FISHER AND MARTEN STUDY

ALGONQUIN REGION

PROGRESS REPORT # 2

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November 1975

ABSTRACT

This study was initiated in the Algonquin Region in 1972-'73 to obtain information on which to base reasonable trapping limitations and management methods for fisher and marten.

Reliable determination of age, information on reproduction, sex ratios, and mortality rates of trapper-caught animals are investigated. Studies of food habits, parasites and diseases have been conducted on the same animals by the University of Guelph.

This is an interim report as the study is still in progress.

SUMMARY

A study of age determination, reproduction and population dynamics of fisher (Martes pennanti) and marten (Martes americana) was begun in the Algonquin Region of Ontario in the winter of 1972-73 and has continued through 1973-74 and 1974-75. The aim of the study is to establish a basis for sound management practices for these species.

In the three years, 859 fisher and 447 marten carcasses, received from trappers, were examined. Emphasis in the study thus far has been on fisher because of their greater economic importance in the Algonquin Region.

Age was determined by skull characteristics and, more precisely, by counts of annual lines in the cementum of the canine teeth. Age distribution and mortality rates were determined for both fisher and marten. Mortality rates in fisher have increased in each year of the study, with those in the 1974-75 season calculated at 65% for males and 45% for females (all age groups included). In marten the sample was not large enough to calculate mortality rates for each year. The overall rate for the three years is 45% for both males and females.

Males are larger and heavier than females in both fisher and marten. In both, however, the young of the year have attained essentially full growth by trapping season.

Ovaries of 196 adult and 170 juvenile fisher were sectioned and examined microscopically for corpora lutea and Graffian follicles. Female fisher, in general, are ready to breed at one year of age

and produce their first young at 2. The reproductive rate (corpora lutea per female) for fisher for all years combined was 3.08. The rate declined slightly in each year of the study. This decline can be attributed almost entirely to an increase in the number of barren females captured each year (1972-73 = 0%, 1973-74 = 6.6%, 1974-75 = 8.3%). All of the barren females were captured in two areas (4-5 townships) in the Parry Sound and Bracebridge Districts. The causes of this lack of fertility have not yet been determined. One possible factor may be lack of mature males in these areas.

In marten, the overall reproductive rate for all years was 2.78 corpora lutea per female. In general, marten females breed at 15 months and produce their first young at 24 months. However a considerable number (27%) of the one-year olds in our sample were not pregnant. No females were barren in 1974-75, resulting in a higher reproductive rate that year.

In male fisher, baculum weights of juveniles increase throughout the winter and by February some are approaching those of adults. However, there is a significant difference in mean weight between bacula of juveniles captured in February (1445 mg) and adult bacula (1990 mg). Adult bacula do not increase in weight significantly after 18 months of age. Testis weights increased throughout the winter in both juveniles and adults although, in juveniles the increase was slightly less rapid. Sperm were found in the testes of both juvenile and adult males in February. All data indicate that male fisher are ready to breed at one year of age. Juveniles, however, may be less successful.

In male marten, baculum weight increases with age. While the differences are not large enough to use as an aging technique, the mean annual weight increment of the baculum is statistically significant. Neither juveniles or adults show increase in baculum weight between November and February. No testes of marten have yet been weighed.

In the total catch male and female juvenile fisher occur in almost equal numbers (34.1% male and 33.9% female). Adult males, however, constitute a much smaller proportion of the catch (8.1%) than do adult females (23.9%). The proportion of adult males, moreover decreased in each year of the study. This was particularly evident in Parry Sound District (1972-73 = 13.5%, 1973-74 = 5.7% and 1974-75 = 5.2%) where most of the barren females were captured. In marten, males are captured more frequently than females (M/100 F = 225) in both juveniles and adults.

Juvenile fisher are found in greater proportion in the catch in November and, especially, in December than later in the season. This knowledge was used as a management method for preserving breeding stock by limiting the season to November and December in 1975.

In marten, the same situation prevails, with juvenile animals being captured during November and December in greater proportion than their expected occurence in the population.

Fur prices of fisher have virtually the same range for juvenile and adult fur. The mean price paid for adult females in 1974-75 was some 17% higher than for juvenile females. In male fisher, the adult brought a slightly lower mean price. In marten, adult male fur is the most valuable, followed by juvenile male, juvenile female and lastly adult female pelts. Limiting the trapping season, so that juveniles are more heavily predatedwill not cause the trapper extreme economic hardship.

Since over 90% of all fisher carcasses received had at least some deposits of body fat, it appears that food is not a limiting factor in fisher populations in this Region at this time.

In marten, 75% of all carcasses were lacking deposits of body fat. It is possible,then, that food may be a limiting factor in their increase.

By examining pelts of marten for which accurate ages are available, it has been possible to identify a number of characteristics which may suffice to distinguish not only males from females but also juveniles from adults by the pelt alone. This method needs yet to be proven. A larger collection of fisher study pelts is needed to determine if a similar method is possible for fisher.

Studies of food habits morphology, parasites and diseases, are being conducted on the carcasses from this study by staff and students at University of Guelph and the Health of Animals Branch, Department of Agriculture.

Recommendations for continuing the study were made.

Abstract

Summary

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FISHER AND MARTEN STUDY

ALGONQUIN REGION

PROGRESS REPORT #2

INTRODUCTION

A study to determine some basic information about reliable aging techniques, age distribution within the population and reproductive rates of both fisher (Martes pennanti) and marten (Martes americana) has been in progress in the Algonquin Region of Ontario (see fig. I) since the winter of 1972-'73. The first two years of the study were documented in a progress report prepared in September 1974 (Strickland 1974). This present report will discuss activities since that date and summarize results of the 1974-'75 trapping season.

Three hundred and sixty-five fisher and 189 marten carcasses were received during the 1974-'75 season. This brings the total number of carcasses collected and examined during the study to 859 fisher and 447 marten.

As in previous years, specimen material was collected for personnel at the University of Guelph and Health of Animals Branch, Department of Agriculture, Guelph, for use in disease and parasite investigation and morphological studies.

MATERIALS AND METHODS

During the 1974-1975 trapping season, all trappers in the Algonquin Region who had fisher or marten quotas were issued paired numbered tags. As in the previous year, trappers were asked to tag both pelt and carcass with one each of a pair of tags and to mark the date of capture on the carcass tag. The carcasses were delivered to the nearest Ministry Office where they were held in freezers until transferred to the laboratory in Parry Sound.

Whenever tagged pelts were received at the Ontario Trapper's Association's Fur Sale in North Bay they were marked with the fur grade and price. The tags were then returned to Parry Sound by the Ontario Trappers Association for coordination with the carcass data.

All carcasses which had been kept frozen in Parry Sound were thawed overnight before dissection. Each carcass was given a number as it was dissected. Information about the carcass was recorded directly onto a punch card which had been designed for that purpose (see fig. 2).

The head, gonads and baculum were removed and numbered to correspond to the necropsy number. The lower jaw was removed from the head and stored in a numbered envelope. The rest of the head and the baculum (in fisher) were boiled in water, in individual bags, for 6 to 8 hours and cleaned by hand. The testes and female reproductive tracts were preserved in 10% formalin.

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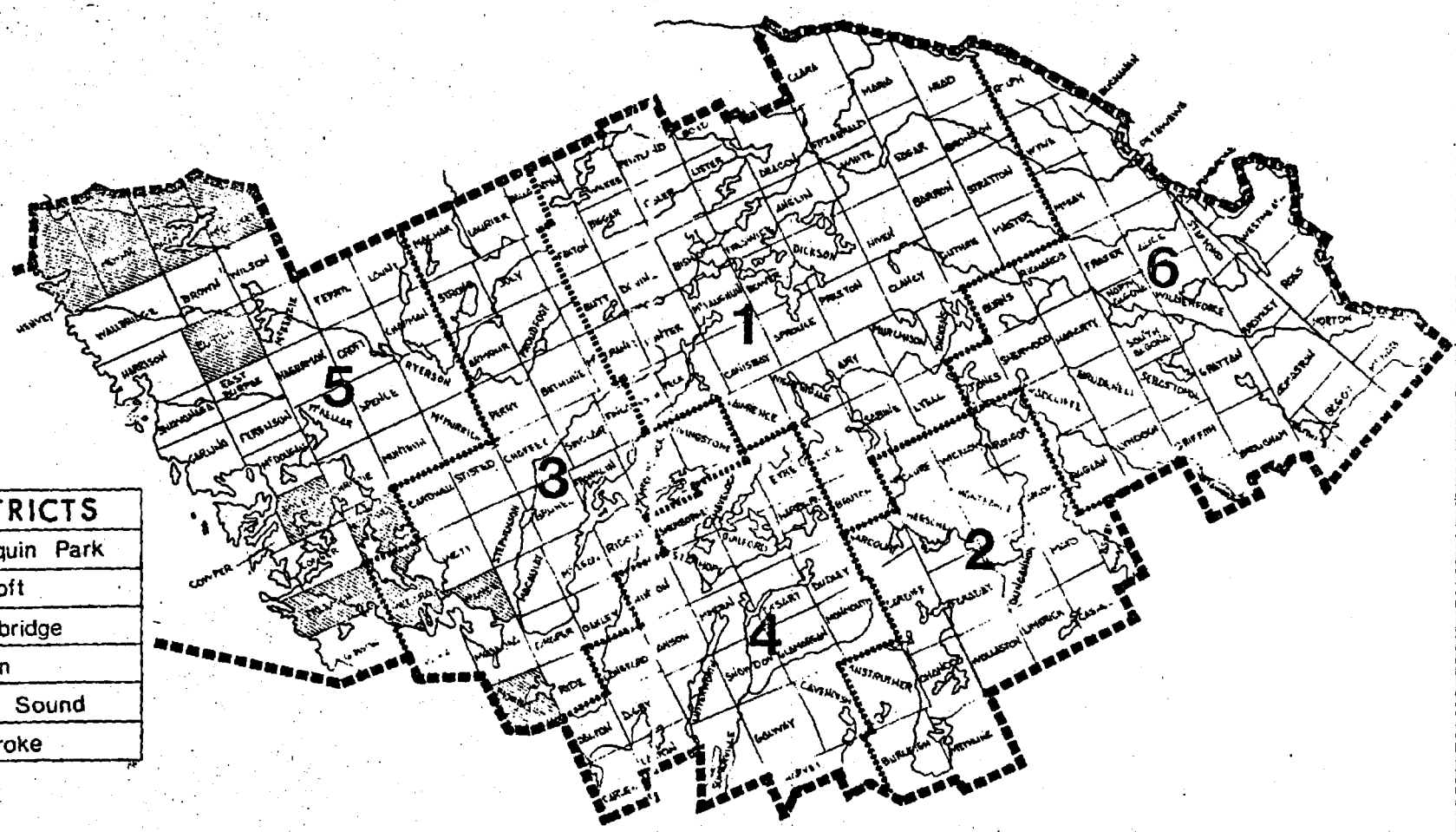
FIG. 1



DISTRICTS	
1	Algonquin Park
2	Bancroft
3	Bracebridge
4	Minden
5	Parry Sound
6	Pembroke

