Alaska Department of Fish and Game
Division of Wildlife Conservation
Wildlife Technical Bulletin #9

Reintroduction of Caribou to the Central and Southern Kenai Peninsula, 1985-86

by
Ted Spraker
March 1992

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SUMMARY

The Alaska Department of Fish and Game and U.S. Fish and Wildlife Service jointly reintroduced caribou (*Rangifer tarandus*) to the Kenai National Wildlife Refuge in 1985-86. The primary objective was to reestablish viable population(s) throughout suitable, but unoccupied, caribou range. The secondary objective was to provide additional opportunities to hunt caribou on the Kenai Peninsula. The Service was the primary funding source for this project.

One hundred twenty-one caribou were captured from the Nelchina herd in Game Management Unit (GMU) 13A using two capture techniques during April of 1985 and 1986. Eighty of these animals were relocated to the central (GMU 15B) and southern (GMU 15C) regions of the Kenai Peninsula. In 1985, 47 caribou were captured using helicopter-darting. Chemical immobilization was accomplished with a mixture of 6.25 mg of etorphine (M-99, 1 mg/ml) and 7.5 mg of acetylpromazine (Prom Ace, 10 mg/ml) per dart. Three (6%) mortalities occurred during the capture operation. The remaining 44 caribou were loaded into a 40 foot cattle truck and transported 325 road miles to the Kenai Peninsula. Sixteen (36%) caribou died in transit because of stress and trampling. The remaining 28 caribou (6 males, 22 females) were re-tranquilized and transported by helicopter to Glacier Creek and released on 14 April 1985. Caribou were re-tranquilized using a mixture of 2 mls of xylazine (Rompun, 100 mg/ml) to 10 ml of ketamine hydrochloride (Vetalar, 100 mg/ml) at a dosage of 3.0 ml for adults. The approximate cost per caribou captured using the helicopter-darting method was $553.00.

In 1986, 74 caribou were captured with a 21.3 m by 21.3 m (70 X 70 ft.) drop-net. Alfalfa and salt were used to lure the caribou under the net. Captured animals were tranquilized using a mixture of 1.5 ml xylazine and 10 ml of ketamine dosed at: 5 ml for adults, 3.5 ml for yearlings and 2 ml for calves. Six caribou died during the capture operation. Ten caribou were radio-collared, tagged and released as part of an ongoing Nelchina herd study. Two animals escaped from the holding pen during loading and one was released due to insufficient space on the transport vehicle.

Fifty-two of the 74 caribou were transported to the Kenai Peninsula in 3 trips in individual crates loaded on a two-ton truck and 20 foot trailer. No mortalities occurred using this transport method. Caribou were then transported by helicopter to the release sites in individual crates. Caribou were blindfolded but only those that were extremely excited were re-tranquilized using a mixture of xylazine and ketamine for the 20-25 minute trip to the remote release site. Release sites, numbers and dates were: 1) GMU 15B, Lake Emma - 18 caribou on 15 April 1986; 2) GMU 15C, Caribou Lake - 16 caribou on 17 April 1986; and 3) GMU 15B, Green Lake - 18 caribou on 20 April 1986. Composition of relocated caribou was: 5 males and 47 females. The approximate cost per caribou captured using the drop-net method was $191.00.

Key Words: caribou, Nelchina herd, capture techniques, helicopter-darting, drop-net, transport methods, translocation.

CONTENTS

BACKGROUND

Historically, caribou were found on the Kenai Peninsula (Porter 1893; Seton-Karr 1887; and Schiefner 1874 cited in Lutz 1960; Palmer 1938). Although reports indicate their distribution was widespread, estimates of population size were not given. Because suitable caribou habitat is limited on the peninsula caribou were probably never numerous. Caribou antlers, originating from the early 1900s have been found in only two areas on the Kenai Peninsula during the past two decades: 1) Caribou Hills; and 2) Skilak-Tustumena Benchlands, according to Department and U.S. Fish and Wildlife Service (USFWS) records.

Caribou were extirpated from the Kenai by 1912 (Palmer 1938). Market hunters during this period hunted caribou for mining camps and killed most of the original population. Remaining animals probably died through natural attrition and predation.

The USFWS first considered reintroducing caribou in 1951. However, a reintroduction was not attempted until 1965 and 1966 when the Alaska Department of Fish and Game (ADF&G) released 15 and 29 caribou, respectively, on the Kenai National Wildlife Refuge. These two reintroductions resulted in the establishment of two caribou herds: the Kenai Mountains herd and the Kenai Lowlands herd which currently number approximately 300 and 130 animals, respectively. Despite the success of these reintroductions, the two principal historic ranges, the Caribou Hills and Skilak-Tustumena Benchlands, remained unoccupied.

To establish caribou on these historic central and southern peninsula ranges, the ADF&G and USFWS conducted a cooperative project to introduce additional caribou in 1985 and 1986. Caribou from the Nelchina herd, in Game Management Unit 13, were selected as the donor population for two reasons: 1) caribou previously reestablished on the Kenai Peninsula originated from this herd; and 2) a segment of the herd wintered near the Glenn Highway near Lake Louise, thus reducing capture and transportation costs.

OBJECTIVES

The primary objective of this project was to reestablish viable caribou populations throughout suitable and/or historic, but unoccupied, caribou habitat on the Kenai Peninsula, specifically, in the Skilak-Tustumena Benchlands area (GMU 15B) and the Caribou Hills area (GMU 15C). The secondary objective was to provide additional opportunities to hunt caribou on the Kenai Peninsula. The project called for the release of 30-80 caribou, initially to the Skilak-Tustumena Benchlands and, if sufficient numbers of caribou were obtained, to the Caribou Hills.

The following management guidelines were established for the relocated caribou population(s):

a. Hunting shall occur after the population(s): 1) reach a sufficient size which enables them to maintain themselves or increase, coincident with predation, other natural mortality, and hunting; 2) investigate or seasonally use the majority of suitable caribou habitat in these subunits; and 3) maintain a minimum post-season bull:cow ratio of 35:100. The harvest rate will depend upon the sexes of caribou harvested and the desired herd size.

b. Initially, hunting will be allowed by a limited permit drawing hunt, and the number of permits will be adjusted commensurate with objectives for population size and sex ratios.

