No. 25 October 1, 1955

FISH AND WILDLIFE MANAGEMENT REPORT

PROVINCE OF ONTARIO

DEPARTMENT OF LANDS AND FORESTS

Division of Fish and Wildlife

Hon. Clare E. Mapledoram
Minister

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Deputy Minister

TABLE OF CONTENTS

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MOOSE INVESTIGATIONS IN THE PERRAULT FALLS AREA DURING THE SUMMER OF 1954.

by
A. T. Cringan, W. J. D. Stephen and J. Elbrink

Introduction

A field party, engaged in moose investigations, worked in the Perrault Falls area during part of the summer of 1954. J. Elbrink was present from June 29th to August 7th., and W. J. D. Stephen from July 7th to August 7th.. They were accompanied by R. Shuttlewood, July 7th - 28th.. Dr. A. de Vos and A. T. Cringan acted in supervisory capacities, Dr. de Vos from July 7th - 9th., and A. T. Cringan July 7th - 9th, 12th - 14th, 16th - 18th, 26th - 28th, and August 4th - 7th.. This report concerns the work of the July 7th - August 7th period.

While moose investigations were the main objectives of the work, incidental observations of waterfowl and other wildlife were also recorded. These form the contents of other reports. Principal objectives, as far as moose are concerned, were:

- sex-age composition of the herd through observations.
- calf count;
- moose movement study through observations;
- continuation of moose marking experiments;
- moose behaviour and food habits studies.

In addition to the work of the field party, moose observation cards had been distributed to Tourist Outfitters within the area, for recording the observations of their customers. The results of this effort are included in this report. Shortly after the completion of field work, A. T. Cringan and E. H. Stone engaged in helicopter flights over the same area. The results of these flights, and also of Cringan's October, 1953 helicopter flights, are also included for comparative purposes.

Certain parts of the field program were designed so as to tie in with work done by Dr. A. de Vos at Missinaibi Lake in the Chapleau District during 1952 and 1953. References to this work are made in the appropriate places.

Field Methods

The party operated from Perrault Falls from July 7th - 17th, from Cedar Lake Ranger's Headquarters July 17th - 26th, from the north end of Wabaskang Lake July 26th - August 5th, and from Perrault Falls, August 5th - 7th.

The general procedure was to travel along lakeshores and rivers, by canoe and 5 H.P. outboard motor, searching for moose. Travel was therefore restricted to lakes, and the larger, more easily navigable streams. The marking experiments were run concurrently, and made it necessary that certain areas be revisited every other day. These were Ord Creek, July 8th - 25th, and the Cedar River north of Wabaskang Lake, July 27th - August 5th.

Three forms of notes were kept - a daily log, a moose observation description, and a marking station record. The daily log comprised a record of times, route and distance travelled, a brief weather summary, and a list of game seen. The moose observation description included the date, time and location of each observation, the kind of moose, its distinguishing features, its behaviour and feeding habits, and an account of the weather at the time of observation. Each time a marking station was revisited, work notes and results notes were made.

Sex-age Composition of the Perrault Falls Moose Herd

The field party made 20 observations of either single moose or small groups of moose, comprising 29 sightings of 21 different moose. Observations, excluding those considered as repeats, are summarized in Table I, together with observations resulting from helicopter surveys and those reported by the public.

TABLE I - Sex and age of moose observed

Source of Information	Adult Bulls	Single Adult Cows	Cows With One Calf	Cows With Two Clvs.	Year-ling Cows	Year-ling Bulls	Sex & Age Un-known	Total Moose
Field Party, July 7 - Aug. 6/54	1	3	3	1	5	3		21
Helicopter, Aug. 19 - 21, 1954	5	11	1		2	4		24
Helicopter, Oct. 19 - 20, 1954	2	3	2	1			2	14
By public, May, 1954	6	12	2	1	3		11	39
By public, June, 1954	17	16	11	4	5		9	81
By public, July, 1954	11	13	7	4	1	1	17	69
By public, May - July, 1954	34	41	20	9	9	1	36	189

Certain sex and age ratios derived from Table I are given in Table II.

TABLE II - Sex and age ratios of moose observed

Adult Sex Ratio	Basic Ratio, M:F	Percent Males	Males Per 100 Females
By field party, 1954	1 M : 7 F	12% M	14 M : 100 F
By helicopter, 1954	5 M : 11 F	31% M	45 M : 100 F
By public, 1954	34 M : 70 F	33% M	49 M : 100 F
Yearling and Adult Sex Ratio			
By field party, 1954	4 M : 12 F	25% M	33 M : 100 F
By helicopter, 1954	9 M : 14 F	39% M	64 M : 100 F
By public, 1954	35 M : 70 F	33% M	50 M : 100 F

	Basic Ratio Adult : Yearling : Calf	Per cent Adult : Yearling : Calf
By field party, 1954	8 : 8 : 5	38% : 38% : 24%
By helicopter, 1954	17 : 6 : 1	71% : 25% : 4%
By public, 1954	104 : 10 : 39	68% : 7% : 25%

	Basic Ratio Adult Cows : Calves	Calves Per Adult Cow	Calves Per 100 Adult Cows
By field party, 1954	7 : 5	0.71	71
By helicopter, 1954	11 : 1	0.09	9
By public, 1954	70 : 39	0.56	56

	Total Adult Cows:: Cows With Calf or Calves	Percent of Cows With Calf
By field party, 1954	7 : 4	57%
By helicopter, 1954	12 : 1	8%
By public, 1954	70 : 29	41%

It is perfectly clear that no one method of collecting data yields good sex-age ratios, at least from such small samples. Reasons for this may lie in failure to classify moose properly, particularly by the public, and in behaviour differences in moose of different ages and sexes.

The field party results indicated an unreasonably high proportion of yearlings, a probably low proportion of males, and what is likely a very accurate proportion of calves. The helicopter technique failed to disclose a proper number of calves, and may have produced too many observations of male moose. The public must have failed to recognize many yearlings as such, but otherwise, their reports lead to the establishment of very reasonable adult sex ratio and proportion of calves. Perhaps the very size of the public's sample, it being four times as large as the field party and helicopter samples combined, accounts for its greater apparent accuracy in these two respects.

Individual observations of cows with calves are listed in Table III.

TABLE III - Observations of cows with calves

By Field Party	Date	Time	Place
(1) cow with twins	July 9, 1954	9:00 AM	Ord Creek
(2) same as (1)	July 11, 1954	8:48 AM	Ord Creek
(3) same as (2)	July 13, 1954	10:45 AM	Ord Creek
(4) cow with calf	July 14, 1954	9:30 AM	Wabaskang Lake
(5) cow with calf	July 19, 1954	7:20 AM	Ord Creek
(6) cow with calf	July 27, 1954	7:45 AM	Cedar River
By helicopter, 1954			
(1) cow with calf	Aug. 20, 1954	Evening	Near Wabaskang Lake
By helicopter, 1953			
(1) cow with twins	Oct. 19, 1953	Afternoon	Ord Creek
(2) bull, cow with calf	Oct. 19, 1953	Afternoon	near Hole Lake
(3) cow with twins same (1)	Oct. 20, 1953	Morning	Ord Creek
(4) cow with calf	Oct. 20, 1953	Morning	Ord Creek

The Relationship of Moose Observations to Time of Day

The work program was varied, so as to be in the field at different times of the day enough to establish whether moose are more likely to be seen at certain times than at others. All observations have been tabulated by time of day in Table IV.

TABLE IV - Correlation between the number of moose observed per hour and the time of day.

