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Progress Notes contain *interim* data and conclusions and are presented as a service to other wildlife biologists and agencies. The notes will appear in a summary volume at the end of the calendar year.

LIFE HISTORY, ECOLOGY AND BIOLOGY OF THE POLAR BEAR, AUTUMN 1966 STUDIES

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Introduction

In October 1966, the Canadian Wildlife Service started a new phase of research on polar bears in the Canadian Arctic. This work was directed to developing trapping, handling, and marking techniques and was an extension of a long-term study of polar bears begun in 1961 by Mr. C.R. Harington. The initial emphasis of Mr. Harington's work was on reviewing the literature (Harington, 1964) and studying den ecology (Harington, 1966). Mr. T.H. Manning (1964) contributed to this study by developing age determination techniques from skull measurements and by reviewing the taxonomic relationships of the various world polar bear populations.

The purpose of the present research is to make a complete investigation of all aspects of polar bear biology by the following methods:

1. Capturing and marking individual bears to study growth, behaviour, migrations, and population regulation.

2. Collecting biological materials from bears killed by hunters to study reproductive rates, food habits, and parasites.

3. Improving annual census techniques using aerial surveys and marked animals.

4. Carrying out a variety of other procedures, including radio-tagging, to obtain quantitative expressions of polar bear population dynamics, life habits, and ecology.

5. Carrying out special studies to develop and test methods for management.

The broad goals of the present study are to gain both practical and academic information on polar bears. Recommendations for changes in the management or protection of bears in particular areas will be made as information becomes available. A detailed research plan is being prepared.

This work by the Canadian Wildlife Service will be adjusted to any interests the provinces develop in polar bear research, and the project is already co-ordinated with research being done by other nations. The study will depend for success on the labour and wit of many people. The Canadian Wildlife Service, therefore, will adapt to the interests of other persons or groups wishing to work on particular phases of polar bear biology. Polar bear populations may be so low in some areas that they could not endure costly research mistakes, and the Canadian Wildlife Service will therefore welcome any opportunity for sharing ideas or giving information and assistance on techniques. Other government agencies are also invited to lend their support in collecting data throughout the Arctic.

Work this October was conducted in the Cape Churchill area with the co-operation of the Churchill Rocket Research Range of the National Research Council. Mr. Jagat Dutta from India, a Columbo Plan Trainee in Wildlife Conservation attached to the Canadian Wildlife Service for six months, assisted in these preliminary experiments. The Fort Churchill Royal Canadian Mounted Police detachment also gave valuable aid.

Methods

Standard trapping techniques used on black and grizzly bears were tested for use on polar bears. The merits of modified Number 150 Newhouse steel bear traps (Woodstream Corporation, Lititz, Pennsylvania) and heavy-duty Aldrich Snare traps (Aldrich Spring Activated Animal Snare, Castle Rock, Washington) were compared. A chain net, 45-gallon oil barrels partially filled with gravel, and 40-inch steel stakes constructed of four-inch girder (Figure 1) were tested as anchoring devices. Trap sites were placed approximately one mile apart and were constructed of oil barrels, boulders, and squares of lichen and moss turf. Polar bear meat and kippered herring were used as bait.

Bears were immobilized with the powdered form of Sernylan (donated for experimental work by Parke, Davis, and Company, Ann Arbor, Michigan) mixed to a concentration of 100 mg. per cubic centimetre in sterile water. The drug

was administered with an automatic projectile syringe powered by a powder charge dart gun (Cap-Chur Gun, Palmer Chemical Co., Atlanta, Georgia).

Bears were marked with metal stock tags and Perma-tags (Ketchum Manufacturing Sales, Ltd., Ottawa), Leadertags (Salt Lake Stamp Co., Salt Lake City, Utah), and vinyl plastic ribbons placed in their ears (Craighead and Stockstad, 1960). Bears were tattooed inside the lip and on any partly bare areas of the anterio-ventral region. Small areas of the fur were marked with spray enamel and Paint-Stik (Ketchum Manufacturing Sales, Ltd., Ottawa).

A series of biological information was recorded for each bear, including measurements, parasites, the action of the drug, and sex and reproductive condition. Weights were determined by placing the bears on a canvas sling and weighing both the bear and sling with spring scales. The accuracy of a cattle Weightape (Ketchum Manufacturing Sales, Ltd., Ottawa) designed for estimating the weights by thoracic girth was tested. An upper premolar (P3) was removed from each bear and placed in 10 per cent formalin for use in age determination. Blood slides were prepared for all animals captured.

A small amphibious vehicle (Jiger Corporation, Ltd., Toronto) was tested for use in beach and tundra areas.