The ADF&G had primary responsibility for the capture and relocation of the caribou. The USFWS had primary responsibility for evaluating the success of the transplant. The success of the reintroduction was to be evaluated by monitoring the movements, seasonal habitat use patterns, reproductive success, and mortality rates of relocated caribou.

PROCEDURES

Capture, transport, and release - 1985

In 1985, Caribou were captured using the standard helicopter darting method (Nielson and Shaw, 1967), during a two-day period (April 11 and 12). On the first day animals were

chemically immobilized with a mixture of 5.75 mg of etorphine (M-99, 1 mg/ml) combined with 12.5 mg of acetylpromazine (Prom Ace, 10 mg/ml). The following day caribou were immobilized with increased dosages of etorphine (6.25 mg) combined with a decreased dosage of acetylepromazine (7.5 mg). The immobilizing drug was administered in a 7 ml Palmer dart fired from a Palmer capture rifle. Brown (very low speed) external charges were used to prevent deep penetration of the darts.

Two Bell 206 Jet Ranger helicopters, each with two two-man capture crews, were used to capture caribou and transport them to a circular holding pen. The holding pen, 9.1 m (30 ft.) in diameter, was constructed of interlocking sections of metal rodeo corral panels to which wooden extensions were added to reach 2.4 m (8 ft.). The inside wall of the holding pen was covered with burlap and heavy seine netting to provide a visual barrier and to minimize injury to caribou. A gate and enclosed chute covered with 3/8 plywood connected the holding pen to a fenced work area. Snow was pushed up to a height of about 1.2 m (4 ft.) around the outside perimeter of the holding pen to provide stability.

Immobilized caribou had all four legs hobbled together and were placed inside a canvas transport bag. A cloth hood was used to protect their eyes and a 7-10 cm (3-4 inches) thick foam rubber collar kept their head upright during transport. Figure 1 shows a schematic diagram of the hobbles, transport bag and hoods used to restrain caribou. A 15 m (50 ft.) steel cable attached to the cargo hook of the helicopter was used to sling the captured caribou to a staging area 300 m (985 ft.) from the holding pen to reduce noise and disturbance to caribou already in the holding pen. Once on the ground, caribou were removed from the transport bag, placed on a field-hospital stretcher, loaded on the bed of a pick-up truck and driven to the work area at the holding pen. There they were marked by placing one numbered sheep-button ear tag in each ear, their antlers were sawed off, and they were fitted with a visual collar. Selected animals were also fitted with a radio collar. Information on sex, age, reproductive status, body weights and measurements was recorded. Hair and fecal samples were also collected. Three 10 ml blood samples were collected from each caribou to test for Brucellosis before being transported from the area. Before release into the holding pen, each caribou was injected intramuscularly with 5-10 ml of Penicillin, 40 mg of ivermectin solution (Eqvalan, 20 mg/ml) for treatment and control of internal nematodes and bots, and 14 mg (10 mg intramuscular, 4 mg intravenous) of diprenorphine (M50-50\, 2 mg/ml) as an antagonist to etorphine.

Caribou were transported to refuge headquarters in Soldotna in a 40 foot cattle truck. They arrived at refuge headquarters on 14 April, 9 hours after departing the holding pen. A military CH-54 Sky Crane helicopter equipped with a people-pod was originally scheduled to airlift approximately 30-35 sedated caribou directly to the release site. However, the military cancelled its assistance on 11 April after 22 caribou were captured. We had no alternative but to transport caribou by cattle truck or abandon the project and release the animals already captured.

On arrival at refuge headquarters, each caribou was sedated with a 3 ml intramuscular injection of xylazine (Rompun, 100 mg/ml) and ketamine hydrochloride (Vetalar, 100 mg/ml) premixed at a ratio of 2 parts xylazine to 10 parts ketamine. Caribou were then hobbled, blindfolded, and transported, 7-0 at a time, in a Bell 205 helicopter to the release site at Glacier Creek (Fig. 3). There they were unloaded and allowed to recover from the sedatives before being released. All caribou were released within 8 hours of arrival in Soldotna.

Capture, transport, and release - 1986

During 1986, caribou were captured with a 21.3 m x 21.3 m drop net borrowed from the Colorado Division of Wildlife, using procedures described by Schmidt et al. (1978). Eight bait stations for the drop net were established on 3 March 1986 and baiting continued until trapping was completed. We experimented with seven types of bait: 1) alfalfa hay; 2) brome hay; 3) hair grass; 4) brome haylage; 5) rolled barley; 6) white rock salt; and 7) red trace-mineral salt block. All bait stations were located on frozen lakes or swamps adjacent to lakes to provide a relatively flat space to set up the drop net. It was also necessary to locate stations that could be viewed from a distance of up to 400 m to avoid frightening caribou under or approaching the net.

We used two teams, one of two or three people to drop the net and the other of 6 to 12 to hold and transport animals. The the first team was generally less than 300 m away, with snowmachines ready, so they could reach the entangled animals in less than one minute to secure any caribou in danger of injury. (Occasionally,a caribou twisted its head under its body or over the top of its back). One experienced person could generally handle a caribou. When the net was dropped the second team, 500-800 m away snowmachined to the net in less than three minutes. Caribou were sedated, blindfolded, hobbled, and secured in a canvas transport bag for transporting via standard snowmachine and sled 1 to 5 km to the staging/loading site.

Caribou were tranquilized to minimize stress and facilitate handling. The first 13 caribou captured were injected intramuscularly with an experimental drug, identified by the numbers R51163, at a dosage of 0.4 mg/kg body weight. The remaining caribou were given an intramuscular injection of xylazine and ketamine, premixed at a ratio of 1, 1.5 or 2 ml of xylazine to 10 ml of ketamine. Dosages were 5 ml for adults, 3.5 ml for yearlings, and 2 ml for calves.

