DALL SHEEP AND MOUNTAIN GOAT TRAPPING AND TRANSPLANTING IN ALASKA

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[Editor's Note: Even though the Alaskan experience with sheep and goats transplants is marginally relevant to the content of this workshop, a summary from Alaska is included. Alaska pioneered capture methods with sheep and goats, and its unique experiences with transplants of sheep and goats in pristine ecosystems should provide a perspective which is broadening. Additionally, this seemingly extraneous paper will serve as a vehicle for getting the Alaskan experience into broadly available literature. KH]

DALL SHEEP

Abstract: Even though transplant of Dall sheep among pristine ranges in Alaska's intact ecosystems is a low priority, development of capture methods has been pursued as an prerequisite to research programs. Cost-effectiveness of Dall sheep capture methodology was a dominant feature of early programs. Consequently, mass capture methods were favored, and centered on mineral licks where sheep naturally concentrated. Successful methods of mass capture included drop and rocket nets. Chemical immobilization using several drugs and delivery systems has, to date, proven unsatisfactory. Net-gun capture using a helicopter skid-mounted delivery system has been the most successful means of individual capture. Neonatal lambs estimated to be less than eight hours old have been captured by running them down on foot after landing "on" them with a helicopter. Alaska's single transplant effort was ill advised, and resulted in a failed transplant of sheep to unsuitable maritime habitats on Kodiak Island. While this transplant failed, it provided impetus for a biologically-based transplant policy.

I can think of two reasons to capture wild mountain sheep. One is to translocate the sheep for some management purpose. The other is to mark individual sheep for study. In Alaska, Dall sheep exist on pristine ranges in intact ecosystems. Consequently, capture of sheep for management translocation purposes has been a low priority. However, capture of sheep for marking to allow individual identification has been important. Dall sheep are abundant in Alaska, and learning to identify significant numbers of individuals in large populations is impractical. As a result, capture and marking for identification has been essential to the study of Dall sheep biology.

TRAPPING METHODOLOGY

Although aboriginal people trapped Dall sheep using snares, snaring is a time-intensive process which does not assure healthy sheep can be released after capture. Until quite recently, Dall sheep capture for research purposes required unusual cost-effectiveness. To this end, Jim Erickson, the first Alaskan sheep biologist to concern himself with cheap sheep capture, developed the concept of trapping sheep as they naturally concentrate at mineral licks during spring. When concentrated at mineral licks, Dall sheep are unusually approachable, and subject to capture. Using this characteristic to his advantage, Erickson adapted drop net technology from successful turkey (and later deer) trappers as early as 1969 (Erickson 1970). Strategic positioning of salt blocks at the natural mineral licks greatly facilitated capture by attracting sheep to specific trap sites. Over the years, this method was perfected, and has been responsible for capture of upwards of 500 Dall sheep in Alaska. Trapping mortality has been negligible (Heimer et al. 1980).

Dall sheep were also successfully trapped on a winter range using high quality hay as bait. This effort suggested that even baiting with food required a lengthy period of conditioning to the visually imposing drop net before sheep would walk under it. To expedite the capture of Dall sheep at mineral licks without a lengthy period of conditioning (apparently two years), my friends and I experimented with projectile-thrown nets. We found cannon nets were too slow before we moved on to the rocket-thrown net, another turkey (and deer) trapping technique adapted to Dall sheep. Without the visual barrier associated with the drop net, we found immediate

trapping success was dramatically increased over other forms of "on ground" capture at mineral licks (Heimer et al. 1980).

Eventually, it was seen as necessary to capture sheep at places other than mineral licks without the logistic restraints of mass capture methods. The difficulty in approaching sheep when they were not at a mineral lick dictated helicopter-assisted capture technology be adapted from other species. We tried chemical immobilization with the best drugs available through the late 1980s, and found it unsatisfactory. Mortality was unacceptably high, so we employed a skid-mounted net gun deployed from a high-performance turbine helicopter. This technique is the most cost effective individual sheep capture method we've found (Heimer and Mauer 1990).

