards have been established for live-holding devices (Proulx and Barrett 1991), a humane live-trap could be defined as a device that should be expected, at a 95% confidence level, to hold ≥70% of animals for 24 hours without serious injury (Proulx et al. 1993*b*). To our knowledge, no study has ever used such strict criteria to assess the humaneness of steel-jawed leghold traps to capture arctic fox.

If leghold traps were banned, alternatives would be needed to ensure the long-term survival of the fur industry (Barrett et al. 1988). In simulated natural environments, Proulx et al. (1993*a*) showed that the Sauvageau 2001-8 (Les Pièges du Québec, St-Hyacinthe, Que.) rotating-jaw trap had the potential to humanely kill arctic fox. When set with an offset baited trigger in a 3-sided wire mesh cubby, the trap rendered 9 of 9 arctic foxes irreversibly unconscious in ≤3 minutes. The trap was safely handled, did not damage pelts, and it could be expected at a 95% confidence level to render ≥70% of animals captured on traplines irreversibly unconscious in ≤3 minutes (Proulx et al. 1993*a*).

We conducted this study on 2 northern traplines to: (1) evaluate the ability of the Sauvageau 2001-8 trap to strike properly and humanely kill arctic foxes, (2) determine the type and magnitude of limb injuries of arctic foxes captured in Number 1½ steel-jawed leghold traps (Woodstream Co., Lititz, Pa.), and (3) compare the capture-success of both trapping devices.

STUDY AREAS AND METHODS

Traps were field-tested on 2 traplines in the Northwest Territories. We selected traplines on the basis of previously high trapping success for arctic fox and a willingness of the trappers to participate in the research. Trapline 1 was located near the town of Sachs Harbor on Banks Island. Trapline 2 was located at Walker Bay approximately 95 km north of Holman on Victoria Island. The topography ranged from relatively flat plains to rugged low mountains and high plateaus. Coastal regions varied from gently sloped plains to high hills. Numerous lakes, rivers, and small streams were

found on both traplines. Vegetation cover consisted mainly of forbs, moss, and lichens.

As described in Proulx et al. (1993*a*), the Sauvageau 2001-8 is a killing trap with 2 rotating frames (one of them has an extra striking bar at each extremity) and 2 torsion springs. Each trap was descented by boiling, and dyed and waxed once. Each trap was set on top of a 50-cm aluminum post driven into the snow to a depth of 34 cm. A 3-sided cubby made of wire mesh (both traplines) or snow (Trapline 2 only) was constructed around the trap. On Trapline 1, the trigger was baited with a red cloth previously soaked in sardines. On Trapline 2, the red cloth was previously stuffed inside the rumen of freshly killed caribou (*Rangifer tarandus*) and wrapped around the trigger of the trap. A piece of fatty membranous tissue taken from the intestinal cavity of caribou was also wrapped around the cloth. On both traplines, small chips of frozen caribou rumen were placed in front of the set. On Trapline 2, the trap consistently faced the dominant winds.

Trappers used their own technique on both traplines when setting the Number 1½ steel-jawed leghold trap. On Trapline 1, traps were set on a flat mound of snow or ice and covered with snow. Muskox (*Ovibos moschatus*) or caribou meat pieces were placed at the four corners of each set. On Trapline 2, traps were set near a distinctive landmark (i.e., large rock, ice mound, etc.). Small pieces of frozen caribou rumen were scattered near each trap and a larger piece was pushed into the snow approximately 10 cm from the trap.

Trapline 1 was operated from 10–18 November 1990; Trapline 2, from 16 November 1990–2 January 1991. Trapline 1 used 40 Sauvageau 2001-8 traps and 42 leghold traps. Trapline 2 used 58 and 59 traps, respectively. Each trapper was assisted by an experienced technician who recorded data. Trappers selected trapping sites; the type of trap to be placed at each site was determined at random. Traps and trap sets were individually numbered and photographed.

On Trapline 1, traps were usually visited on a daily basis. On Trapline 2, traps were examined irregularly because of unstable weather and equipment failure. For each animal captured, trap placement on the animal, signs of struggle, oral and anal discharge, and pelt damage were recorded. Each captured animal was photographed in the trap. Animals found alive in traps were killed by a sharp blow to the head. Animals were removed from the trap, labelled, placed in a plastic bag, and frozen. In the laboratory carcasses were thawed, radiographed, and necropsied for lesion assessment.