At the staging/loading site caribou were processed similarly to 1985, except that in 1986 3 ml of ivermectin was given subcutaneously to each caribou. Additionally, 10 to 15 ml of oxytetracycline (Liquamycin, LA-200, 200 mg/ml) were given to increase the caribou's immune capabilities against disease and infection. After processing, caribou were placed in individual transport crates. "Walking" caribou (one person held one hind leg up and pushed the caribou while two other persons walked alongside to guide it) into a crate was

found to be easier on the animal and handlers, than physically lifting fully sedated caribou into a crate.

We used crates of two basic designs. Stanchion bar crates, designed to accommodate the body of a reindeer with its head outside the crate were used with an adjustable set of padded stanchion bars to accommodate the larger caribou if necessary. Stanchion bar crates were used for transporting caribou by both truck and helicopter. In addition, enclosed crates, 2' wide x 4' high x 6' long were built on the two-ton truck and 20-foot trailer bed used to transport caribou. Only 3 enclosed crates could be built across the forward portion of the truck and trailer beds. Air circulation was provided by drilling eight 2-inch holes in each end of the crates and spacing the top boards 6" apart to increase airflow. Both types of crate were designed with a vertical sliding door.

Caribou were loaded into the enclosed crates first, then 10 additional stanchion bar crates containing caribou were loaded in the rear of the truck and trailer. Stanchion bar crates were evenly spaced to allow maximum room for each caribou to move its head and to allow adequate air circulation.

Caribou were captured and processed in the morning and transported at night when temperatures were cooler and transport was least affected by heavy highway traffic. When the load limit for the truck and trailer was reached, excess caribou were held over in the holding pen for transport on the next trip. Caribou kept in the holding pen more than two days were collared and released on site as part of an ongoing Nelchina herd study.

As in 1985, caribou were enroute approximately 9 hours to the staging site at refuge headquarters. Upon arrival caribou were off-loaded from the transport truck to a Bell 205 helicopter. Stanchion-bar crates were used to helicopter transport caribou, 9 per trip, to the Lake Emma and Green Lake release sites (Figure 3). Caribou in enclosed crates were transferred to stanchion-bar crates by placing the crates together and removing the vertical sliding doors to allow the caribou to move into the stanchion-bar crates. Adult caribou were fitted with visual collars and selected animals were also radio-collared at this time. Calves were not collared. Caribou were hooded to protect their eyes and reduce stress. Excited caribou were tranquilized with a mixture of 1.5 parts xylazine to 10 parts ketamine. A 3/4 ton pickup was used to transfer caribou from the transport truck or trailer to the helicopter 0.5 km away. This reduced stress caused by the departing helicopter to caribou still in the transport truck or trailer. It was also easier to transfer crated caribou from the smaller vehicles to the helicopter. Helicopter travel time to the remote release sites was about 20 minutes at an average speed of 60 mph. Sixteen caribou were transported by truck to a release site near Caribou Lake in Game Management Unit 15C (Figure 3). Total time enroute was approximately 14 hours, including 2 hours in standard pickup trucks used for access to the release site. Upon arrival at all release sites crated caribou were released as a group in one direction.

RESULTS AND DISCUSSION

Reintroduction of Caribou

One hundred twenty-one caribou were captured during the 2-year reintroduction project. In 1985, 47 caribou were captured and 3 (6%) capture-related mortalities occurred (Table 1). The remaining 44 caribou were transported in a stock truck and 16 (34%) animals perished due to stress and trampling. It is interesting to note that only 3 (14%) of the animals held for over 24 hours in the holding pen died during transport, compared to 13 (57%) mortalities for animals transported less than 24 hours after initial capture. We believe the higher survival rate of caribou captured on the first day was directly related to the amount of time allowed to recover from drugging.

Twenty-eight caribou (6 males, 22 females) were released at Glacier Creek and 20 (4 males, 16 females) of those were instrumented with radio collars. Three of the radio collared females died before 1 November 1985: one died near the release site on approximately 24 April 1985 probably because of transport stress, the second died on 21 May 1985 when struck by a highway vehicle; the third was shot and killed by a hunter on 24 October 1985 after it joined the Kenai Mountain Caribou Herd, where caribou hunting is allowed. At least 8 calves were observed shortly after the calving period at or near the release site on Tustumena Flats.

Two small distinct groups of caribou were identified in subsequent surveys: 1 group (12 adults and 4 calves) was regularly found at the headwaters of Funny River; the 2nd group (3 adults and 2 calves) occupied a small home range near the headwaters of Crystal Creek, south of Tustumena Glacier.

Of the 10 remaining adults released, at least two joined the Kenai Mountains herd (GMU 7) and one joined the Lowland herd (GMU 15A). Six caribou without radio collars were not accounted for. As of November 1985, mortality from predation was not documented, at least among radio-collared adults, although a black bear was observed chasing a caribou calf on the Tustumena Glacier Flats.

During April 1986, 74 caribou were captured using a drop-net and 6 capture-related mortalities occurred: 1 caribou died of a broken neck in the capture net, 1 male calf died in the holding pen 20 hours after capture from trampling by adults, and 4 caribou died when 7 animals were accidently captured during the night because of an electrical net release malfunction in the cold temperature. The 7 caribou were entangled in the net for up to 8 hours before they were discovered; the surviving 3 caribou were released at the capture site. Ten caribou were radio-collared and released at the capture site to supplement study animals for an on-going Nelchina caribou study. Two caribou escaped from the holding pen and one was released because we captured more animals than we were capable of transporting.

The remaining 52 caribou were transported to Emma Lake, Caribou Lake and Green Lake, and released (Fig. 3). One aged adult female died shortly after being released because of injuries and stress from transporting.

Total mortality during the 1986 project was 7 caribou (9%), compared to 19 (40%) in 1985. Capture-related mortality was similar for both years: 5 and 3 caribou, respectively. Other considerations that can be compared:

1. Personnel Safety - Helicopter darting is hazardous when compared to the operation of snowmachines and highway vehicles used to operate a drop-net.

2. Drugs - Both capture techniques required handling drugs. However, the narcotics used for immobilization from the helicopter are much more stressful on the caribou and more dangerous for the capture crews than the tranquilizers used with the drop-net technique.

