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SOUTHEASTERN BROWN BEAR STUDIES

by
Robert E. Wood

Final Report
Federal Aid in Wildlife Restoration
Project W-17-4, Job 4.5R

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FINAL REPORT (RESEARCH)

State: Alaska

Cooperators: Jack Alexander, Alan Courtright, David Zimmerman and Harry Merriam (Game Biologists, ADF&G)

Project No.: W-17-4 Project Title: Big Game Investigations

Job No.: 4.5R Job Title: Techniques for Capturing, Marking and Radio-tracking Brown Bears in Southeast Alaska

Period Covered: July 1, 1971 through June 30, 1972

SUMMARY

Two techniques of capturing brown bears were evaluated on Admiralty Island.

Foot approaches using a "Cap-Chur" gun were relatively unsuccessful. During two spring periods, three bears were captured in 22 days using this technique. Three bears were shot at and missed and one was hit but not captured. The use of this technique along fish creeks for 25 days during one summer and fall period resulted in two captured bears. Three others were hit but not captured and one bear drowned after being immobilized.

Aldrich foot snares were more successful and produced a satisfactory bear per unit of effort ratio. During one spring period, five bears were caught during 45 snare days, and during 24 days in one fall season, 18 bears were captured in approximately 340 snare days.

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BACKGROUND

The brown bear (*Ursus arctos*) is one of the most valued big game trophy animals in Southeast Alaska. This species is also important as an indigenous portion of Southeastern fauna; providing attraction for tourists, naturalists and photographers. Information presently available on brown bears in this region is confined almost entirely to data from hunter-harvested bears including sex, age, size and location of kill. Little information is available on total populations, movements and habits.

The September, 1968 Forest Service timber sale on Admiralty Island to U. S. Plywood-Champion Papers, Inc. includes many drainages known to support brown bears. To insure adequate management of this bear resource much additional information is required on the effects of clear-cutting, road building and human activity on bears. Data on bear numbers and movements in natural unlogged areas are needed in order to show changes in bear populations and habitats that could be attributed to logging. This project was the first phase of a detailed study to evaluate the effects of logging on brown bear.

The initial objective was to determine if brown bears could be captured in sufficient numbers to justify further studies. Southeast Alaska's vegetation and topography precluded the use of helicopters which are highly effective for capturing brown bears on Kodiak Island, the Alaska Peninsula and the arctic North Slope where more open conditions prevail. Consequently, this project was designed to test and evaluate various ground capture techniques.

Hood Bay on southern Admiralty Island was chosen as a study area because of its large population of brown bears, its geographic location with respect to other bays of importance to bears, its excellent salmon streams and the light hunting pressure that occurs there. Hood Bay was also one of the first areas within the Plywood-Champion sale scheduled for logging.

Figs. 1 and 2 show the location of the study area.

Fig. 1. General locale of Hood Bay Study Area.

