Wildlife Research Annual Progress Report

Mountain Goat Movement Patterns and Population Monitoring on the Cleveland Peninsula.

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Division of Wildlife Conservation

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Cover photo: Photo of an 11-year old male mountain goat (CG-08) captured on Black Bear Ridge on September 28, 2009. This animal had the longest horns yet measured during live-capture activities, in recent years (2005-2010: Lynn Canal, n = 138, Cleveland Peninsula, n = 8). Total horn length measured 11 12/16 and 11 8/16 in. (left and right horns, respectively).

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INTRODUCTION

The lower Cleveland peninsula mountain goat population is small (45-50 animals) and geographically isolated from the closest mainland population by ca. 20-30 miles. As a result, concerns have existed for many years about persistence of this population given human harvest and natural causes of population fluctuation (Smith 1982). The Cleveland peninsula mountain goat population is of particularly high interest among guides and hunters due to the extremely high proportion of trophy goats taken from this area in the past (ie. three of the top 10 Boone and Crockett goats were taken here). As a result of an apparent population decline, the mountain goat hunting season was closed in 2004 yet there has been significant pressure to re-open the season (ie. BOG 2010). While this may be possible on a limited basis, basic information about the actual population size and genetic isolation of the population are needed before this can be considered. A small-scale project is timely because we currently have a unique opportuntity to have genetic analyses conducted free of charge (via ongoing Univ of Alberta genetics project). In addition, proposals relating to management of the Cleveland Peninsula mountain goat population are likely to be evaluated at the 2010 BOG meeting.

Objectives:

1) Capture and radio-collar 10-12 adult mountain goats on the lower Cleveland Peninsula

2) Collect tissue and other biological samples for genetic analyses

3) Conduct mark-resight population estimates and compile aerial survey sightability data

Study Area:

The Cleveland peninsula is a large peninsular geographic feature that is about 50 miles long and 10-15 miles wide that seperates Behm and Bradfield Canal (Figure 1). The Cleveland peninsula is geographically subdivided into distinct upper and lower localities (Smith 1982). The alpine habitats in the upper peninsula are largely contiguous with the Coast Range Mountains complex. In contrast, alpine habitats on the lower peninsula are isolated from the upper peninsula by 20-30 miles of lowland conifer forest.

Methods and Analyses:

Mountain goat capture and handling:

Adult mountain goats will be captured in fall 2009 using standard helicopter-darting techniques (Taylor 2000, White and Barten 2008). During immobilization, biological samples (i.e., blood, tissue, hair, fecal pellets), body condition measurements (e.g., rump fat thickness via ultrasonography, body weight), and morphological data will be collected. These data will provide baseline information about nutritional condition, diet, and morphology. Blood, tissue and hair samples will be archived for later analyses relating to genetics, disease, and nutrition. All animals will be outfitted with VHF radio-collars (MOD-500, Telonics Inc., Mesa, AZ).