In an effort to capture neonatal lambs for predation studies, the Alaska Department of Fish and Game has found that Dall lambs born in accessible country can be readily caught on foot. Lambs estimated at more than eight hours old cannot be captured by this method (B. Scotten ADF&G Wildlife Technician, Fairbanks pers. commun.). Procedures involve observation of lambing areas (from fixed-wing aircraft) to locate new-born lambs, which can be identified by their gray birth-coat. When a likely-looking new-born is located, the capture helicopter is called, and deposits a crew member "on top" of the lamb. Twenty five lambs were marked this way in 1995, and another 25 in 1996. Separating lambs from their ewes occurs when this is done, appears to be a potential cause of lamb mortality. Eagles are known to kill lambs separated from ewes by helicopter disturbance (Nette et al. 1984), and three lambs were killed by eagles shortly after being marked (T. Russ, President FNAWS, Anchorage pers. commun.)

TRANSPLANTING

Alaska has been involved in one Dall sheep transplant (which was presumed at the time) to expand populations to unpopulated areas. The area selected was Kodiak Island. The first recorded mention of transplanting sheep to Kodiak was related to the Alaska Territory stocking program administered by the federal government in 1925 (Burris and McKnight 1973). Even though wildlife transplants were considered at the vanguard of management in the 1920s and 1930s, the idea was not given serious consideration because little was known about sheep, and the project was obviously expensive.

After statehood, interest in the sheep transplant was revived by Kodiak residents who had experienced great benefits from the transplant of Sitka blacktailed deer to Kodiak Island during the Territorial transplant project. The project became politically popular, and the Alaska Department of Fish and Game conducted a feasibility study. Results suggested the transplant would not succeed because of climatological unsuitability of the island. However, public interest on Kodiak could not be denied so the Department was ordered to proceed with introduction of sheep to Kodiak Island.

Sheep were captured on the Kenai Peninsula ranges using chemical immobilization with succinyl choline delivered by darts from a piston-powered Hiller 12 E helicopter. Considerable difficulties attended sheep capture, handling, and transport, and eventually the project was discontinued because of unacceptability high levels of mortality in captured sheep. One ewe was transplanted in 1964, 13 additional sheep in 1965, and two sheep in 1967. Sporadic reports of a few sheep being seen on Kodiak persisted through the late 1970s. No reports of Dall sheep on Kodiak Island have been documented in the last 15 years.

The Dall sheep transplant was hardly a shining chapter in the transplant history of the Alaska Department of Fish and Game. However, it does illustrate the value of biologically based policies. Memory of this transplant failure facilitated development of a biologically based policy on wildlife transplants in Alaska within five years of its failure. Had such a policy existed at the time of the transplant, it would have provided a framework in which the Department of Fish and Game could have successfully resisted pressure from Kodiak residents for this transplant. It is unlikely that such a fiasco will occur in the future if the lessons learned in the Kodiak transplant are remembered.

EXPORT

During the late 1960s, Dall sheep were captured for the Milwaukee County Zoo in Minnesota. Seven Dall sheep were provided, and used to establish a herd at the zoo. Breeding behavior records from this zoo provided corollary support for Heimer and Watson's hypothesis regarding the beneficial effect of mature rams in increasing lamb production and limiting juvenile ram mortality (Heimer and Watson 1986, 1990).

HOLDING IN CAPTIVITY

Additionally, sheep have been captured and held for research and educational purposes in Alaska. One such project was apparently carried out during the 1950s at the Palmer Research Station by the U. S. Department of Agriculture.

In the early 1970s, sheep captured by in November by drop-net at the Usibelli Coal Mine reclamation project were held in Fairbanks for nearly a decade. Several generations were produced, but all subsequently died. Many showed slow wasting and diarrhea before death, and one newborn lamb was overcome by contagious ecthyma.

Dall sheep from the Chugach Mountains were captured by helicopter-mounted net gunning and moved a few miles to an impoundment habitat at the Anchorage Zoo on the periphery of their range. Alaska Department of Fish and Game biologists provided capture expertise once funding had been raised by the zoo i.. order to preclude the presence of "exotic" Dall sheep which the Anchorage Zoo proposed to purchase from other zoological gardens. The possibility of importing diseases in Dall sheep kept on the margin of wild Dall sheep range in Alaska was considered too great to allow import of zoo-raised sheep. These animals continue to survive and produce more sheep.