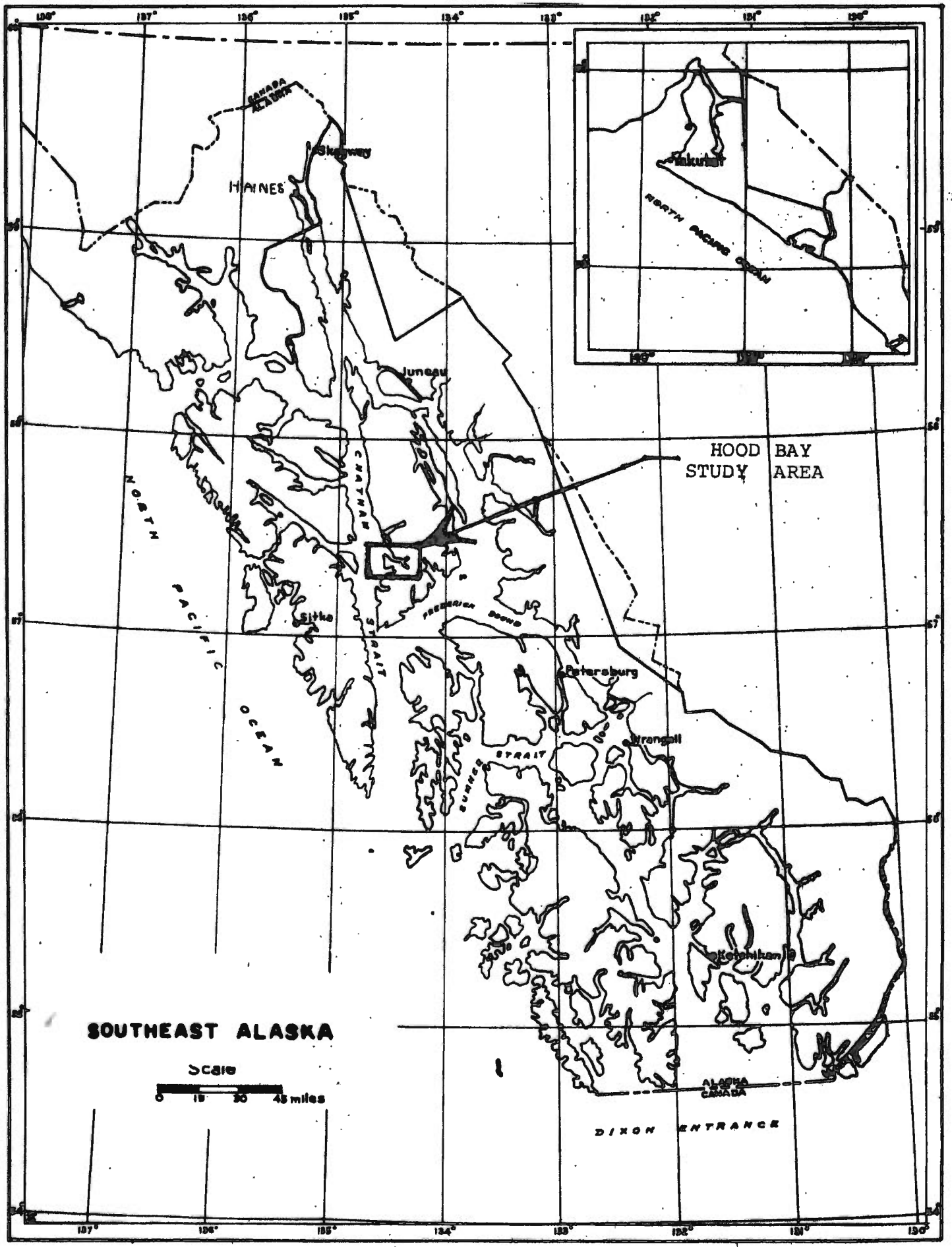
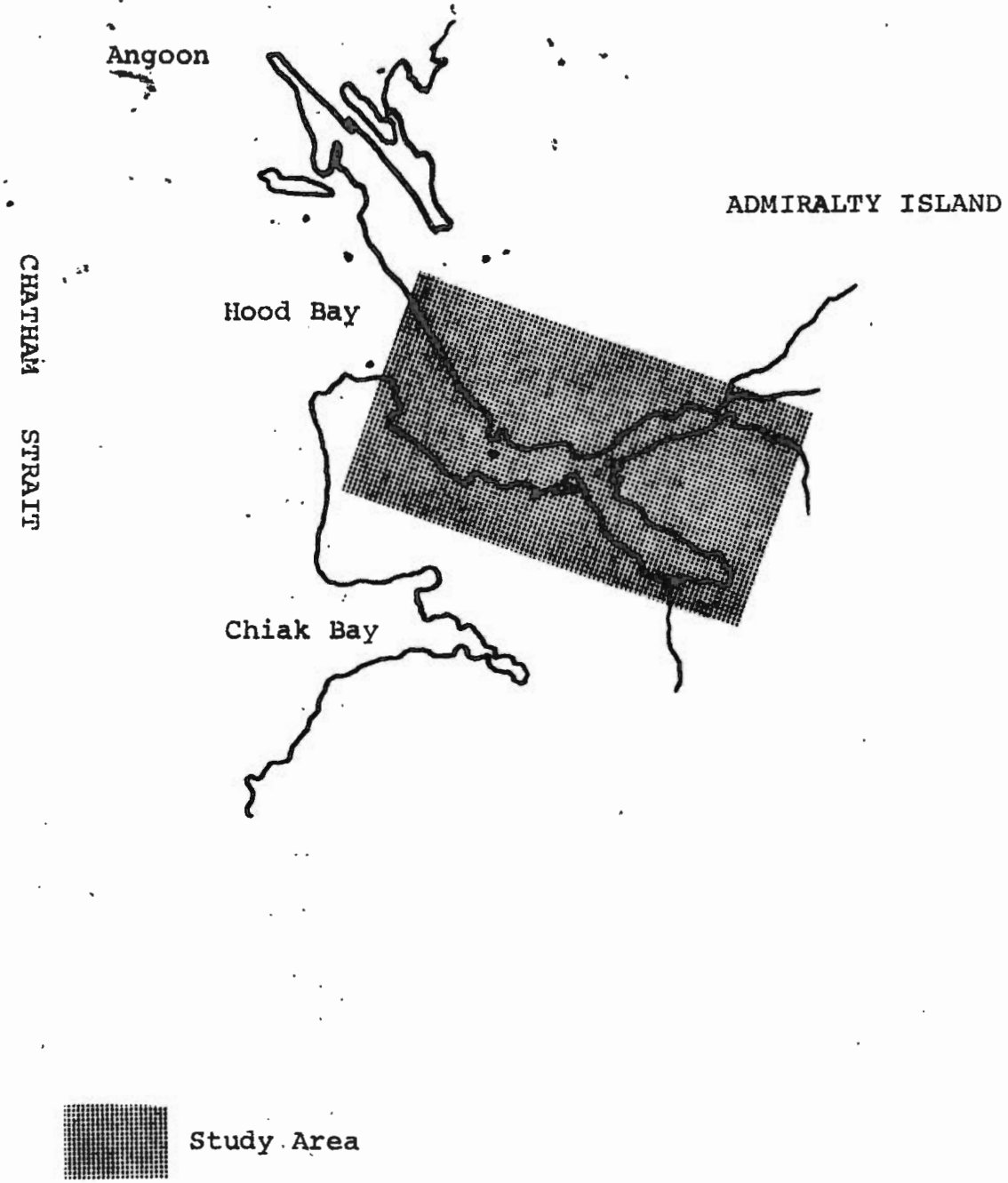


