RELOCATION OF MOUNTAIN GOATS TO MT. WHITE, YUKON 1983 - 1984

Jean Carey

Norman Barichello

Fish and Wildlife Branch

Department of Renewable Resources

Government of Yukon

Yukon
Renewable Resources

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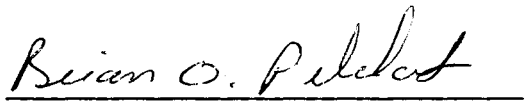
Yukon Department of Renewable Resources,

Box 2703,

Whitehorse, Yukon,

Y1A 2C6

Director, Fish & Wildlife Branch



Supervisor

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NATURAL HISTORY

The mountain goat (Oreamnos americanus) is one of the rarest big game species native to the Yukon, its range extending only into the southern third of the territory (Figure 1). The term "mountain goat" is somewhat of a misnomer. This species is actually a rupicaprid, or mountain antelope, more closely related to Europe's chamois than to the familiar domestic goat.

The mountain goat is a stocky animal, with a short tail and slender neck; the horns are thin and pointed, approximately 200 mm (8 inches) long in adults. Their winter coat consists of white wool and long white guard hairs, and is characterized by a long pointed beard. Adult males range in total length from 1250 to 1800 millimeters (50 to 70 inches) and weigh from 45 to 140 kilograms (100 to 300 pounds). Females are generally 30% smaller. The goat's hooves are ideally suited to the smooth rock surfaces encountered in mountain goat habitat. A hard shell surrounds cushion-like pads that are sensitive to touch and provide a good grip on the rock faces.

Mating occurs from early November through to mid-December, with the kids born in late May or early June. Kids are very precocious, clambering about the rocky cliffs a few hours after birth. They are weaned by September, but continue to travel with their mother until the following year's kid is born.

Mountain goats prefer habitat characterized by steep slopes and rocky outcrops. This precipitous terrain puts them beyond range of most potential predators, compensating for the difficult environmental conditions in such areas.