3. Induced Stress to Captured Animals - Blood samples have not yet been analyzed to determine if differences exist in steroids and blood enzyme levels between caribou captured using these two methods. We assume stress increases as the time from initial disturbance (chased with a helicopter or drop-net falls) to sedation or immobilization increases. Darting caribou generally required an average chase time of 7 minutes, since animals often had to be pushed to an open area to dart. Once darted the average induction time was 16.1 minutes (N=41) using etorphine. We averaged 23 minutes to "capture" each caribou via helicopter.

   Using the drop-net we averaged the same amount of time to inject the drugs, but since we were able to: 1) readily adjust a drug dosage according to each animal's sex, age and approximate weight; 2) assure a complete and less traumatic intramuscular injection; and 3) use a sedative and analgesic rather than an immobilizer. Under these conditions induction time averaged only 4 minutes. The total "capture" time using the drop-net was less than half that when using a helicopter to dart the animals. Once a caribou tangled in the drop-net and was held down, energy expended struggling was minimal compared to the energy expended running when darted. We never encountered over-heated caribou using the drop-net, but animals chased with a helicopter for over 10 minutes appeared to over-heat.

4. Field Operation Costs - During 1985, approximately $26,000 was spend to capture 47 caribou using helicopter darting, or $553 per animal. During 1986, approximately $12,820 was spent to capture 67 caribou using the drop-net, or $191 per animal. However, operational costs in 1986 would have been greater had we purchased rather than borrowed the two drop-nets. These costs did not include salaries and per diem for capture and holding crews. It should be noted that the use of drop-nets requires more personnel, increasing salary and per diem

costs. We used up to 8 volunteers to reduce personnel costs in 1986, but 1986 personnel costs were still significantly greater than in 1985.

Bait Stations

We found that caribou in this area were strongly attracted to alfalfa hay and rock salt. Bales of alfalfa hay were broken into small flakes using 1/4 to 1/2 of a bale per bait station. The flakes were placed in a circle with a diameter of 10-15 m, to reduce aggressiveness between caribou competing for hay. Aggressiveness between caribou was especially evident when calves attempted to feed near adults.

The placement of hay flakes under the drop net is extremely important and should only be done by experienced personnel. Caribou do not have time to respond, other than to raise their heads, as the net falls. For this reason, flakes must be placed to avoid trapping several animals standing together. Having several animals together under the net may result in injuries from kicking as they attempt to free themselves. In addition, animals in groups are difficult to hold and remove from the net. Hay flakes should not be placed too close to the edge of the net or along the snap-line. Caribou near the edge frequently escape and those (especially calves) caught on the snap-line generally get their head or at least one leg free, and struggle more than those solidly under the net.

We found that it was not necessary to bait as long as we initially suspected. Caribou visited 3 of 6 bait stations the first night they were established and were strongly attracted to the bait stations by the end of the first week. Up to 80 caribou were observed in one day feeding at the 5 most productive bait stations. We suggest baiting two weeks prior to trapping.

Once bait stations were established and caribou were regularly feeding at them, we rebaited on a regular daily schedule. Snow machines were used to reach the bait stations and initially disturbance was minimized by using only one or two people to place bait. However, once caribou habituated to the bait we used up to four snowmachines to deliver bait. In fact, several times during trapping, caribou bedded down 80-100 meters from the 8-12 man crew erecting the net, waiting to feed. Precautions were taken not to overfeed these animals because of potential digestive problems with this protein-rich diet supplement. The only signs of possible dietary problems observed were soft pellets, similar to pellets in spring when green grass is available. We did not see any signs of scouring.

Drug Dosages

Twelve pregnant cows and one yearling bull received intramuscular injections of an experimental tranquilizer (R51163), at a dosage of 0.4 mg/kg within five to ten minutes of being captured. These caribou were easily removed from the net within five minutes after injection. Adults were estimated to weigh approximately 122 kg.

R51163 produced sternal recumbancy in adult caribou within 3-5 minutes after injection and permitted easy handling and manipulation for 25-35 minutes. A tranquilizing effect was observed 6-7 hours after injection. The animals were calm and did not struggle during handling and were tranquil in the holding pen. When examined the following morning (12 hours post-injection), no drug effects were noted in any animals; they were extremely excited and displayed normal fear responses. No evidence of abortion was noted in this group 2 weeks following the translocation.

Fifty-four caribou received an intramuscular injection of a mixture of xylazine and ketamine. Twenty-four caribou were sedated with a mixture of 1.5 parts xylazine to 10 parts ketamine. This dosage produced satisfactory results in 3-8 minutes at which time animals could be easily handled and transported. Alternative mixtures of 1 part xylazine to 10 parts ketamine were given to 20 and 10 caribou, respectively. Neither dosage produced as acceptable results as the 1.5 parts xylazine mixture. The 1:10 mixture was insufficient to produce desirable results. The 2:10 mixture in most cases resulted in animals being more heavily sedated than was desired. Although there were some variations in degree of sedation with the 1.5 part xylazine to 10 parts ketamine, it appeared to be the best "average dosage." The occasional animal that was difficult to handle 10-15 minutes post-injection was given an additional ml of this mixture, which produced an acceptable level of sedation.

When sedated caribou were secured for travel, they were given intravenous injections of 5 to 10 mg of yohimbine hydrochloride (Antagonil, 5 mg/ml) as an antagonist to prevent respiratory problems.