Fig. 2. Detailed Map of the Study Area.



OBJECTIVE

To develop and evaluate methods of capturing and tagging brown bears in Southeast Alaska.

PROCEDURES

Capture attempts were conducted during June when bears were feeding on new growth beach vegetation and in late August, September and parts of October when the bears were concentrated along fish streams.

We first evaluated capturing free-ranging bears using Palmer Chemical and Equipment Co., Inc., powder "Cap-Chur" guns. Using this technique, bears were first located by patrolling the beaches in an outboard skiff and to a lesser extent by use of binoculars and a spotting scope from vantage points. Some searching was conducted during all daylight hours, but most effort was expended during the late afternoon and evening.

When a bear was observed from the skiff, a landing was normally made downwind 300 to 500 yards from the bear. Generally an approach was made through the beach fringe timber, although open approaches along the beach were also tried. A predator call was also used in some instances. At times, the skiff was run at idle speed straight to the bear and a canoe was also used in several attempts. A canoe propelled by an electric motor was tried in several water approaches in June, 1972.

A sneak approach was used along the fish streams from August 28 through September 11 and from September 29 through October 8, 1971. Streams were usually walked twice a day; in early morning and late afternoon. Some of the better riffle areas were watched from a blind during late afternoon and evening hours.

A trail dog was used to follow and locate all darted bears after waiting ten minutes for drugs to take effect. Normally all gear was left in the area where the bear was hit and later transported to the location of the immobilized bear.

Following the attempts on foot with the "Cap-Chur" gun, Aldrich foot snares (Jonkel and Cowan, 1971) were tested. These snares were originally developed by Jack Aldrich of Castle Rock, Washington, for black bear (*Ursus americanus*) trapping and were enlarged for use with brown bear.