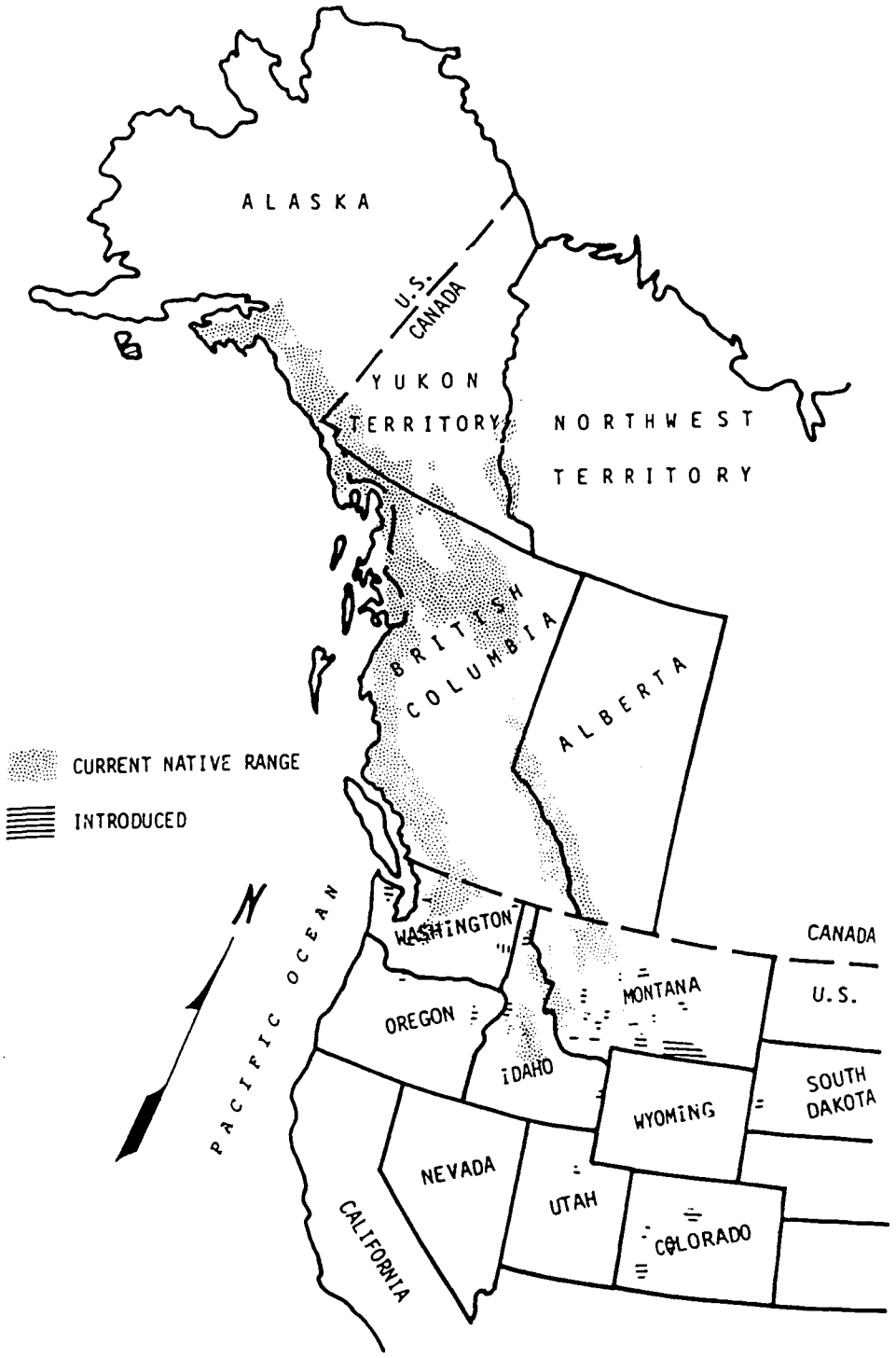

Figure 1. Distribution of mountain goats in North America (from Johnson, R. L. 1977. Distribution, Abundance and Management Status of Mountain Goats in North America. In: Proceedings of the First International Mountain Goat Symposium, February 19, 1977, Kalispell, Montana).

The food habits of goats are very diverse, adapting to include almost any plant material that is available, from grasses to shrubs to conifers. During the summer they take advantage of the forage-rich alpine slopes, but must be satisfied with the food available on snow-free rocky slopes through the winter months.

STATUS OF MOUNTAIN GOATS IN YUKON WITH AN EMPHASIS ON MT. WHITE

Word of mouth and casual observations, primarily by hunters and outfitters, were the only population estimates available until 1973, when the territorial government first hired biologists and began aerial surveys to census the big game of the territory. Only then could management decisions be implemented in the Yukon to reflect abundance and distribution. In 1977, the goat population in the Yukon was estimated to be 1400 of which approximately 900 were protected in Kluane National Park and Kluane Game Sanctuary.

In recent history, a number of small, isolated bands have been exterminated. These areas include Rockslide Creek, Mineral Creek and Tincup Lake in the Kluane Range, an unnamed mountain east of Pickhandle Lake along the Alaska Highway, and Mt. White near Jake's Corner. Residents of the Jake's Corner area can recall seeing ten to thirty goats at a time on the mountain prior to the construction of the Atlin Road in 1949. The Atlin Road gave easy access to the mountain to hunting and also bissected a possible goat movement corridor off Mt. White to Little Atlin Lake for water during the summer months. The last known sighting of any goats in this area was in the late 1960's.

In 1981, a proposal was made to re-establish goats on Mt. White. In the Yukon, there were two options: purchase goats from a local game farm, or capture and relocate free-ranging animals. A decision was made to capture wild goats, a choice based on three considerations.

(1) The purchase price of captive-bred goats was $6000 per goat compared to $2000 per goat to live capture wild stock.

(2) Free ranging goats are suspected to be cleaner of parasite and disease.

(3) Free ranging goats are likely less inbred.

The objectives of the planned program were:

- to re-establish a healthy and viable mountain goat population on Mt. White.
- to allow residents and tourists the opportunity to observe wildlife in its natural habitat.
- to gain knowledge and experience, through the capture and monitoring programs, that would be applicable to future management.
- to enhance abilities to measure and assess vegetation use by an expanding goat population.