ACKNOWLEDGEMENTS

Primary funding for this project was provided by the U.S. Fish and Wildlife Service with additional funding from the Alaska Department of Fish and Game. Kenai National Wildlife Refuge Manger, R. L. Delaney, and Deputy Refuge Manager, M. B. Hedrick, coordinated the project with the Department. Refuge Wildlife Biologists, T. N. Bailey and E. B. Bangs, did an excellent job of assisting during the capture phase and coordinating the project at the release sites. Bangs also played an important role in transporting equipment and assisting me in establishing and maintaining bait stations during the second capture period. In addition, numerous State and Federal staff members contributed many long hard days to see the project to completion. I sincerely appreciate the help from Department staff: Dave Holdermann, Jim Davis, Ken Taylor, Al Franzmann, Randy Zarnke, Ken Pitcher, Chuck Schwartz, Bill Taylor, Robert Tobey, Jim Lieb, Mike Hubert, Carolyn Crouch, Virginia Alexander, Luly Ruiz, Pam Smith, and Gail Roberson; and Refuge staff: Jim Frates, Al O'Guinn, Dick Kivi, Bill Learned, Carlos Paez, Mary Portner, and Tom Schumacher. An essential element in the success of a project of this nature is skillful pilots. Craig and Vern Lofstedt and Monty Hauk of Kenai Air Alaska, as they have in many other projects, did an exemplary job of piloting

their helicopters to make their part of the operation safe and cost efficient. The fixed-wing pilots, Al and Jerry Lee and Don Deering also did an excellent job of flying spotter planes to locate caribou for darting. All of these pilots were a pleasure to work with.

This project would not have been as successful without the assistance of the local residents of Lake Louise. They provided many hours of help and used their personal snowmachines to transport equipment and caribou. In particular, Andy Runyun deserves special thanks for showing us traditional caribou routes to use for bait stations and for maintaining bait stations during our absence. All of these people were extremely helpful and enjoyable to work with.

I would also like to thank the Colorado Division of Wildlife and Mr. Robert Schmidt for his expert assistance and the use of their two drop-nets and associated equipment. Each member of this project gained a wealth of knowledge from Mr. Schmidt concerning the capture of animals using the drop-net and handling of captured animals. Mr. Schmidt is certainly an expert in his field.

A personal and professional expression of appreciation is extended to my brother, Terry Spraker, D.V.M., Ph.D. As expressed by his colleagues, through many years of dedicated work in the wildlife profession, Terry, has established himself as a well recognized professional. He participated in all phases during both years of relocating animals and in my opinion, played the key role in major field decisions of the project. He also volunteered his time and paid all travel expenses from Colorado during the first year.

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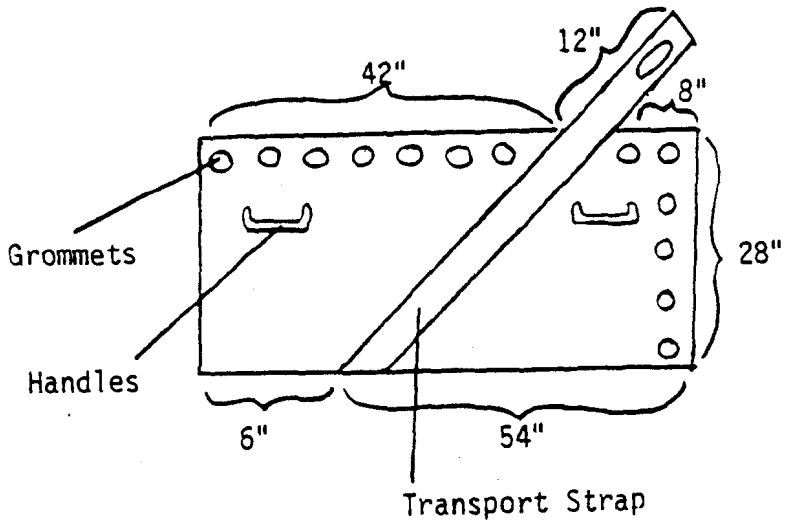
Transport Bag

Transport trap - 2 5" loops for sling hook (heavy switching).
Width - 2" nylon
Length - 2 3/4" nylon
Handles - 8" x 2" nylon (4 each)

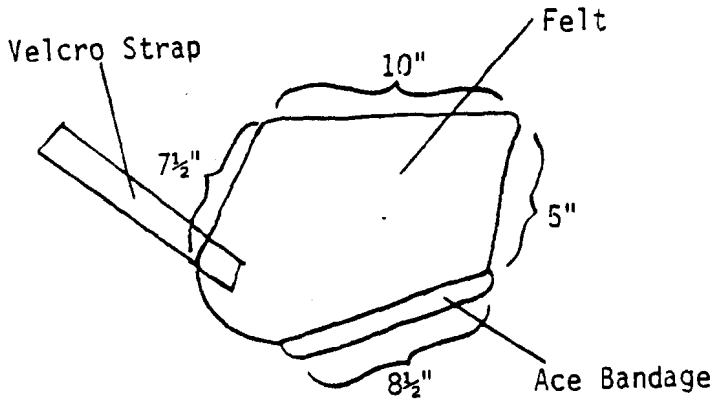
Grommets:
on long side - 9
on short side - 4
5" between grommets



Hood

1 Felt
2 Strips - velcro
1 ace bandage

- length of ace bandage - 9"
- width of ace bandage - 3"
- length of velcro strap - 10½"
- width of velcro strap - 1"



Hobble

2" metal ring
8 D rings
4 nylon straps
4 sheepskin

- Each strap 26"
- Length of strap from metal ring to D ring 2½"
-length of sheepskin 7"
width of strap 1"

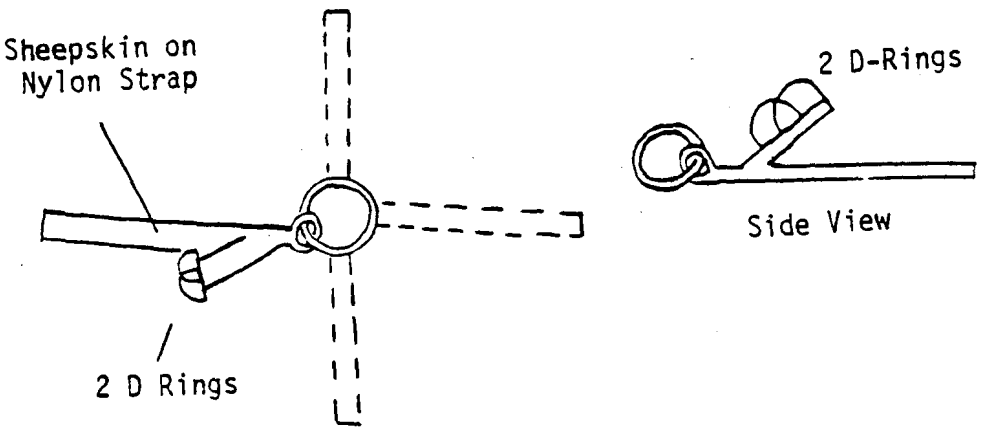


Figure 1. Materials needed for handling immobilized caribou.