By Field Party

Time Observed (C.D.S.T.)	No. of Hours in Field	Total No. of Moose Observed	No. of Moose Observed Per Hour	No. of Moose Observed Per Hour During 3-Hour Periods
4 - 5 AM	1	0	0.00	
5 - 6	7	1	0.14	0.12 (0.50) x
6 - 7	8	0	0.00	
7 - 8	17	7	0.41	0.27
8 - 9	23	6	0.26	(0.30)
9 -10	26	6	0.23	
10 -11	24	5	0.21	0.16
11 -12 noon	21	0	0.00	(0.07)
12 - 1 PM	16	0	0.00	
1 - 2	16	0	0.00	0.07
2 - 3	13	3	0.23	(0.15)
3 - 4	11	0	0.00	
4 - 5	10	0	0.00	0.00
5 - 6	8	0	0.00	(0.32)
6 - 7	7	0	0.00	
7 - 8	8	0	0.00	0.00
8 - 9	5	0	0.00	(0.60)
9 -10	3	1	0.33	0.20
10 -11 PM	2	0	0.00	(0.67)

By Helicopter

	Date	No. of Hours In Field	No. of Moose Observed	No. of Moose Observed Per Hour
morning	Aug., 1954	5 hr. 05 min.	10	2.0
afternoon	Aug., 1954	5 hr. 00 min.	1	0.2
evening	Aug., 1954	5 hr. 20 min.	14	2.6
morning	Oct., 1953	4 hr. 25 min.	10	2.3
afternoon	Oct., 1953	3 hr. 40 min.	7	1.7

x Bracketed figures are those for de Vos' 1952, Missinaibi Lake work.*

Practically all (83%) of the field party's observations were made between 7 AM and 11 AM. This contrasts rather sharply with de Vos' 1952 survey at Missinaibi Lake, when observations were made at the highest rate during the evening. Results of the two surveys are compared in the final column of Table IV. We cannot properly account for the differences yet, but one reason may be that the Missinaibi moose are relatively undisturbed by tourists whereas the moose in our study area are frequently bothered by anglers passing by in high-powered outboards. The fact that our best observation rates were made in the first half of July, as will be shown later in this report, adds weight to this contention.

One moose was seen per 7.7 hours of field work, a value contrasting with one observation per 4.7 hours of field work during de Vos' 1952 Missinaibi Study.

Moose Movements

During the 1954 summer field work, and both helicopter flights, we have collected a few repeat observations of moose. These are as follows:

By field party, 1954

- Cow with twin calves, seen at 9:00 AM July 9th, 8:48 AM July 11th, and 10:45 AM July 13th; all observations at same place on Ord Creek, about half-mile below downstream portage; one of these calves also seen alone at 8:40 AM, July 13th.

- Yearling cow, seen at 10:30 AM, July 8th, and at 8:30 AM July 9th; at same place on Ord Creek, about quarter-mile below downstream portage.

* See Fish & Wildlife Mgt. Rept. No. 24, Aug. 1, 1955.

By helicopter, 1954

- adult cow, seen during evening August 19th and morning August 20th., in bush near west end Peephole Lake.

- adult cow with yearling cow, first seen at 6:00 PM, August 21st, standing in alder thicket near junction Highway 105 and Camp Robinson Road, subsequently seen at 7:05 PM, in same place, but lying down.

By helicopter, 1953

- cow with twin calves, seen during afternoon of October 19th, and again in same place on the morning of October 20th, on Ord Creek.

The field party produced remarkably few repeat observations, in view of the intensity with which certain areas were covered. Ord Creek was covered on July 8, 9 (twice), 11, 13, 15 17, 19, 20, 21, 23 (twice) and 25th - or 13 times altogether, yet only 4 out of 10 different moose seen there (cow with twin calves, and yearling cow) were seen oftener than once.

The 1954 helicopter flights were designed so as to reduce duplication of coverage, and render repeat observations unlikely. Ord Creek was flown twice within 16 hours and yielded no repeat observations. Keynote Lake was flown twice within 16 hours, and different moose were seen during both flights.

This technique does not seem too satisfactory for the study of movements, as identification is based on human memory, which is somewhat fallible. Future efforts, if continued, may well include photography of moose seen to aid in recognition.

Seasonal Variation in Rate of Moose Observations

Most observations, 69%, were made during the first 11 days of the field party's work, as shown in Table V.

TABLE V - Relationship between period of observation and number of moose observed.

Date By Field Party	No. of Hrs. In Field	No. of Moose Observed	Percent Moose Observed	Cumulative % Moose Observed	No. of Moose Observed Per Hour
July 7-10	34	6	21%	21%	0.15
July 11-17	60	14	48%	69%	0.23
July 18-24	52	4	14%	83%	0.08
July 25-31	47	5	17%	100%	0.11
Aug. 1- 6	31	0	0%	-	0.00
Total	224	29	100%	-	0.125

By helicopter

Date	No. of Hours In Field	No. of Moose Observed	No. of Moose Observed Per Hour
Oct. 19-20, 1953	8 hr. 55 min.	17	2.1
Aug. 19-21, 1954	15 hr. 25 min.	25	1.6
Total	24 hr. 20 min.	42	1.73

The decline in rate of observation is probably due to several reasons. Among them may be:

- increasing scarcity of moose in readily accessible places, owing to increasing disturbance by tourists;
- adverse weather for activity by moose;
- inferior moose habitat visited, part of period July 17-26.

No such decline was evident in the result of de Vos' 1952 Missinaibi work. The greatest difference between Missinaibi Lake and Perrault Falls may be the amount of disturbance to which the moose are subjected.

It is shown in Table V that summer and fall helicopter flying produces about 14 times as many moose observations per hour as the field party did. In spite of high hourly helicopter costs, it is just about as economical a way to produce moose observations as is the canoe approach.

Variations in Rate of Moose Observations with Weather

It is difficult to relate the effect of weather on moose activity on the basis of only 29 observations, since weather in itself is so complex. While no moose were seen during rain, they were seen at times while the cloud cover ranged from clear to overcast. Precise weather conditions at time of observation varied considerably in other respects - temperature 60° - 75°F, all wind directions, and wind velocities of up to 35 m.p.h.. This whole question is much too complex to analyze on the basis of a few observations.

Moose Food Habits

Every effort was made to ascertain whether moose seen were feeding or not, and the adult moose involved in 12 of the 20 observations were judged to be feeding on aquatic plants at the time of sighting.

The adult cow with twin calves seen at 9:00 AM, July 9th, 8:48 AM July 11th and 10:45 AM on July 13th was feeding on aquatics on each occasion, although the calves simply remained on shore or in shallow water nearby. This cow was feeding on Potamogeton richardsonii, among other plants, on July 13th.

Two adult cows with one calf each, one observed at 9:30 AM on July 14th, the other at 7:45 AM on July 27th, were feeding when seen.

Three single adult cows, at 7:15 AM, July 13th, at 2:45 PM July 27th, and at 7:35 AM July 30th, were seen feeding on aquatics. The cow seen on July 27th submerged itself a couple of times while feeding.

One yearling cow, seen at 9:10 AM on July 19th was feeding when seen.

The adult bull, which was seen at 10:45 AM on July 12th, was feeding when seen, as were 2 of the 3 yearling bulls seen. These were at 2:00 PM on July 12th and 5:00 AM on July 19th.

Little exact information on aquatic plant species being eaten by moose was collected. Quite a few specimens of such plants were preserved, and when these are identified, we will be able to elaborate upon the aquatic food habits somewhat.

Moose Behaviour

Behaviour notes taken during the field party's work are too few and too unrelated to summarize at the present time. They will be saved for possible use in the future.

Moose Marking Experiments

The starting point of marking experiments was using the marking device described under Method II by de Vos and Pearson (Preliminary Moose Movement Studies, 1952).* In addition, each marking device setup was accompanied by a 48-hour alarm clock fixed in such a way as to indicate when the marking device was sprung.