MOUNTAIN GOAT TRANSPLANTS - PRELIMINARY CONSIDERATIONS

Feasibility

Mountain goat transplant programs have been carried out in North America since the 1920's. Alaska, Washington, Montana, Idaho, Utah, South Dakota, Oregon, Nevada and Alberta wildlife agencies have all used transplants to re-establish exterminated populations and to extend the southern and eastern ranges of the species.

One of the true transplant success stories took place in Washington state. From 1925-29 approximately twelve goats were relocated from Alberta and Alaska to the Olympic Peninsula by a Port Angeles sportsmen's organization, with assistance from the U. S. Forest Service and the State of Washington. Ironically, thirteen years later the area was included in Olympic National Park and therefore closed to hunting. This region proved to be ideal habitat: goats flourished, their distribution soon spread, and in some places the increased density caused habitat destruction. Since that time, the Olympic Peninsula has served as a sourcebank for many of the relocation programs in the United States.

Capture Method

There are three basic modes of capturing goats for transplant: trapping (using pen traps, baited box traps, drive nets or drop nets) netting from a helicopter with a net gun, or chemical immobilization using a dart gun.

A net gun is a blank-loaded rifle fitted with a triangular basket on the muzzle containing a weighted triangular net. When the gun is fired, the charge dispels weights from the basket, pulling the net along with them. To be effective the gunner must be within three meters of the targeted animals. With a dart gun, a syringe containing the immobilizing drug is projected from the firearm. Upon impact, the drug is injected into the animal.

The Yukon Department of Renewable Resources chose the net gun as the method of capture. It is highly selective, requires minimal personnel, and does not necessitate lengthy baiting of the capture site. Risk to both the goats and crew is minimized compared to chemical immobilization: the drug Ketamin takes too long to act, so the goats could fall and injure themselves in the interim, while M99, the other commonly used drug, is fatal to humans. In addition, a net gun was readily available and it had proved successful for caribou and sheep captures.

Timing

Late summer was chosen for the transplant because

- nannies should have recovered from the energy drain of pregnancy and lactation

- kids should be old enough to withstand the stress of separation from their nannies

- the goats have lost their winter hair, thus reducing the risk of hyperthermia

- the transplanted animals should have time to habituate to their new range before the rut begins

- it is not during the period when they obtain critical minerals from traditional mineral licks

Age and Sex Composition

Based on local goat productivity and mortality, the Alaska Department of Fish and Game estimated that at least five males and ten females, between the ages of two and eight were necessary for a successful introduction in Southeast Alaska. A similar composition was proposed for the Yukon transplant.

Transport

The major concern in transporting the goats to the release site was temperature regulation, minimizing the chances of the goats suffering from hyperthermia. Aircraft was considered for the transport but that was an expensive option and would possibly require holding the animals for extended periods.

Truck transport was a more viable alternative because the goats could be transported immediately after capture, regardless of the number captured or of the flying conditions at the release site.

Individual crates with adequate ventilation allowed the goats to be doused with cold water at frequent intervals and provided protection to the animals during transport.

Cost was minimized by the Yukon Fish and Game Association's contribution of pick-up trucks and volunteer drivers.

Site Suitability

Site suitability is also an important consideration in any transplant operation. The new area must be capable of supporting a goat population, available winter forage, precipitous terrain adjacent to feeding areas and mineral licks must all be present.

Medical Concerns

During transplant operations in Washington's Olympic National Park, management officials experienced severe losses of captured goats. In 1979, all four of the captured juvenile goats died, and in 1980 three out of nine animals were lost. A closer examination of the capture operation led to a conclusion that three major problems should be overcome for safe and successful relocations: capture myopathy, parasitism and infection. Capture myopathy (originally referred to as white muscle disease) is a degenerative change in cardiac and skeletal muscles, resulting in paralysis and ultimately death. The condition is apparently precipitated by a build up of acids in the blood generated due to physical exertion and psychological stress.