TOWNSHIPS IN WHICH BARREN FEMALE FISHER [illegible] CAPTURED IN 1973-74 AND IN THE 1974-75

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ALGONQUIN REGION

Scale: 1 inch = 25 miles ±

COMPILED BY: Lands Administration Section
Algonquin Region

FIGURE 2

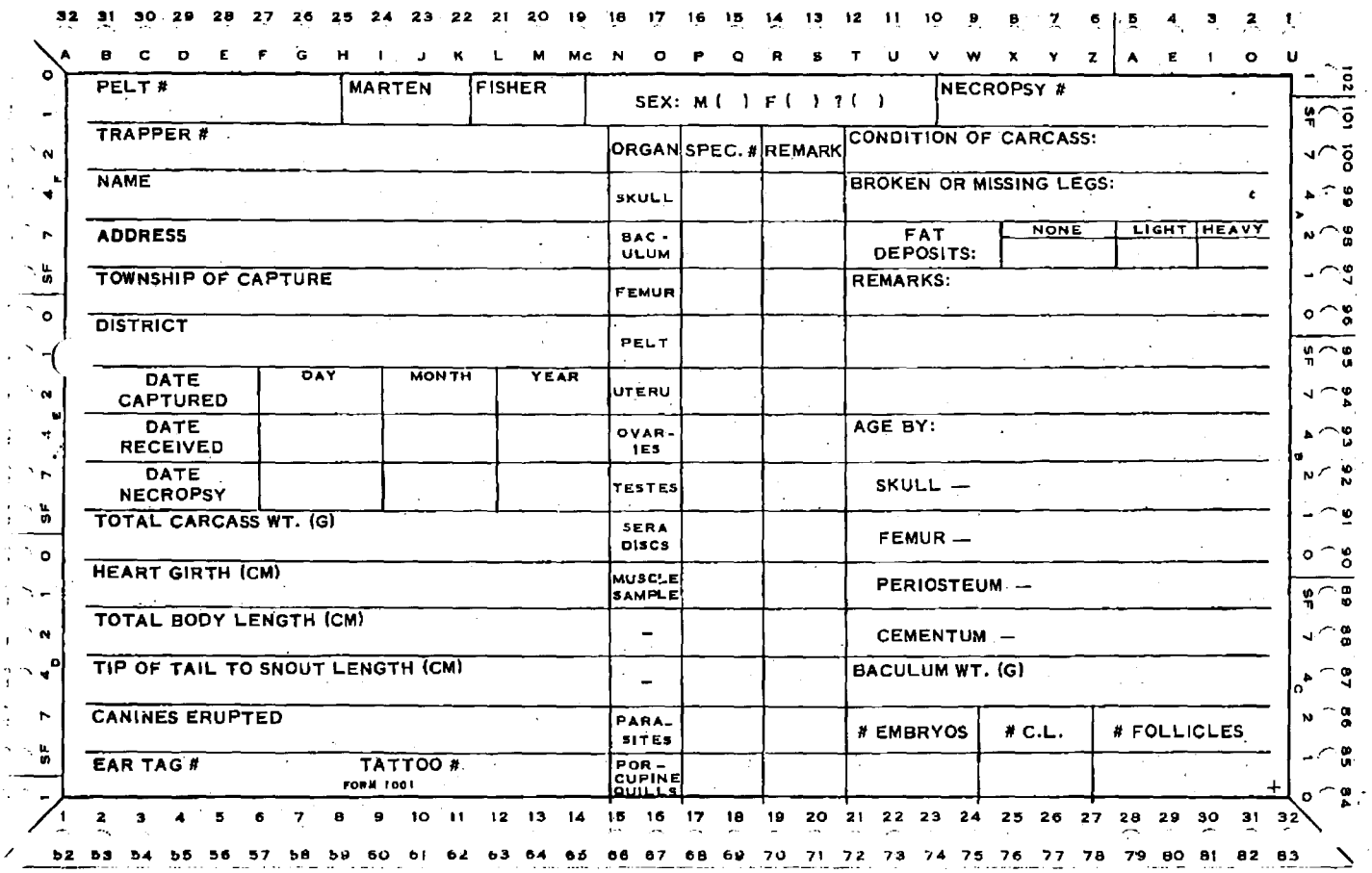
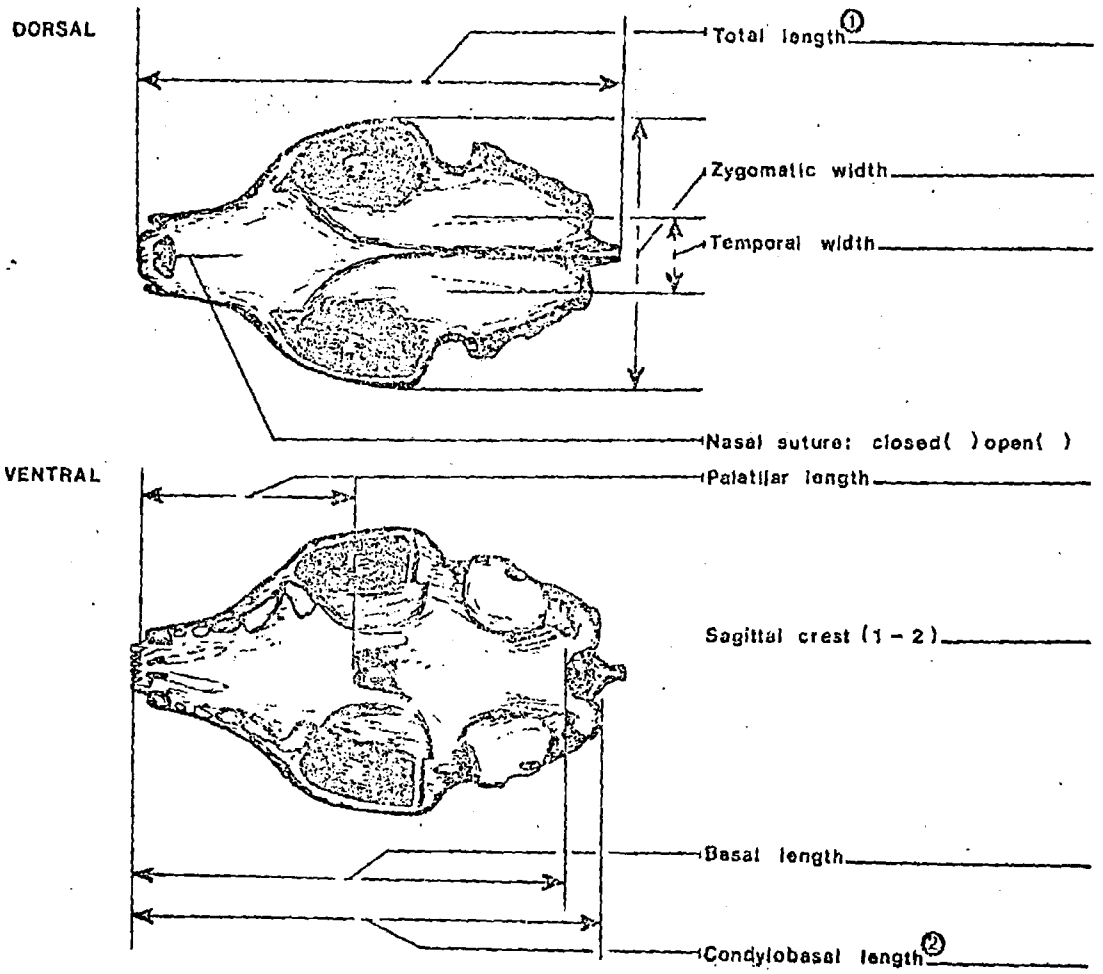

PELT #
MARTEN
FISHER
SEX: M ( ) F ( ) ? ( )
NECROPSY #
TRAPPER #
NAME
ADDRESS
TOWNSHIP OF CAPTURE
DISTRICT
DATE CAPTURED
DATE RECEIVED
DATE NECROPSY
DAY
MONTH
YEAR
TOTAL CARCASS WT. (G)
HEART GIRTH (CM)
TOTAL BODY LENGTH (CM)
TIP OF TAIL TO SNOUT LENGTH (CM)
CANINES ERUPTED
EAR TAG #
TATTOO #
FORM 1001
ORGAN
SPEC. #
REMARK
SKULL
BAC-ULUM
FEMUR
PELT
UTERU
OVAR-IES
TESTES
SERA DISCS
MUSCLE SAMPLE
PARA-SITES
POR-CUPINE QUILLS
CONDITION OF CARCASS:
BROKEN OR MISSING LEGS:
FAT DEPOSITS:
NONE
LIGHT
HEAVY
REMARKS:
AGE BY:
SKULL —
FEMUR —
PERIOSTEUM —
CEMENTUM —
BACULUM WT. (G)
EMBRYOS
C.L.
FOLLICLES

Figure II

File No. F M [ ][ ][ ][ ][ ]
(Cont'd.)

Skull



Reproductive Information

Female: No. placental scars ( )

No. fetuses ( )

No. Graafian follicles ( ) sizes:_____

No. corpora lutea of pregnancy (current) ( ) sizes:_____

No. corpora lutea of estrous ( ) sizes:_____

No. corpora lutea accessorium ( ) sizes:_____

Atretic follicles ( )_____

Male: Active ( ) Inactive ( )

Remarks_____

Figure I

File No. F M ☐☐☐ ☐☐

N E C R O P S Y · (FISHER/MARTEN)

Species: Fisher( ) Marten( )

Sex: M( ) F( ) ?( )

Method of Capture_____

Location_____

Trapper_____

Skull No._____

Condition of Skull_____

Condition of Carcass(general, fat depots, bone marrow, etc.)____

_____

_____

_____

_____

_____

_____

Date Captured: day____mo.____yr.____

Date Received: day____mo.____yr.____

Received by_____

Where received_____

Tag No.(recapture)_____

Age: Baculum_____ Teeth_____

Other (specify)_____

Remarks_____

_____

_____

_____

Parasites(location, species and no.)____

_____

_____

_____

Total Carcass Wt.(g)_____

Heart Girth (cm)_____

Skull: Lgth.(cm)_____Width(cm)___

Total Body Lgth.(cm)_____

Tip of Tail to Snout Lgth.(cm)_____

Organ	Weight	Length	Width	Remarks	Spec. No.
Stomach					
Spleen					
Adrenal (L)					
Adrenal (R)					
Intestines					
Lungs					
Testis/Ovary(L)					
Testis/Ovary (R)					
Uterus					
Hide					
Baculum					

Disposition of Carcass_____

Remarks_____

_____

_____

see over ( )

The bacula of the marten were stored with the testes in formalin.

Muscle samples from the diaphram were placed in plastic "roll-pac" bags and frozen. The heart was cut open and five filter paper blood serum discs were saturated with blood and left in a petri dish overnight to dry. They were then stored in numbered envelopes. These muscle samples and serum discs were delivered to the Health of Animals Branch, Department of Agriculture, Guelph for studies of trichinosis (Dr. B. Kinscote), Leptospirosis (Dr. B. Kingscote), and to University of Guelph for testing of Aleutian disease (Professor D. Ingram) and Toxoplasmosis (Dr. Ian Tizzard). In addition, six fisher and four marten whole fresh carcasses were supplied to Dr. R. Anderson, University of Guelph for internal parasite investigation. Robin Craig, Ontario Ministry of Natural Resources, Fonthill also examined lungs of fisher and marten for parasites. Doug Leach, graduate student of O.V.C. received 25 fisher and 25 marten carcasses (from which heads and gonads had been removed) for studies of post-cranial morphology.

Lower canines of all fisher (1974-'75) and marten (1973-1974, 1974-1975) were sectioned for microscopic examination of the cementum for annual lines. The method used was the same as that described in the previous report (Strickland, 1974). All tooth sections were read independently by at least two people.

Ovaries of all fisher and marten not previous microsectioned, were processed by the method described by Strickland, 1974.

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Bacula of fisher were boiled, cleaned of tissue by hand, air dried for several weeks and weighed in a beam balance accurate to 0.01 grams. Bacula of marten were removed from the formalin solution, cleaned of tissue by hand, dried in a drying oven for several days and weighed periodically until their weight stablized.

Testes of fisher were removed from the formalin solution and blotted dry. Extraneous tissue and the scrotal sac were removed and each testis, complete with epididymis, weighed separately on a balance .

No additions were made to the study skin collection in 1974-1975.

RESULTS AND DISCUSSIONS

FISHER

Collection of Carcasses

In the 1974-1975 trapping season, 365 fisher carcasses were received from trappers in the Algonquin Region.

Table I gives the number of fisher carcasses received from each District in the Region in both the 1973-1974 and 1974-1975 season. It also gives the total number of fisher pelts sealed in that District for each of these years. This number is based on the computer print-out of fur returns for the Algonquin Region to August 31 of 1974 and November 12, 1975.

Table 1 also gives the percentage of the fur sealed for which carcasses were collected in each District for each year.

The total fisher harvest for the Province of Ontario is also given. This year 30% (844 of 2790) of the provincial fisher were captured in the Algonquin Region. This compares to 34% in 1973-1974.

Table II gives a summary of the number of carcasses received in the 1972-1973, 1973-1974, and 1974-1975 trapping seasons from each district and the month of capture of the animals. Where no capture date is available, the animal is indicated in brackets in the month when it was received in Parry Sound.

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TABLE 1

FISHER CARCASSES RECEIVED AS %
OF FISHER PELTS SEALED IN
EACH DISTRICT OF ALGONQUIN REGION
1973-1974 AND 1974-1975 SEASONS

	1973 - 1974			1974 - 1975		
DISTRICT	CARCASSES REC'D	FUR SEALED*	%	CARCASSES REC'D	FUR SEALED**	%
Parry Sound	~~103~~ 132*	465	~~26.5~~ 28.4	155	265	58.4
Bracebridge	~~135~~ 126*	248	~~54.4~~ 50.8	76	156	48.7
Algonquin Park	17	66	25.8	9	35	25.7
Pembroke	10	106	9.4	2	78	2.6
Minden	39	259	15.1	30	152	19.7
Bancroft	81	214	37.8	91	158	57.6
Unknown	9	-	-	2	-	-
Regional Total	414	1358	30.5	365	844	30.25
Provincial Total		3992			2790	

* BASED ON COMPUTER PRINT-OUT OF FUR RETURNS TO AUGUST 31, 1974

** BASED ON COMPUTER PRINT-OUT OF FUR RETURNS TO NOVEMBER 12, 1975

* 9 fishers were mistakenly listed as BR instead of PS.
(Lount & Blair Twp)

In the 1972-1973 data, only those from the new Parry Sound and Bracebridge Districts are included. Those carcasses received from North Bay District (1) and from unknown locatlities (6) are excluded. Also excluded from this table are three animals from 1972-1973 and two animals captured in 1973-1974 for which no age and/or sex is available.

The abbreviations used for the districts in the Algonquin Region are: P.S. - Parry Sound, BR. - Bracebridge, MD. - Minden, AL. - Algonquin Park, PE. Pembroke, BA. - Bancroft.

AGE DISTRIBUTION AND MORTALITY RATES

As described in the previous report, age of fisher was determined both by skull characteristics and, more precisely, by counts of annual lines in the cementum. Throughout this report, young of the year (those less than one year old when captured) will be referred to as "juveniles". All others (one year of age and older) will be called "adults".

Table III gives the age distribution for each year of the study, based on cementum age. All of the carcasses received in the Algonquin Region in each year are included.

Since the last report, all tooth sections have been re-read by two independent agers and as a result some of the ages, and thus ratios based on them have altered from the last report.

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Table II corrected

1973-74

MONTHS	SEX & AGE	PS	BB	MD	AL	PE	BA	UNKNOWN	SUB TOTAL	TOT JUV + ADULT	TOT BY MONTH
ou	J ♀	4	7						11		
	J ♂	1	5	3			1		10	21	
	A ♀	4 (1)	3						8		
	A ♂		1						1	9	30
)EC	J ♀	8 (2)	14 (5)	4	4		(3)	(2)	42		
	J ♂	9 (4)	13 (6)	3	2	1	(3)		41	83	
	A ♀	3 (1)	5 (1)	2	1		(1)		14		
	A ♂	(1)	1 (2)	1			(1)		6	20	10
JAN	J ♀	9 (2)	8 (3)		(1)	3	1 (2)	(2)	31		
	J ♂	17 (2)	6 (5)	1	1	3	1 (2)	(1)	39	70	
	A ♀	18	6 (1)	1	1	3			30		
	A ♂	2	4 (1)				(1)		8	38	1
FEB	J ♀	11 (3)	3 (2)	1 (4)			2 (10)	(2)	38		
(	J ♂	6 (3)	4	3 (6)			(8)	(1)	31	69	
	A ♀	11 (3)	3 (1)	(1)			3 (5)	(1)	28		
	A ♂	6		2 (1)	(1)		(2)		12	40	
MAR	J ♀		(6)	(2)	(3)		(12)		23		
	J ♂		1 (3)	(1)	(2)		1 (10)		18	41	
	A ♀		1 (1)	(2)	(1)		(10)		15		
	A ♂		(3)	(1)			(2)		6	21	
		109 (22)	85 (40)	21 (18)	9 (8)	10 (0)	9 (72)	(9)			
		131	125	39	17	10	81	9	412		

* BRACKETS INDICATE ADD [illegible]