A C.I.L. fast-drying enamel, Vitakote, was used in this year's experiments. Supply of this enamel was irregular, and reduced the intensity of marking experiments by about 50%.

The following is an account of each marking station:

Station #1 - near east arm Wabaskang Lake.

July 7th - installed unmodified Method II device, with alarm clock string tied to marker string.
July 9th - checked; sprung by moose, but razor barely nicked bag, and clock failed to stop.

Summary - one encounter with moose in which marker and clock both failed, in 2 days' operation.

Station #2 - Ord Creek

July 8th - installed unmodified Method II device.
July 9th - clock had stopped owing to dew.
July 11th - paint loss, bag nicked owing to dew.
July 13th - normal.
July 15th - successful marking had occurred at 7:30 AM, July 15th.
July 17th - normal; Method II device replaced by rat-trap marking device.
July 19th - marker sprung by dew.
July 21st - normal.
July 23rd - AM - marker sprung by dew, removed.
July 23rd - PM - marker re-set.
July 25th - normal, device removed.

Summary - one encounter with moose in which marker and clock both succeeded, and three marker misfires, one clock failure due to rain or dew in 18 days' operation.

Station #3 - Ord Creek

July 9th - installed unmodified Method II device.

* See Fish & Wildlife Mgt. Rept. No. 24, Aug. 1, 1955.

July 11th - razor blade touching bag because of dew.
July 13th - successful marking had occurred at 6:30 AM, July 13th.
July 15th - possible encounter with moose at 11:30 PM, July 14th, but razor had slid under bag without cutting it
July 17th - encounter with moose at 6 PM, July 15th, marker failed because razor barely nicked bag; clock almost failed; paint-holding bar lowered.
July 19th - clock had stopped and bag cut because of rain.
July 21st - marker sprung by dew or rain.
July 23rd - clock had stopped through string tightening, marker normal; trap removed in morning, re-set in evening.
July 25th - marker and clock sprung by tightening string.

Summary - three encounters with moose, one in which both marking and clock were successful, and two in which marking was unsuccessful but clock worked; also four marker misfires and three clock stoppages through tightening up of one or both strings with rain; all in 17 days' operation.

Station #4 - Ord Creek

July 9th - installed unmodified Method II device.
July 11th - normal, marker accidentally fired while being checked.
July 13th - successful encounter with moose at 9:30 AM, July 13th.
July 15th - clock had stopped because of rain; marker modified to a balanced-rock-loaded device.
July 17th - normal.
July 19th - clock had stopped through tightening of string.
July 21st - marker had been sprung, and clock stopped, probably by wind.
July 23rd - marker had been sprung, probably accidentally. Marker removed in morning, and re-set in evening.
July 25th - marker had been sprung, probably accidentally; marker removed.

Summary - one fully successful encounter with moose; three marker misfires and two clock stoppages as a result of rain, dew and wind, and one accidental release of marker; all in 17 days' operation.

Station #5 - Cedar River

July 27th - installed rat-trap marking device.
July 29th - clock stopped prematurely because of rain.
July 31st - clock stopped prematurely because of rain.
Aug. 2nd - clock stopped prematurely because of rain; marker removed.

<u>Summary</u> - three clock stoppages in 6 days' operation.

<u>Station #6</u> - Cedar River

Aug. 2nd - installed rat-trap marking device.
Aug. 4th - normal
Aug. 5th - normal, removed.

<u>Summary</u> - normal in 3 days operation.

<u>Summary of Stations 1-6</u>

Total days operated: 63 days.
Total intervals between inspections: 31.
Total ineffective intervals owing to marker misfire: 10.
Total intervals throughout which successful marking might have occurred: 21.
Total number of encounters with moose: 6.
Total number of successful markings: 3.
Reasons for failure if moose encountered:
- bag nicked delivering insufficient paint: 2.
- razor failed to nick bag at all: 1.

Total number of bags of paint used: 16.
- used to mark moose: 3.
- failed to mark moose: 2.
- marking device misfired: 9.
- accidentally lost: 1.
- remaining after survey: 1.

Well over half of the paint used was wasted, owing to misfires and accidents. The high number of misfires were unavoidable, as the devices had to be set up fairly sensitively in order to work, and there was little leeway after that. Should the experiments be continued at all, it would be worthwhile to search for a shrink-proof string. Such material would probably have eliminated 7 or 8 of the 9 misfires.

An adequate supply of enamel would easily have permitted the operation of two more stations from July 11th - 25th, and four more stations July 27th - August 5th. This would have added 38 two-day intervals to the marking experiments, or some 120% more effort than was actually applied. At least twice as many moose would likely have been marked.

There is considerable room for improvement in the marking device itself, so as to increase the proportion of successful markings after moose-marker encounters. Continuation of the study should be preceded by development of a more reliable marking device.

We were satisfied with the staying qualities of Vitakote. However, California biologists caution against the use of any paint, and recommend a dye instead. Future workers should use dyes rather than paints. Good dyes may be available in those developed by the California biologists, and in modern sheep-branding dyes.

The final aspect of the marking experiments came on August 19-21, 1954, when A. T. Cringan and E. H. Stone did some helicopter flying. Every moose seen was carefully inspected for signs of enamel, but none was seen. Since only three moose had been marked, this was not surprising.

Further marking experiments should be aimed at the marking of 20 or more moose. The senior author feels that this is the minimum number likely to afford useful results. I would first like to see the whole problem appraised by a panel of research biologists, to judge whether or not the approach should be continued another year.

Summary

We wish to summarize the several suggestions and implications which have been made in this report as to the conduct of future investigations for similar purposes.

1. Field trips should be confined largely to the time of day proven to be most productive of moose observations.

2. Every moose possible should be photographed, as an aid to establishing repeat observations.

3. If disturbances reduce the likelihood of observing moose in mid-summer, the work should be done earlier.

4. A non-shrinking string should be used in marking devices.

5. Dye should be used instead of paint, and a supply ample for every emergency be obtained before experiments begin.

6. A mechanically superior marking device should be developed.

7. Continuation of these investigations should be subject to the approval of a panel of research biologists.

AN ANALYSIS OF THE SEX RATIO OF TIMBER WOLVES KILLED IN 1948 AND 1949.

by
A. deVos

An analysis was made of the sex ratio of timber wolves killed in 1948 and 1949, where the bounty was paid and the sex of the animal was determined. The overall analysis shows a departure from an expected 1:1 ratio which is weighted towards the males. This departure in itself is not significant but at specific periods of the year, such as the late winter and early spring, deviations from this expected ratio become significant.

Another peculiarity which showed up in the analysis was a predominance of females killed in June of both years. Although this predominance is not sufficiently high to be significant, and the sample is rather small for these months, it is nonetheless interesting. Further analysis of subsequent years might provide sufficient data for statistical proof of these assumptions. This further analysis could be made in Mr. Madigan's office, and we suggest that he be asked to undertake this compilation work.

Further information regarding the means of killing the animals is also forwarded. This was compiled on the basis that the means of death was recorded only for those animals whose sex was known. Data regarding the demise of animals of unknown sex were disregarded. Analysis of the means of taking the animals will also provide more useful information.