A veterinary study in Africa where zebra were chased and captured under experimental conditions showed that the fall in blood pH after a short extensive chase proved lethal in animals not subsequently treated with a sodium bicarbonate solution (a blood neutralizing agent). Those animals caught after a longer chase were reported to have lower acid levels, presumably because exhaustion had set in and the effort to escape had become less intense.

Animals receiving the sodium bicarbonate treatment had lower acid levels in their blood, their heart and respiratory rates were restored to more normal levels and their overall condition improved. All survived.

Studies have also indicated that animals with a selenium deficient diet are more likely to develop the condition. A selenium-Vitamin E product can be administered as a long term precaution against a selenium deficiency.

Diazipam (valium) has proven useful in reducing stress to the animals. General stress related to capture and relocation is known to suppress an animal's immune system, making it more vulnerable to disease and parasitism. An injection of long-acting penicillin can act as a preventative against these infections. In addition, an injection of a Vitamin B complex is recommended for its anti-stress related abilities and its action as an appetite stimulant.

The expertise of a veterinarian was considered desirable to monitor the goat's condition and to administer the required medications.

Mt. White Transplant

During 1981, a cursory habitat assessment was carried out on Mt. White. A brief helicopter reconnaissance was done during which suspected goat trails, accessible watering areas and caves were noted. Aerial photographs of representative plant communities were taken with a 35 mm camera and three of these sites were sampled on the ground, wherein percent cover estimates were used as an indicator of the relative abundance of plant species. Since goats are known to have inhabited Mt. White in the past, and the vegetation is not thought to have changed in the intervening years, this was merely a confirmation that the area is indeed suitable goat range, and that biotic factors were unlikely the cause of the disappearance.

Four weeks prior to the first transplant, aerial surveys were conducted to obtain general locations of goats in the Kluane Game Sanctuary south of Dezadeash, the source of the goats. Suitable capture sites were baited with salt blocks and alfalfa pellets at that time, not only to increase the chances of finding the animals but to attract them to areas conducive to helicopter capture.

The first phase of the Yukon's mountain goat transplant was carried out 28-30 August, 1983. Several logistic problems were encountered that hindered capture. Firstly, the capture helicopter was pre-empted by the Ministry of Transport and the R.C.M.P. to investigate two aircraft crashes in the area, necessitating flying late in the day. Unfortunately, as time passed, the winds in the mountains became very gusty. There was also an unfortunate helicopter

crash during the capture operation which forced a change in procedure. Luckily, no one was injured.

Generally, the goats were found low in the brush, probably due to the time of day and time of year, and close to ravines which they used as escape terrain. The brush served as a disadvantage by hanging up the net and allowing the goats to escape from beneath. Once in the ravines, the goats could not be approached close enough to accurately discharge the net gun, nor could they be effectively hazed to a more suitable capture site.

At the start of the transplant, the transport crates were ferried to a nearby ridge. These crates were plywood boxes 120 x 60 x 105 cm (47 x 24 x 41 inches), vented with metal mesh and equipped with a lanyard ring for slinging from the helicopter. From the ridge, the net gunner and an observer set out in the helicopter (Bell 206B) to locate the first goat for capture. Once selected, the goat was hazed by the helicopter to a suitable capture site, where the net gun was fired and the animal entangled. The gunner and observer were immediately dropped off to restrain and blindfold the goat, while the pilot returned to the staging area for the veterinarian and an additional handler (Figure 2). Immediately upon arrival, the veterinarian administered a sedative and withdrew a blood sample. The prescribed drug regime was then administered. Doses varied according to the size of the animal (Table 1).

Meanwhile, rubber hoses were placed over the horns, a radio transmitter collar was attached, body and horn measurements taken and a fecal sample collected. Finally, the goat was untangled from the net, backed into the crate, and the

Figure 2. Handler restraining blindfolded goat.

Table 1. Drugs administered at time of capture.