The foot snare is comprised of two parts - the coil spring or closing mechanism and the snare itself. The spring is shaped from spring steel 5/16 inches in diameter. It is supported by two 7 1/2-inch prongs and the trigger mechanism attaches at the junction of the prongs and spring. The snare is 1/4-inch flexible cable terminating at a swivel. When setting, the prongs are inserted into the ground and the 18-inch coiled arm is pressed parallel to the ground and engaged by the trigger. The snare is temporarily attached by the swivel to the stationary part

of the spring and the loop is placed over the trigger. When the animal steps inside the loop and on the trigger, the coiled arm of the spring is released and draws the snare above the foot while tightening. The spring, when pulled out of the ground, drops away from the snare. All snares were anchored securely to available trees or large roots. Jack Aldrich was hired to operate the snares and assist with tagging operations. The first use of these snares was in June, 1972, when both bait and trail sets were used.

These snares were also used during the initial phase of the follow-up study in September of 1972 (conducted under S&I Job 4.0) when trail sets were made along fish streams.

Numbered, nylon jumbo Rototags (Oberach Patent, Ltd., London) were placed in both ears and in some cases 3" by 3" squares of safflag were placed under the ear tags.

All bears were tattooed on the lip and groin with a Spaulding Fieldmaster Electric Tattoo Marker.

Radio transmitter collars were attached to four of the bears. The transmitters were patterned after those described by Seidensticker, et al, (1970) and were built in Kodiak with the help of Jack Alexander of the Alaska Department of Fish and Game and George LeMasters of the Kodiak Naval Base. The power source was six Burgess Hg-42R batteries and the collar was made of 1 and 3/16-inch OD vinyl tubing which supported the batteries and transmitter and also contained the antennae. General Motors Plastic Solder (used for auto body repair) was used to cover and seal the battery and transmitter pack. The vinyl tubing was filled with a styrofoam mix when the collar was attached. Collars were adjustable for neck sizes ranging from 23 to 34 inches. Total weight of the unit was about five pounds. Collars transmitted a pulsed signal at varying rates within a frequency range of 30.17 to 30.25 megahertz.

Drugs and dosages used for all bears were the same as those described and used by Glenn and Miller (1970). Sernylan (phencyclidine hydrochloride, Park, Davis and Co., Detroit, Michigan) in concentrations of 100 milligrams/milliliter was used to immobilize; Sparine (promazine hydrochloride, Wyeth Laboratories Inc., Philadelphia, Pennsylvania) in concentrations of 50 milligrams/milliliter was used as a tranquilizer; and Hyaluronidase (Haver-Lockhart Laboratories, Kansas City, Missouri) in concentrations of 150 N.F. units was used to speed induction time. Sernylan was used in dosages of 0.75 milligrams/pound body weight. Adult bears were given 2.0 cc of Sparine while subadults were given 1 to 1.5 cc. All weights were visually estimated, resulting in considerable variation in actual dosages.

A lower, first premolar from each bear was pulled for cementum age determination. Weight was estimated and the following measurements were taken: neck circumference; head length, width and circumference; body length, chest girth; tail length; hind and front foot length and width; claw length over curve; shoulder height; and ear length from notch.

FINDINGS

Brown bear habitat in Southeast Alaska is not suited to the use of aircraft as a capture technique due to the predominant dense forest vegetation that normally extends from sea level to about 2000 to 2500 feet elevation. Beaches are characteristically narrow, with the exception of the tidal delta flats which can be quite extensive. Hood Bay contains about 30 lineal miles of shoreline, all of which is bordered by dense spruce-hemlock-cedar forest. Alpine meadow areas extend from treeline to the highest elevation of about 3100 feet. Tideflats in the north arm of the bay are approximately three-fourths mile long and one-half mile wide. The remainder of the beaches used by bears averaged less than 50 yards wide above mean high tide.

There are three large salmon spawning streams in the bay and seven smaller streams which also support some fish. All are used to some extent by bears during the salmon spawning period; however, bears were more abundant along the larger streams. All of the streams run through dense forest vegetation and contain many fallen trees, and a thick understory is common along the banks. On the flats in the North Arm the streams run through the open grass flats and here bears are sometimes observed up to 300 yards from the forest edge.