	1948							1949							Total 1948 - 1949						
	Trapped	Snared	Shot	Run over	Poisoned	Clubbed	Misc.	Trapped	Snared	Shot	Run over	Poisoned	Clubbed	Misc.	Trapped	Snared	Shot	Run over	Poisoned	Clubbed	Misc.
Jan.								22	95	18	0	8	3	1*	22	95	18	0	8	0	1
Feb.	6	15	21	1	0	0	0	16	40	40	4	5	0	0	22	55	61	5	5	0	0
Mar.	50	87	59	6	1	0	1**	20	89	53	3	16	0	1'	70	176	112	9	17	0	2
Apr.	5	23	23	0	0	0	0	13	21	55	3	4	0	0	18	44	78	3	4	0	0
May	11	40	18	0	1	6	0	6	41	17	1	5	0	0	17	81	35	1	1	6	0
June	10	30	15	2	0	0	0	9	17	7	1	0	0	0	19	47	22	3	0	0	0
July	4	6	6	0	0	0	0	6	1	2	0	0	0	0	10	7	8	0	0	0	0
Aug.	2	1	3	0	0	0	0	4	3	4	0	0	0	0	6	4	7	0	0	0	0
Sept.	4	4	10	2	0	0	0	7	11	10	4	0	2	0	11	15	20	6	0	2	0
Oct.	20	29	19	0	1	0	0	18	10	16	0	0	0	0	38	39	35	0	1	0	0
Nov.	25	33	38	0	0	0	0	14	40	27	0	0	0	1"	39	73	65	0	0	0	1
Dec.	45	83	42	1	3	0	0	32	40	23	0	0	1	0	77	123	65	1	3	1	0
TOTAL	182	351	254	13	6	6	1	167	408	272	16	38	3	3	349	759	526	28	39	9	4
Total Number of Wolves - 1727																					
%	22.4	43.1	32.0	1.3	0.7	0.7	0.1	18.6	44.8	30.0	1.8	4.2	0.3	0.3	20.3	44.2	30.6	1.6	2.7	0.5	0.2

* Killed with axe.   ** Killed with airplane.   " Drowned
' Chased on skis and killed with stick.

Timber Wolf Bounty Records

	1948				1949				Total of Two Years			
	♂♂	%	♀♀	%	♂♂	%	♀♀	%	♂♂	%	♀♀	%
January					70	48.3	75	51.7				
February	25	56.8	19	43.2	65	61.9	40	38.1	90	60.4	59	39.6
March	110	53.9	94	46.1	102	56.3	79	43.7	212	55.1	173	44.9
April	38	74.5	13	25.5	60	61.8	37	38.2	98	60.7	50	39.3
May	48	63.1	28	46.9	45	64.3	25	35.7	93	63.6	53	36.4
June	27	47.4	30	52.6	15	44.1	19	55.9	42	46.2	49	53.8
July	9	56.2	7	43.8	6	66.6	3	33.4	15	60.0	10	40.0
August	3	50.0	3	50.0	7	63.6	4	36.4	10	58.8	7	41.2
September	13	65.0	7	35.0	21	61.7	13	38.3	34	62.9	20	37.1
October	33	47.8	36	52.2	26	58.6	19	41.4	59	55.6	55	44.4
November	48	50.0	48	50.0	49	59.7	33	40.3	97	54.5	81	45.5
December	103	57.8	75	42.2	54	55.6	43	44.4	157	57.0	118	43.0
TOTALS	457		360		520		390		977	56.5	750	43.5

STATUS OF WOLVES IN TWEED DISTRICT, 1954

by
H. G. Lumsden

At the spring trap-line meetings 91 trappers were interviewed about the status of wolves on their lines. It is felt that with some exceptions much more accurate estimates were received than in 1953.

It is again, however, most difficult to distinguish from the reports, timber and brush wolves. Many trappers claim the presence of only timber wolves when bounty figures indicate this species to be extremely rare in that county.

It is also extremely difficult to give any estimate of density for various parts of the District. We are still unable to indicate on the attached map how many square miles per wolf the various colour symbols represent.

The following table gives the reports of trappers on the status of wolves classified under four headings for 1953 and 1954.

	Increase	Same	Decrease	Do Not Know
1953	21	27	17	20
1954	13	34	28	15

When the locations of the trap-lines showing increases or decreases are plotted on a District map the pattern becomes much clearer. All trappers across the northern part of the District report fewer wolves or none at all present on their lines during the past year. Reports of the same or an increase come from the west central area while in the eastern part there are some trappers reporting complete absence of wolves where comparative abundance was reported in 1953.

The following table gives the number of timber and brush wolves bountied in the counties of Hastings, Lennox and Addington, Frontenac, Renfrew, Lanark and Prince Edward. Only part of Renfrew and Lanark Counties lie in Tweed District

	1950-51	1951-52	1952-53	1953-54
Timber Wolves	29	11	26	13
Brush Wolves	157	104	149	95

These figures back up the trappers' reports that there was a decrease in wolves in Tweed District during the past year.

The addresses of the people who bountied timber wolves indicated that only seven were actually killed within Tweed District. These were killed in the townships of Sheffield, Barrie, Grimsthorpe and McClure.

TWEED
DISTRICT

Plan Showing
Status of Wolves - Tweed District, 1954.

Moderate densities

Light densities

No Wolves

Timber wolves bountied

Miles

20 10 0 20 40

REPORT ON DISCUSSION WITH J.D. ROBERTSON
MANITOBA PREDATORY CONTROL OFFICER
THE PAS, MANITOBA, JULY 4, 5, 6, 1955.

by
R. Simkoe

The Fish and Wildlife Supervisor and myself had several private discussions with Joe Robertson, Predatory Control Officer.

Mr. Robertson's impressions and his methods of predatory control would indicate that poisoning is a very simple and effective method of taking wolves.

Photos and reports shown to us certainly prove that a large number of wolves are taken by this method in spite of the cunningness of this animal.

Most of the control work was done in the north where the wolves mainly preyed on caribou and, therefore, these animals were shot specifically for bait.

Sets were made out on the lakes in an area reported by the trapper to be most suitable. A fresh caribou carcass would be opened up and strychnine spread over the entrails and in the liver. The quarters would be removed and saved for another location. It was necessary to have the poison well distributed in the flesh of the animal and the bait anchored to the ice. The anchoring would be done mostly by "freezing in." The large bait set would be used in locations frequented by a high number of wolves.

The smaller sets, which included either a hind quarter of caribou or several whitefish would be used where a smaller number of wolves may be present. The quarters of caribou would be slit and poison distributed evenly in the slits. The quarter would be frozen in the ice. Here a hole is made in the ice until the water came through and the quarter placed in the hole with one to three quarters of it above the water's edge. Snow and slush may be built up around the bait also. The purpose of this is that the wolf would only be able to take small portions of the bait and he would have to work hard to get that. This bait could kill up to twenty-five wolves. Dead wolves surrounding a poison bait do not have any effect on the newcomers.

In one case Mr. Robertson came across a fresh kill and states he cut open the wolf and spread poison throughout the insides and over the entrails and killed several wolves that fed on this carcass.

Whitefish baits would be frozen in mounds of snow and slush with only a portion of fish protruding. This set was used where the other failed. Mr. Robertson states that very few animals and only one dog were killed accidentally. Baits should be picked up each spring.

It is necessary that each Conservation Officer obtain from his trappers the locations where the wolves are operating. The trappers may suggest the best locations on a lake where a set would be suitable. When flying permits, sets may be made at these likely places and in this district (Kenora) deer meat would be the best bait as our wolves prey mostly on deer.

It is necessary to post a sign indicating that poison bait is at the location. A spruce tree would be placed upright approximately ten paces from the bait and on opposite sides. These trees are about five or six feet high and are used to attract the curiosity of the wolf.

Mr. Robertson suggested that in the first year only a few baits should be used until such time that we become familiar with the project and have some success with same. He also suggested that one of our officers return this winter and take a field trip on one of their projects.

In concluding this report, I wish to make the following recommendations:

(1) that the project be carried out from the District office only during the first year.

(2) that no publicity be made other than advising the trappers on whose areas the poison sets are made.

