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PROJECT M3-2-2. BEAVER POPULATION STUDIES,  
NORTHERN MACKENZIE DISTRICT

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INTRODUCTION

The limited beaver population study proposed in earlier project plans and reported on in June 1963 was continued during the summer of 1963. Objectives of the study are to determine colony composition, colony densities, colony and individual range, reproductive success, population turnover and related aspects of the biology and ecology of the beaver in the northern Mackenzie District and fluctuations in those factors due to habitat, climate, harvest and other environmental variations and to determine the present status of the beaver in that area.

The live-trapping phase of the study to determine movements and colony composition was initiated on Lakes 2 and 3 during the summer of 1963. The major portion of the live-trapping was conducted by Dan Blower, student assistant, using Bailey and New Mexico style live traps. After a period of instruction in trapping and handling techniques in early July, Mr. Blower worked on the project from 17 July through 15 August.

Captive beavers, held in live traps, were weighed to the nearest pound by use of a spring dial scale. Beavers were then injected intramuscularly with succinylcholine chloride at a dosage of one milligram for every six pounds of body weight. After immobilization, beavers were ear-tagged, sexed, examined for physical and reproductive condition and measured for zygomatic breadth. Experimental marking by ear-tattoo for permanent identification was not completed, the beavers were returned to the trap until recovered sufficiently from the drug to be able to move and swim easily. Then beavers were released at the capture location.

The consecutive weekly aerial beaver food cache counts planned for September 1963 on the experimental trapping area to determine the timing and rate of cache construction were not completed because of poor weather and lack of suitable aircraft.

### RESULTS

A total of 463 trap units (one trap unit is one trap set for 24 hours) was set in Lakes 2 and 3 in 17 captures of 11 beaver (7♂♂ and 4♀♀). One of the male beavers was a juvenile. Three beavers died during the live-trapping operations, one from drowning in a tipped trap and two from overdoses of succinylcholine chloride. One male and one female were each recaptured once and one male and one female twice.

An aerial survey of beaver food caches on the 27 square mile experimental trapping area was completed on 11 September 1963. Twenty-two food caches were seen and the locations marked on aerial photos. Weekly aerial cache counts were not completed after that date.

#### DISCUSSION

The live-trapping program was slowed in the early portion because of the lack of traps which curtailed the area which could be covered at one setting. Upon the completion of construction of the New Mexico style traps, area coverage was extended. Neither the Bailey or New Mexico traps were suitable for setting along steep banks with deep water close to shore and over lodge or den openings. As a result, live-trapping success was quite low. Bailey traps accounted for 330 of the 463 trap units and made 16 of the 17 captures. Few good sites were available for setting of New Mexico traps and but one capture was made from 133 trap units. There were 19 trap failures for Bailey traps and one for the New Mexico. During the period when the New Mexico traps were in operation and took one beaver, Bailey traps took five in 160 trap units. However that is not a good comparison of trap efficiency because the Bailey traps were in operation at the better sites ~~and the New Mexico traps were in operation at the better sites~~ and the New Mexico traps were used to fill in at activity sites where

the Bailey traps could not be set. Trapping during the next summer should give a better comparison of the efficiency of the two traps in the type of habitat found on the experimental trapping area.

The Hancock beaver traps are more suitable for that habitat with steep banks and deep waters. They also function more efficiently with rarely a miss to make beaver wary of traps. It is hoped that at least eight will be available for the live-trapping during summer of 1964 so that the area of activity can be more uniformly covered.

The use of succinylcholine chloride to immobilize beavers (Table 1) for more precise and accurate examinations and measurements was only partially successful. All the beaver were easily handled with the aid of the drug but the loss of two of nine beavers from presumed overdose is a much too high mortality. The high percentage of deaths may, however, be the result of chance, poor technique or inadequate methods of resuscitation. The succinylcholine chloride used on the first six beavers was undated and may have deteriorated prior to use. The fresh dated drug used on the last three worked well with rapid, even and full immobilization followed by a smooth uncomplicated recovery. However, the sample is too small for a conclusion as to effectiveness and safety. The safety factor could probably be increased to near totality if adequate apparatus for resuscitation and oxygen administration were available. Further experimentation with the drug will be

Table 1. Results of the use of succinylcholine chloride to immobilize beaver on the Canadian Wildlife Service experimental trapping area (RTA91) in the Mackenzie River delta, summer 1963.

BEAVER NUMBER	SEX	WEIGHT (LBS)	DOSE (MGMS)	ELAPSED TIME IN MINS. & SECS. FROM INJECTION TO:			
				EFFECTS		FIRST	FULL
				FIRST	FULL	FIRST	FULL
1	♂	31	5	1:50	4:20	NONE (DIED)	
3i	♀	48	4 <sup>a</sup>	NONE			
ii <sup>b</sup>			4 <sup>a</sup>	NONE			
iii <sup>c</sup>			4 <sup>a</sup>	7:00	UNKNOWN	23:00	83:00
4i	♂	45	7.5	7:15	NONE	NONE (DIED)	
ii <sup>d</sup>			8.5	5:30	12:15		
5i	♀	32	4.3	4:45	NONE		
ii <sup>e</sup>			5.0	4:15	NONE <sup>f</sup>		
6	♂	26	4.4	8:30	NONE <sup>f</sup>	N/A	21:00
7	♀	41	7.0	6:00	14:15	UNKNOWN	29:15
8	♂	32	5.4	5:00	15:00	UNKNOWN	30:00
10	♂	20	3.3	4:00	8:00	UNKNOWN	24:00
11	♀	24	4.0	4:15	10:15	UNKNOWN	34:25

