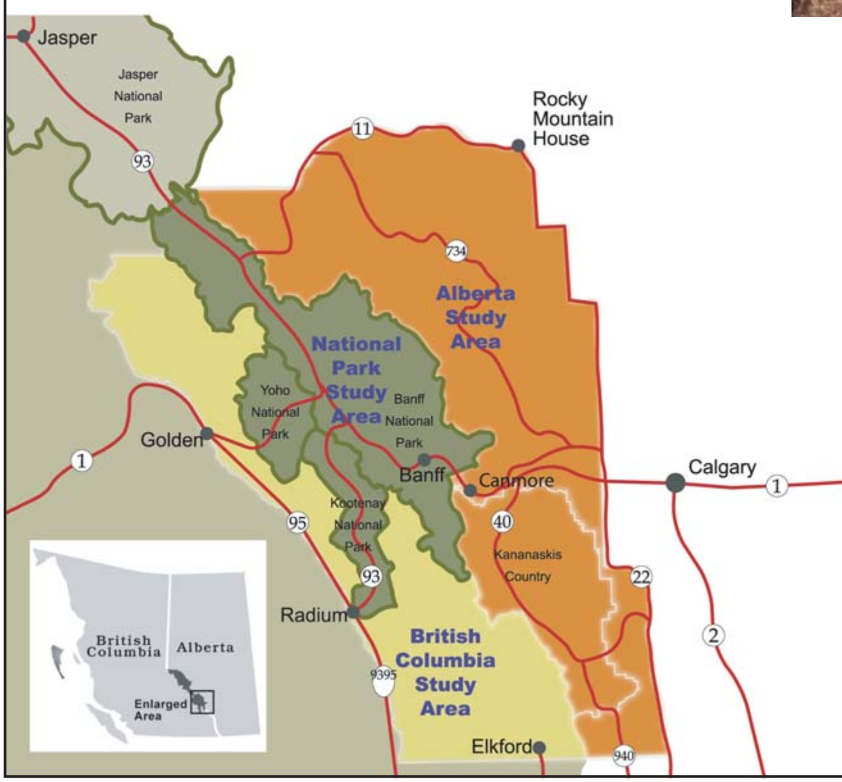
# CHAPTER 3

# RESEARCH METHODS REGARDING CAPTURE, HANDLING AND TELEMETRY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# 3. RESEARCH METHODS REGARDING CAPTURE, HANDLING AND RADIOTELEMETRY

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## CAPTURE AND HANDLING

Between 1994 and 2002 we captured and radio-marked grizzly bears in the Bow River watershed and monitored their movements. Selection of areas to trap was based upon local knowledge of where habitat and terrain factors suggested we were most likely to capture grizzly bears. Trapping effort varied between years and was widespread throughout the entire 11,400 km2 area. Most trapping was conducted during the spring when bears were concentrated at low elevations due to snow.

We captured grizzly bears in culvert traps or Aldrich foot snares as outlined in the protocol of Jonkel (1993). Bears were free-range darted from the ground and helicopter in special circumstances. We used snares predominantly in backcountry areas of Banff National Park and Kananaskis Country where vehicle access was prohibited. These sites were monitored once or twice daily, by foot or horseback. In vehicle accessible areas we used a combination of snares and culvert traps. Trapping effort was expended equally between remote areas and vehicle accessible areas. For bait, we used road-killed ungulates and beaver carcasses from local trappers. Some sites were pre-baited and monitored for activity before a snare or trap was set.

We immobilized captured bears using Cap-Chur dart gun equipment (Palmer Chemical Co., Douglasville, GA) and/or a jab-stick with Telazol © at a dosage of 7-9 mg/kg (Taylor et al., 1989). We used Ketamine/xylazine at a ratio of 2 mg/kg for bears that required additional anesthesia (Taylor et al., 1989). The immobilized bear was given a complete physical exam then we obtained measurements, respiration, heart rates and rectal temperatures. When possible, we weighed the bear (to the nearest kilogram) by raising it with a pulley system attached to a weigh scale suspended from a tree or tripod. A premolar tooth was extracted and sent to Matson's Laboratory, Milltown, MT, USA to determine age by cementum analysis. Numbered plastic ear tags (Allflex USA Inc. Dallas, Texas) were placed in each ear; males received yellow in the left ear and white in the right ear. Females received a white tag in the left ear and yellow in the right ear. Between 1994-96 we placed a 9x4 cm color coded ear streamer in the left ear of males and right ear of females to assist in visual identification. This practice was discontinued after abandoning the use of cameras, for which the visual ear markers were necessary, to try to estimate populations size. We extracted blood, from the femoral vein or artery, and tissue samples for both mitochondrial and nuclear DNA analysis as well as serum chemistry.