NELCHINA/KENAI CARIBOU TRANSPLANT FIELD DATA FORM - 1985/86

Date Captured: _____ Date Released: _____

Method of Capture: Helicopter/Darting _____

Drop Net _____ Station #_____

Sex: _____ Pregnant: Yes_____ No_____ Unknown_____

Age: Calf___, Yearling___, 2-5 yr. old___, 6-9 yr. old___, 10+ yr. old___

Physical Condition: _____ (1 = poor, 2 = fair, 3 = good, 4 = excellent)
(1-4)

TAGGING DATA: Ear Tags (Right #)_____ (Left #)_____

Visual Collar No. _____ Visual Collar Color _____

Radio Collar Frequency _____ Radio Collar Serial No. _____

MEASUREMENTS: Weight _____ (scales/estimate) Neck _____

Total Length _____ Body Length _____

Hearth Girth _____ Shoulder Height _____

SPECIMENS COLLECTED: Blood _____ (Vol. _____ ml.) Hair _____

Fecal _____ Other _____

DRUG DATA: Primary Drug _____ Amt._____ Time_____

Secondary Drug _____ Amt._____ Time_____

Antidote: Type_____ Amt._____ Time_____

Reaction to Drug_____

TREATMENT: Ivermectin _____ ml.

LA-200 _____ ml.

Brucellosis Results: Neg._____ Pos._____

Percent HB _____ PCV _____

Captured by _____ Released by _____

Figure 2. Nelchina/Kenai Caribou Transplant Field Data Form - 1985/86.

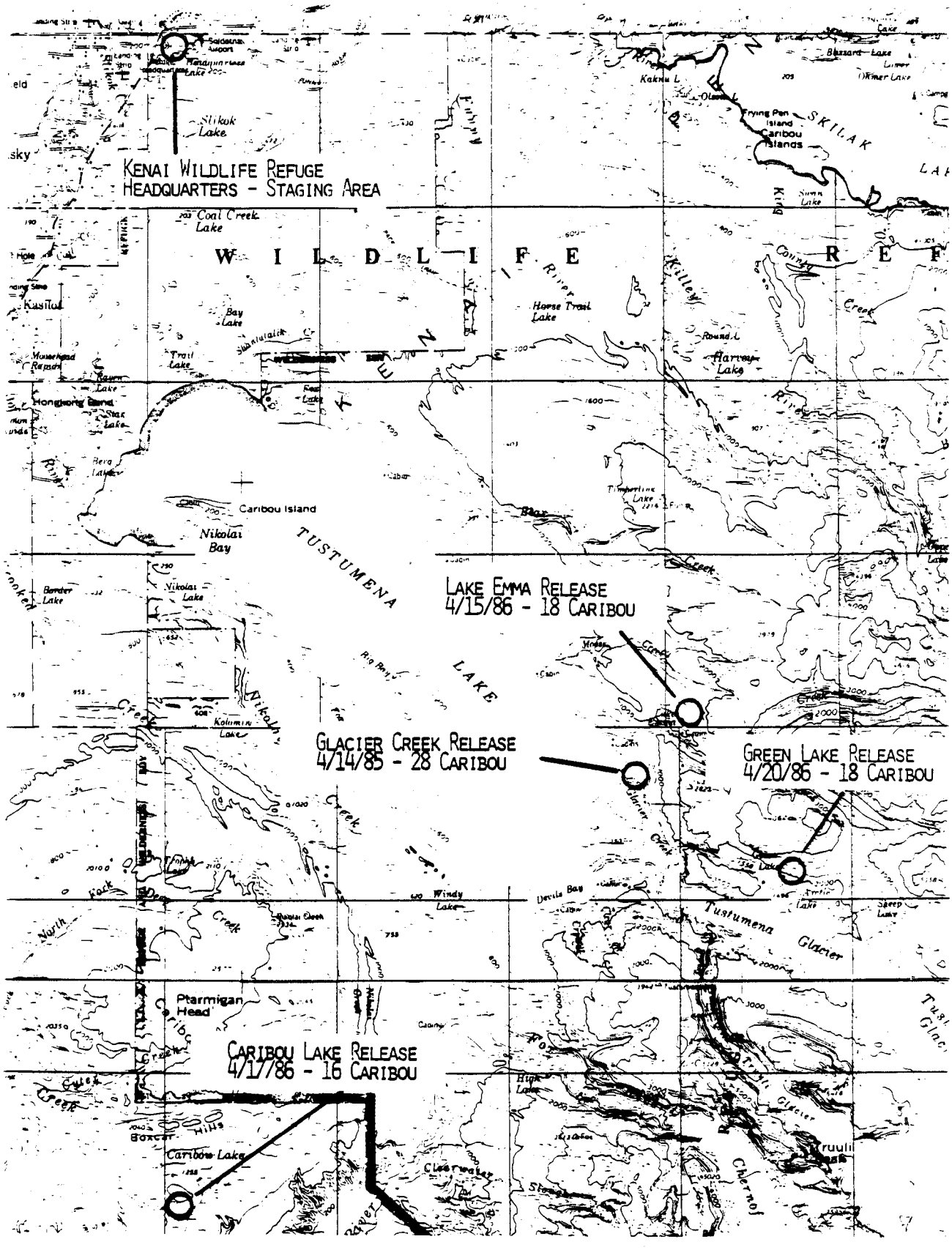


Figure 3. Location of caribou transplant areas on the Kenai Peninsula, 1985-86.

Table 1. Nelchina/Kenai Caribou Relocation Data, 1985.