Checked by [illegible] E. Reeves - Oct 76

TABLE II

SUMMARY OF FISHER CARCASSES COLLECTED BY DISTRICT AND MONTH OF CAPTURE*

Month	Sex and Age	1972-1973 Season P.S.	BR.	TOT.	1973-1974 Season P.S.	BR.	MD.	AL.	PE	BA	UNK.	TOT.	1974-1975 Season P.S.	BR.	MD.	AL.	PE.	BA.	UNK.	TOT.	Total Age All
Nov.	Juv. F.	1	(2)*	3	4 ~~3~~	7 ~~8~~						11	1	10	2	0	1	2		16	30
	Juv. M	2		2	1	5	3			1		10	2	4	2	2		8		18	30
	Ad. F.	1		1	4 ~~5~~ (1)	3	0					8	5	3	1	0		2		11	20
	Ad. M.					1						1	1	1	0	0				2	3
Dec.	Juv. F.	5(3)	1	9	3 ~~2~~(2)	14 ~~16~~(5)	4 ~~3~~	4		~~1~~(3)	(2)	42	28	12	4	2		4		50	101
	Juv. M.	(1)		1	9 ~~7~~(4)	~~14~~(6)	3	2 ~~3~~	1	(3)		41	22	8	3	1		12		46	88
	Ad. F.	1(3)		4	3(1)	5(1)	2	1		(1)		14	22	6(1)	2	1				32	50
	Ad. M.	1	1	2	(1)	1(2)	1			(1)		6	1	3		1				5	13
Jan.	Juv. F.	5(2)		7	9 ~~8~~(2)	5 ~~9~~(3)		(1)	3	1(2)	(2)	31	19(1)	2	4	1(1)		4(8)		40	78
	Juv. M.	5(4)	2	11	17 ~~16~~(~~2~~)(1)	6 ~~7~~(5)	1	1	3	1(2)	(1)	39	10(1)	5	4			4(6)	(2)	32	82
	Ad. F.	3(1)	1	5	18	6(1)	1	1	3			30	6(2)	5(3)	2			4(2)		24	59
	Ad. M.	1(2)		3	2 ~~1~~	4 ~~5~~(1)				(1)		8	3(1)	1(1)				(2)		8	19
Feb.	Juv. F.	2(2)		4	11 ~~10~~(3)	3 ~~4~~(2)	1(4)			2(10)	(2)	38	4		2(1)			1(5)		13	55
	Juv. M.	6(4)		10	6(3)	4	3(6)			(8)	(1)	31	8	5(1)	(2)		1	2(11)		29	70
	Ad. F.	8(1)		9	11(3)	3(1)	0(1)			3(5)	(1)	28	6(3)	2	1			1(1)		15	52
	Ad. M.	6		6	6	0	2(1)	(1)		(2)		12	1	1(1)				(2)		5	23
Mar.	Juv. F.		(1)	1		(6)	(2)	(3)		(12)		23	2(1)					(4)		7	31
	Juv. M.	(1)		1		1(3)	(1)	(2)		1(10)		18	2	(1)				(2)		5	24
	Ad. F.	(1)	(1)	2		1(1)	(2)	(1)		(10)		15	1(1)					(2)		4	21
	Ad. M.		(1)	1		(3)	(1)			(2)		6	1					(2)		3	10
Sub Totals		47+ (25)	5+ (5)	82	109* ~~100+~~ (22)	85* ~~94+~~ (40)	21 ~~22+~~ (~~17~~) (18)	9+ (8)	10	9+ (72)	0+ (9)	412	145+ (10)	68+ (8)	27+ (3)	8+ (1)	2	44 (47)+	(2)	365	
Total Each District		72	10	82	131 ~~122~~	125 ~~134~~	39	17	10	81	9	412	155	76	30	9	2	91	2	365	859

* 9 animals mistakenly charged to BR instead of PS

Changed Oct/76 EK

* BRACKETS INDICATE NO DATE OF CAPTURE AVAILABLE.

TABLE III

AGE DISTRIBUTION

FISHER - ALGONQUIN REGION

ACTUAL FREQUENCY

Age	1972 - 1973			1973 - 1974			1974 - 1975			Total Sample		
	Males	Females	Both	Males	Females	Both	Males	Females	Both	Males	Females	Both
0	25	24	49	139	145	284	130	126	256	294	295	589
1	5	7	12	9	23	32	11	33	44	25	63	88
2	1	5	6	14	17	31	3	16	19	18	38	56
3	3	3	6	4	15	19	5	11	16	12	29	41
4	2	1	3	3	11	14	4	6	10	9	18	27
5	1	0	1	2	13	15		9	9	3	22	25
6		4	4		7	7		7	7		18	18
7		1	1		2	2		1	1		4	4
8				1	6	7		3	3	1	9	10
9					1	1					1	1
Totals	37	45	82	172	240	412	153	212	365	362	497	859

FREQUENCY AS %

Age	1972 - 1973			1973 - 1974			1974 - 1975			Total Sample		
	Males	Females	Both	Males	Females	Both	Males	Females	Both	Males	Females	Both
0	67.6	53.3	59.7	80.8	60.4	68.9	85.0	59.4	70.1	81.2	59.4	68.6
1	13.5	15.5	14.6	5.2	9.6	7.8	7.2	15.6	12.1	6.9	12.7	10.2
2	2.7	11.1	7.3	8.1	7.1	7.5	2.0	7.5	5.2	5.0	7.6	6.5
3	8.1	6.7	7.3	2.3	6.2	4.6	3.3	5.2	4.4	3.3	5.8	4.8
4	5.4	2.2	3.7	1.7	4.6	3.4	2.6	2.8	2.7	2.5	3.6	3.1
5	2.7	-	1.2	1.2	5.4	3.6	-	4.2	2.5	0.8	4.4	2.9
6	-	8.8	4.9	-	2.9	1.7	-	3.3	1.9	-	3.6	2.1
7	-	2.2	1.2	-	0.8	4.8	-	0.5	0.3	-	0.8	0.5
8	-	-	-	0.6	2.5	1.7	-	1.4	0.8	0.3	1.8	1.2
9	-	-	-	-	0.4	.2	-	-	-	-	0.2	0.1

Table III also gives the above age distributions expressed as percentages.

Examination of this table reveals that the age structure of the harvest is decreasing each year. This age shift is not due simply to the temporal distribution of the catch since examination of the mean age of adults by month of capture (Table IV) indicates that the mean age in each month decreased, in each of the last two years (1972-1973 does not have an adequate sample of adults). This shift to the younger age classes indicates a heavily harvested population.

From the age distribution, weighted mortality rates for each sex in each year were calculated after the method in Rounsefell and Everhart (1953). They are listed in Table V.

The rates calculated using the whole sample, which included the young of the year, were exceedingly high and increased in each succeeding year of the study. The rates for males were higher in all years than those for females.

This method of calculating mortality rates has, as one of its assumptions, that all age classes are equally vunerable to capture. Since juveniles are more vunerable to trapping (as will be shown later in this report), mortality rates for the adult age classes only were calculated. While this gave mortality rates which were less than half those for the whole population, these rates too, increased in each year of the study.

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TABLE IV

MEAN AGE OF ADULT FISHER

BY MONTH OF CAPTURE

MALES AND FEMALES

	1973 - 1974	1974 - 1975
November	3.0	2.8
December	1.9	2.2
Janurary	3.8	3.3
February	3.0	2.3
All Months	3.2	2.6

TABLE V

WEIGHTED MORTALITY RATES

FISHER - ALGONQUIN REGION

		1972-1973	1973-1974	1974-1975
Mortality Rate of Whole Sample	Males	.4620	.5740	.6500
	Females	.3520	.3910	.4530
Mortality Rate of Adults Only In Sample	Males	.1720	.1860	.2290
	Females	.1560	.1890	.2800

It would appear from these mortality rates that fisher populations in Algonquin Region are being heavily harvested and that the exploitation is increasing.

TOOTH ERUPTION

As in the previous years, a number of the animals examined did not have fully erupted canines. Of the 365 fisher examined this year, 10 (2.7%) had unerupted canines. This compares to 7.3% (37 of 506) examined previously.

Of these ten with unerupted teeth, 3 were juvenile males, 6 juvenile females and one was an adult (and pregnant) female. Dates of capture of these animals ranged from November 21, to January 18. One juvenile male captured on December 6, had both milk and permanent canines present in the lower jaw.

No explanation for this anomaly of unerupted canines in nearly adult sized carnivores has been discovered.

SIZE

Weights and measurements of the carcasses were taken at the time of necropsy as described in the previous report (Strickland 1974). Again variations in weights due to drying and to missing parts (tails, feet, etc.) could not be avoided.

Since no significant difference was found (at the 95% level) in the measurements between the 3 years, the data were combined

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and the mean weights (Table VI) and mean lengths (Table VII) were calculated by month of capture for each of the four groups - juvenile males and females, adult males and females. The mean ± standard deviation and the sample size are given.

There appears to be no significant difference in either weight or length between juveniles and adults of the same sex or between the various months of capture in any group. The variations (± 2 standard deviations) are greater than the differences between the means. The differences in both lengths and weight between the sexes is apparently significant. Analysis of variance of all groupings will be applied at a later time.

It appears then, that juveniles cannot be distinguished from adults by length or weight in either males or females by the time trapping season begins.

FEMALE REPRODUCTIVE TRACTS

Fisher have delayed implantation; breeding occurs in March and parturition occurs the following March after a 9 - 10 month delay in implantation. (Coulter 1966).

Since the previous report, ovaries of all female fisher, one year of age and older have been sectioned and stained (using methods described by Strickland 1974) and examined for corpora lutea (here after abbreviated to C.L.) and Graffian follicles (G.F.). All adult

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TABLE VI

MEAN WEIGHTS ± ONE STANDARD DEVIATION

OF FISHER CARCASSES

BY MONTH OF CAPTURE

(ALL YEARS COMBINED)

Weight in grams

	Ad. Males	Juv. Males	Ad. Females	Juv. Females
November	3150 ± 602 (2)*	2945 ± 475 (28)*	1858 ± 229 (17)	1702 ± 240 (27)
December	3459 ± 934 (9)	3048 ± 546 (74)	1728 ± 227 (43)	1658 ± 278 (86)
January	3778 ± 652 (11)	3065 ± 520 (57)	1787 ± 274 (47)	1610 ± 282 (56)
February	3619 ± 874 (15)	3240 ± 549 (34)	1693 ± 257 (36)	1646 ± 380 (25)

* SAMPLE SIZE GIVEN IN BRACKETS.

TABLE VII

MEAN BODY LENGTH ± ONE STANDARD DEVIATION

OF FISHER BY MONTH OF CAPTURE

(ALL YEARS COMBINED)

BODY LENGTH IN CM.

	Ad. Males	Juv. Males	Ad. Females	Juv. Females
vember		58.8 ± 1.8 (30)*	51.3 ± 1.5 (18)	50.1 ± 1.3 (28)
December	61.1 ± 3.2 (9)	58.8 ± 2.3 (74)	50.4 ± 1.5 (43)	50.1 ± 1.5 (86)
January	61.1 ± 3.4 (11)	58.5 ± 2.4 (57)	51.0 ± 1.4 (49)	50.3 ± 1.8 (56)
February	59.5 ± 3.2 (15)	60.1 ± 2.3 (34)	50.4 ± 1.5 (36)	50.7 ± 1.5 (25)

(* SAMPLE SIZE IN BRACKETS).

females had both of these structures present in their ovaries with the exception of 13 animals (6.6 %)which had no C.L..

In addition, ovaries of all juvenile females captured during the first two years of the study have been similarly examined. The juveniles from the 1974-1975 collection were not sectioned since none of the juveniles from the first two years had any C.L. and all but one had developing G.F. (This juvenile had what appeared to be a large corpus luteum-like body filling the whole of each ovary and had no G.F.. This appeared so unusual that it was presumed to be a tumor or some other abnormality and was deleted from the sample. In all other respects this animal appeared normal).

In general then female fisher are ready to breed at one year of age and produce their first young at age 2.

To see if the age of the female has an effect on the reproductive rate, the C.L. counts in females of various ages are given in Table VIII. The mean number of C.L. per female is given for each age class in each of the three years of the study and for all years combined. The rate is also given for each year when the barren females are not included in the average.

The overall rate (for all year and ages) is 3.08 C.L. per female when the barren females are included, and 3.30 if they are excluded from the sample. In both cases, the younger animals, especially the "ones" and "twos" are slightly less fertile.

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Wright and Coulter (1967) reported mean C.L. counts of 3.28 for Maine fisher and Eadie and Hamilton (1955) reported 2.72 C.L. per adult female for New York fisher. Neither made note of any barren adults. Our reproductive rates of 3.08 falls between these two.

Table IX gives the reproductive rate of fisher by District for each of the three years. Parry Sound has the lowest rate of just under 3.0 and Bancroft the highest of 3.4. Since the barren females are included in this ratio, Parry Sound which has 10 of the 13 barren animals is most affected. When these barren females are excluded (see Table X) the reproductive rate for Parry Sound over the three years is 3.28.

A comparison of reproductive rates when the barren females are included and when they are excluded from the sample is shown in Table X for the two districts which had barren animals. The percentage of females which were barren in each year is also given.

It is obvious that the decreasing reproductive rate is directly related to the increasing number of barren females in each year. When the barren animals are excluded the rate is more nearly constant for the three years. When the barren ones are included, the reproductive rate decreases as the percentage of barren females increases.

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TABLE VIII

CORPORA LUTEA IN ADULT FISHER BY AGE

ALGONQUIN REGION

		AGE									
		1	2	3	4	5	6	7	8	9	Total
1972-73	#C.L.	20	16	11	4		13	3			67
	#Ad. Fem.	7	5	3	1		4	1			21
	CL/Fem.	2.86	3.20	3.67	4.0		3.25	3.50			3.19
	NO BARREN FEMALES										
1973-74	#C.L.	65	43	51	31	42	24	5	20	4	285
	#Ad. Fem.	22	17	15	9	12	7	2	6	1	91
	CL/Fem	2.95	2.53	3.40	3.40	3.5	3.43	2.5	3.33	4	3.13
Barren Females excluded	#C.L.	65	43	51	31	42	24	5	20	4	255
	#Preg. F.	22	13	14	9	12	7	1	6	1	85
	CL/Preg. Fem.	2.95	3.31	3.64	3.40	3.5	3.43	2.5	3.33	4	3.35
1974-75	#C.L.	93	42	34	21	23	24	4	10		251
	#Ad. Fem.	32	16	10	6	9	7	1	3		84
	CL/Ad. Female	2.91	2.63	3.40	3.50	2.55	3.42	4.0	3.33		2.99
Barren Females Excluded	#C.L.	93	42	34	21	23	24	4	10		251
	#Preg. F.	31	13	10	6	6	7	1	3		77
	CL/Preg. Female	3.0	3.23	3.40	3.50	3.83	3.42	4.0	3.33		3.26
All Years	#C.L.	178	101	96	56	65	61	12	30	4	603
	#Ad. Fem.	61	38	28	16	21	18	4	9	1	196
	CL/Ad. F.	2.92	2.66	3.43	3.50	3.09	3.39	3.0	3.33	4.0	3.08
Barren Females Excluded	#C.L.	178	101	96	56	65	61	12	30	4	603
	# Preg. F	60	31	27	16	18	18	3	9	1	183
	CL/Preg. Female	2.97	3.26	3.56	3.50	3.61	3.39	4.0	3.33	4.0	3.30

TABLE IX

REPRODUCTIVE RATE OF FISHER BY DISTRICT - ALGONQUIN REGION

BARREN FEMALES INCLUDED

YEAR	DISTRICT													
	PARRY SOUND		BRACEBRIDGE		MINDEN		ALGONQUIN		PEMBROKE		BANCROFT		TOTAL	
	CL/♀♀	Rate	CL/♀♀	Rate	CL/♀♀	Rate	CL/♀♀	Rate	CL/♀♀	Rate	CL/♀♀	Rate	CL/♀♀	Rate
1972-73	60/19	3.16	7/2	3.5									67/21	3.19
1973-74	114/38	3.0	65/22	3.09	21/6	3.5	10/3	3.33	9/3	3.0	62/18	3.44	281/90*	3.12
1974-75	131/46	2.85	62/20	3.10	17/6	2.83	3/1	3.0	4/1	4.0	34/10	3.4	251/84	2.99
Total All Years	305/103	2.96	134/44	3.04	38/12	3.16	13/4	3.25	13/4	3.25	96/28	3.43	599/195*	3.07

* ONE ANIMAL FROM 1973-74 NOT INCLUDED BECAUSE NO LOCATION, THUS TOTAL DOES NOT AGREE WITH TABLE VIII.