(3) that this report and our proposed project be kept strictly confidential and within our own Department and not be released to the press.

REPORT ON HELICOPTER SURVEY OF CARIBOU ON SLATE ISLANDS *

by
H. G. Cumming

Purposes

1. To test the efficiency of a helicopter for surveying big game.

2. To work out survey techniques for use in a helicopter.

3. To improve on present estimates of the number of caribou on the Slate Islands.

Party

"Bob" Gillies, Helicopter Pilot; H. G. Cumming, District Biologist, Geraldton.

Account of Trip and Observations

October 22nd, 1954. Take off was delayed several hours due to fog.

10.15 took off from Pays Plat and flew over Wilson and Cooper Islands on the way to Slate Islands.

We approached Mortimer Island from the west and began flying strips over the northeast part of it.

Most of the leaves were off the trees, so ground could be seen most of the time.

On the last transect, tracks were seen on the sandy shore and we went down to hover about fifty feet off the water to be certain that they were caribou tracks. Over this portion of the island it was impossible to fly at any one height due to the rugged nature of the terrain. We more or less followed the contours of the land maintaining a height of about 100-200 feet above the tree-tops. The speed was about 65 mph. Bowes and McColl Islands were surveyed with no results.

* A map showing flight survey lines accompanied this report.

11.00 the first caribou was sighted by Mr. Gillies on the northeast corner of Patterson Island. A short time later the second one was seen. It dashed off through the bush with a white flag so prominent that it greatly resembled a white-tailed deer. We were about 200 feet at this time, and the white collar on its neck was plainly visible. It had no antlers.

After the first two caribou were seen, a height of about 400 feet was maintained, as it was felt that this gave a better range of vision without reducing accuracy. Also, the more level country on Patterson Island allowed more control of our height.

The position of a recent burn shown on the F.R.I. maps was confirmed. Some objects were seen on a small lake on the southeast corner of Patterson Island. Due to the unusually low altitude these appeared much larger than they do from regular aircraft. Investigation showed that they were black ducks. However, this turning aside from our regular flight lines proved to be a mistake, for we lost direction and flew very crooked lines on the next few crosses of Patterson Island. Three unidentified ducks were seen on the southeast corner of Patterson Island, but this time we did not stop to identify them.

At 11.42 Mr. Gillies drew my attention to four caribou running over bare rocky knolls near the end of Lawrence Bay. We were already past these before they were seen, and thus had no more time for observations.

At 11.45 five caribou were seen by Mr. Gillies and myself as they ran up a less precipitous valley between the high cliffs of Mortimer Island. Again we were past them before they were seen.

When the remainder of Mortimer Island had been covered, we returned to Patterson Island for a closer look at some of the lakes where I felt caribou should have been seen. This second search is shown in green on the map. Although we flew around the shores of several lakes just above the tree tops in an effort to chase out any caribou, our attempt was to no avail.

At the end of this flight we looked over Edmond Island where an empty eagle's nest was seen (this nest had previously been reported by Mr. A. Cringan, personal communication 1954).

At 12.45 after an interval of one hour we returned to the place on Mortimer Island where the caribou had been seen. Although we searched the valley and the shore of the small lake toward which they ran, we saw no signs of them.

At 13.10 we landed on a small sand beach beside towering rocky cliffs to refuel. We then flew over the Leadman Islands and Dupuis Island. A young bald eagle was seen on Dupuis Island, also many small birds were seen here as on other islands. These flew over the tree tops in flocks and appeared to be of the bunting-longspur type.

After a circle over the Delaute Island we returned to the north shore of Lake Superior and due to fog once more moving in, flew far inland on the return to Pays Plat.

14.00 landed on the dock at Pays Plat.

Summary and Conclusions

1. In a flight totalling three and one half hours, of which two hours and thirty-five minutes were spent in actual survey, a total of eleven caribou was seen.

2. Also seen were four black ducks, three unidentified ducks, one eagle's nest, one young bald eagle and many small birds, probably of the family Fringillidae.

3. The best survey height seemed to be about 400 feet, as it gave greater coverage than lower heights and did not reduce visibility. However, it was impossible to maintain any constant height over some parts of the islands due to the irregular nature of the country. The speed throughout the survey was around 60 mph.

4. It was not possible to draw flight lines before the flight. However, it was quite easy to fly straight lines, even over the most broken part. It was found that turning aside from the line of flight to investigate objects did not pay, because it destroyed our sense of direction.

5. Ten of the eleven caribou were seen first by the helicopter pilot. These ten were all on the left side of the line of flight. Several factors may have contributed to this situation:

   i. Inability to concentrate on observing due to the continued shifting of the helicopter which gives an entirely different feeling from that in conventional aircraft.

   ii. Part of time and attention were taken up with mapping the flight lines.

   iii. A four inch to the mile base map of the island was used. This provided a sheet of paper about two feet square, folded in four. Although this

gave plenty of room to draw in flight lines and write comments, there were disadvantages. Care had to be exercised not to cover the instrument panel with the map, as the helicopter pilot had to observe this at all times, especially at low speeds and low altitudes. Also when the survey was about half finished, it was realized that the reflection of the white paper on the plexiglass dome seriously reduced visibility. Dark clothing and small maps should be the rule for this kind of operation.

6. Although most of the leaves were off the trees, there were many areas where caribou could not have been seen if they stood still. This was especially true of areas under conifers. The facts that all ten of the caribou seen first by Mr. Gillies were even with, or behind the helicopter when seen, and that all those seen were running, indicates that they were only observed after being frightened by the noise. Also, when we returned an hour later to look for one of the groups, a most careful search did not reveal it. It is very unlikely that we found all of the caribou.

7. In spite of the inefficiency of the method, we did see more caribou than has any other survey party this year. If we had had the benefit of snow on the ground, we would probably have come very close to a total count. A helicopter for winter use would be a great boon in big game censusing.

COMPUTATION OF CURRENT POTENTIAL RATES OF REPRODUCTION OF WHITE-TAILED DEER FROM CHECKING STATION DATA

by
A. T. Cringan

Each fall, a sample of the Western Region's deer herd, the sample consisting of some of the deer killed by licenced hunters, is examined, and the sex and age qualities of that sample are determined. The results of this work have been applied in various ways. I wish to suggest what is to me a new way in which the results can be used, for calculation of the potential preceding and following rates of reproduction of deer.

Four assumptions are basic to the following calculations:

(a) That sampling either provides an accurate expression of the sex ratio of the deer herd and of its age ratios in the three lowest year-classes, or if there is any bias in these connections that it is fairly uniform from year to year.

(b) That reproduction by yearling does in the Western Region is insignificant.

(c) That 2-year old does should produce an average of 1 fawn each under normal conditions.

(d) That 3-year old and older does should produce an average of 2 fawns each under normal conditions.

1. Calculation of Potential Rate of Reproduction for Following Year.

The potential rate of reproduction for the following year, expressed as an index, may be computed by adding the proportion of yearling does in the sample to twice the proportion of $2\frac{1}{2}$-year old and older does. The formula for this equation may be expressed:

$$R_1 = p_{IF} + 2(p_{IIF} + p_{OF}) \qquad (1)$$

where: R_1 = potential rate of reproduction for following year.

p_{IF} = proportion of 1½-year old does in sample.

p_{IIF} = proportion of 2½-year old does in sample.

p_{oF} = proportion of older does in sample.

2. Calculation of Potential Rate of Reproduction for Preceding Year.

Formula (1) dealt with a sample which included fawns. As the fawns had not yet entered the deer population contributing to the preceding year's reproduction, the sample and proportions required for this calculation are different than those used in Formula (1).