The Sauvageau 2001-8 was classified as humane if it struck ≥70% arctic foxes in the head-neck region (Proulx et al. 1993*a*). Onderka et al.'s (1990) cumulative scoring system was used to assess the humaneness of the Number 1½ leghold trap (Table 1). The trap was judged humane if it held ≥70% of the foxes without serious injury, i.e. <50 points in the scoring system (Table 1).

Chi-square goodness-of-fit test was used to compare success between trap types (Siegel 1956:42–47). We used 2 × 2 tables with the Yates correction to test for independence between cubby type categories and arctic foxes captured (Siegel 1956:107–109). We used contingency tables to compare the proportions of animals with injury scores ≥50 points from Traplines 1 and 2 (Dixon and Massey 1969:240–241). For the Sauvageau 2001-8 trap, the distance from the nose of the animal to the striking bar was compared to that recorded in simulated natural environments (G. Proulx, unpubl. data) with a *t*-test (Dixon and Massey 1969:114–119).

RESULTS

Trap-Nights and Monitoring

The Sauvageau 2001-8 trap represented 49.6% of 546 trap-nights on Trapline 1 and 49.9% of 4,404 trap-nights on Trapline 2. On average, researchers visited Trapline 1 every 1.4 days and Trapline 2 every 8 days. All traps were visited 5 times on average.

Capture Success

On Trapline 1 the leghold trap captured more ($\chi^2 = 51.112$, 1 df, $P = 0.005$) arctic foxes than the Sauvageau 2001-8 trap (Table 2). It took 5 times as many trap-nights to capture an arctic fox in the Sauvageau 2001-8 than in the leghold.

On Trapline 2, the Sauvageau 2001-8 and the leghold trap captured a similar ($\chi^2 = 1.941$, 1 df, $P = 0.20$) number of arctic foxes (Table 2). Twenty-nine foxes were captured in 37 Sauvageau 2001-8 trap cubbies made of wire mesh. Fourteen foxes were captured in 21 cubbies made of snow. There was no difference ($\chi^2 = 0.030$, 1 df, $P = 0.90$) between the number of foxes captured in each type of cubby.

On the 2 traplines combined, the Sauvageau 2001-8 also captured 2 red foxes (*Vulpes vulpes*) and 1 weasel (*Mustela* spp.). The leghold traps captured 5 arctic hares (*Lepus arcticus*).

Capture Locations and Injuries

The average distance between the tip of the arctic foxes' nose and the striking bar of the Sauvageau 2001-8 ($\bar{x} = 12.5$ cm, SE = 0.325, $n = 62$) was less than ($t = 2.832$, $P = 0.005$) that recorded in simulated environments ($\bar{x} = 15.0$ cm, SE = 0.5, $n = 9$). The majority (88.7%)

Table 1. Number and percent of limb injuries to arctic foxes captured in the longspring Number 1½ steel-jawed leghold trap on 2 traplines in the Northwest Territories, Canada, 1990–1991.

Injury	Points scored	Number of occurrences			
		Trapline 1[a]		Trapline 2[b]	
		$n = 97$	%[c]	$n = 58$	%
No apparent injury	0	48	49	16	28
Edema/hemorrhage	1–5	24	25	7	12
Skin laceration	5–10	3	3	15	26
Maceration of subcutaneous muscle, tendon or ligament; partial severance of tendon	20–40	11	11	6	10
Periosteal/bone abrasion	20–40	9	9	5	9
Subluxation below carpus/tarsus	30	3	3	1	2
Dislocation below carpus/tarsus	50	0	0	6	10
Fracture of digits	30–40	1	1	3	5
Simple fracture below carpus/tarsus	50	6	6	3	5
Severance of tendons below carpus/tarsus	50	1	1	2	3
Simple fracture above carpus/tarsus	100	3	3	0	0
Compound fracture above carpus/tarsus	200	0	0	3	5
Amputation of toes	30–40	1	1	7	12
Amputation of limb	400	2	2	3	5

[a] Average visitation rate = 1.4 days.
[b] Average visitation rate = 8.0 days.
[c] Each injury category is considered separately and a fox may be represented in >1 row. Total percent exceeds 100.

of the 62 arctic foxes were struck on the head. The others (11.3%) were struck on the neck. All the strike locations were associated with a loss of consciousness in ≤3 minutes in simulated environments. No arctic fox was found alive in the Sauvageau 2001-8 trap. Autopsies performed on 60 carcasses indicated that the majority (86.7%) of the animals received major traumatic lesions involving mostly the central nervous system (Table 3). The Sauvageau 2001-8 was judged to be humane by our criteria. Pelt damage from scavengers was recorded in 15 animals.