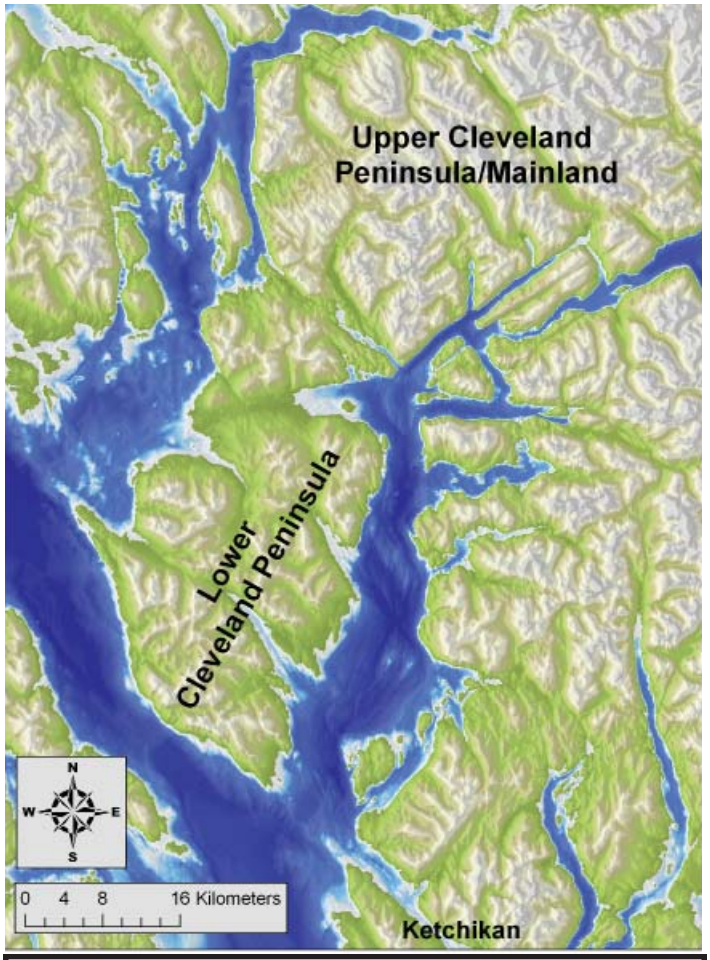

Figure 1: Map of the lower Cleveland peninsula study area. Mountain goats are confined to the western portion of the lower peninsula between Helm Bay and Vixen Inlet. The closest "mainland" population is located on the upper Cleveland peninsula near Lake McDonald, approximately 20-30 miles away to the northeast.

Genetic Analyses:

Mountain goat tissue samples collected from radio-marked animals will be sub-sampled and preserved in a 90% ethanol solution. In addition, fresh fecal pellets and hair samples will be opportunistically collected during the course of routine field activities to supplement tissue sample collections. Samples will be sent to the University of Alberta (Aaron Shafer) and analyzed as part of a regionwide mountain goat population genetics project. Since 2005, approximately 500 mountain goat tissue samples have been collected from throughout southeast Alaska and will serve as a geographic baseline for comparative analyses involving Cleveland peninsula samples. Specifically, samples will be analyzed in order to determine whether

mountain goats inhabiting the Cleveland peninsula have a distinct genetic structure, as compared to other regional populations. Additional analyses may involve estimating gene flow (ie. migrants/generation) between the Cleveland and other populations.

Mountain Goat Population Estimation:

Accurate estimation of mountain goat population size and composition is a critical information need. Reliable population status information can best be acquired by marking animals in a population and conducting mark-resight population estimates (Krebs 1989) or via sightability modeling (Rice et al. 2009). Consequently, following capture and radio-collaring efforts, aerial surveys will be conducted and the presence of radio-marked goats seen in survey areas will be recorded and compared to the total number of marked animals in an area. This information will enable calculation of mountain goat survey sighting probabilities and population size estimation using mark-resight techniques (Krebs 1989, Cooch and White 2009). In addition, individual sighting probability convariate information will be collected during each aerial survey for each radio-marked animal in the sampling area (regardless of whether the animal was seen or not seen during the survey). These data will be used in combination with data concurrently being collected elsewhere in southeast Alaska (ie. Lynn Canal; White and Barten 2008) to develop generalized individual sighting probability, or sightability, models. (While desirable, it is unlikely, within the scope of the present project, that an adequate data set will be compiled to develop a robust site-specific model).

Vital Rate Monitoring:

To the extent possible, study animals will be monitored at regular intervals (i.e., monthly intervals) throughout the year via ground-based, boat-based or aerial radio-telemetry techniques. Monitoring activities will focus on determining survival status (via radio-telemetry pulse rate changes) and reproductive status in early-summer and/or fall. Collars determined to be on "mortality" mode will be investigated, if possible, to determine fates of associated goats.