There were two periods during the year when bears were accessible in sufficient numbers for capture attempts. In June, bears were consistently found along the beaches through most of Hood Bay. Their use of the beaches probably began as soon as the new growth of grasses and sedges appeared. From June 5 through June 17, 1971, 64 observations (109 bears) were made along the beach. Individual characteristics such as color patterns, rub marks and size were recorded with times and locations. From these data it was calculated that a minimum of 18 different bears had been observed. Included were three females, each with twin yearling cubs.

The tagging period in the spring of 1972 was from June 9 through June 25. Fifty-eight observations (82 bears) were made during this time but no comparison was made with the previous spring because of varying efforts and differences in areas covered. A minimum of 17 different bears were observed in 1972.

During the 1971 salmon spawning season, bears were present in good numbers on at least some of the streams by the last week in August. There were fish available several weeks earlier, but bears did not concentrate along the streams until at least two weeks after fish appeared. By September 29, most of the salmon were gone in all streams except the main stream in the South Arm where good numbers of fish were available until about mid-October. Pink (*Oncorhynchus gorbuscha*) and chum salmon (*O. keta*) are the primary species. The major streams apparently have both early and late runs of chums. Coho salmon (*O. kisutch*) also are available in small numbers starting around the first of October.

Capture Techniques

Foot Approaches

Foot approaches with the "Cap-Chur" gun were not successful enough to obtain bears with reasonable effort. During the two spring periods, using one "Cap-Chur" gun for 22 days, three bears were caught, three were shot at and missed, one was hit but not caught and two were approached within 80 yards but not shot at.

Bears could not normally be approached close enough for effective use of "Cap-Chur" equipment. Their hearing is excellent and usually the bears were gone from the beach before the shooter was within range. In most cases, brush and trees were so thick that it was difficult to make a quiet approach. Attempts were also made along the open beach but the bear was usually alerted before we were within range.

A predator call was used successfully on one sow with twin yearling cubs; it appeared the cubs were attracted and the sow followed them. The call was tried on numerous other occasions without success but often after the bears were already disturbed.

Water approaches were attempted several times but were not successful because of motor noise, or some other type of boat noise. In addition, bears were often too far from the waterline for effective use of the "Cap-Chur" gun.

Many bears used small bays where wind currents were very erratic as feeding sites. Usually the bear scented the stalkers regardless of the direction approached.

The best conditions for using this procedure appeared to be a bear moving downwind along the beach where the shooter could get in front of the bear and let it come to him. Several bears came within range in this manner, but the right conditions were not often presented.

Success per unit of effort would probably be better along fish streams than on open beaches. On the beaches the crew could not usually get close enough to the bears, conversely, they were often too close for safe shooting when working along streams. Thick vegetation, fallen trees and winding streams generally prevented shots at more than 40 yards and several shots were taken at approximately 20 yards. Better success could be expected along the streams because of higher bear concentrations, more consistent wind patterns and stream noise which covers approach sounds.

Too much human activity along the fish spawning streams appeared to drive the bears away, at least temporarily. Activities were confined to the three main fish streams. The normal procedure was to make two trips a day up and down a creek for three or four successive days before moving to another stream. Indications were that bears left the area and did not shift their efforts to hours of darkness. Undoubtedly a much

better procedure would be to spend only one day on each stream and rotate so it would be several days before the same stream was walked again.

While fish streams would probably yield better results than beaches, it is doubtful if enough bears could be taken with the "Cap-Chur" gun to provide the information required for the planned logging study. Using one "Cap-Chur" gun for 25 days, two bears were captured, one was drowned when it became immobilized in a small stream, two were hit but not found and one was hit but the dart richocheted off. Several other bears were approached within good range but not darted because it was late in the day when light conditions were poor and following the bear would have been difficult and dangerous.

All bears darted were found by use of a trailing dog. It is doubtful if immobilized bears could have been located without the dog because of the dense brush and ground cover of moss which made tracking difficult. Distances traveled by the bears that were found after being hit varied from about 30 feet to 400 yards. The bears that were hit but never located were followed for at least a mile. It is possible the dog changed bear trails or that the dart failed to inject the drug. The drug also may have been injected into fatty tissue resulting in slow absorption. Using 15 minutes as a maximum immobilization time, a bear running continually could cover more than a mile. The dog used was excellent for the job. It was small and could be carried and controlled when close to bears. When trailing, it would only get about 100 yards ahead before coming back; this prevented losing contact with those bears that were hit but not immobilized.