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MOUNTAIN GOATS

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Abstract: Mountain goats were transplanted to three Alaska Islands between 1928 and 1955. These goats were captured by private trappers encouraged by the high prices offered for live goats by the federal government during territorial days. The trappers used a variety of innovative methods. Transplants were successful on Kodiak and Baronof Islands. A similar transplant to Chichagof Island failed. The most successful modern capture technique for transplant and research has been chemical immobilization of individual goats by aerial darting. It requires modern drugs, high performance helicopters with short rotors, and biologists willing to take occasional risks involving technical rock climbing equipment. Between 1983 and 1991, four mountain goat transplants were undertaken using this capture method. Three were in southeast Alaska, of which two were to a large island not formerly inhabited by goats, and the other to the mainland near Juneau. The fourth transplant was done on the Kenai Peninsula to restock a depleted population. All but the Juneau area transplant were successful.

Transplant of mountain goats in Alaska was achieved with no small effort during the heyday of wildlife transplanting (1925-1935). During territorial days, transplants were made to Kodiak Island in Alaska's Southcentral Region as well as Baranof and Chichagof Islands in Southeast Alaska. These transplanted goats were captured by a variety of innovative physical capture techniques detailed by Burris and McKnight (1973). These capture efforts were a response to highly attractive fees paid to private trappers by the Territorial Government of the day. Capture for research purposes became a high priority with decline of many Alaskan mountain goat populations during the 1980s, and additional transplants were done using modern capture techniques (Nichols 1982, Smith and Nichols 1984).

TRAPPING METHODOLOGY

Chemical Immobilization

'Modern' mountain goat capture in Alaska has been exclusively by helicopter-assisted chemical immobilization. Administration of the drug requires a high performance helicopter with sufficiently short main rotors to allow 'tow-in' landings in extremely steep terrain. The Hughes 500D is preferred. Obviously, a highly skilled pilot with mountain experience is required, and a successful capture operation also requires the pilot have good instincts for keeping goats in safe places after darting. If the helicopter is too close or too far away, the goat will flee to potentially dangerous locations before becoming immobile. Ideally, a pilot can approach goats, move them to an accessible area for darting, "fix" them in this position, and then "hold" them there once the chemical immobilizing agent has been delivered intramuscularly by capture dart.

Carfentanil is the present drug of choice for immobilizing goats in Alaska. Dosage for Adult females is 2.4-2.7 mg. Adult males require 2.7-3.0 mg, and yearlings 1.8-2.1 mg. Induction time is approximately three minutes, and reversal is accomplished by using 100 mg of Naltrexone per mg of carfentanil ***administered intramuscularly.***

Etorphine (M99) doses are higher at 3.5-4.5mg for adult females, 4.5-5.5 mg for adult males, and 3.0-3.5 mg for yearlings. Reversal is accomplished by 50 mg of Naltrexone per mg of etorphine ***administered intramuscularly.***

Mountain goats are usually found in very steep terrain. Because of the possible adverse effects of residual tranquilization on the animal's ability to navigate in this terrain, use of additional tranquilizer or sedative with the narcotic is not recommended. Capture crews should carry and be trained in the use of climbing ropes and gear which may be required to reach goats which reach dangerous locations before 'going down.'

Chemical Sedation

If captive goats are to be handled or moved, sedatives may be recommended. The adult female dose for diazepam is 15-20 mg and for xylazine 25-30 mg. A blindfold usually helps calm and control goats sedated or lightly immobilized. If animals are only sedated, short pieces of garden hose should be placed over their horns to prevent injuries.

TRANSPLANTING

Early Transplants

Baranof Island. In 1923, 18 goats were transplanted from Tracy Arm to Baranof Island in Southeast Alaska, and by 1937, 41 goats were counted on the island. Restricted hunting was established in 1949. In 1970, the population was estimated at 250-275 goats (Burris and McKnight 1973). Subsequent records contain speculation that the goats damaged their habitat because of inadequate herd control. However, at present the population seems to be stable at approximately 1,000 goats. Annual harvests have averaged approximately 40 goats over the last five years (Faro 1994).