Results and Discussion:

Mountain Goat Capture and Handling

Mountain goats were captured over 2 days on September 2 and 28, 2009. Overall, 8 animals (6 males and 2 females) were captured using standard helicopter darting methods (Appendix 1). All animals were deployed with Telonics MOD-500 VHF radio-collars (battery life-span = 8 years). During handling, standard morphological measurments were taken and included: total body length, chest girth, neck circumference, hind foot length and horn length and circumference (total, 1st annuli, 2nd annuli). In addition,

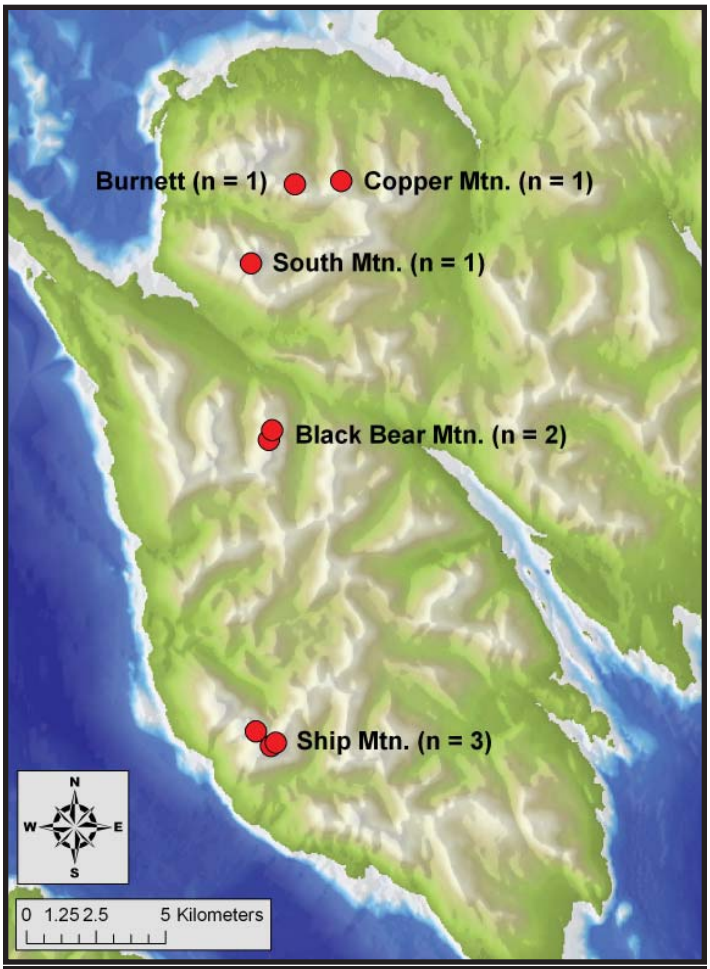

Figure 2: Location of mountain goat capture sites on the lower Cleveland peninsula, September 2 and 28, 2009. Geographically distinct alpine complexes where animals were captured are noted, along with the respective sample size.

serum, whole blood and red blood cell samples were collected, processed and frozen. Ear tissue, hair and fecal pellet samples were also collected. All biological samples were archived at the ADFG regional office in Douglas, AK.

Helicopter captures were conducted in early-fall to maximize the likelihood that animals would be distributed in high elevation locations amenable to capture and because kids are largely nutritionally independent from their mothers. While all reasonable efforts were made to limit disturbance of mountain goat groups, some level of disturbance is inevitable given the capture method used. Overall, the availability of suitable terrain for safe and efficient capture of mountain goats on the lower Cleveland peninsula is limited. As a result, daily capture success was somewhat lower than that experienced elsewhere (White and Barten 2008); however, capture success on September 28, 2009 was also constrained by patchy fog. Nonetheless, safe and efficient capture of mountain goats on the lower Cleveland peninsula is possible but requires considerable care and thoughtful planning in regard to helicopter approach vectors, terrain configuration and animal disturbance. Impor-

tantly, a suitably experienced helicopter pilot is mandatory.