- a. Error in computation of dilution of drug and supposed dose of 8 mgm. was actually 4 mgm.  
 b. Second dose given 1 hour 7 minutes after the first.  
 c. Third dose given 55 minutes after the second.  
 d. Second dose given 49 minutes after the first.  
 e. Second dose given 1 hour 37 minutes after the first.  
 f. Beaver not fully active and could be handled and tagged.

continued as complete immobilization of beaver during examination is desirable. For one person to get accurate body and skeletal measurements while wrestling a fully active beaver is almost an impossibility in my opinion although such beavers can be tagged, sexed and given a superficial examination. Palpation for embryos in early caught females is generally a waste of time when the abdominal muscles are tautened during its struggles to escape.

The trapping was not sufficient to determine colony composition or range because many areas of activity remained untrapped, the trapping was not successful in capturing beaver at some sites showing a great deal of activity (probably because the beaver were made wary by sprung traps which failed to make a capture), trapping was conducted for too short a time in the vicinity of greatest activity where there was one lodge, a large dam and a food cache and no trapping was done during the fall at those sites. Those considerations do not allow an evaluation of the success in taking all members of the colony, to determine whether all beaver were from one colony or whether the area trapped was the total range of the colony.

Lakes 2 and 3, which were trapped, are connected by a narrow gap in the shoreline so access by water between the two is not at all hindered. The aerial cache count of September 11

Table 1. Summary of the use of aerial cache counts to determine the composition and range of beaver colonies. The data are based on the counts of caches made during the summer of 1967.

revealed but one food cache on the two lakes so it is likely that all animals taken were from one colony. That would be more definitely established if a later aerial survey had been made or if the intensive work on beaver had continued until late September. However, I was over the area several times in late September and saw but the one cache. The number and composition of the beaver taken are consistent with the supposition of one colony, being one kit (♂), 3 yearlings (2♂♂, 1♀), 4 two-year olds (3♂♂, 1♀) and three adults (1♂, 2♀♀). One of the females classified tentatively as an adult by weight had a small zygomatic breadth (71mm.) in the kit class and may not be adult. An error in measurement or recording of the zygomatic breadth is suspected because of the anomaly in weight (the beaver weighed 37 lbs. when recaptured a second time). If those eleven animals represent one colony, colony size would likely have been larger as more kits should have been present. Their non-capture does not rule out their presence since kit beaver are not usually taken in live-traps in mid-summer.

Re-trapping of the area during the summer of 1964 and more intensive observation on the area should clarify the status of those beaver and determine if they represented one colony. The re-trapping should also yield more complete data on colony composition and range.

The early aerial beaver food cache count of 22 caches was surprisingly close to the 28 foodcaches located in late

September 1962. I had expected that far fewer would be constructed that early in the season. Previous work with cache counts in Montana had not shown such a large percentage of food caches constructed so far in advance of freezeup. That may be one major adjustment the beaver has made to the far northern environment. Unfortunately, the successive weekly cache counts planned could not be made and it is not known whether more caches were constructed after that date. At least two sites containing caches in 1962 did not have caches by late September 1963. It is presumed, therefore, that the early 1963 cache count would be even nearer the total which would have been located on a late September flight.

#### PLANS AND RECOMMENDATIONS

The beaver live-trapping phase of the study is to be continued in 1964. Hopefully, the area and colony coverage will be extended and intensified. Acquisition of about eight Hancock beaver live traps should improve the live-trapping success and reduce the length of time needed to gather information on colony composition. That time can then be used to increase area coverage. It will be very helpful if the student assistant can continue his investigations into the important late fall period as planned since that season is very productive of data on beaver populations.



Collections of beaver specimens from unworked colonies will be used to gather data on reproduction, age in relation to weight, body and skeletal measurements, disease, parasitism, etc. Some collections of carcasses from trappers will be attempted.

Possibly the use of radio transmitters attached as collars on beavers will be tested to determine movements and activities of individual beavers within colonies.

The investigations during the summer of 1964 will also be directed toward gathering data and testing methods and techniques as a base for formulation of a masters thesis project for the current student assistant, Michael Aleksuk. The thesis project will probably be conducted on a selected aspect of the current problem during the summer of 1965.

The aerial beaver survey will again be attempted on a weekly schedule beginning in late August or early September to determine the period and rate of food cache construction in the delta area and to obtain needed data on colony location and density on the study area which is typical of much delta habitat. Data from those flights will be used to set up a method suitable for sampling the delta to determine densities over that larger area and to obtain data on the present status of the beaver in the delta.

Detailed studies into unresolved problems of beaver biology and ecology of the beaver will probably not be attempted. However, continued trapping on the study area to follow trends in population density and structure and to mark animals for recapture as known age specimens may be continued after 1965. The project will be evaluated at that time in the light of the information obtained and prevailing economic and management conditions.

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