Name	Sex	Valium	Sodium Bicarbonate	Selenium	Penicillin	Vitamin B
Adrienne	F	20 mg	20 mEq	2 cc	3 cc	3 cc
Carolle	F	10 mg	15 cc	4.5 cc	3 cc	5 cc
Cathy	F	10 mg	15 cc	4.5 cc	3 cc	5 cc
Dillon	M	17 mg	30 mEq	3 cc	4 cc	3 cc
Dougie	M	5 mg	15 cc	1 cc	1 cc	2.5 cc
Edna	F	20 mg	20 mEq	2 cc	4 cc	3 cc
Grant	M	30 mg	35 mEq	3 cc	4 cc	3 cc
Hanna	F	10 mg	15 cc	4.5 cc	3 cc	5 cc
Helen	F	10 mg	20 mEq	2 cc	3 cc	3 cc
Mac	M	20 mg	35 MEq	3 cc	4 cc	3 cc
OKQ	F	10 mg	15 cc	4.5 cc	3 cc	5 cc
Steve	M	15 mg	15 cc	6 cc	4 cc	5 cc

blindfold removed. Care had to be taken throughout the procedure to restrain the animal to avoid injury to both the goat and the handler.

Once in the crate, the goat was slung by helicopter to the staging area (Figure 3). When two goats had been captured and processed, they were loaded into the Fish and Game Association pick-up and driven to the release site along the Atlin Road (Figure 4 and 5). Enroute, they were frequently drenched with water to prevent hyperthermia, and checked for their health. At the release site, the crates were unloaded from the truck, and placed with the door facing uphill, away from the road.

A snow fence was erected along the downhill side of the area in the hope of directing the animals uphill, away from the road. A large crowd had gathered to witness the event, and probably contributed to the goats' reluctance to leave their crates and to their disorientation upon release. Eventually, all the animals made their way up the slope.

The 1984 (2-3 August) capture regime was the same as the previous year's, but none of the problems were evident: the helicopter had no other commitments, and the weather was clear and calm. The goats also seemed to be more "co-operative". They were generally found in high alpine meadows, away from any shrubbery or ravines that could interfere with the capture.

Two injuries were noted however. One large nanny (Edna) suffered a scraped shin and brow during a tumble down a scree slope, but the wounds required no special attention. The other casualty was a biologist who received a puncture wound to his hand when it was caught between a goat horn and the crate.