TABLE X

COMPARISON OF REPRODUCTIVE RATES

OF FISHER WHEN BARREN FEMALES

ARE INCLUDED AND EXCLUDED

PARRY SOUND AND BRACEBRIDGE DISTRICTS

	PARRY SOUND					BRACEBRIDGE				
	Barren Females Included		Barren Females Excluded		% of Ad. Fem. which were Barren	Barren Females Included		Barren Females Excluded		% of Ad. Fem. which were Barren
Year	CL/Fem.	Rate	CL/Fem.	Rate		CL/Fem.	Rate	CL/Fem.	Rate	
1972-73	60/19	3.16	60/19	3.16	0	7/2	3.5	7/2	3.5	0
1973-74	114/38	3.0	114/34	3.35	10.5	65/22	2.95	65/20	3.25	9.1
1974-75	131/46	2.85	131/40	3.28	13.0	62/20	3.10	62/19	3.26	5.0
All Years	305/103	2.96	305/93	3.28	9.7	134/44	3.04	134/41	3.27	6.8

Not enough information is available to determine a cause for this lack of fertility but some avenues are being explored.

All of the barren females were caught in two small areas (4-5 townships) in the Parry Sound and Bracebridge Districts (see Fig. 1).

From examination of the ovaries, 2 of the 13 barren females were apparently sterile and had never conceived. 4 were not producing ova for the next breeding season but there was evidence that they had conceived before. 7 had ova developing for release (4 of these 7 had conceived before, 2 were only 1 year of age, so were not old enough to have copora albicantia, 1 (age 2) had not conceived before).

Age and condition appear not to be factors in the barreness. Age ranges from 1 to 6 years with 2 age 1, 6 age 2, 1 age 3, 3 age 5, and 1 age 6, The condition index of these animals fell within the limits of the mean $\pm$ 2 standard deviations as calculated for all adult females and half of them had visible deposits of fat.

Disease does not appear to be a significant factor. Of the animals tested at University of Guelph for trichinosis, leptospirosis and Aleutian Disease, only one animal was positive for trichinosis, and all were negative for the other diseases. One animal in 1974-'75 had the right kidney destroyed presumably by kidney worm (Dioctophyma renale).

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Another possible factor in some cases, may be the lack of mature males at breeding time in these two areas. This is discussed in a later section on sex ratios.

Just how much store can be set by C.L. counts as a measure of the reproductive capacity may be questionable. They are, at best only an indicator of the number of eggs released and fertilized and do not account for embryos which are resorbed or aborted before birth. In addition, one animal was collected in 1974-'75 which had 4 well developed embryos but only 2 C.L.. If this "twinning" is common, C.L. counts as a measure of productivity would be even less reliable.

Still they are an easily obtainable measure and indicate change from year to year and one area to another. They also accurately point out barren animals which appear to be of utmost importance to the reproductive rate of the population.

As an indication of the reliability of C.L. counts, comparison was made between number of embryos, where they were well enough developed to count, and the number of C.L. in the ovaries of that female. This information is given in Table XI for each of the three years and for all years combined. The data for 1974-'75 are also shown with the "twinning" animal excluded.

The mean number of C.L. per animal in this sample of 28 actively pregnant females is 3.46 while the mean embryo count is 3.14. Thus

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there is 9% loss of potential embryos. Wright and Coulter (1967) found no difference in the C.L. and embryo counts in 9 females in active pregnancy.

By applying this 9% loss to the overall reproductive rate (from Table X) of 3.08 C.L. per animal, then only 2.8 embryos per animal would survive past the implantation stage.

Table XI also shows a decline in the number of C.L. per female over the three years - 3.67 to 3.56 to 3.22. This decline can be at least partly explained by a shift in the age distribution of the adult females during this period. In 1972-73 none of the 3 females were yearlings, in 1973-74 4 of 16 (25%) were 1 year old and in 1974-75 3 of 9 (33.3%) were 1 year old. Since it was shown in Table VIII that yearling females had a slightly lower reproductive rate, the increase in the incidence of yearling females is almost enough to explain the decrease in corpora lutea rate over the three years. A fisher management program which tends to protect adult females should thus increase the reproductive rate of the population by increasing the number of more productive older females.

All of the females which had embryos large enough to count were captured during the period from late January to late March. It was erroniously reported in the 1974 report that two females with countable embryos were captured in November. This was a clerical error. The earliest date of capture for any female with swellings in the uterus sufficiently large to be noticed was January 30. The earliest date of capture for a female with embryos large enough to sex by external genetalia was February 20. Unfortunately reliable dates of capture are not available for all pre-

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TABLE XI

NUMBER OF EMBRYOS COMPARED TO NUMBER OF CORPORA LUTEA IN PREGNANT FISHER ALGONQUIN REGION

Year	# Females	#C.L.	# Embryos	CL/Female	Embryo/Female
1972-73	3	11	11	3.67	3.67
1973-74	16	57	47	3.56	2.94
1974-75	9	29	30	3.22	3.33
(excluding twinning)	8	27	26	3.38	3.25
Total 3 Years	28	97	88	3.46	3.14

gnant females, making estimations of implantation dates, gestation periods and parturition dates difficult.

MALE REPRODUCTION

Baculum

The previous report (Strickland 1974) confirmed Coulter's (1966) findings that baculum weight was a reasonably good indicator of maturity in male fisher for animals caught early in the season. As juvenile males approach their first birthday, the baculum weight approaches that of adult males. The dividing line between juvenile and adult bacula is generally 1500 mg.

Fig. III shows that mean weight ± one standard deviation of bacula from the 1974-75 juvenile animals divided by their date of capture into bi-weekly periods.

The mean weights increased steadily from 870 mg. in early November to 1570 mg. in late February. The correlation coefficient is 0.647 ± 0.063 indicating that there is a significant correlation between baculum weight and period of capture in juvenile fisher.

Figure 3 also shows the mean weights of adult bacula by period of capture. The adult means were calculated by combining data from three years since the sample of adult males in any one year is small. No significant difference (at the 95% level) was found between samples taken in each of the three years. There was also no significant difference (at 95%) between weights of bacula from adult fisher of various ages.

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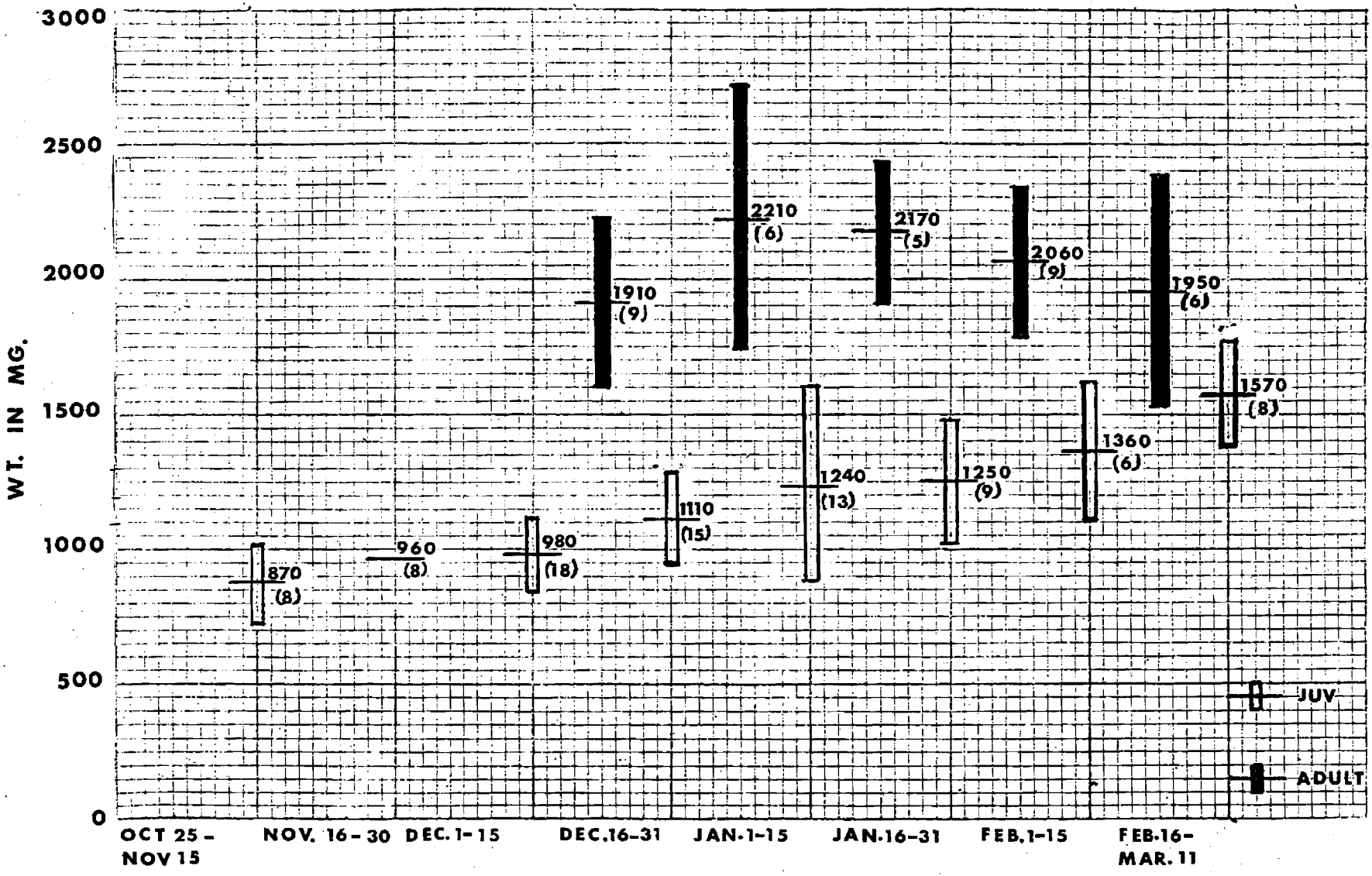
FIG. 3
BACULUM WEIGHTS
FISHER



The mean weights of adult bacula ranged from 1910 mg. to 2210 mg. with a correlation coefficient of 0.104 ± 0.181 indicating no significant difference in the weights for the various capture periods in adult males.

In summary, the weights of juvenile bacula increase as the winter progresses; those of adults do not change appreciably. Juveniles can usually be distinguished from adults by baculum weight until the end of December. After that time, weights of individual bacula sometimes overlap those of adults. However, the mean weight of bacula from juveniles captured during the month of February was 1,445 ± 207 which is significantly (at 95%) lower than the adult mean of 1,988 ± 282 for February-caught animals (or 2,070 ± 359 for all adults). Since many mustelids are known to be induced ovulators (Ewer 1973) it is possible that the baculum of juvenile animals is not developed completely enough to produce sufficient stimulation to induce ovulation.

Testes (complete with epididymus) of juvenile fisher captured in 1974-1975 and adult fisher (all years) were weighed. Figure 4 gives the mean paired weights ± two standard deviation for both juvenile and adult testes in each month of capture. The regression line, obtained by least squares method, for juveniles and adults is also shown.

Weights of both juvenile and adult testes increased throughout the winter (for juveniles r = 0.741 ± .069, for adults r = 0.804 ± .066). Juveniles cannot be separated from adults by testes weight in any month, but the regression lines show that the adults testes increase in weight slightly more rapidly than the juveniles. (Regression line - juveniles Y = 0.066 + 1.954 X; adults Y = -1.027 +2.420 X).

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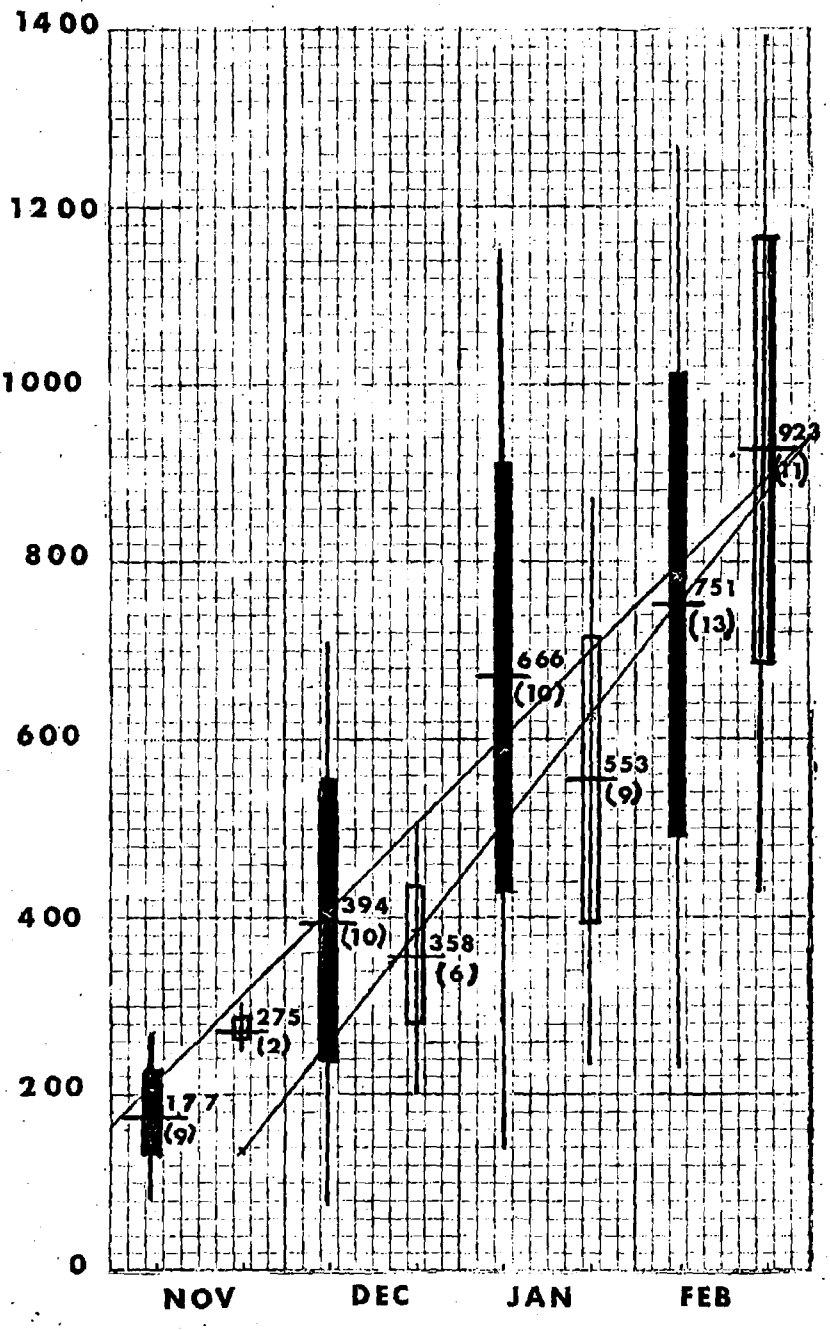
FIG. 4

TESTES WEIGHT

FISHER



JUV.