The potential rate of reproduction for the preceding year may be computed by adding the proportion of 2½-year old does (as a proportion of adult deer in the sample) to twice the proportion of 3½-year old and older does. The formula for this equation is:

$$R_O = p^{ad}_{IIF} + 2p^{ad}_{oF} \quad (2)$$

where: R_O = potential rate of reproduction for preceding year.

p^{ad}_{IIF} = proportion of 2½-year old does in sample of adult deer. (Adult deer include yearlings).

p^{ad}_{oF} = proportion of older does in sample of adult deer.

3. Examples

	1953		1954	
	Number	Proportion	Number	Proportion
Total deer	558	1.000	460	1.000
Fawns	119	0.214	74	0.161
1½-year old does	57	0.102	46	0.100
2½-year old does	79	0.142	69	0.150
Older does	84	0.150	83	0.180
Adult deer	439	1.000	350	1.000
2½-year old does	79	0.180	69	0.197
Older does	84	0.192	83	0.237
Fawns as % adult deer		27.1%		21.2%

Formula (1)

	1953		1954	
	Number	Proportion	Number	Proportion
p_{IF}		0.102		0.100
$2p_{IIF}$		0.284		0.300
$2p_{oF}$		0.300		0.360
R_1		0.686		0.760

Formula (2)

	1953		1954	
p^{ad}_{IIF}		0.180		0.197
p^{ad}_{oF}		0.384		0.474
R_0		0.564		0.671

4. Contrast of Advance and Back Calculations of Rates of Reproduction.

The potential rate of reproduction for 1954 has been computed twice in the foregoing examples. An advance computation, based on 1953 data, showed a potential rate of 0.686, while the back calculation based on 1954 data showed a potential of 0.671. These two indices agree to within 3% of each other. This close agreement suggests that the technique might prove to be quite reliable.

5. Contrast of Potential Rates of Reproduction and Actual Proportions of Fawns.

The potential rate of reproduction is of course theoretical. In ways it is perhaps analogous to the normal forest, and gives us an ideal to aim for. Downward deviations from this potential are to be expected, as a result of weather, snow accumulations, supply of browse, density of deer, and so on. Also, post-natal mortality of fawns, a normal event, also reduces the effective population gain. The factors causing these downward deviations themselves vary from year to year, and so considerable variation in the amount of deviation is to be expected. Perhaps a comparison of the potential rate of reproduction and the observed proportion of fawns will afford us some idea of how good a year it has been for deer. In this way, we may better be able to evaluate the findings of the snow cover surveys.

The potential rate of reproduction for 1953 was (back-) computed as 0.564, using data collected in the fall of 1953. Yet that fall, fawns amounted to only 27.1% of the adult deer. This was only 48% of what their incidence would have been had the full potential been realized.

The potential rate of reproduction for 1954 was (advance-) calculated as 0.686 using 1953 data, and (back-) calculated as 0.671 using the data collected in 1954. Yet in the fall of 1954, there were only about 0.212 as many fawns shot as there were adult deer. This was only 31% or 32% of the potential incidence of fawns, depending which potential is used.

The above would suggest that the winter of 1953-54 was much less favourable to the ensuing reproduction of deer than was the winter of 1952-53, even though there was a greater proportion of breeding does in 1954 than in 1953. This can be regarded as logical in the light of the results of the 1952-53 and 1953-54 snow cover surveys. 1953-54 was a tougher winter than 1952-53 in most parts of the Western Region.

6. Predictions Based on Potential Rates of Reproduction

In 1953, the potential rate of reproduction for white-tailed deer in the Western Region in 1954 could have been computed as 0.686. In 1954, following a reasonably tough winter, there were only 0.212 fawns for every older deer in the sample studied, or about 32% of this potential.

The potential rate of reproduction for 1955 should be about 0.760, based upon the sex-age attributes of the sample of deer checked in the fall of 1954. As the winter of 1954-55 was probably less severe in its effects on deer than that of 1953-54, a greater proportion (say 40%) of the potential reproduction was likely to be achieved. Therefore, in 1955, fawns are likely to amount to about 31% of the adult deer taken, or about 0.24 of all deer taken. If so, it will be about as high an incidence of fawns as in the good years of 1951 and 1952, and considerably higher than the fawn incidences of 1953 and 1954.

7. Comment

The procedure outlined herein for the advance- and back- calculation of rates of reproduction of deer takes into account changes in the reproductive abilities of different age classes of female deer, and changes in the sex-age structure of the deer population. It does not

take into account further effects upon reproduction imposed by climate, range, etc. Further knowledge of these factors is required for the accurate prediction of deer population changes through reproduction. Still, I feel that the above idea may have considerable value. Therefore, I would appreciate the comments of other deer workers in the province on the idea.

WATERFOWL NOTES FROM LAKE OF THE WOODS

by
H. E. Deedo and H. G. Lumsden

On the 29th June a boat trip was made through the northern part of Lake of the Woods for the purpose of examining the waterfowl habitat and checking waterfowl species present and breeding. The routes followed were not designed to give maximum counts of ducks. Starting at Kenora the route led through French Narrows to some bays a mile southeast of Shore Island. On the return, for the most part, a different route was followed. A total of 44 miles of open water and shore line were checked without duplication, altogether a greater distance than this was covered.

There are few extensive marshes in this part of the Lake of the Woods but many small bays and narrow inlets are shallow enough to support marsh vegetation. The dominant plants in these marshes are bullrushes, wild rice, sedge and phragmites while small stands of smartweeds occurred in some areas. Yellow waterlillies and at least three species of pond weed were the most common submerged aquatics noted. One marsh dominated by cattail was seen. This was a floating bog with a heavy understory of ferns and other marsh plants and with a light stand of willow growing through it. This is the type of bog frequently found on very acid soils on drowned land in eastern Ontario.

The following ducks were seen:

Species	No. of Broods	No. of Young	Average Brood Size
Golden-eye	16x	86	5.1
American Merganser	6x	48	8.0
Mallard	3	20	6.7

One mallard nest containing 8 eggs was found.

x A single golden-eye female was followed by 19 young of two age classes. One merganser female was followed by 22 young. These flocks have been considered as two broods in each.

Other Ducks Observed:

Species	Number Seen
Golden-eye	46
American Merganser	20
Mallard	2
Baldpate	2 pairs
Ring-necked Duck	1 pair
Unidentified	3

This check indicated a game duck brood (excluding mergansers) density of one brood for every 2.3 miles covered. Had the routes followed shorelines exclusively the count would have been higher than this. As the check was done during the heat of the day some broods were probably missed in the cover of the marshes.

This part of the Lake of the Woods appears to be very good golden-eye habitat.

On 28th June the writers made a flight with Mr. Burton and Mr. Simkoe over Monument Bay, Northwest Angle Inlet and Deepwater Bay. The following species were seen:

Golden-eye	3
Mergansers	4
Mallard	1 pair and 4
Baldpate	3 males
Ring-necked Duck	2 pairs and 8 males
Blue-winged Teal	1 pair and 3 males

Most of the ringnecks and baldpates were seen in the Northwest Angle Inlet which appears to be the most fertile marsh of those so far examined in this area.

WILDLIFE MANAGEMENT PLANS IN COUNTY FORESTS

by
J. F. Gage

This past winter we commenced to make an inventory of County Forests in the Huron District. We are attempting to classify the various tracts as they differ widely in what they have to offer for hunting purposes.

To date we have discovered that there are three main categories and a fourth which is a combination of the first three.

(1) Newly planted areas of land - trees up to eighteen inches high, abundance of grass and sod. Provides food and cover for European Hare and Fox - some summer range for cottontail rabbit.

(2) Plantations over eighteen inches to ten feet - maximum for cottontail rabbits and fox - some grouse and deer. Fair under storey of grass and other vegetation.