Aldrich Foot Snares

When it became apparent that the "Cap-Chur" gun technique would not produce the number of bears desired, an attempt was made to capture bears using Aldrich foot snares. Jack Aldrich, who developed the snares and has used them extensively on black bear in Washington, was hired to operate the snares and assist in the tagging. Initial attempts were in June, 1972 with bait sets along the beaches. Harbor seal (*Phoca vitulina*) carcasses were used for bait and four sets were placed in areas frequented by bears. None of the sets were disturbed after five days. The bears were feeding on grasses, sedges and possibly herring spawn that was abundant on most of the beach vegetation at the time the snares were set. When it was found that bears would not come to bait, the snares were reset on well-traveled bear trails. Only four snares were initially available and, with the bears widely scattered along the beaches, good coverage was impossible. Also, not many trails were used consistently. In approximately 45 snare days, five bears were caught, tranquilized and handled. There were no detectable foot injuries from the snares. The method was considered successful and it appeared that two men could easily operate 20 to 30 snares, thus increasing success. It would require at least this many snares to adequately cover all of the beaches used by bears in Hood Bay. These sets were made adjacent to the beach fringes and most could be checked from a skiff.

Initially a slightly smaller snare was used than the one finally adopted, and sprung snares were a minor problem. The entire foot and claws must be within the snare or the cable would slide under the foot.

Subsequent to this study, 30 snares were used along the salmon streams from September 3-26, 1972 and 18 different bears were captured and handled in approximately 340 snare days. One mortality and one serious foot injury occurred. The injured foot was on a large bear (estimated weight 800 pounds) caught by the hind foot. Both the location of the snare and the size of the bear probably contributed to the injury.

Data concerning marking history, weights and measurements, reproductive status and drugs and dosages are presented in the Appendix.

CONCLUSIONS

The Aldrich foot snare proved to be an effective means of capturing brown bears in Southeastern Alaska. Using these snares we feel that an adequate sample of bears can be captured and marked to enable enumeration of the Hood Bay population and the assessment of bear movements within and among Hood Bay and the adjacent drainages.

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PREPARED BY:

Robert E. Wood
Game Biologist

APPROVED BY:

Frank Jones
Director, Division of Game

Donald E McKnight
Research Chief, Division of Game

SUBMITTED BY:

Harry Merriam
Regional Management-Research Coordinator

Appendix I. Weights and measurements of brown bears captured in Hood Bay, Admiralty Island, 1971-72.

Body Measurements in Centimeters

(1) Total length
(2) Height of shoulder
(3) Hind foot length (a)/width
(4) Front foot length (a)/width
(5) Neck circumference
(6) Girth
(7) Width of skull (b)
(8) Length of skull (b)

Bear	Sex	Cem. Age	Est. Wt.	1	2	3	4	5	6	7	8
1											
7 June 71	F	-	275	160.0	96.5	20.3/11.4	11.4/12.7	58.4	94.0	29.2	39.4
2											
9 June 71	F	-	350	172.7	99.1	22.9/12.7	12.7/14.0	59.7	109.2	30.5	41.9
3											
28 Aug. 71	F	-	250	148.6	78.7	21.6/13.0	- /13.3	58.4	104.1	29.8	36.8
19 June 72	F	-	200	158.8	96.5	23.2/14.0	13.0/15.2	59.7	-	28.6	39.7
4A											
1 Sept. 71	F	-	150	-	81.3	19.7/11.4	11.4/12.1	45.7	83.8	27.3	33.7
4B											
29 Sept. 71	F	-	450	173.4	95.3	25.7/14.0	18.4/14.6	77.5	146.8	34.9	42.5
5											
11 June 72	M	-	400	175.3	113.0	27.9/16.5	15.2/18.4	86.4	134.6	34.3	45.7
6											
17 June 72	F	-	300	175.3	100.3	25.7/16.5	13.7/15.2	64.8	120.7	33.7	42.2
7											
19 June 72	F	-	200	161.9	96.5	21.9/12.7	13.3/14.0	61.0	110.5	30.5	39.7
8											
21 June 72	M	-	150	151.1	91.4	22.5/14.0	12.1/14.6	54.6	95.3	28.6	39.1

(a) Length includes toes but not claws.