MONTH OF CAPTURE

ADULT

Smears were made from testes which had been frozen. These testes were from animals captured in February and early March. The smears were examined under the microscope for the presence of sperm. Although some of these carcasses had been kept frozen for over 2 months, sperm were visible in both stained and unstained slides. Of 10 males examined, 9 were juveniles and 1 an adult of 1 year and all showed at least some sperm.

Captured dates ranged from February 4 to March 17. Unfortunately smears were not made of animals captured earlier in the season but an attempt was made to make smears using preserved tested (in 10% formalin) with a limited amount of success. Further efforts will be made to determine how early in the year sperm are present and if there is a difference between adults and juveniles in this regard. Wright and Coulter (1967) found both juvenile and adult males with abundant sperm in late February and March.

All indications point to the fact that males are ready to breed at 1 year of age. It is not as easy to tell in males as it is in females whether all are successful.

The fact that testis weights in juveniles tended to increase more slowly than those of adult animals may indicate that, in spite of the ability to produce sperm juveniles are not fully mature, or that they mature later after the female oestrus cycle.

While much has been learned about reproduction in fisher in the past year, a number of areas remain unexplored. Of first importance is the need to collect a sample of both male and female fisher throughout the year so that the full reproductive cycle can be documented.

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The uterui of a sample of adult females should be sectioned and examined for developing blastocysts as compared to the number of C.L. Flushing for blastocysts could also be tried although Wright and Coulter did not find this method useful with preserved specimens.

Embryos from animals with capture dates should have crown-rump measurements taken to help determine implantation and parturition dates.

Further work on determining the cause and extent of barreness is also needed. This would include observations about the abundance and age of males.

SEX RATIOS

Table XII gives sex ratios in embryos, juveniles in the catch and adults in the catch for each of the three trapping seasons. The ratio of males per 100 females is also given.

Those embryos which were large enough, were sexed by external genitalia. Although the sample is small, it has a decided sex imbalance of 6 males to 14 females (43/100). Whether or not this represents a real imbalance in newborns can only be determined by larger sampling. The other 74 embryos on hand, which are too small for external sexing, will be sexed using the sex chromatin method (Moore 1966).

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TABLE XII

SEX RATIO OF FISHER

ALGONQUIN REGION

Year	Sex Ratio of Embryos		Sex Ratio of Juv.		Sex Ratio of Adults		Sex Ratio of Juv & Ad.	
	M/F	M/100F	M/F	M/100F	M/F	M/100F	M/F	M/100F
1972-73	0/3	0	25/24	104	12/21	57	37/45	82
1973-74	5/9	56	139/145	96	33/95	35	172/240	72
1974-75	1/2	50	130/126	103	23/86	27	153/212	72
All Years	6/14	43	294/295	99.7	68/202	34	362/497	73

In the catch, the ratio of males to females in juvenile animals is 100:100 but in adults only 34 males per 100 females are captured.

It is interesting that over the three years, the number of males in proportion to females was fairly constant in juveniles (at about 100:100) but in adults, the proportion decreased by half (57 to 35 to 27 per 100).

This decrease in the proportion of adult males in the catch is not due solely to temporal shift. Table XII(a) shows adult males as a percentage of the monthly catch for each of the years.

The column for February seems to be particularly significant. That is the period in which adult males are most evident. With a shift to higher harvest in the earlier part of the season and an apparently declining population, we should be extracting an increasing percentage of the available juveniles early in the year which would cause a shift to an increasing percentage of adult males later in the year. This does not occur. Therefore we feel safe to conclude that the decrease in percentage of adult males is real.

If indeed, adult males are more able to effect successful fetilization of females than are juveniles, it becomes apparent that a decrease in adult males in the population would lead to an increase of barren females.

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TABLE XII (a)

ADULT MALES AS % OF MONTHLY CATCH

Year	November	December	January	Feburary	All Months
1972-73					
fx	0/6	2/9	1/17	6/22	9/54
%	0	22.2	5.8	27.3	16.6
1973-74					
fx	1/30	2/71	6/84	8/55	17/240
%	3.3	2.8	7.1	14.5	7.1
1974-75					
fx	2/47	5/132	4/74	2/35	13/288
%	4.3	3.8	5.4	5.7	4.5
All Years					
fx	3/83	9/212	11/175	16/112	39/582
%	3.6	4.2	6.3	14.3	6.7

To check this postulation, the number of animals in each of the four sex and age classes as a % of the total carcasses received were compared. Table XIII gives these figures for four Districts and each of the 3 years (Pembroke and Algonquin District were not included because of small sample size).

In the Parry Sound District, where 10% of the adult females were barren in 1973-74 and 13% were barren in 1974-75, the percentage of adult males decreased markedly between 1972-73 (13.5%) and 1973-74 (5.7%) and remained at 5.2% in 1974-75. Since it appears that at least some males at one year old are capable of fertilization, the trend of juvenile males should also be considered. It is also slightly downward.

Bracebridge District which had 9% of its females barren in 1973-74 also showed a decline in the percentage of adult males received - 1972-73 - 20%, 1973-74 - 10.4%, 1974-75 - 10.5%. The percentage of juvenile males increased somewhat over the three years.

No male adults were received from Minden District in 1974-75. Although the sample is very small, it may be indicative of a shortage of male adults in that area. The percentage of juvenile males also decreased somewhat. No barren females have been received from Minden.

Bancroft showed the smallest decline in adult males, and an increase in juvenile males. No barren females were received.

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TABLE XIII

AGE AND SEX CLASSES AS % OF CARCASSES RECEIVED

BY DISTRICT AND YEAR

(ADULTS AGE 1 AND OLDER)

	Parry Sound			Bracebridge			Minden			Bancroft			Total		
	72-73	73-74	74-75	72-73	73-74	74-75	72-73	73-74	74-75	72-73	73-74	74-75	72-73	73-74	74-75
Ad. Male															
f.	10	7	8	2	14	8	-	5	0	-	6	6	12	32	22
%	13.5	5.7	5.2	20.0	10.4	10.5	-	12.8	0	-	7.4	6.6	14.3	8.5	6.3
Ad. Fem.															
f.	20	41	46	2	22	20	-	6	6	-	19	12	22	88	84
%	27.0	33.6	29.7	20.0	16.4	26.3	-	15.4	20.0	-	23.5	13.2	26.2	23.4	23.9
Juv. Male															
f.	23	39	45	2	45	24	-	17	11	-	26	45	25	127	125
%	31.1	31.9	29.0	20.0	33.5	31.6	-	43.6	36.7	-	32.1	49.5	29.8	33.8	35.5
Juv. Fem.															
f.	21	35	56	4	53	24	-	11	13	-	30	28	25	129	121
%	28.4	28.7	36.1	40.0	39.6	31.6	-	28.2	43.3	-	37.0	30.8	29.8	34.3	~~46.4~~ 34.4
Total															
f.	74	122	155	10	134	76	-	39	30	-	81	91	84	376	352

Whether the small number of adult males present in the catch is truly representative of their numbers in the population is not known. It may be that old males have become trap wary and simply escape capture. However, if correlation continues to occur between areas and years with both barren females and lack of adult males in the catch; the indications are that the shortage is a real one and very significant to the management of the animals.

If the catch is representative of the population, the sex ratio data can also be used to indicate the number of females which one male must service.

Table XIV gives the ratio, for the Parry Sound District, of the total number of females requiring breeding divided by the number of males available. Two ratios are given - one presuming that only adult males are capable of breeding, the other presuming that all males breed.

The number of females which one male must service if only adult males breed ranges from 4 in 1972-73 to over 12 in 1974-75. Since the reproductive rate (Table IX) does not decline nearly to this extent during the 3 years, it is apparent that one male must service many females or that juvenile males must also breed. When the ratios of all females to all males is considered the ratio is still seen to increase over the three years from 1.24 to 1.65 to 1.92 females per male. It is apparent then, that even if all males breed it is still necessary that a male service more than one female. This is further evidence that fisher are probably polygamous as stated by Coulter (1966)

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TABLE XIV

BREEDING RATIOS OF FISHER

PARRY SOUND DISTRICT

Year	All Females/Adult Males Only	All Females/All Males
1972-73	41/10 = 4.1	41/33 = 1.24
1973-74	76/7 = 10.9	76/46 = 1.65
1974-75	102/8 = 12.8	102/53 = 1.92

JUVENILE/ADULT RATIOS

In the section on female reproduction, it was calculated that only 2.8 embryos per adult female would survive to the implantation stage. It is not unreasonable to assume another 10% natural mortality between implantation and the first winter. Thus the expected ratio of juveniles to adult females (i.e. the mothers of the juveniles) in the population at the beginning of the trapping season is 250 juveniles to 100 adult females (age 2+).

Table XV gives the ratio of juveniles per adult female (2+) of those carcasses which had known dates of capture. The information is divided by year and by month of capture.

Looking first at the monthly ratios for all years combined, the number of juveniles per 100 adult females is 400 for November, 762 for December, 308 for January and 250 for February for an overall number of 406 juveniles per 100 adult females.

In all of these months except February, there are more juveniles in the catch than would be expected from the reproductive rate. The month of December is especially high with 762 juveniles - more than 3 times the expected number.

The management implications of this are obvious since trapping in November and December would cause heavy predation against the juveniles while permitting more of the breeding animals to escape capture. It was for this reason that the trapping season for fisher has been changed for 1975-76 to include only November and December.

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TABLE XV

RATIO OF JUVENILES TO ADULT FEMALES

(2 and older)

FISHER BY MONTH OF CAPTURE

Month	1972 - 73		1973 - 74		1974 - 75		All Years	
	Juv/Ad. Fem.	Juv/100 Ad. F.	Juv./Ad. Fem.	Juv/100 Ad. F.	Juv/Ad. Fem.	Juv/100 Ad. F.	Juv/Ad. Fem.	Juv/100 Ad. F.
November	5/1	500	21/6	350	34/8	425	60/15	400
December	6/0	600	58/6	967	96/15	640	160/21	762
January	12/3	400	49/23	213	53/11	480	114/37	308
February	8/6	133	30/11	273	22/7	314	60/24	250
All Mont	31/10	310	158/46	343	205/41	500	394/97	406

(south of the French-Mattawa line).

Looking at the difference between the three seasons, the trend throughout the winter in all years is similar. The shift in proportion of juveniles to adults which is so obvious in 1973-74 between December (967) and January (213) does not occur so markedly in 1974-75. This may be because 1974-75 was an open winter with little snow accumulating before mid-January whereas the 1973-74 season was more normal with heavy snows in December. This would seem to support the postulation in the previous report (Strickland 1974) that "perhaps an initial difficulty in winter foraging renders them (the juveniles) highly susceptible to bait early in the winter".

The other obvious trend in the increase in the number of juveniles/100 adult females over the 3 years - 310 to 343 to 500. This can be explained by the fact that each year a larger proportion of the catch was taken in November and December (1972-73 - 25%; 1973-74 - 41%; 1974-75 60%).

Since more juvenile animals are captured early in the season, this shift toward earlier trapping would tend to increase the proportion of juveniles in the catch.

Figure 5 shows the monthly catch of fisher divided into percentage of animals in each sex and age class. Adults, both female and male form a greater proportion of the catch in January and February than they did early in the season. The percentage of juveniles is greatest in November and December and decreases later in the season.

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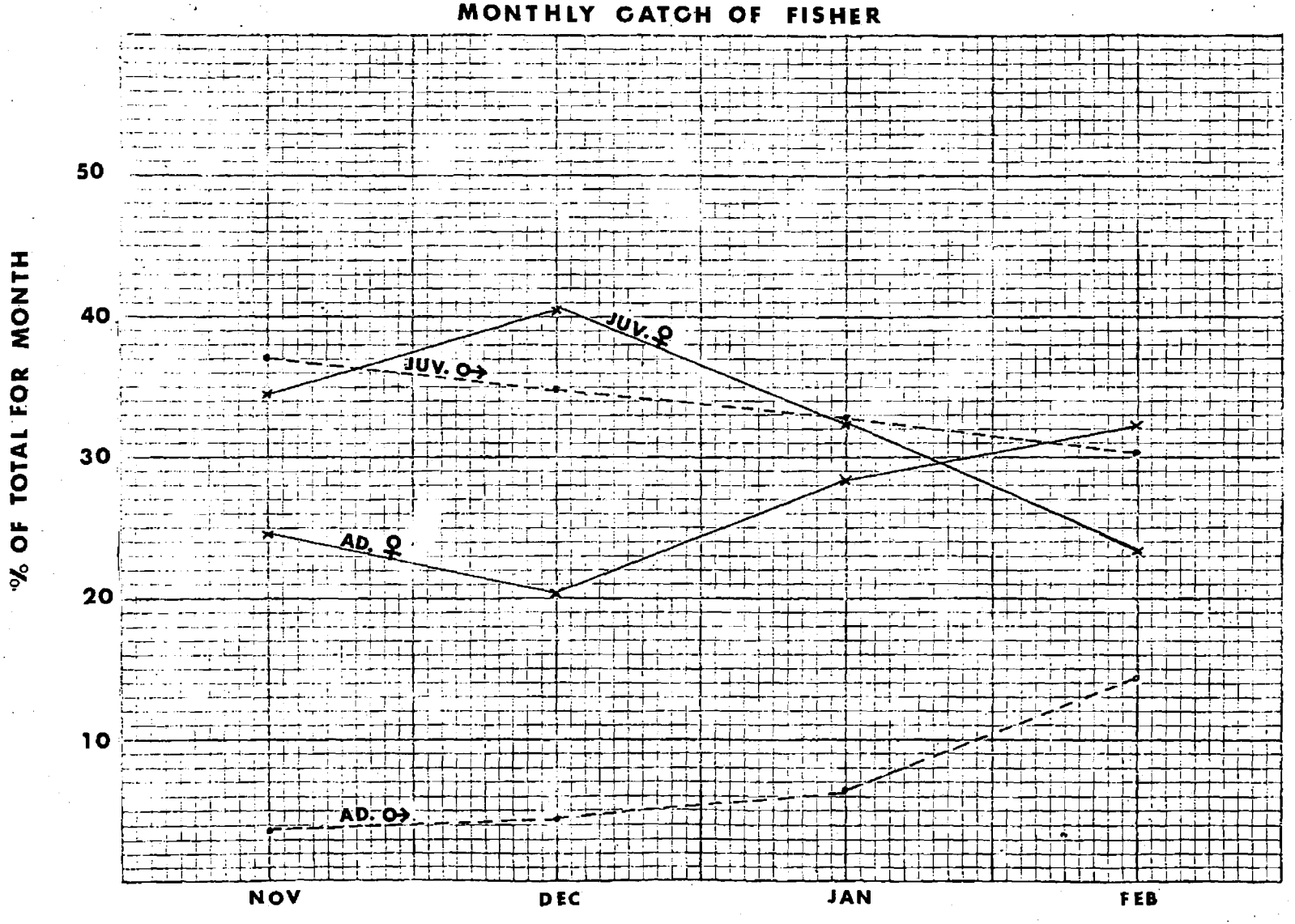
FIG. 5


MONTHLY CATCH OF FISHER
% OF TOTAL FOR MONTH
50
40
30
20
10
JUV. ♀
JUV. ♂
AD. ♀
AD. ♂
NOV
DEC
JAN
FEB

It is also interesting to realize that over 40% of all adult males captured, were taken in February. Table XVI shows what % of each age and sex class was captured in each month. It again emphasizes the advisability of trapping in November and December only, since only 30.6% of adult males and 42.3% of adult females were taken in that period compared to 53.1% of juvenile males and 57.9% of juvenile females.