Of the 155 arctic foxes captured in leghold traps, 150 were necropsied. One of them was omitted from the injury analyses because we could not determine if the injuries were due to the trap or scavenging by a gray wolf (*Canis lupus*). Four others were lost during transport. Evidence of self-mutilation was not encountered, nor were neck, shoulder or chest injuries. Pelt damage (due to traps and scavengers) was recorded in 12 animals.

Only 2 of the 97 arctic foxes captured in leghold traps on Trapline 1 were dead on arrival of the researchers. Most arctic foxes had little (edema, skin laceration) or no apparent injury (Table 1). Moderate injuries (dislocations, fractures of digits, simple fractures below carpus/tarsus, severance of tendons) were re-

Table 2. Total captures and trap-nights/capture for arctic fox using the Sauvageau 2001-8 (S) and the Number 1½ steel-jawed leghold (L) traps on 2 Northwest Territories traplines, Canada, 1990–1991.

	Trapline 1		Trapline 2	
	S	L	S	L
Number of captures	19	97	43	58
Trap-nights per capture	14.3	2.8	51.1	38.1

Table 3. Major traumatic lesions observed for arctic foxes captured in the Sauvageau 2001-8 trap on 2 traplines in the Northwest Territories, Canada, 1990–1991.

Lesion combinations	n	%
Cranial fracture	6	10
Cranial fracture plus brain hemorrhage/laceration	34	57
Brain hemorrhage/laceration	1	2
Spinal fracture	6	10
Cranial and spinal fracture	2	3
Trachea severance	3	5
None	8	13
Total	60	100

Table 4. Cumulative injury scores for arctic foxes captured in longspring Number 1½ steel-jawed leghold traps on 2 traplines in Northwest Territories, Canada, 1990–1991.

Trapline	n (%)	Injury score classes					
		0–15	20–45	50–80	85–120	125–395	400+
1	96 (100)	78 (82)	4 (4)	5 (5)	3 (3)	4 (4)	2 (2)
2	53 (100)	26 (49)	6 (11)	10 (19)	2 (4)	4 (8)	5 (9)

corded 7 times (Table 1). Severe injuries (compound fracture, amputation of toes or a limb) occurred in 3 animals. The injury score of the majority (82%) of animals was <20 (Table 4). The Number 1½ steel-jawed leghold trap was considered humane on Trapline 1.

On Trapline 2, 14 of the 58 arctic foxes captured in legholds were found dead. Only 32 (60%) of 53 autopsied arctic foxes had an injury score <50 (Table 1). Moderate injuries were recorded 14 times. Severe injuries were present in 14 animals (Table 1). The proportion of animals with injury scores ≥50 was greater ($\chi^2 = 12.068$, 1 df, $P = 0.001$) on Trapline 2 (21 of 53 animals) than on Trapline 1 (14 of 96 animals). The Number 1½ leghold was not found humane on Trapline 2.

DISCUSSION

Our study showed that in the field, the Sauvageau 2001-8 trap consistently struck arctic foxes in the head-neck region. In simulated natural environments, such strikes induced consistent and rapid unconsciousness (Proulx et al. 1993*a*). Therefore, we believe that this trap is humane and can be expected, at a 95% confidence level, to render unconscious in ≤3 minutes ≥70% of arctic foxes captured on traplines.

We also conclude that the Number 1½ steel-jawed leghold trap is humane when examined daily. Obviously, visitation rates do not equal the duration of capture of animals in traps. However, we can assume that on Trapline 2, where traps were visited every 8 days on average, the animals were probably held in traps longer than on Trapline 1, where traps were visited on average every 1.4 days. Longer time in traps explains the higher percent of seriously injured foxes on Trapline 2.

Both traps have met the humaneness requirements used in trap research (Proulx and Barrett 1991). Therefore we recommend them both for the capture of arctic foxes. In construction camps and oil-development sites frequented by arctic foxes (Mayfield 1976, Eberhardt et al. 1982) where killing traps may endanger pets and people, the Number 1½ leghold is more appropriate. However, northern traplines are often remote and cannot be examined daily. Also, live-captured foxes may suffer serious injuries. On these traplines, given the choice between the leghold that may cause serious non-lethal trauma over time and the Sauvageau that quickly kills the animal, we recommend the killing trap.

Trappers participating in this study were familiar with the leghold trap, and they used a set they had effectively developed over years. When properly concealed in snow, a leghold has greater chances of capturing a fox investigating a trap site. On traplines visited daily, it is more advantageous to use the leghold trap. However, when visitations were as long as 8 days apart, the success of the leghold trap dropped and was similar to that of the Sauvageau 2001-8 trap. Under these circumstances, the Sauvageau 2001-8 should be selected for humane reasons.