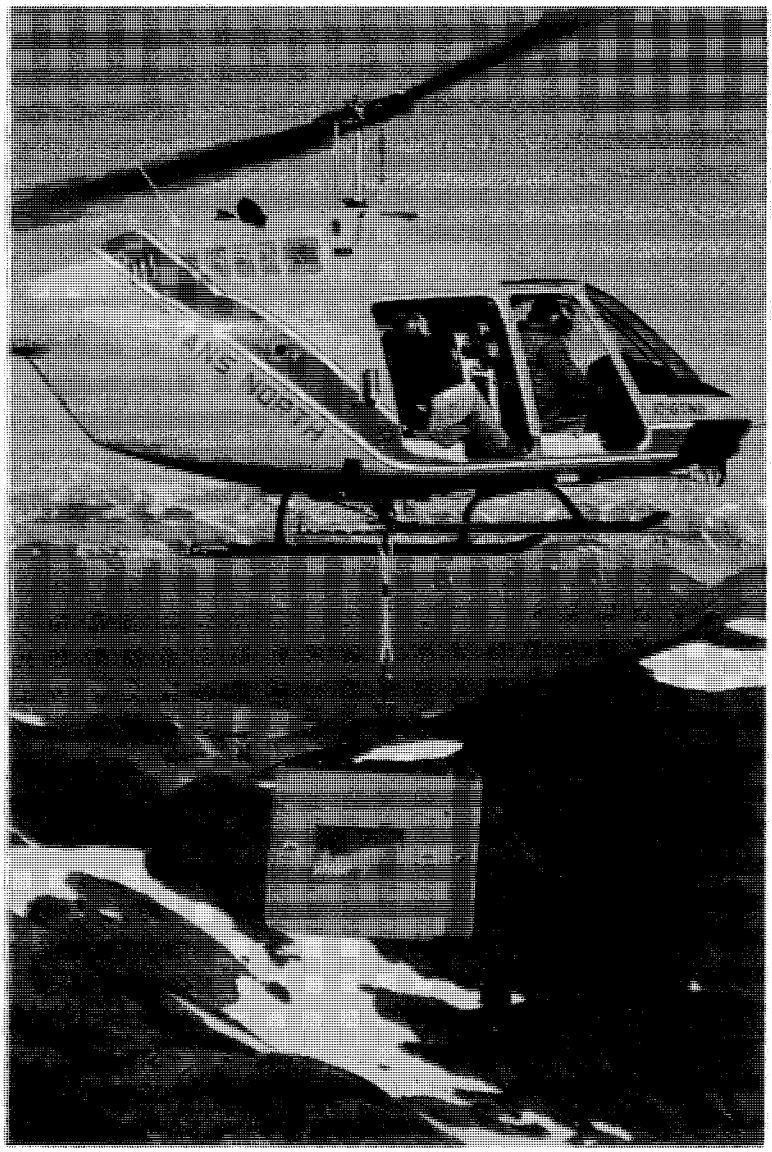

Figure 3. Crated goat being transported to the staging area.