PORCUPINE QUILLS

The incidence of porcupine quills found in carcasses at the time of dissection has increased over the three years. No quills were found in 84 carcasses in 1972-73. 6 of 412 (1.5 %) 1973-74, and 21 of 365 (5.75%) in 1974-75 had quills.

Most of the occurences in 1974-75 were from Bancroft District (11 of the 91 (12%) carcasses received from Bancroft had quills). Our sample from that area is increasing. In Parry Sound, Bracebridge and Algonquin Districts where fisher have been present for a considerable length of time, quill incidence was least.

Coulter found 35% of the fisher carcasses he examined in Maine had quills.

Skulls of road killed procupines are being collected across the Region in 1975-76 so that age class distribution studies can be made on this food source.

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TABLE XVI

% OF AGE AND SEX CLASS CAPTURED

IN EACH MONTH - FISHER

(all years combined)

Month	Ad. Males		Ad. Females		Juv. Males		Juv. Females		Total
	Fx	%	Fx	%	Fx	%	Fx	%	Fx
vember	3	7.6	20	13.4	30	15.3	30	14.2	83
December	9	23.0	43	28.9	74	37.8	86	43.7	212
January	11	28.2	50	33.6	58	29.6	56	28.9	175
February	16	41.0	36	24.1	34	17.3	26	13.2	112
Total	39	100	149	100	196	100	198	100	582

BODY FAT

When doing necropsies, animals which had visible deposits of body fat (both internal and subcutaneous) were noted. Three categories were used - heavy fat, light fat and no visible fat. This is slightly different from the system used in 1973-74 where only two categories were used - fat and not fat. The two years' results are thus not strictly comparable.

Table XVII shows percentage of fisher which had heavy and light fat deposits in each month in 1974-75. They are divided into 4 age and sex classes.

All adult males received had fat deposits - 47% had heavy fat, 53% had light fat. These figures varied little throughout the winter. Juvenile males were almost as fat with only 3% of the carcasses received having no fat deposits. Most of those with no fat were captured in January.

Among the females, 93% of the juveniles had some fat deposits but only 79% of the adults were fat. Among juveniles, those with fat deposits decreased as the winter progressed from 94% in November to 66% in February. In adult females, the % with fat was almost constant throughout the winter at about 80%.

Since over 90% of all carcasses received in 1974-75 had at least some deposits of fat, it appears that food is not a limiting factor in fisher populations in this Region at this time.

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TABLE XVII

% OF FISHER CARCASSES WITH BODY FAT

BY MONTH OF CAPTURE

1974-1975

	November		December		January		February		Total	
	#	%	#	%	#	%	#	%	#	%
Juv. Fem.										
Heavy	10	63	25	51	12	40	2	33	49	48
Light	5	31	23	47	15	50	2	33	45	45
None	1	6	1	2	3	10	2	33	7	7
									101	100%
Ad. Fem.										
Heavy	1	10	5	17	5	33	0	0	11	17
Light	7	70	18	60	8	53	8	73	41	62
None	2	20	7	23	2	14	3	27	14	21
									66	100%
Juv. Males										
Heavy	10	56	33	73	13	59	5	38	61	62
Light	8	44	11	24	7	32	8	62	34	35
None	0	0	1	3	2	9	0	0	3	3
									98	100%
Ad. Males										
Heavy	1	50	2	40	2	50	2	50	7	47
Light	1	50	3	60	2	50	2	50	8	53
None	0	0	0	0	0	0	0	0	0	0
									15	100%

A "condition index" was calculated for each animal by dividing the carcass weight by the body length.

The mean condition indices ± one standard deviation are given for the four age and sex classes in Table XVIII, by month of capture.

Comparison of Table XVII and Table XVIII show substantial agreement in the trends of the data. The calculated condition index would appear to be a reasonable measure of the fat condition of the animal.

FUR PRICES

Table XIX shows the prices paid for fisher pelts of the various O.T.A. fur sales in North Bay in 1974-75. Only pelts for which carcasses were received are included. Damaged fur is not included. The mean price, the range of prices and the number checked are given for the four sex and age classes and for each sale. This information is also given for all sales combined.

Juvenile male fur brought an average price slightly above adult males ($51.22 compared to $48.13). The range of prices in juveniles was greater, some fur bring as much as $130.00 compared to a high in adults of $65.00.

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TABLE XVIII

CONDITION INDEX (WEIGHT/BODY LENGTH)

OF FISHER CARCASSES BY MONTH OF CAPTURE

1974-1975

Month	Ad. Males	Juv. Males	Ad. Females	Juv. Females
November	51.75 ± 7.84 (2)*	49.2 ± 6.05 (16)	36.35 ± 2.86 (11)	34.4 ± 3.8 (16)
December	64.08 ± 6.24 (15)	52.7 ± 8.57 (46)	34.88 ± 3.68 (31)	34.59 ± 4.29 (50)
January	65.4 ± 9.40 (4)	53.6 ± 8.05 (22)	37.5 ± 4.19 (15)	32.1 ± 5.09 (29)
February	65.4 ± 6.08 (2)	51.03 ± 8.4 (19)	33.86 ± 2.94 (12)	31.34 ± 5.87 (10)
Mean All Months	60.55 ± 9.09	52.03 ± 8.06	35.51 ± 3.72	33.56 ± 4.74

*SAMPLE SIZE IN BRACKETS

Female fur is considerably more valuable than male fur. In females, the mean price paid for adult fur was higher than that for juveniles ($86.53 compared to $71.42). The range of prices, however, is virtually the same with highs in both of $142.00.

Predating more heavily against juvenile animals by ending the season on December 31, will not greatly decrease the catch value to the trapper since the range of prices paid is the same for juveniles as for adult fur. The mean price for adult female fur is however some 17% higher than that for juvenile females, while that for adult males is some 6% lower than that for juvenile males.

PELT CHARACTERISTICS

While little progress was made on assembling a study collection of fisher pelts in 1974-75, thought is still being given to methods of differentiating juveniles from adults by pelts alone. Pelts, bearing our tags, will be examined at the O.T.A. before the sales in 1975-76, to see if any characteristic, such as mammary development, is useful. The ages of these pelts can be accurately determined from the related carcasses received from the trapper.

PARASITES AND DISEASES

Carcasses were examined for Dracunculus insignis. Its presence was recorded in 22 of the 365 carcasses (6.0%) received

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TABLE XIX

PRICES PAID FOR FISHER FURS

O.T.A. SALES - NORTH BAY
1974-1975
(damaged fur not included)

	December Sale	January Sale	February Sale	March Sale	All Sales
Adult Females					
Mean	$71.00	$86.33	$102.25	$46.80	$86.53
Range	53-106	36-140	50-142	33-69	33-142
Number	3	30	16	5	54
Juvenile Females					
Mean	$59.75	$71.91	$73.34	$46.00	$71.42
Range	46-77	39-132	38-142	-	38-142
Number	4	46	26	1	77
Adult Males					
Mean	$58.00	$44.20	$55.60	$41.25	$48.13
Range	-	30-65	46-60	33-55	30-65
Number	1	5	5	4	15
Juvenile Males					
Mean	$44.33	$53.48	$53.56	$33.00	$51.22
Range	40-53	13-130	24.87	10-46	10-130
Number	3	33	16	5	57

in 1974-75. This compares with 6.5% in 1972-73 and 5.1% in 1973-74. In 1974-75, 7.7% (12 of 155) of the carcasses received from Parry Sound District, 10.5% (8/76) from Bracebridge, 1.1% (1 of 91) from Bancroft and 3.3% (1/30) from Minden had Dracunculus. Adults had about twice the incidence of Dracunculus in 1974-75 as juveniles and males were slightly more heavily parasitized than females (Adult females 9.3%, adult males, 13.0%, juvenile females 4.0%, juvenile males 4.6%). This would be expected since the female worm takes about one year to reach maturity (Fyvie 1969).

Only one animal in 1974-75 had evidence of the giant kidney worm, Dioctophyma renale. This barren adult female had her right kidney destroyed. The worm itself was not found.

While complete reports will be submitted by personnel at the University of Guelph and Health of Animals Branch, Department of Agriculture, Guelph on their studies of various parasites and diseases of fisher, some preliminary results are available. They are summarized in Table XX. Testing for toxoplasmosis and Aleutian disease has not been completed on the 1974-75 samples.

In addition, Robin Craig, Ontario Ministry of Natural Resources, Fonthill, has examined a sample of lungs from fisher captured in 1972-73 and 1973-74 for various parasites. While a full report will be forthcoming, prelimary reports are of an increase in the parasite load, both in incidences of occurance and numbers of species, between 1972-73 and 1973-74.

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TABLE XX

PARASITES AND DISEASES OF FISHER*

ALGONQUIN REGION

	Trichinosis	Leptospirosis	Toxoplasmosis	Aleutian Disease
1972-73				
# examined	75	75	-	-
# positive	5	7	-	-
% positive	6.7	9.3	-	-
1973-74				
# examined	303	65	379	360
# positive	14	3	157	9
% positive	4.6	4.6	41.4	2.5
1974-75				
# examined	296	42	-	-
# positive	17	0	-	-
% positive	5.7	0	-	-

* RESULTS FROM TESTING DONE AT UNIVERSITY OF GUELPH AND HEALTH OF ANIMALS BRANCH, GUELPH.

Cont'd page 57

MARTEN

Collection of Carcasses

In the 1974-75 trapping season, 189 marten carcasses were received from trappers in the Algonquin Region. This brings the total collected over 3 years to 421 marten from Algonquin Region and 26 from Wawa District.

Table XXI gives the number of marten carcasses received as a percentage of the fur sealed in each District in Algonquin Region for 1973-74 and 1974-75. The total marten harvest for the Province of Ontario is also given. In 1973-74, Algonquin Region contributed 4.1% of the Province's marten; in 1974-75, 3.87%.

Table XXII gives a summary of the marten carcasses received in the three trapping seasons divided by district, sex, age and month of capture. In the 1972-73 season, seven animals were not included because of lack of information about location, date of capture, or age. In 1973-74, 5 animals were not included for the same reasons.

In that year, as well, 26 marten were received from Wawa District. These animals have provided a study skin collection and are listed separately in Table XXII.

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TABLE XXI

MARTEN CARCASSES RECEIVED AS %

OF MARTEN PELTS SEALED IN

EACH DISTRICT OF ALGONQUIN REGION

1973-74 AND 1974-75 SEASONS

	1973-1974			1974-1975		
District	Carcasses Received	Fur+ Sealed	%	Carcasses Received	Fur* Sealed	%
Parry Sound	13	110	11.8	35	89	39.3
Bracebridge	153	353	43.3	125	257	48.6
Algonquin [A]	2	311	0.6	22	178	12.4
Pembroke [A]	-	185	0	-	57	0
Minden [A]	-	91	0	3	86	3.5
Bancroft [A]	19	69	27.5	3	31	9.6
Unknown	6	=		1	-	-
Total	193	1119	17.2	189	698	27.1
Provincial Total		27150			18006	

[A] Carcasses were not requested for these Districts

\+ Computer Print Out to August 31, 1974

* Computer Print Out to

TABLE XXII

ARTEN CARCASSES COLLECTED BY DISTRICT AND MONTH OF CAPTURE*

	Season 1974-75															Totals by Age & Sex All Years	Total by Age All Yrs.	Total All Yrs. by Month	Wawa 1973-1974
L.	PE	BA.	UNK	TOT	P.S.	BR.	MD.	AL.	PE.	BA.	UNK	TOT							
				5		9						9				14	51		
				8	3	11		11				25				37			
				1		3		2				5				6	32		
				11	4	8		2				14				26		83	
			(1)	14	2	12					1	15				30	83		
			(2)	14	6	27						33				53			
			(1)	8	1	7		1				9				18	54	137	
				14	1	17		2				20				36			
				10	(1)	1(3)						5				15	50		
			(2)	21	1	4(4)	1	1				11				35		99	
1				9	(1)	3		2				6				17	49		
1				14	4(5)	5(1)		1				16				32			
				0								0				0	16		
				7	4	(2)						6				16		42	
				4		1(1)				(1)		3				9	26		
				4	2	2(4)	(2)			2		12				17			
																13	34		10
		(5)		11												21			4
		(7)		17													26	60	
		(1)		6												7			3
		(6)		15												19			9
		19	6	193	35	125	3	22		3	1	189				421	421	421	26

IN BRACKET = THOSE FOR WHICH NO DATE OF CAPTURE IS AVAILABLE.

AGE DISTRIBUTION AND MORTALITY RATES

Ages of all marten received during the three years were obtained by counting the annual lines in the cementum of canine teeth as described for fisher.

The distribution of the animals by cementum age is given in Table XXIII for both males and females in each of the years and in all years combined. The distribution is also given in percentage.

From these ages, weighted mortality rates were calculated after Rounsefell and Everhart for males and females separately. Both sexes had essentially the same rates - 45% mortality when all ages are included in the calculation, and 34% mortality in the adult sample only. The sample was not large enough to calculate the mortality rate for each year separately.

No marten with unerupted teeth were observed in any of the carcasses examined.

SIZE

Weights and measurements of the marten carcasses were taken at the time of necropsy as described previously (Strickland 1974).