Visual Collar Number	Sex	Age	Ear Tags Right/Left	Radio-Collared	Date Captured	Date Released	Remarks
Glacier Creek Release - 1985							
1	F	Adult	366/365	No	4/11/85	4/14/85	
2	F	Adult	387/388	Yes	4/11/85	4/14/85	
3	F	Adult	393/394	No	4/11/85	4/14/85	Calved in 1985
5	F	Adult	317/318	No	4/11/85	4/14/85	
6	F	Adult	377/378	Yes	4/11/85	4/14/85	
7	F	Adult	305/306	Yes	4/11/85	4/14/85	Joined Lowland Herd, 1985
8	F	Adult	347/348	Yes	4/11/85	4/14/85	
9	F	Adult	309/310	Yes	4/11/85	4/14/85	Shot 10/19/85 in Mtn Herd (Marrs)
11	F	Adult	361/362	No	4/11/85	4/14/85	Calved in 1985
12	F	Adult	333/334	Yes	4/11/85	4/14/85	Died at Release Site 4/24/85
13	F	Adult	349/350	Yes	4/11/85	4/14/85	Calved in 1985, joined Mtn Herd, 1985
14	F	Adult	399/400	Yes	4/11/85	4/14/85	
15	F	Adult		Yes	4/11/85	4/14/85	
16	F	Adult	363/364	Yes	4/11/85	4/14/85	Calved in 1985
17	F	Adult	389/390	Yes	4/11/85	4/14/85	Calved in 1985
32	F	Adult	337/338	Yes	4/11/85	4/14/85	Calved in 1985, joined Lowland 1985, Mtn. Herd 1986
20	F	Adult	369/370	Yes	4/11/85	4/14/85	Shot in Colorado Cr.(Mtn Herd) 11/4/85 (D. Beam)
21	F	Adult	337/338	Yes	4/11/85	4/14/85	Calved in 1985
70	M	Adult	319/320	?	4/12/85	4/14/85	Joined Mtn. Herd, 1985
22	F	Adult	211/212	Yes	4/12/85	4/14/85	
27	F	Adult	391/392	Yes	4/12/85	4/14/85	Road Kill, 5/21/85, w/fetus
29	F	Adult	385/386	---	4/12/85	4/14/85	
38	F	Adult	325/326	No	4/12/85	4/14/85	Calved in 1985
66	M	Adult	313/314	Yes	4/12/85	4/14/85	
69	M	Adult	372/371	Yes	4/12/85	4/14/85	
71	M	Adult	331/332	No	4/12/85	4/14/85	
72	M	Adult	443/444	No	4/12/85	4/14/85	

(continued)

Table 1. (continued)

Visual Collar Number	Sex	Age	Ear Tags Right/Left	Radio-Collared	Date Captured	Date Released	Remarks
4	F	Adult	397/398	---	4/11/85		Transportation Mortality
10	F	Adult	395/396	---	4/11/85		Transportation Mortality
18	F	Adult	303/304	---	4/11/85		Transportation Mortality
70	M	Adult	341/342	---	4/11/85		Transportation Mortality
23	F	Adult	381/382	---	4/12/85		Transportation Mortality
24	F	Adult	367/368	---	4/12/85		Transportation Mortality
25	F	Adult	343/344	---	4/12/85		Transportation Mortality
26	F	Adult	383/384	---	4/12/85		Transportation Mortality
28	F	Adult	375/376	---	4/12/85		Transportation Mortality
30	F	Adult	353/354	---	4/12/85		Transportation Mortality
32	F	Adult	321/360	---	4/12/85		Transportation Mortality
33	F	Adult	447/448	---	4/12/85		Transportation Mortality
34	F	Adult	441/440	---	4/12/85		Transportation Mortality
35	F	Adult	373/374	---	4/12/85		Transportation Mortality
36	F	Adult	445/328	---	4/12/85		Transportation Mortality
37	F	Adult	356/358	---	4/12/85		Transportation Mortality
None	F	Adult	---/---	No	4/11/85		Capture Mortality - Darting
None	F	Adult	---/---	No	4/12/85		Capture Mortality - Darting
None	M	Adult	---/---	No	4/12/85		Capture Mortality - Darting

Table 2. Nelchina/Kenai Caribou Relocation Data, 1986

Visual Collar Number	Sex	Age	Ear Tags Right/Left	Radio-Collared	Date Captured	Date Released	Remarks
Lake Emma Release - 1986							
30	F	Adult	505/506	Yes	4/13/86	4/15/86	
40	F	Adult	512/511	Yes	4/13/86	4/15/86	
41	F	Adult	530/531	No	4/14/86	4/15/86	
42	F	Adult	532/533	No	4/14/86	4/15/86	
43	F	Adult	504/503	No	4/13/86	4/15/86	Wolf killed
44	F	Adult	537/536	Yes	4/14/86	4/15/86	
45	F	Adult	455/454	Yes	4/14/86	4/15/86	
46	F	Adult	520/519	No	4/14/86	4/15/86	
47	F	Adult	527/526	No	4/14/86	4/15/86	
50	F	Adult	589/588	Yes	4/14/86	4/15/86	Wolf killed
51	F	Adult	539/538	No	4/14/86	4/15/86	Died at release site
52	F	Adult	522/521	No	4/14/86	4/15/86	
53	F	Adult	516/515	No	4/14/86	4/15/86	
54	F	Adult	517/518	No	4/14/86	4/15/86	Shot in Mtn. Herd, 9/86
55	F	Adult	541/540	Yes	4/14/86	4/15/86	Joined Mtn. Herd
56	F	Adult	528/529	No	4/14/86	4/15/86	
None	M	Calf	535/534	No	4/14/86	4/15/86	
None	M	Calf	523/524	No	4/14/86	4/15/86	
Caribou Lake Release - 1986							
10	F	Adult	553/554	Yes	4/16/86	4/17/86	
18	F	Adult	578/577	No	4/16/86	4/17/86	
24	F	Adult	574/573	Yes	4/16/86	4/17/86	
31	F	Adult	567/568	No	4/16/86	4/17/86	
36	F	Adult	551/552	Yes	4/16/86	4/17/86	
37	F	Adult	579/580	No	4/16/86	4/17/86	Shot in Wolf Cr.(Mtn Herd), 9/27/86
39	F	Adult	570/569	No	4/16/86	4/17/86	
58	F	Adult	557/558	No	4/16/86	4/17/86	