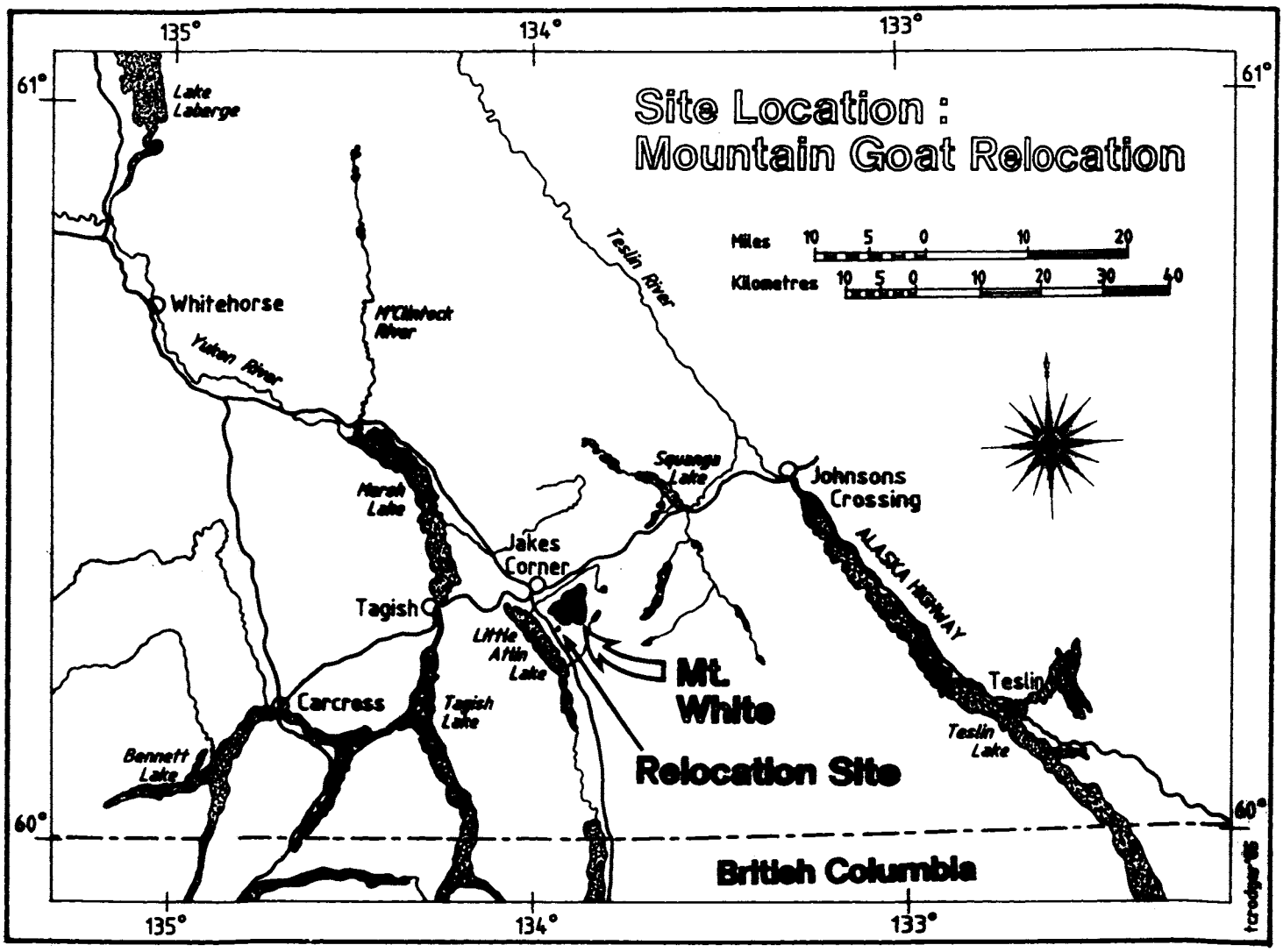

Figure 4. Location of Mt. Goat release site.

Figure 5. Mt. White release site, 1983.

The same release site was used in 1984, but the personnel in attendance were kept to a minimum, and there was very little confusion associated with the procedure. The goats were not forced from the crates, but allowed to leave at their leisure. The only incident occurred when a large billy charged at two of the handlers. They were caught on the roof of their truck for over half an hour, before the billy wandered away.

RESULTS AND DISCUSSION

Table 2 gives the sex, age, body and horn measurements at the time of capture. All of the parameters were not obtained for each animal, depending on the individual circumstances.

Since their release, the four male and seven female radio-collared coats have been monitored on an approximately monthly basis. Whenever possible, visual sitings were attempted, but the nature of the terrain, the goats's habits and the sometimes turbulent flying conditions often made this impossible.

Two of the transplanted goats, Dougie, the 1983 kid, and Grant, one of the large billies, have not survived. Grant was found dead near the release site and is believed to have died because of the trauma of capture. Kids generally have a very low survival rate their first year, so while unfortunate, it is not extraordinary that Dougie did not live through his first winter.

No kids were observed in spring 1984, but there have been at least two kids produced in each of 1985 and 1986.

Table 2. Goats captured and relocated to Mt. White.

Name	Sex	Year of capture	Age at capture	Neck circumference (mm)	Girth (mm)	Body length (mm)	Horn length (mm)	Horn circumference (mm)	Horn tip spread (mm)
Adrienne	F	1984	4	376	1060	1610	204	107	165
Carolle	F	1983	2	410	1060		188	93	73
Cathy	F	1983	5	370	1210		255	103	
Dillon	M	1984	7						
Dougie*	M	1983	0						
Edna	F	1984	8	400	1140	1800	220		
Grant	M	1984	8				245	140	
Hanna	F	1983	3						
Helen	F	1984	2	340	990	1475	185	93	132
Mac	M	1983	5	635	1357	2000	238	140	175
OKQ	F	1983	5						
Steve*	M	1983	2	430	1000		153	110	

*Not radio-collared.

Without radio collars, it is very difficult to determine the young goats' survival for they are extremely hard to see and would have to be encountered almost by chance. Even so, there is no way of determining the goat's identity.

Except for one excursion to the Teenah Lake area by Carolle, all of the goats have settled onto Mt. White and the peak directly to the east. They are often found on the cliffs overlooking the Alaska Highway or Little Atlin Lake. There have also been several reports of a goat being sited along the Atlin Road, perhaps travelling to the lake for water.

An interpretive sign has been erected at a suitable viewing site along the Atlin Road, to bring the presence of the goats to the attention of the travelling public.

In the short term, the Mt. White goat transplant project has been very successful. However, the true success cannot be judged until the kids born there produce kids of their own, and Mt. White once again has a self-sustaining goat population.

ACKNOWLEDGEMENTS

The Yukon Fish and Game Association actively participated in the project by providing volunteers to transport and release the captured goats.

Grant Lortie provided expert service as the net gunner, and Doug Makkonan of Trans North Turbo Air skillfully piloted the capture helicopter.

Hanna Hoefs was the veterinarian in 1983, and Helen Schwantje of the Western College of Veterinary Medicine volunteered her services in 1984.

Northwestel supplied radio phones to provide communication between the ground areas. Parks Canada generously offered to provide any assistance required.