Results and Discussion

Two traps were set October 4 through October 6 and seven traps were kept set from October 7 to October 12. Three bears were captured in these traps, and two other bears sprung traps but were not captured. The sprung traps were number 150 Newhouse steel traps and at least one of these trap failures was attributed to the bear's foot being of a greater diameter than the jaws of the open trap. The other three bears were all captured with the snare traps. No injury was sustained by any of the animals. The snare proved very effective in all three cases, but some problems were encountered when gulls and arctic foxes disrupted the sets or tripped the snares.

Another bear was captured on October 13 and again on October 14. This animal was accustomed to being fed near a rocket launching site and had little fear of man. She was captured both times by being shot with a dart at close range. The second day she was immobilized and moved 20 miles from the launch area since she was becoming bothersome, but she returned one and one-half days later.

A standard cubby set constructed of available materials (Figure 1) proved very effective. Several sets were also constructed with three oil barrels - one having an open end and holding the bait, the other two closed and flanking the first (see Figure 2). Bears were easily lured to the set and guided with the stepping sticks to place their foot properly for capture. They showed no aversion to the trap sites, but several passed between trap sites unaware of the bait. Even in completely open areas like Cape Churchill, it may prove necessary to place some traps at one-half mile intervals, depending on topographic features.

One barrel used in the construction of some cubby sets served a dual purpose. It was filled one-half to two-thirds full with sand or gravel and functioned then as an anchor for the trap. Two snares anchored in this manner stopped bears within 20 feet of the trap site. The barrel rolled or swung slightly when pulled, and this may be an advantage over a solid anchor since it encourages the animal to pull in different directions rather than pull with great force in one direction. A 40-inch steel stake driven almost level with the ground in a sand and gravel beach proved adequate to hold a 900-pound adult male. The bear had struggled considerably but the stake had not been loosened. Certain types of soil may not hold the stake properly, however, and so care should be taken to anchor traps in at least two ways until the stake has been tested further. The six-foot-square chain net was found unnecessary in the Cape Churchill area, but such a net could be filled with small boulders and used as an anchor where barrels were unavailable or where the soil would not hold the stakes.

The drug Sernylan gave excellent results as an immobilizing agent. Table 1 presents the data for individual animals. The bears were very tractable during their recovery from the drug and made no attempts to harm us even after they were capable of sitting. Although they struggled to stand, they made no attempts to bite or swat when handled. Even before immobilization they were quite calm compared with adult black bears and grizzly bears. This may not be true during other seasons, however,

Four different types of tags were tested for ease of application and durability. The metal stock tags would not penetrate properly unless sharpened, and the Perma-tags often bent during application. The Leadertags and vinyl ribbons were both inserted through holes punched

or cut in the ear. Polar bear ears were found to be considerably more vascular than black or grizzly bear ears, and freezing and sloughing of the ear around the tags may prove less serious than expected. Other types of tags and other ways of inserting them should be investigated before large numbers of animals are captured and marked. The tags of one animal were observed in good condition three weeks after they were inserted, and the tattoo in the lip of one bear showed very clearly one day after application, but later recaptures will give more reliable information on the durability of each. Red enamel and red Paint-Stik markings were not evident on one of the bears three weeks after application and so may be of no use. Nyanzol (Nyanza Inc., New York), Ag NO_3, and specially developed dyes will be tested on other bears.

A cattle Weightape estimation of body weight based on thoracic girth proved quite accurate. The results were as follows:

Actual weight		Weight estimated by cattle Weightape	
lbs.	kg.	lbs.	kg.
230	104	235	106
860+	410+	949	425
250	113	250	113
285	128	289	130

These data show that thoracic girth gives a good estimate of actual weight, but an adjustment for polar bears might have to be made during other seasons when adipose tissue in the posterior regions is either greater or less.

Premolars and blood slides collected from individual bears have not yet been examined. These results will be reported at a later date.

The Jiger was a useful vehicle for transporting equipment and crossing boggy terrain. The machine can carry approximately 200 pounds of equipment and two people. An important feature noted was the only slight amount of damage the vehicle did to the terrain. A heavier vehicle might damage the vegetation to an extent that would take many years to repair in an arctic environment. The Cape Churchill area is very prone to wind-damage, and tracks made by heavy vehicles in earlier years have become large sand-pits.