Kodiak Island. The history of the Kodiak transplant began in 1948 with preliminary studies by the Federal Aid in Wildlife Restoration program (Nelson 1953). At this time, capture of wild mountain goats was an experimental enterprise. Attractive 'bounties' of up to $410 per live goat induced innovative capture techniques including a corral trap, padded steel-jaw wolf traps and snares (Burris and McKnight 1973). Results of these private capture efforts slowed the program because females were apparently less readily caught than males. In February of 1952, two male goats were transplanted, followed by four more male goats later that same year. Finally, in December of 1952 a female was transplanted, and early in 1953, nine more females and one male were released on Kodiak Island. All these goats were captured on the nearby Kenai Peninsula. After a slow start, the population established itself. It is currently estimated at 800 goats (Hicks 1995:8). Restricted hunting was opened in 1968. Since 1986, hunting has been limited by limited entry drawing permit, and the harvest has averaged about 30 goats per year. Current plans call for holding the population at its present level (Smith 1994).

Chichagof Island. Based on the success of the Baranof (and Kodiak Island) transplants, 22 goats were transplanted to Chichagof Island in 1955. The last sighting of a goat on Chichagof Island was in 1964 (Burris and McKnight 1973).

Modern Transplants

Kenai Peninsula. Between 1965 and 1982, only occasional sightings of one to four goats were made on Cecil Rhode Mountain on the Kenai Peninsula. In July 1983, 14 mountain goats were captured on the Kenai Peninsula and transplanted to augment this depleted population. Twelve female and two male goats were captured. Of those, two female goats died during transport and two additional female goats died shortly after being released. In September 1983, a female goat dispersed from Cecil Rhode Mountain to her original home range. The remaining goats became established on Cecil Rhode Mountain (Smith and Nichols 1984). Since then, the goat population has increased steadily, and in 1993 the area was opened to limited entry permit hunting. In 1994, 56 goats were counted on Cecil Rhode Mountain (T. H. Spraker, pers. commun.).

Revillagigedo Island. Transplanting goats to vacant habitat to create a new population was considered as a potential means for mitigating anticipated losses associated with development of a large mine in Southeast Alaska. Potential sites in the Ketchikan vicinity indicated the northeast portion of Revillagigedo Island had the appropriate habitat characteristics (Smith 1984). In June and July 1983, 18 mountain goats were captured from three sites on the mainland north and east of Revillagigedo Island. One female goat died during capture; 17 goats (12 females and five males) were safely captured and released near Swan Lake on Revillagigedo Island. Four lactating females soon dispersed several miles from the release site (Smith and Nichols 1984). In 1992, 84 goats were observed in the Swan Lake area (Larsen 1984). In 1993, 127 goats were counted, and the population estimated to be more than 200 goats. The area was opened to limited entry permit hunting in 1993 (D. N. Larsen, pers. commun.).

In August 1991, 15 additional mountain goats (of 17 goats darted-two fell to their deaths during capture) were transplanted from the mainland east of Ketchikan to Upper Maine Lake on Revillagigedo Island. The intent was to establish a goat population which the public could reach easily from Ketchikan for viewing and hunting. The transplant included ten females and five males. Between December 1991 and November 1993, at least three of the original transplanted goats died (D. N. Larsen unpublished data). Recently goat numbers have increased, and current estimates put the Upper Maine Lake population at 20-25 goats (D. N. Larsen pers commun.).

Juneau. In August 1989, 11 mountain goats were captured in the Whiting River/Tracey Arm area and moved to Mt. Juneau. The project was funded by the Audobon Society to establish goats for viewing in an area close to Juneau. Oral history indicated the area may have had a viable goat population in the past. Eight female and three male goats were successfully captured and moved to Mt. Juneau. An additional 4 goats died during the capture or transport process. (T. McCarthy, unpubl. data). By 1991, the eight radiocollared goats had apparently dispersed from the Mt. Juneau area; however, unmarked goats are occasionally sighted on Mt. Juneau. The Mt. Juneau re-introduction has not contributed to population expansion (Robus 1994).

EXPORT

In 1986, 15 goats from Misty Fjord were exported to Oregon in exchange for elk. Three males and 5 females were released at Hurricane Divide, and 2 males and 5 females were released at Pine Creek (Matthews and Coggins 1994).

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