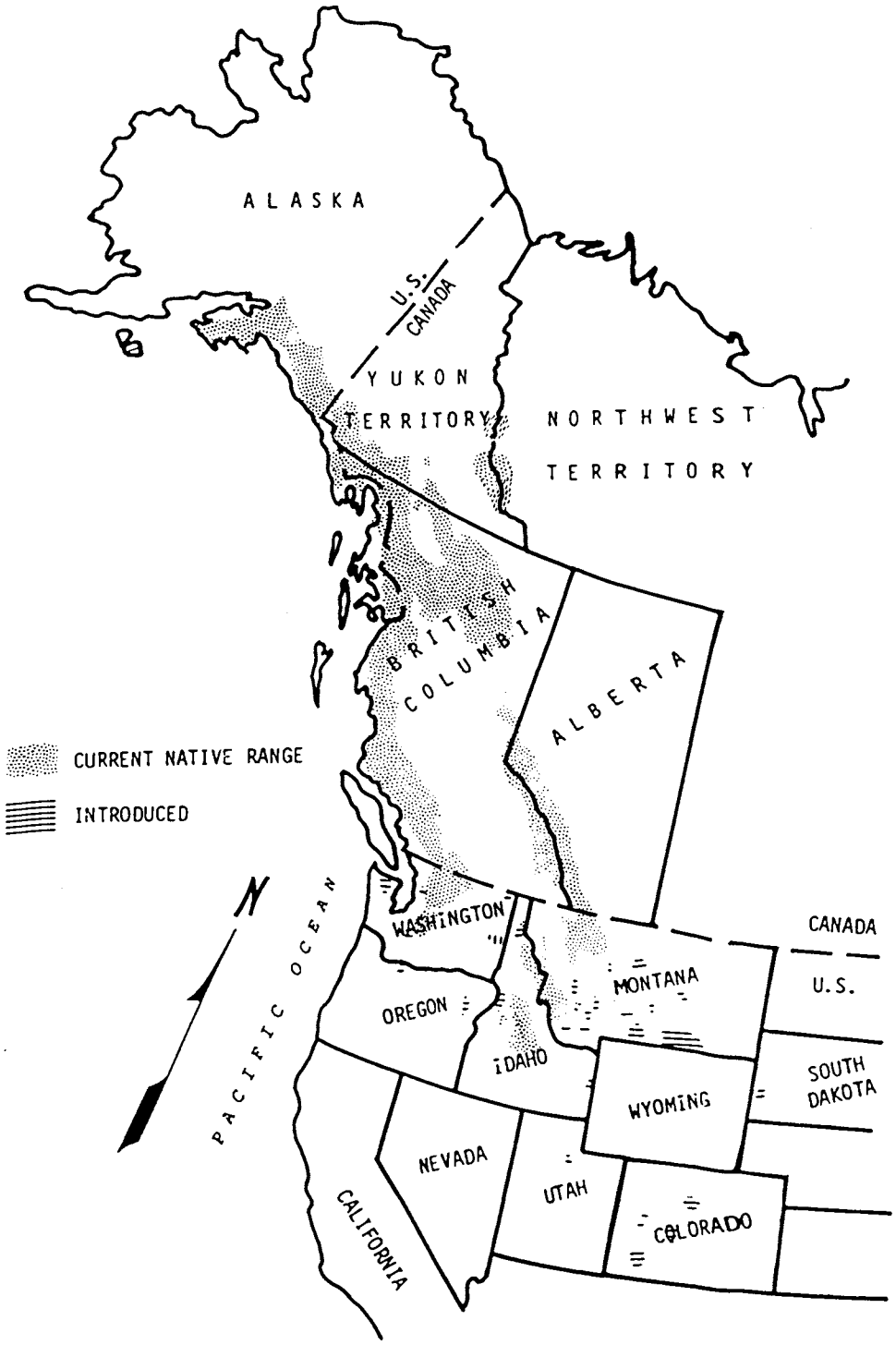

Figure 1. Distribution of mountain goats in North America (from Johnson, R. L. 1977. Distribution, Abundance and Management Status of Mountain Goats in North America. In: Proceedings of the First International Mountain Goat Symposium, February 19, 1977, Kalispell, Montana).