To avoid European legislation banning fur imports from countries that allow conventional steel-jawed leghold traps (Gilbert 1991), trappers may have to adopt traps such as the Sauvageau 2001-8 (Barrett et al. 1988). Also, recent interviews in northern communities have

indicated that trappers accepted and promoted the use of killing traps to harvest furbearers (Northwest Territ. Renewable Resour. 1992).

SUMMARY

The ability of the Sauvageau 2001-8 trap to humanely kill arctic fox by rendering ≥70% of animals captured on traplines irreversibly unconscious in ≤3 minutes was tested on 2 Northwest Territories traplines. The trap, set on a post with a baited trigger, captured 62 arctic foxes. All animals captured by the Sauvageau 2001-8 traps received head-neck strikes. Based on simulated natural environment studies, where head-neck strikes caused loss of unconsciousness in ≤3 minutes, the Sauvageau 2001-8 trap humanely killed arctic foxes on traplines. We also assessed the ability of the Number 1½ steel-jawed leghold trap to hold ≥70% of arctic foxes without serious injury, i.e., <50 points in our injury scoring system. A total of 155 arctic foxes were captured in the Number 1½ steel-jawed leghold trap. On the trapline visited an average of 1.4 days, the majority (81.4%) of 97 arctic foxes were held without serious injury. On the trapline visited an average interval of 8 days, 21 of 53 autopsied animals had an injury score >50. When the Number 1½ steel-jawed leghold was visited daily, it was found humane and more successful than the Sauvageau trap in capturing foxes. However, when visitation rates averaged 8 days, the trap was not humane and its capture success dropped to that of the Sauvageau 2001-8 trap. On such traplines, the Sauvageau 2001-8 should be selected for humane reasons.

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LITERATURE CITED

BARRETT, M. W., G. PROULX, AND N. JOTHAM. 1988. Wild fur industry under challenge—the Canadian response. Trans. North Am. Wildl. and Nat. Resour. Conf. 53:180–190.

DIXON, W. J., AND F. J. MASSEY, JR. 1969. Introduction to statistical analysis. Third ed. McGraw-Hill Book Co., New York, N.Y. 638pp.

EBERHARDT, L. E., W. C. HANSON, J. L. BENGTSON, R. A. GARROTT, AND E. E. HANSON. 1982. Arctic fox home range characteristics in an oil-development area. J. Wildl. Manage. 46:183–190.

GILBERT, F. F. 1991. Trapping—an animal rights issue or a legitimate wildlife management technique—the move to international standards. Trans. North Am. Wildl. and Nat. Resour. Conf. 56:400–408.

GRAVES, J. G., AND E. HALL. 1988. Arctic mammals. Dep. Renewable Resour., Yellowknife, Northwest Territ. 85pp.

MAYFIELD, H. F. 1976. Of arctic foxes and birds and men. Audubon 78:2–23.

NORTHWEST TERRITORIES RENEWABLE RESOURCES. 1992. The Northwest Territories trap exchange program. Northwest Territ. Renewable Resour., Yellowknife, leafl. 4pp.

ONDERKA, D. K., D. L. SKINNER, AND A. W. TODD. 1990. Injuries to coyotes and other species caused by four models of foothold devices. Wildl. Soc. Bull. 18:175–182.

PROULX, G., AND M. W. BARRETT. 1989. Animal welfare concerns and wildlife trapping: ethics, standards and commitments. Trans. West. Sect. Wildl. Soc. 25:1–6.

———, AND ———. 1991. Ideological conflict between animal rightists and wildlife professionals over trapping wild furbearers. Trans. North Am. Wildl. and Nat. Resour. Conf. 56:387–399.

———, A. KOLENOSKY, M. J. BADRY, P. J. COLE, AND R. K. DRESCHER. 1993*a*. Assessment of the Sauvageau 2001-8 trap to effectively kill arctic fox. Wildl. Soc. Bull. 21:132–135.

———, D. K. ONDERKA, A. J. KOLENOSKY, P. J. COLE, R. K. DRESCHER, AND M. J. BADRY. 1993*b*. Injuries and behavior of raccoons (*Procyon lotor*) captured in the Soft Catch® and the EGG® traps in simulated natural environments. J. Wildl. Dis. 29:447–452.

SIEGEL, S. 1956. Nonparametric statistics for the behavioral sciences. McGraw-Hill Book Co., New York, N.Y. 312pp.

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