Table 2. (continued)

Visual Collar Number	Sex	Age	Ear Tags Right/Left	Radio-Collared	Date Captured	Date Released	Remarks
Caribou Lake Release - 1986							
59	F	Adult	566/565	No	4/16/86	4/17/86	
60	F	Adult	576/575	Yes	4/16/86	4/17/86	
61	F	Adult	560/559	Yes	4/16/86	4/17/86	
62	F	Adult	546/545	No	4/16/86	4/17/86	
63	F	Adult	571/572	No	4/16/86	4/17/86	
64	F	Adult	564/563	No	4/16/86	4/17/86	
80	M	Adult	556/555	Yes	4/16/86	4/17/86	
None	F	Calf	561/562	No	4/16/86	4/17/86	
Green Lake Release - 1986							
12	F	Adult	335/336	No	4/19/86	4/20/86	
19	F	Adult	471/115	No	4/19/86	4/20/86	
25	F	Adult	550/548	Yes	4/19/86	4/20/86	
28	F	Adult	542/467	No	4/19/86	4/20/86	
33	F	Adult	380/101	Yes	4/19/86	4/20/86	
40	F	Adult	544/543	Yes	4/19/86	4/20/86	
48	F	Adult	472/473	No	4/19/86	4/20/86	
50	F	Adult	113/600	Yes	4/19/86	4/20/86	
57	F	Adult	315/316	No	4/19/86	4/20/86	Laid down 200m from release site
65	F	Adult	470/116	Yes	4/19/86	4/20/86	
74	F	Adult	302/301	Yes	4/19/86	4/20/86	
75	M	Calf	598/599	No	4/19/86	4/20/86	
77	F	Adult	351/352	Yes	4/19/86	4/20/86	
None	F	Calf	379/117	No	4/19/86	4/20/86	
None	F	Calf	340/339	No	4/19/86	4/20/86	
None	F	Calf	463/464	No	4/19/86	4/20/86	
None	F	Calf	465/466	No	4/19/86	4/20/86	
None	M	Calf	468/469	No	4/19/86	4/20/86	

(continued)

Table 2. (continued)

Visual Collar Number	Sex	Age	Ear Tags Right/Left	Radio-Collared	Date Captured	Date Released	Remarks
Caribou Released at Capture Site - Lake Louise							
None	F	Adult	514/513	Yes	4/13/86	4/15/86	Released from holding pen
None	F	Adult	502/501	Yes	4/13/86	4/15/86	Released from holding pen
None	F	Adult	510/509	No	4/13/86	4/15/86	Escaped during loading
None	F	Adult	508/507	No	4/13/86	4/15/86	Escaped during loading
None	F	Adult	596/597	Yes	4/17/86	4/19/86	Released from holding pen
None	F	Adult	594/595	Yes	4/17/86	4/19/86	Released from holding pen
None	F	Adult	592/593	Yes	4/17/86	4/19/86	Released from holding pen
None	F	Adult	590/591	Yes	4/17/86	4/19/86	Released from holding pen
None	F	Adult	585/586	Yes	4/17/86	4/19/86	Released from holding pen
None	F	Adult	583/584	No	4/17/86	4/19/86	Released from holding pen
None	F	Adult	---/---	No	4/17/86	4/17/86	Released from capture site
None	F	Adult	---/---	No	4/17/86	4/17/86	Released from capture site
None	M	Calf	---/---	No	4/17/86	4/17/86	Released from capture site
None	F	Adult	474/None	Yes	4/19/86	4/19/86	Released from capture site
None	F	Adult	---/---	Yes	4/19/86	4/19/86	Released from holding pen
None	F	Adult	---/---	No	4/19/86	4/19/86	Released from capture site
Mortalities - 1986							
None	F	Adult	---/---	No	4/13/86	----	Capture mortality, neck broken in net
None	M	Calf	581/582	No	4/17/86	----	Died 20 hrs after capture, trampled in holding pen
None	F	Calf	---/---	No	4/17/86	----	Accidental death due to malfunction of net
None	F	Adult	---/---	No	4/17/86	----	Accidental death due to malfunction of net
None	F	Adult	---/---	No	4/17/86	----	Accidental death due to malfunction of net
None	F	Adult	---/---	No	4/17/86	----	Accidental death due to malfunction of net

Table 3. Relocation summary - 1986

Date	Location	Time	# Caribou Under Net	Number Caught	Composition	Remarks
4/13/86	Lake Louise #2	1600	12	8	8 adult females	1 caribou killed/broken neck. 7 held in holding pen. 3 transported Emma and 4 released.
4/14/86	Lake Louise #2	1530	7	7	1 male calf 6 adult females	Transported to Lake Emma
4/14/86	Lake Louise #1	1730	8	8	1 male calf 7 adult females	Transported to Lake Emma
4/16/86	Dawson's	900	10	10	1-2 year old bull 8 adult females 1 female calf	Transported to Caribou Lake.
4/16/86	Wolverine	1130	8	6	6 adult females	Transported to Caribou Lake. One cow and calf escaped from net.
4/17/86	Wolverine	620	7	7	1 male calf 6 adult females	7 held in holding pen released on 4/19. Male calf died 4/18 due to injuries received in holding pen from adults.
4/17/86	Dog Creek	Unk	Unk	7	1 male calf 1 female calf 5 adult females	Net malfunctioned during night capturing 7 caribou. 3 adult females and 1 female calf died and 2 adult females and 1 male calf released.
4/19/86	Andy's	630	7	6	1 female calf 5 adult females	Transported to Green Lake
4/19/86	Cameron Cove	700	8	8	1 male & 2 female calves, 5 adult females	Transported to Green Lake. 2 adult females were collared and released.

(continued)

Table 3. (continued)

Date	Location	Time	# Caribou Under Net	Number Caught	Composition	Remarks
4/19/86	Andy's	0800	7	7	1 yearling male 6 adult females	Transported to Green Lake. 1 adult female released at site.
Total			74(+unk)	74	7 males 67 females	