We fitted most individuals with either a VHF radio neck collar (Lotek Engineering, Newmarket, Ontario) or VHF ear tag transmitters (Advanced Telemetry Systems, Isanti, Minnesota). All radio collars were fitted with a breakaway cotton spacer (Hellgren et al. 1988) to ensure that collars would not be worn permanently. All transmitters were motion sensitive, changing pulse rate after 7 hours of inactivity to alert researchers if the transmitter was shed or the grizzly bear had died. Ear tag transmitters were programmed to turn on and off daily, and on a seasonal basis to maximize battery life. We placed two ear tag transmitters on some grizzly bears (one on each ear). One transmitter of the pair was programmed to begin functioning after the battery life of the first operating transmitter had expired. A small number of GPS collars (Televilt, Lindesberg, Sweden) were deployed in 2001 and 2002 in the immediate vicinity of Canmore and Lake Louise.

Captured bears were classified by sex and age class: adult ( > 5 years old), subadult (2-5 years old), and yearling (1 year old). Cubs of the year were not marked in any way. There were few management related captures in the sample (2 subadult males, 1 subadult female, 1 adult female).

## TELEMETRY AND MONITORING

We searched for collared bears at ± weekly intervals from the air, weather permitting, using a Bell Jet Ranger III helicopter or a STOL equipped Cessna 337 Skymaster. Aerial tracking followed the techniques of Mech (1983). Aerial fixes were established from an aircraft mounted GPS unit using the Universal

Transverse Mercator coordinate system. We also located bears from the ground on a daily basis where possible using a portable receiver, roof mounted omni-directional antenna and 3-element hand-held yagi antenna. In addition to systematic radio tracking, we conducted periodic 24-hour monitoring of individual animals at hourly intervals to obtain daily movement patterns. Rugged mountain topography limited our ground-based search for collared bears to areas adjacent to roads and trails. Radio locations were supplemented by occasional direct observation or reports from the public.

The status of bears was determined by a variety of methods. If a change in transmitter pulse rate was detected during regular flights, or from the ground, the site was investigated usually within one week and the dropped transmitter retrieved or the cause of mortality determined. Bears killed as problem wildlife, by hunters, and in some cases illegally were reported to and investigated by Conservation Officers. A suspected mortality was recorded when the radio signal from a bear that had been located in proximity to human settlement or camps disappeared prematurely.

Reproductive status of each female was determined by repeated visual observations from the aircraft while searching for radio collared bears during regular flights. Cubs were classified from their size and the known reproductive status of the female from the previous year. The maximum number of cubs observed was considered the litter size, although cubs lost very early in the season would not have been recorded. Mortality of cubs was assumed if they were no longer observed with their mother.

## THE DATABASE AND NATURE OF THE SAMPLE

While trapping effort was expended equally between remote areas and vehicle accessible areas, over time, individual animals were targeted for collar replacement. Our recapture success varied depending upon capture vulnerability and the animal's experience with trapping methods. While on the one hand it is necessary to follow individual animals for longer than the battery life of one radio collar to document long reproductive intervals, it potentially biases the data set by not re-sampling from the total pool of bears available. This could skew some results by weighting the radio telemetry sample towards bears whose circumstances or behavior favors longevity.

Aerial-based telemetry data, if collected from all study animals within the study area systematically, is an effective technique that does not bias location data except that only daytime locations are sampled. Our regular aircraft monitoring provided such a sample where each bear was searched for every flight. There were occasions however where not every bear was found every flight due to the difficulties of detecting radio telemetry signals in mountainous terrain. Budgets also constrained searching widely for bears whose signal had not been detected during regular monitoring flights. The ground based telemetry data is highly biased towards where workers could travel and signals could be detected easily. While this data is valuable for some analyses, it is not an unbiased representation of landscape use, is highly auto-correlated and was used cautiously. The GPS location data set is a better representation of fine scale movement although there are inherent biases in this data as well and we only had a small sample of GPS data. Research from other areas has found that GPS data is influenced by both shadow effect of mountainous topography and forest canopy closure. These blind spots create biases that are difficult to identify and correct for.

## LITERATURE CITED

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