(3) Plantation maturing over eight feet; under storey clean - no cover or food - winter cover for deer only.

(4) Very large tracts are planted a few acres each year, this results in sections being in various stages of the above classification. They are the most desirable from a management point of view.

We have actually done very little in the way of management. Mr. W. A. G. Thurston, now District Forester at Lindsay, planted some cedar as a direct request to establish more food on the Sudden Tract and our Zone Foresters have left openings, old trees and other desirable features at our request, providing it did not interfere with their forestry programme.

We feel that this is a long term programme and our time is limited. We find that during the winter we are able to spend some time in classifying the county forests and making game inventories. We have only just started on this programme and have a large number of tracts yet to be inspected.

TWEED DISTRICT RUFFED GROUSE BROOD COUNTS, 1955.

by
P. A. Thompson

Officer Reporting	Date Seen	No. in Each Brood	Location (Township)
Ramsbottom, R. L.	May 20	8 young	Carlow
	July 6	6 young	Raglan
	Average young per brood		7
Ferguson, E. W.	May 14	5 young	Denbigh
	May 18	3 young	Raglan
	June 13	6 young	Matawatchan
	June 16	2 young	Abinger
	July 19	5 young	Griffith
	July 19	7 young	Griffith
	Average young per brood		4.6
Shields, S. A.	June 9	8 young	Brougham
	June 14	6 young	Admaston
	June 14	5 young	Admaston
	June 14	9 young	Admaston
	June 24	7 young	Admaston
	Average young per brood		5
Winters, C. H.	June 3	5 young	Hillier
	June 4	3 young	Ameliasburg
	Average young per brood		4
Saundercook, B. M.	No report		
Thibadeau, J. J.	June 5	5 young	Palmerston
	June 23	7 young	Miller
	June 29	9 young	Clarendon
	July 8	7 young	Clarendon
	July 22	6 young	South Canonto
	July 27	4 young	South Canonto
	Average young per brood		6.3
Shannon, J. A.	May 24	12 eggs	Tudor
	June 15	3 young	Lake
	June 21	6 young	Lake
	June 22	4 young	Madoc
	June 29	6 young	Tudor
	July 1	5 young	Lake
	July 7	4 young	Cashel
	July 17	7 young	Tudor
	July 21	8 young	Wollaston
	Average young per brood		5.3

Officer Reporting	Date Seen	No. in Each Brood	Location (Township)
Stewart, J. G.	June 25	11 young	Blythfield
	June 30	8 young	Blythfield
	July 10	14 young	Darling
	July 24	12 young	Darling
	Average young per brood		11.2
Shears, E. L.	May 28	6 young	Oso
	May 28	4 young	Oso
	June 1	4 young	Olden
	June 7	8 young	Olden
	June 30	7 young	Olden
	Average young per brood		5.8
Davison, R. J.	June 4	6 young	Kaladar
	June 22	4 young	Anglesea
	July 1	4 young	Barrie
	July 18	6 young	Barrie
	July 23	2 young	Barrie
	Average young per brood		4.4
MacDonald, F. W.	May -	9 young	Tyendinaga
	Average young per brood		9
Page, R. B.	Reports no grouse brood seen in his patrol zone.		
Thompson, P. A.	June 14	8 young	South Canonto
	June 16	10 young	Palmerston
	July 11	8 young	Palmerston
	Average young per brood		8.2

District Totals

Total Broods	Total Young	Average Young Per Brood
47	297	6.3

SPECIES COMPOSITION OF WESTERN REGION WATERFOWL BAG, 1954.

by
A. T. Cringan

The following is a summary of waterfowl taken by hunters in the Western Region and inspected by the author, during the first five weeks of the 1954 open season. District names are abbreviated. SL - Sioux Lookout; KE - Kenora; FF - Fort Frances.

	Sept. 15-21			Sept. 22-28			Sept. 29-Oct. 5			Oct. 6-12			Oct. 13-19			Total	
	SL	KE	FF	SL	KE	FF	SL	KE	FF	SL	KE	FF	SL	KE	FF	No.	%
Lesser Scaup Duck									1	2		17			58	78	24
Mallard Duck									6	9		5			54	74	23
Ring-necked Duck									1	2		5			47	55	17
Common Golden-eye	1									31					15	47	14
Buffle-head										4					41	45	14
Hooded Merganser															8	8	2
Blue-winged Teal															6	6	2
Redhead															5	5	2
American Coot									3							3	1
Baldpate															2	2	1
Green-winged Teal															1	1	-
Gadwall															1	1	-
Canvasback															1	1	-
Greater Scaup Duck															1	1	-
American Scoter															1	1	-
TOTAL																328	

RACCOON HUNTING IN SOUTHERN ONTARIO

by
H. G. Lumsden

In 1950 the sport of raccoon hunting at night with hounds was officially recognized in Ontario with the institution of a raccoon hunting licence and a raccoon dog licence.

This sport has been gaining in popularity since as indicated by the following figures on the sale of licences:

Year	Raccoon Hunting Licence	Raccoon Hound Licence
1950	233	293
1951	151	256
1952	750	760
1953	810	820
1954	755	808

Raccoons are now harvested for their fur by trappers and taken for sport by hunters. The following table gives some of the harvest figures for the last three years taken from trappers returns and from the returns of holders of raccoon hunting licences for four southern Ontario Districts:

Southern Ontario Raccoon Harvest

District	1952-3		1953-4		1954-5	
	Trapped	Hunters' Kill	Trapped	Hunters' Kill	Trapped	Hunters' Kill
L. Erie	4130	-	2703	7419	3545	7504
L. Huron	3236	4783	3913	7857	3991	7745
L. Simcoe	1184	-	1894	-	1054	673
Lindsay	469	-	976	-	321	462
TOTALS	9019	-	9486	-	8911	16384

The following tables give a summary of the hunters' returns. It will be seen that for each District the average annual bag of raccoons per hunter reporting exceeds 20. This is far above the average annual bag of other game. For example, the average seasonal kill of ducks in the Mississippi Flyway varies between 4 and 5 per hunter and for geese, between .1 and .2. Upland game

figures usually run a little below ducks. There are, of course, far fewer sportsmen hunting raccoon than other game and this probably accounts in part for the high bag. Nevertheless, if quality of sport is partially measured by the size of the bag this is excellent hunting.

The yields of raccoons in some areas also are high. In Lambton county in Erie District, 1619 raccoons were killed by hunters on 1128 square miles in 1953, giving a yield of 1.4 raccoons per square mile. In 1954, the kill was 974 and the yield .9 raccoons per square mile. The age ratio for a small sample of 35 raccoons from the northern part of this county was .6 juvenile males for each adult male. If this type of hunting does not select adults over juveniles and if the sample received was truly random this ratio certainly does not indicate over hunting.