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TABLE XXIII

AGE DISTRIBUTION

MARTEN - ALGONQUIN REGION

ACTUAL FREQUENCIES

	1972 - 1973			1973 - 1974*			1974 - 1975			All Years		
Age	Males	Females	Both	Males	Females	Both	Males	Females	Both	Males	Females	Both
0	20	3	23	67	40	107	75	29	104	162	72	234
1	7	2	9	23	11	34	23	5	28	53	18	71
2	1	2	3	21	15	36	21	4	25	43	21	64
3	1	1	2	6	0	6	7	8	15	14	9	23
4		1	1	3	1	4	5	2	7	8	4	12
5				2	1	3	1	1	2	3	2	5
6				0		0	2	0	2	2	0	2
7	1		1	3		3	0	2	2	4	2	6
8							3	1	4	3	1	4
Total	30	9	39	125	68	193	137	52	189	292	129	421

* WAWA MARTEN NOT INCLUDED

FREQUENCY AS %

Age	Males	Females	Both	Males	Females	Both	Males	Females	Both	Males	Females	Both
0	66.7	33.3	58.9	53.6	58.8	55.4	54.7	55.8	55.0	55.5	55.8	55.8
1	23.3	22.2	23.1	18.4	16.2	17.6	16.8	9.6	14.8	18.2	13.9	16.9
2	3.3	22.2	7.6	16.8	22.0	18.6	15.3	7.7	13.2	14.7	16.3	15.2
3	3.3	11.1	5.1	4.8	0	3.1	5.1	15.4	7.9	4.8	7.0	5.5
4		11.1	2.6	2.4	1.5	2.1	3.6	3.8	3.7	2.7	3.1	2.8
5				1.6	1.5	1.6	0.7	1.9	1.1	1.0	1.6	1.2
6				0		0	1.5	0	1.1	0.7	0	0.5
7	3.3		2.6	2.4		1.6	0	3.8	1.1	1.4	1.6	1.4
8							2.2	1.9	2.1	1.0	0.8	0.9

Table XXIV gives the mean weights ± one standard deviation for marten in each of the four age and sex groups and by month of capture. Data from all years were combined. Table XXV gives the mean lengths for the same animals.

There appears to be no significant difference in either weight or length between juveniles and adults of the same sex or between the various months of capture in any group. The variations (± 2 standard deviations) are greater than the differences between the means. The differences between the sexes is apparently significant in both lengths and weights. Analysis of variance will be applied at a later time.

In marten therefore, as in fisher, juveniles cannot be distinguished from adults by length or weight by the time trapping season begins in November.

FEMALE REPRODUCTIVE

Like fisher, marten have delayed implantation, breeding occuring in July or August and parturition in April (Ashbrook, 1930; Brassard and Bernard, 1939). There is some question as to when marten mature. Jonkel and Weckwerth (1963) suggest that "female marten are apparently not sexually mature as yearlings but wild males may reach sexual maturity as yearlings". Quick (1956) says "there is some evidence that marten breed at 15 months and would thus bear young at 24 months".

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TABLE XXIV

MEAN WEIGHTS OF MARTEN BY MONTH OF CAPTURE

(MEAN WT. IN GRAMS ± ONE STANDARD DEVIATION

AND SAMPLE SIZE)

(all years combined)

	Adult Males	Juvenile Males	Adult Females	Juvenile Females
November	634.9 ± 115 (25)	548.9 ± 106.5 (35)	394.6 ± 49.0 (6)	379.6 ± 39.9 (14)
December	576.8 ± 114 (22)	547.0 ± 95.9 (41)	374.2 ± 63 (10)	341.9 ± 69.3 (16)
January	631.2 ± 127.9 (12)	643.8 ± 101.2 (10)	389.6 ± 45.0 (7)	407 (1)
February	670 ± 131.1 (7)	573.9 ± 142.4 (12)	329.5 ± 57.8 (6)	-

TABLE XXV

MEAN LENGTHS OF MARTEN BY MONTH OF CAPTURE

ALL YEARS COMBINED

MEAN LENGTH IN CM. ± ONE STANDARD DEVIATION

(SAMPLE SIZE)

	Adult Males	Juvenile Males	Adult Females	Juvenile Females
November	39.4 ± 1.5 (25)	38.6 ± 1.6 (35)	34.5 ± 0.9 (6)	34.7 ± 0.8 (14)
December	38.1 ± 1.0 (22)	38.8 ± 1.3 (41)	34.7 ± 1.1 (10)	34.1 ± 0.7 (16)
January	38.5 ± 1.7 (11)	39.3 ± 2.0 (10)	35.2 ± 1.4 (7)	35.9 (1)
February	38.9 ± 1.0 (7)	39.0 ± 1.2 (12)	36.3 ± 0.8 (6)	-

To try to determine the age of maturity in female marten, ovaries of all females from the three years of the study were sectioned and stained (using the methods described for fisher ovaries) and examined for corpora lutea (C.L.) and Graffian follicles (G.F.). All juvenile animals, under one year of age which were examined, had no C.L. and all but one had developing G.F. of various sizes. In this one animal, captured in the Parry Sound District in November or December (capture date not recorded), the ovaries were not active.

Among the adult (1 year and over) females all had both C.L. and G.F. except 6 (10.7%) which had no C.L.. Of these, 1 of 6 (16.7%) occured in 1972-73 and 5 Of 27 (18.5%) in 1973-74. None (of 23) were barren in 1974-75. The barren females were captured in Parry Sound (1), Bracebridge (3), Algonquin (1) and Bancroft (1) Districts. All of these barren females were one year of age except one which was 2 years old. Marshall (1951) found a number of barren females among older animals (3 of 22 - 13.6%). He determined age by skull characteristics only. From this it would appear that most female marten are able to breed at 15 months and produce their first young at 24 months as Quick suggested. However, a considerable percentage (27.7% or 5 of 18 one year old) of our sample were not pregnant at 19 to 22 months.

To see if the age of the female had any other influence on the reproductive rate, the C.L. counts in females of various ages are given in Table XXVI. The mean number of C.L. per female is given for each age class for each of the three years of the study and for all years combined. The rate is also given for each year when the barren females are not included in the average.

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The overall rate (for all years and ages) is 2.78 C.L. per female when the barren females are included and 3.12 when they are excluded from the sample. The reproductive rate for all age groups older than one is between 3 and 4. The rate for one year olds at 2.83 is considerably lower even when barren animals are excluded.

Marshall and Enders (1942) reported mean C.L. counts of 2.56 in a sample of 9 females.

As reported in the previous report, three marten had embryos well enough developed to count. The three animals had a total of 10 embryos and 11 C.L. giving a mean C.L. count of 3.67 and a mean embryo count of 3.33. Two of these were captured at the end of March. The capture date of the third is unknown. No marten with countable embryos were received in 1974-75.

Table XXVII gives the reproductive rate for each district from which carcasses were received and for each year. Barren animals are included in calculating the rates. Algonquin District had the highest rate (3.17) over the three years. This compared to Parry Sound and Bracebridge at 2.86 and 2.79 respectively. Bancroft in a very small sample had a rate of 1.67. Largely because of the 5 barren females received in 1973-74, the rate that year is low (2.31) compared to 1974-75 (3.35) when no barren females were received.

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TABLE XXVI

CORPORA LUTEA IN ADULT MARTEN BY AGE

ALGONQUIN REGION

	A G E									
	1	2	3	4	5	6	7	8	9	Total
1972-73										
#C.L.	3	8	2	3						16
#Ad. Female	2	2	1	1						6
CL/Ad. Fem.	1.5	4.0	2.0	3.0						2.67
Barren Fem.	3/1	8/2	2/11	3/1						16/5
excluded /Ad. Fem.	3.0	4.0	2.0	3.0						3.20
1973-74										
#C.L.	18	35	-	3	4					60
#Ad. Fem.	11	13	-	1	1					26
CL/Ad. Fem.	1.64	2.69	-	3.0	4.0					2.31
Barren Fem.	18/7	35/12	-	3/1	4/1					60/21
excluded CL/Ad. Fem.	2.57	2.91	-	3.0	4.0					2.86
1974-75										
#C.L.	13	13	27	-	8	3	6	3	4	77
#Ad. Fem.	4	4	8	-	2	1	2	1	1	23
CL/Ad. Fem.	3.25	3.25	3.38	-	4.0	3.0	3.0	3.0	4.0	3.35
No Barren Ad. Females										
All Years										
.L.	34	56	29	6	12	3	6	3	4	53
#Ad. Fem.	17	19	9	2	3	1	2	1	1	55
CL/Ad. Fem.	2.00	2.95	3.22	3.0	4.0	3.0	3.0	3.0	4.0	2.78
Barren Fem.	34/12	56/18	29/9	6/2	12/3	3/1	6/2	3/1	4/1	153/49
excluded CL/Ad. Fem.	2.83	3.11	3.22	3.0	4.0	3.0	3.0	3.0	4.0	3.12

TABLE XXVII

REPRODUCTIVE RATE OF MARTEN BY DISTRICT

ALGONQUIN REGION

BARREN FEMALES INCLUDED

	DISTRICT									
	PARRY SOUND		BRACEBRIDGE		BANCROFT		ALGONQUIN		TOTAL	
	CL/FEM.	RATE	CL/FEM	RATE	CL/FEM	RATE	CL/FEM	RATE	CL/FEM	RATE
1972-73	6/3 1 barren	2.0	10/3	3.33					16/6	2.67
1973-74	7/2	3.5	51/21 3 barren	2.43	2/2 1 barren	1.0	0/1 1 barren	0	60/26	2.31
1974-75	7/2	3.5	48/15	3.20	3/1	3.0	19/5	3.8	77/23	3.35
All Yrs.	20/7	2.86	109/39	2.79	5/3	1.67	19/6	3.17	153/55	2.78

MALE REPRODUCTION

Bacula of all male marten were weighed. Data for all years were combined and analyzed by period of capture.

Weights of juvenile bacula did not vary significantly during the four months of the trapping season (The correlation coefficient was 0.22 ± 0.11). Neither was there a significant difference in weights of adult bacula during this period (correlation coefficient 0.10 ± 0.13).

Since there was no difference between weights in the various months of capture, all months as well as all years were combined and the marten divided by age. Mean baculum weights for the various age groups is given in Figure 6 ±2 standard deviations (sample size in brackets).

The correlation coefficient for the ages 1 through 7 is 0.66 ± 0.062 indicating that baculum weight does increase significantly with age in adult marten.

Since the weights of juvenile bacula remain relatively constant at 75 mg. throughout the period from November to February but the mean baculum weight of one year old males is 135 mg. and does not vary significantly during the winter it is apparent that the baculum in juvenile marten must increase in weight sometime between February and November. Since the breeding season in marten is in July or August (Ashbrook and Hanson 1930), it seems reasonable that the increase would occur at that time when the animals are about 15 months.

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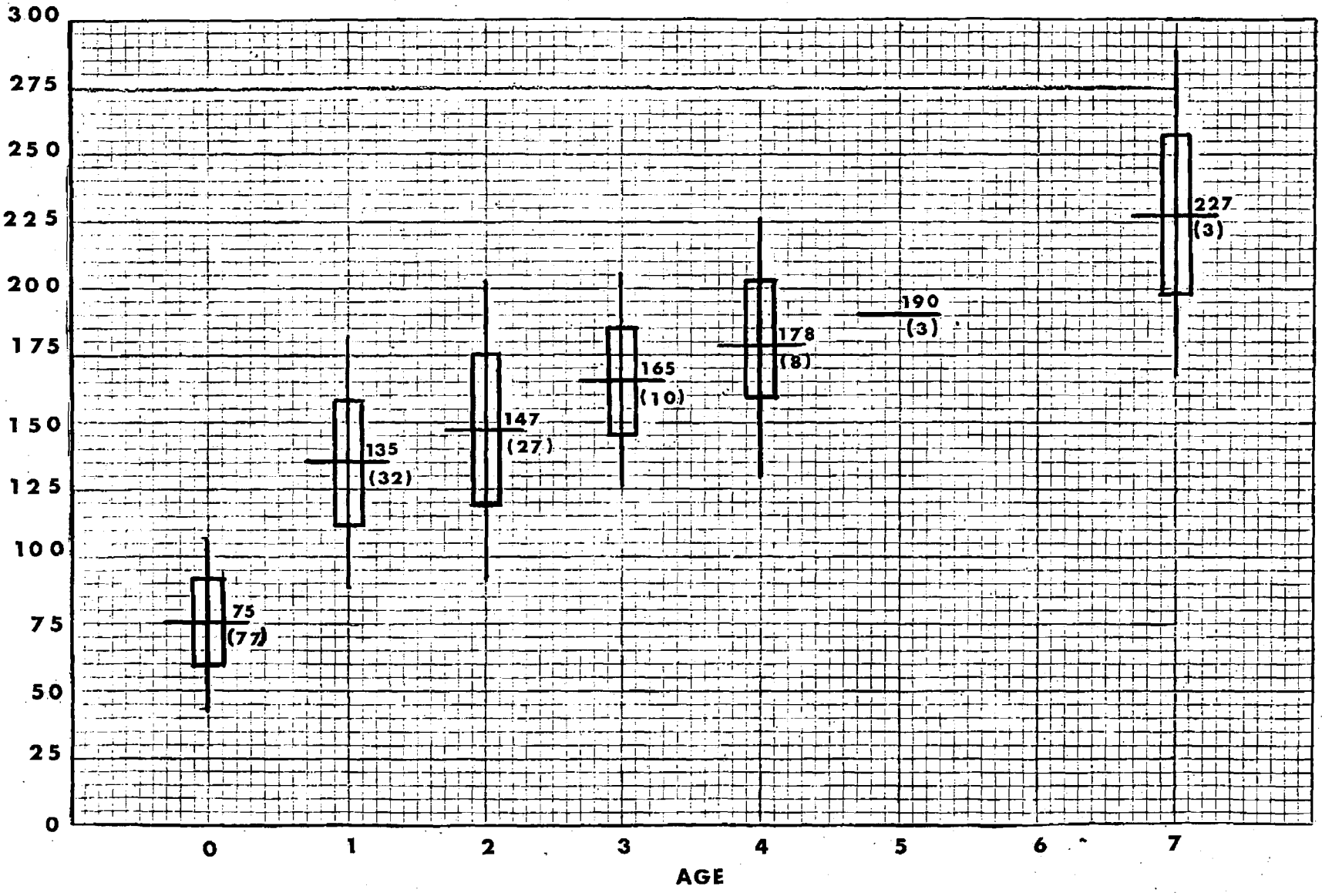
FIG. 6

BACULUM WEIGHTS

MARTEN



Testes of marten have not yet been weighed or examined histologically. This will be done. However, a considerable sample of summer caught animals will probably be necessary before the age of maturity in male marten, (whether any males at fifteen months of age are capable of breeding) can be determined. As with fisher, much has been learned about reproduction in marten in the past year but much remains to be done. Of prime importance is to collect both male and female carcasses throughout the year so that the full reproductive cycle can be documented.

More careful study of the ovarian sections is also required. Not all C.L. appear to be the same size. These need to be related to time of capture to determine if smaller C.L. occur before implantation (in non-active pregnancy).

The state of pregnancy can be determined with greater accuracy by sectioning the uterus of pregnant animals or flushing for blastocysts.

SEX RATIOS

Table XXVIII gives the sex ratios (in both male per female and males per 100 females) of the marten carcasses received in the Algonquin Region in each of the three years. The rate is given for juveniles and adults separately and combined.

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In adults, the ratio of males to females increased in each of the three years (167 to 207 to 269). This shift is due in part to a change in the temporal distribution of the catch over the three years. A greater proportion (68.8%) of the catch was taken in November and December in 1974-75, compared to 52 and 54% in the other two years and a higher proportion of adult males compared to adult females are captured in the early months (see Table XXIX). In juveniles this trend is less obvious because of the small sample in 1972-73. When the data for all years is combined the ratio of males per 100 females is the same in both juveniles and adults at about 225 males per 100 females.