(b) Measurements taken over curve with tape.

Appendix II. Age, weights and reproductive status of tagged female brown bears captured or observed in Hood Bay, Admiralty Island, 1971-72.

Bear	Captured or Observed	Cementum Age*	No. of Cubs	No. Young 1.5 yrs.	No. Young 2.5 yrs.	Vulva Condition	Estimated Weight	Comments
1								
7 June 71	Captured	-	None	2	None	Normal	275	Lactating
2								
9 June 71	Captured	-	None	2	None	Normal	350	Lactating
3								
28 Aug. 71	Captured	-	None	None	None	Normal	250	
19 June 72	Recaptured	-	None	None	None	Turgid	200	
4A								
1 Sept. 71	Captured	-	None	None	None	Normal	150	
4B								
29 Sept. 71	Drowned	-	None	None	None	Normal	450	
6								
17 June 72	Captured	-	None	2	None	Normal	300	
7								
19 June 72	Captured	-	None	None	None	Turgid	200	

*Tooth processing not completed.

Appendix III. Marking history of brown bears captured in Hood Bay, Admiralty Island, 1971-72.

Bear	Sex	Captured or Observed	Eartag No. & Color* Right	Eartag No. & Color* Left	Ear Flag Color Right	Ear Flag Color Left	Collar No. and Data	Tattoo Lip	Cond. Groin
1									
7 June 71	F	Captured	1Y	2Y	None	None	None	ADFG 001	ADFG 000
2									
9 June 71	F	Captured	4Y	3Y	None	None	Radio #12 30.19 3 beeps/sec.	ADFG 002	ADFG 002
5 Sept. 71		Observed					Collar Present		
3									
28 Aug. 71	F	Captured	6Y	5Y	White	White	None	ADFG 3	ADFG 003
19 June 72		Recaptured	Present	Present	Removed	Removed		Poor	Good
4A									
1 Sept. 71	F	Captured	7Y	8Y	None	None	None	ADFG 00B	ADFG 004
5									
11 June 72	M	Captured	1W	2W	Orange	Orange	Radio #5 30.17 1.5 beeps/sec.	ADFG 005	ADFG 5
23 June 72		Recaptured	Present	Present	Removed	Removed	Missing		
6									
17 June 72	F	Captured	10Y	9Y	White	White	Radio #7 30.23 1.3 beeps/sec.	ADFG 6	ADFG 6
7									
19 June 72	F	Captured	11Y	12Y	None	None	Radio #1 30.23 2 beeps/sec.	ADFG 7	ADFG 7
8									
21 June 72	M	Captured	4W	3W	None	None	None	ADFG 8	ADFG 8

*Jumbo rototags - Y=Yellow
W=White

Appendix IV. Drugs and dosages used on brown bear captured in Hood Bay, Admiralty Island, 1971-72.

Bear	Estimated Weight	Sernylan	Sparine	Hyaluronidase	Remarks
1					
7 June 71	375	5cc	2cc	150 N.F. Units	
2					
9 June 71	350	5cc	2cc	150 N.F. Units	
3					
28 Aug. 71	250	3cc	2cc	150 N.F. Units	30 second convulsion.
19 June 72	200	2cc	1cc	150 N.F. Units	Immobilized in 9 minutes.
4A					
1 Sept. 71	150	5cc	2cc	150 N.F. Units	
4B					
29 Sept. 71	450	5cc	2 1/4cc	150 N.F. Units	Drowned
5					
11 June 72	400	5cc	2cc	150 N.F. Units	
6					
17 June 72	300	3cc	2cc	None	Immobilized in 12 minutes.
7					
19 June 72	200	5cc	2cc	150 N.F. Units	Immobilized in 4 minutes.
8					
21 June 72	150	2cc	1cc	150 N.F. Units	Immobilized in 9 minutes.