Genetic Analyses:

Mountain goat tissue samples were collected and preserved in a 90% ethanol solution. Samples were subsequently sub-sampled; one sample set was archived in the ADFG regional office in Douglas, Alaska and the other was sent the Aaron Shafer at the University of Alberta. During 2010, Aaron Shafer plans to conduct genetic analyses of the samples collected during live capture operations, in addition to a sample submitted by C. Smith collected during a mountain goat research effort conducted on the the lower Cleveland peninsula in 1980 (Smith 1983). As of June 2010, tissue samples have been successfully genotyped representing substantial progress on this project objective; further analyses are ongoing.

Mountain Goat Population Estimation:

Due to late-season timing of mountain goat VHF collar deployment and subsequent weather conditions, it was not possible to conduct an aerial population estimation survey in 2009. However, concerted effort will be made to conduct annual aerial surveys in future years for the life of the radio-collars (ca. 8 years).

Monitoring:

Between September 28, 2009-February 23, 2010, 5 monitoring surveys were conducted to determine animal fates and general location. Of these surveys, four were conducted from aircraft and all animals were detected. Five other surveys were conducted from the road system on Prince of Wales island in the vicinity of Sandy beach. During these latter surveys it was typically possible to detect 3 of the 7 collared animals and determine their fates, though location information is extremely coarse-scale.

Future Work/Recommendations:

A primary goal of this project is to understand patterns of genetic structure between mountain goats inhabiting the lower Cleveland peninsula and nearby “mainland” populations to ascertain the vulnerability of this population to natural or human-induced population perturbations. One key information need, in this regard, involves estimating gene flow between the lower and upper peninsula. Planned genetic analyses, in collaboration with the University of Alberta, will provide important information needed to assess this topic.

Another key goal of this project relates to long-term monitring of population size, composition and vital rates. In this regard consistent monitoring of marked animals at regular time intervals needs to continue. In addition, replicated aerial surveys need to be conducted each fall using mark-resight methods to derive accurate population estimates

Figure 3. ADFG wildlife biologist, Steve Bethune, handling a 6-year old adult male mountain goat (CG-05) captured in the Burnett Mountain area, September 2009.

over time. Such activities should be linked with region-wide efforts to develop mountain goat sightability models (White and Pendleton 2009). Acquisition of these data will be key for monitoring the recovery of the population and devising appropriate management strategies.

In general, sample sizes of radio-marked individuals are marginal for deriving meaningful inferences about this population and for accomplishing objectives. Efforts should be made to increase sample size over time in order to properly address management goals. In addition, deployment of GPS radio-collars during future capture activities would greatly increase the ability to describe movement patterns of animals between areas of limited suitable habitat. Consideration should also be given to closely monitoring mountain goats in the upper Cleveland peninsula, “source”, population, to the extent possible.

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Appendix 1. Summary of mountain goat capture activities and individual morphological characteristics for animals captured on the lower Cleveland Peninsula in Spetember 2010.

ID	Sex	Age	Capture Date	Location	Weight (lbs.)	Horn Length (in.)		Horn Basal Circumference (in.)	
						Lef:	Right	Left	Right
CG-01	M	1	09/02/09	Ship Mtn	127	6 5/16	6 5/16	4 14/16	4 12/16
CG-02	M	3	09/02/09	Ship Mtn	180	9 9/16	9 8/16	5 7/16	5 3/16
CG-03	F	5	09/02/09	Black Bear Ridge	173	9 13/16	9 8/16	4 5/16	4
CG-04	M	8	09/02/09	South Mtn	252	11 3/16	11 5/16	5 6/16	5 8/16
CG-05	M	6	09/02/09	Burnett Mtn	278	11	11 1/16	5 13/16	5 15/16
CG-06	M	8	09/28/09	Copper Mtn	323	9 9/16*	10 2/16	5 8/16	5 8/16
CG-07	F	4	09/28/09	Ship Mtn	--	9 2/16	9	4 5/16	4 5/16
CG-08	M	11	09/28/09	Black Bear Ridge	--	11 12/16	11 8/16	5 15/16	6