There has been some suggestion that sex ratios change according to the month of capture (deVos 1952, Yeager 1950) with a greater proportion of females taken later in the season. To test this theory with our data, the ratio of males to females captured in each month of the trapping season was calculated for both juveniles and adults. The data from the three years were combined because the number of animals in the first two years which had accurate dates of capture was very small. Table XXIX gives these results.

In juveniles, the proportion of males to females in the catch increases (rather than decreases) through the winter with 10 or more males being caught for each female in January and February.

In adults the proportion of females in the catch does increase somewhat between November and February. When all ages are considered together, the proportion of females captured in February is less than in any other month (The "all months" figure in Table XXIX does not correspond precisely to those in Table XXVII as the former includes only those

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TABLE XXVIII

SEX RATIO OF MARTEN

ALGONQUIN REGION

Year	Juveniles		Adults		All Years	
	M/F	M/100F	M/F	M/100F	M/F	M/100F
1972-73	20/3	667	10/6	167	30/9	333
1973-74	67/40	167	58/28	207	125/68	184
1974-75	75/29	259	62/23	269	137/52	263
All Yrs.	162/72	225	130/57	228	292/129	226

TABLE XXIX

SEX RATIO OF MARTEN BY MONTH OF CAPTURE

(all years combined)

Month	Juveniles		Adults		All Ages	
	M/F	M/100F	M/F	M/100F	M/F	M/100F
November	37/14	264	26/6	433	63/20	315
December	40/16	250	23/10	230	63/26	242
January	10/1	1000	12/8	150	22/9	244
February	12/0	-	10/5	200	22/5	440
All Months	99/31	319	71/29	245	170/60	283

animals with known capture dates while the latter includes all animals received).

There was considerable discussion in the previous report (Strickland 1974) about the feasibility of using sex ratios as an index to population density with closer sex ratios indicating denser populations or heavy trapping pressure.

The data do not present apparent trends which seems to substantiate these theories and reveal sex and age ratio shifts which seriously complicate such speculation.

It seems unlikely that the catch is representative of the sex ratio in the population, since 2 to 3 males are captured for every female, unless there is also a sex imbalance at birth. It is not known if this imbalance occurs. deVos (1952) suggests it may, yet cites Yeager as finding a 1:1 ratio among recently born young on ranches.

The embryos on hand will be sexed using the chromation method of Moore (1966) but the sample is too small to give any conclusive evidence. However, Yeager (1950) pointed out that since males have 2 to 3 times the home range of females, the chance of a male being captured is 2 to 3 times that of a female. This may explain the unbalanced sex ratio of the catch.

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JUVENILES/ADULT FEMALE

Table XXX gives the ratio of juveniles (both male and female) per adult female marten (two years of age and older) for each month in the trapping season. Only animals with accurate capture dates are included. The data from all years was combined because of small sample size.

Since the reproductive rate was 2.78 C.L. per female a ratio of not more than 2.78 juvenile per adult female (2 and older) would be expected in the catch if it represents the distribution in the population.

Table XXX shows a ratio of 8 to 10 juveniles per adult during November and December. The ratio in January and February is between 2 and 4 juveniles per adult.

This suggests that in marten, as in fisher, juveniles are more vunerable to trapping early in the season so that limiting the season to November and December predates more heavily against juvenile animals and helps to conserve the breeding stock. Overall, 6.5 juveniles per adult female were captured, which is more than twice the number expected from the reproductive rate.

Table XXXI gives the monthly collection of marten divided by percentage in each sex and age class. The same data are given in Figure 7. This also points to the heavier predation of juveniles in November and December.

TABLE XXX

RATIO OF JUVENILES TO ADULT FEMALE (2+) MARTEN

BY MONTH OF CAPTURE

(All years combined)

Year	Juv./Ad. Fem.	Juv./Ad. F.
Nov.	51/5	10.2
Dec.	56/7	8.0
Jan.	11/5	2.2
Feb.	12/3	4.0
Total	130/20	6.5

TABLE XXXI

% OF MONTHLY COLLECTION OF MARTEN

BY AGE AND SEX

(all years combined)

Month	Ad. Males	Ad. Females	Juv. Males	Juv. Females	Total
ember					
fx	26	6	37	14	83
%	31.3	7.2	44.6	16.9	100
December					
fx	23	10	40	16	89
%	25.8	11.2	44.9	18.0	100
January					
fx	12	8	10	1	31
%	38.7	25.8	32.3	3.2	100
February					
fx	10	5	12	0	27
%	37.0	18.5	44.4	0	100
Total	71	29	99	31	

MONTHLY CATCH OF MARTEN

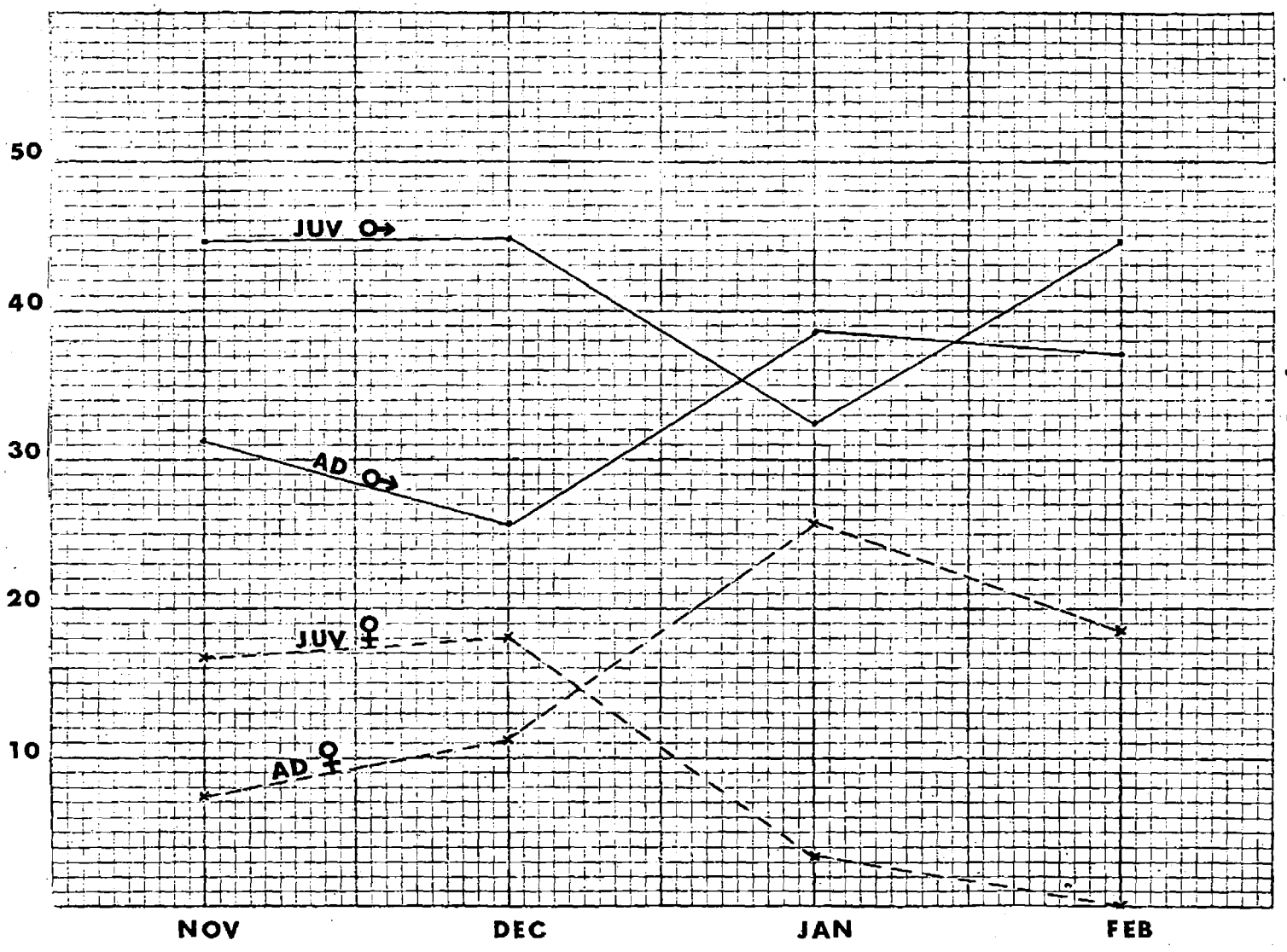

FIG. 7

Males, both juveniles and adults are taken in greater proportion than females in all months.

FUR PRICES

Table XXXII gives the prices paid for marten pelts at the O.T.A. fur sales in North Bay in 1973-74 and 1974-75. Because of the small sample, all sales in each year were combined. The mean price, range of prices and sample size is given for each year for each of the four age and sex groups.

Adult male fur is the most valuable, followed by juvenile male, juvenile female and, lastly, adult female pelts.

BODY FAT

During necropsies, animals with visible deposits of body fat were noted, and record was made of those with heavy fat, light fat and no visible fat.

Table XXXIII shows the number of animals which had fat deposits in each month of the trapping season in 1974-75. They are divided into 4 age and sex classes. While the sample of females is small it appears that few females have any fat deposits and those few occur early in the season. More males than females are fat, some having heavy deposits; they do not appear to be less fat as the winter progresses.

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TABLE XXXII

PRICES PAID FOR MARTEN FUR

O.T.A. SALES - NORTH BAY

(damaged fur deleted)

	1973 - 1974			1974 - 1975		
	Mean	Range	N	Mean	Range	N
Juv. Male	$11.93	7.00-23.50	14	$ 7.47	3.00-13.75	17
Ad. Male	16.99	7.00-23.50	18	9.13	3.00-15.50	10
uv. Female	13.50	6.25-23.50	7	3.25	3.00- 4.00	7
Ad. Female	7.50	7.00-9.50	5	3.00	-	1

Since 75% of all marten lack fat deposits of any kind, it is possible that food may be a limiting factor in their increase. It is suggested by Weckwerth and Hawley (1962) that marten populations are dependent on small mammal densities and that adult females and juveniles are most vunerable to food shortage.

Condition indices (Weight/body length) for each age and sex class are given in Table XXXIIIa for each month of the 1974-75 trapping season. No obvious shifts occur as the season progresses except perhaps in adult females.

This shows general agreement with the condition as indicated by deposits of body fat.

PELT CHARACTERISTICS

A pelt study collection composed of 26 marten from the Wawa District and 2 from the Algonquin Region has been assembled. Cementum ages for all of these animals were obtained.

By examining these pelts of known age, it has been possible to identify a number of characteristics which may suffice to distinguish not only males and females but also juveniles from adults. The fur in the vicinity of the ventral scent gland on the abdomen in the area anterior to the preputial orifice becomes worn and stained in the older animals. A similar wear occurs in the same area in females, and as well, mammary development can be observed in breeding females. Apparently, too, the degree of mammary development is distinctive between pregnant yearlings and older females which have borne a suckled young.

TABLE XXXIII

% OF MARTEN WITH BODY FAT BY MONTH OF CAPTURE

ALGONQUIN REGION

1974-1975

MONTH OF CAPTURE

	November		December		January		February		Total	
	#	%	#	%	#	%	#	%	#	%
Juv. Fem.										
Heavy									0	
Light	1	11	1	7					2	8
None	8	89	14	93	1	100			23	92
									25	100
Ad. Fem.										
Heavy									0	
Light	2	40	3	33					5	25
None	3	60	6	67	5	100	1	100	15	75
									20	100
Juv. Male										
Heavy	4	16	6	18	1	15	2	50	13	18
Light	3	12	6	18	2	28			11	16
None	18	72	21	64	4	57	2	50	45	66
									69	100
Ad. Males										
Heavy			1	5	1	10			2	4
Light	1	7	4	20	3	30			8	17
None	13	93	15	75	6	60	4	100	38	79
									48	100

TABLE XXXIII a

CONDITION INDEX

IN MARTEN

1974-1975

	Ad. ♂	Juv. ♂	Ad. ♀	Juv. ♀
November	16.1	14.2	11.4	10.95
December	15.1	14.1	10.8	10.0
January	16.4	16.4	11.1	11.3 (1)
February	17.2	14.7	9.1	

This method must be proved by examining a large number of pelts at O.T.A. fur sale in North Bay. By examining pelts tagged by Algonquin trappers, bearing one of our paired tags, the pelt can be aged by this method and the carcass of the same animal aged by the cementum method. Some measure of the success of this method as an aging technique can thus be obtained.

PARASITES AND DISEASES

No occurences of Dracunculus insignus were found in marten examined in 1974-1975.

In fourteen of the carcasses (7.4%) examined in 1974-1975, the giant kidney worms, Dioctophyma renale, was found either in the body cavity or the kidney. Kidneys of all animals were cut open and examined for this parasite. Of the 14 cases, 8 of 125 (6.4%) carcasses received from Bracebridge were infected; 5 of 35 (14.3%) from Parry Sound; and 1 of 22 (4.5%) from Algonquin Park.

While complete reports will be submitted by personnel at the University of Guelph and Health of Animals Branch, Department of Agriculture, Guelph on their studies of various parasites and diseases of marten some preliminary results are available. They are summarised in Table XXXVII. Testing for toxoplasmosis and Aleutian Disease has not been completed for the 1974-75 samples.

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TABLE XXXVII

PARASITES AND DISEASES OF MARTEN

ALGONQUIN REGION

	Trichinosis	Leptospirosis	Toxoplasmosis	Aleutian Disease
1972-73				
# examined				
# positive	NONE	EXAMINED		
% positive				
1973-74				
# examined	142	83	139	138
# positive	6	0	15	2
% positive	4.2	0	10.8	1.5
1974-75				
# examined	152	13	-	-
# positive	2	0	-	-
% positive	1.3	0	-	-

RECOMMENDATIONS

1. In view of the change in the season, continue the collection of carcasses of fisher and marten from all of the Region. Hopefully samples will be large enough so that data can be analyzed by areas other than District boundaries, perhaps C.O. patrol areas.

2. Prepare maps showing distribution of sample and distribution of catch showing incidence of barren females, distribution of sexes, distribution of disease and parasites.

3. Keep trappers and O.T.A. aware of progress of study through letters, reports and workshops.

4. Collect samples of fisher and marten throughout the year so that the full reproductive cycle in both males and females can be investigated.

5. Routinely do sperm smears, testes weight and penis measurements on all male fisher and marten.

6. Check blastocysts, either by flushing or sectioning, against number of corpora lutea in both fisher and marten.

7. Investigate causes and extent of barreness in female fisher and marten.

8. Sex embryos using sex chromation method.

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9. Do crown-rump measurements of embryos.

10. Compare lines in periosteum with those in cementum.

11. Prove aging method using pelt characteristics for marten and fisher. Increase study skin collection, with correlated carcasses, especially for fisher.

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ACKNOWLEDGEMENTS

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