Biological material was collected from a fifth polar bear shot near Fort Churchill by an R.C.M. Police officer. This bear had made an apparently unprovoked attack on four boys. The animal was autopsied and tissue as well as the entire specimen was preserved. The skin and skeleton were placed in the University of Manitoba Museum, Winnipeg. Stomach and gut contents were examined, and two .22 calibre slugs were removed from the right hind leg. These were very recent wounds showing no inflammation. A later examination of the skull in the laboratory showed that the bear had also been shot in the head at an even earlier date, eliminating completely the charge of an unprovoked attack. There was extensive bone reconstruction and partial resorption of a displaced canine tooth. The animal was certainly blind in at least one eye, and one entire nasal passage was blocked by the displaced tooth. Except for these disabilities the animal was in fair physical condition. The skull will be examined more closely to determine the animal's age.

Literature Cited

Craighead, J.J., and D.S. Stockstad. 1960. Color marker for big game. J. Wildl. Mgmt. 24(4):435-438.

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Table 1 Dosages of Sernylan given to five polar bears in the Cape Churchill area. All dosages were given intramuscularly

Bear number	Sex	Weight (kg.)	Dosage (mg.)	First effects (minutes)	Period Immobilized (hours)	Full recovery (hours)
501	F	104 (230 lbs.)	200	13	5	20
503	M	425* (949 lbs.)	250	15	could still lift forequarters at 25 minutes	
			100 (25 minutes after first dosage)		1½	had left area 5 hours after first dosage
504	M	113 (250 lbs.)	100	15	still able to sit at 18 minutes	
			50 (18 minutes after first dosage)		1**	4 hours later he was sitting in the same place, but ran competently when frightened by the helicopter
505	F	128 (285 lbs.)	150	10	½	1½
505	F	128 (285 lbs.)	170	10	1½-2	her recovery was not observed, but she returned 20 miles to the rocket launch site within 1½ days

* Estimated with cattle weightape based on thoracic girth.
**Severe muscle convulsion 60 minutes after first dosage - his entire body doubled and jerked violently for about 1 minute.

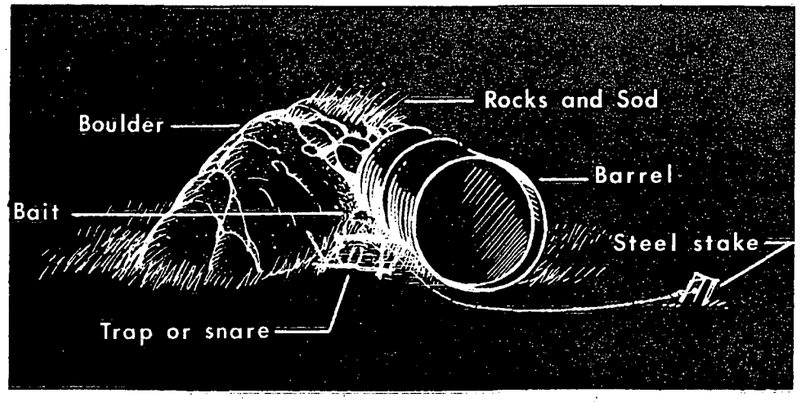

Figure 1 A typical cubby-type trap site constructed of boulders, sod, and a barrel. Some sets were built with only sod and boulders and then a steel stake was used for the anchor.

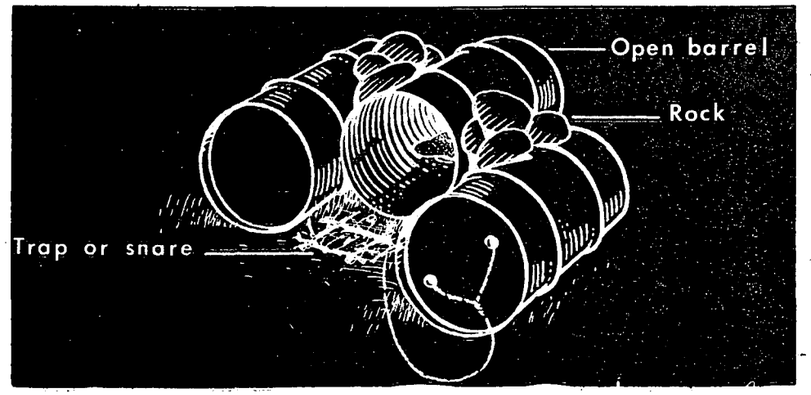

Figure 2 A set built from three oil barrels, rocks, and sod. The centre barrel holds the bait and has one end open. The barrel on the right is partially filled with gravel and serves also as an anchor.

Figure 3 A young male polar bear captured in a foot snare on Cape Churchill. Note the cable anchored to the oil barrel filled with gravel. The trap site has been partially demolished as the bear struggled to escape. (Dutta)

Figure 4 A drugged female polar bear showing the location of one of the tags. The bear was also tagged in the other ear and was tattooed inside the lower lip and under the front leg for further identification. (Jonkel)