Lake Huron District Raccoon Returns - by W. H. Cantelon

Year	No. of Licences Sold	No. of Returns Made	% of Returns Received	No. of Raccoons Killed	Average No. of Raccoons Per Hunter
1952-3	238	238	100%	4783	20.1
1953-4	322	322	100%	7857	24.4
1954-5	277	277	100%	7745	27.9

Lindsay District Raccoon Returns - by G. H. Buie

1954-5	20	20	100%	462	23.1

Lake Simcoe District Raccoon Returns - by J. S. Dorland 1954-1955

Area	No. of Licences Sold	No. of Returns Made	% Ret.	No. Raccoons Killed	Av. # Raccoons Per Hunter
F. B. Richardson	1	1	-	6	6.0
C. J. Spencer	3	3	100%	122	40.6
H. Van Wyck	4	0	0%	-	-
G. R. Armitage	13	11	84.6%	282	25.6
N. E. Sitwell	7	6	85.7%	59	9.9
N. E. Sitwell	4	3	75%	103	34.3
F. H. Marshall	4	2	50%	66	33.0
E. W. Smith	3	3	100%	29	9.6
F. Bowes	1	1	100%	6	6.0
TOTAL	40	30	75%	673	22.4

Lake Erie District Raccoon Returns, 1953-54 - by A. R. Streib

Area	No. Licences Sold	No. Returns Made	% Returns	No. Raccoons Killed	Raccoons Per Hunter
Allan	7	6	85.7	62	10.3
Arbuthnot	20	18	90.0	276	15.3
Bailey	17	14	82.4	173	12.4
Beck	32	18	56.2	348	19.3
Carter	5	3	60.0	29	9.7
Finch	22	21	95.5	456	21.7
Greenwood	25	16	64.0	142	8.9
Howell	16	16	100.	376	23.5
Martin	17	17	100.	678	39.9
McIntyre	29	28	96.5	813	29.0
McKeown	14	14	100.	347	24.8
Mellick	36	30	83.3	1619	54.0
Muma	13	12	92.3	362	30.2
Neill	28	16	57.1	653	40.8
Roberts	20	20	100.	849	42.5
District Office	17	8	47.0	236	29.5
TOTALS	318	257	80.8	7419	28.9

Lake Erie District Raccoon Returns, 1954-1955 - by A. R. Streib

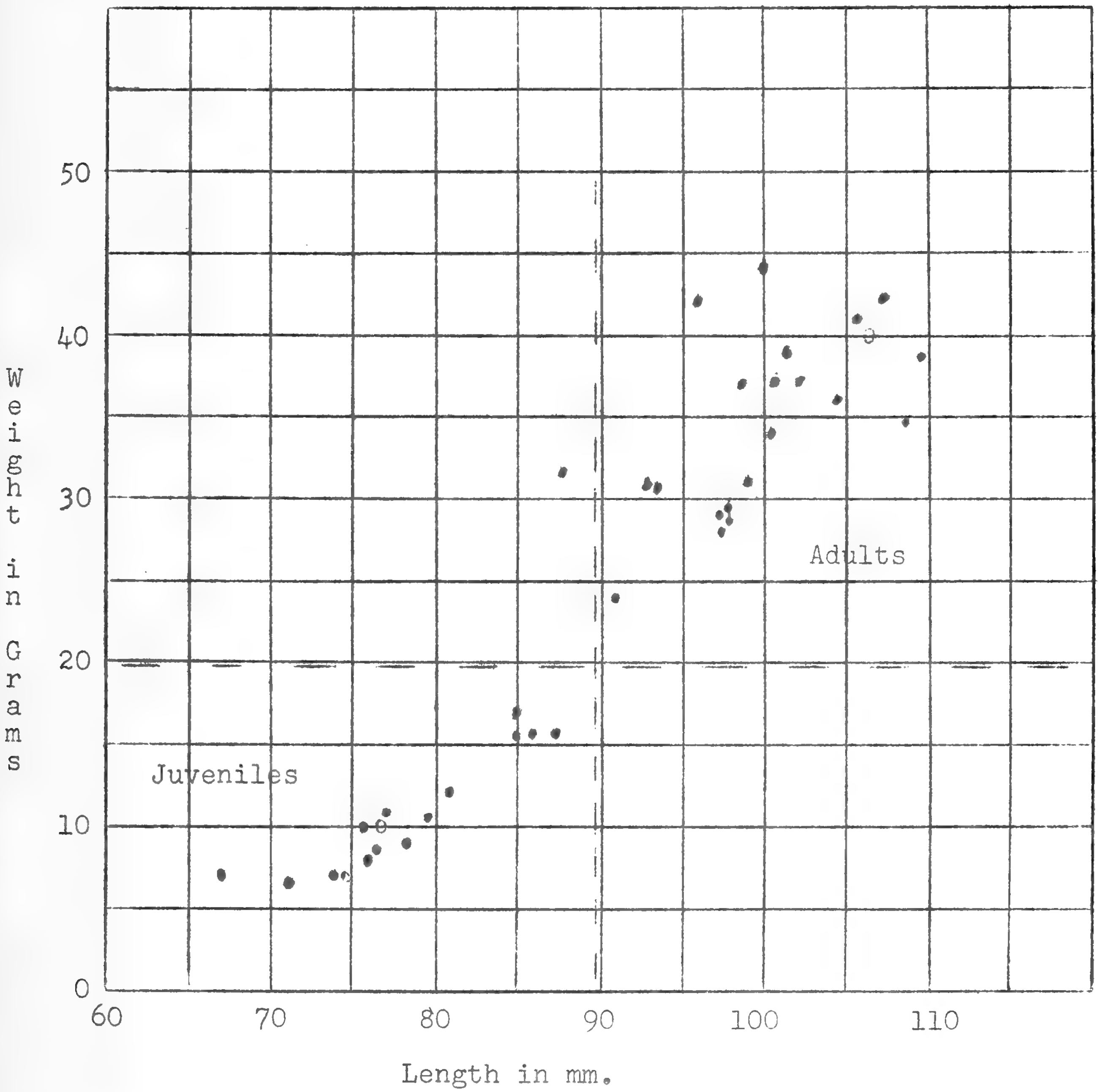
Area	No. Licences Sold	No. Returns Made	% Returns	No. Raccoons Killed	Av. # of Raccoons Per Hunter
E1 Muma	20	18	90.0	369	20.5
E2 Arbuthnot	13	10	76.9	157	15.7
E3 Howell	12	12	100	435	36.2
E4 McKeown	19	19	100	545	28.7
E5 Finch	19	16	84.2	282	17.6
E6 Allan	10	9	90.0	145	16.1
E7 Neill	35	31	88.6	703	22.7
E8 Beck	32	24	75.0	708	29.5
E9 McIntyre	26	26	100	973	37.4
E10 Mellick	28	16	57.1	974	60.9
E11 Martin	16	16	100	541	33.8
E12 Roberts	23	23	100	1048	45.6
E13 Carter	4	4	100	118	29.5
E14 Greenwood	21	11	52.4	123	11.2
E15 Bailey	10	10	100	196	19.6
District Office	13	12	92.3	187	15.6
TOTALS	301	257	85.4	7504	29.2

Age criteria for raccoons have been worked out in Iowa by Sanderson (Methods of measuring productivity in raccoons. Journal of Wildlife Management, Vol. 14, No. 4, 1950). He used body weight, the length and dried weight of bacula of males, and the condition of genital tracts of females.

A sample of 35 bacula was collected by Mr. Streib, Wildlife Management Officer, Aylmer from two hunters. Mr. Sherwood Stephenson of Thedford and Mr. Fred Tanton of Watford killed these animals in Bosanquet and Warwick townships, Lambton County during the fall and winter of 1954. Three additional ones were collected by Dr. C.H.D. Clarke near Toronto. These bacula were cleaned in a dermestid colony, dried for several weeks and then weighed and measured. Figure 1 shows the weight plotted against the length for each penis bone. Using Sanderson's Iowa criteria, these have been tentively classified as 22 adults and 16 juveniles.

Sanderson has pointed out that the dividing line between juveniles and adults for bacula weights is 2.0 grams in Iowa and 2.6 grams in Missouri where the raccoons are larger. The dividing line for lengths is 90 mm. in both states. It is possible that Ontario raccoons differ from animals in these two states. It will be necessary to have known age animals and a good series of measurements from the province before this question can be answered.

FIGURE I - Weight and Length of Bacula of Raccoons.



• Lambton County Specimens

o Toronto specimens

REPORT ON THE WATERS OF THE ROB ROY TROUT CLUB

by
J. F. Gage

The following report is the result of an investigation requested by Mr. O. G. Clarke of the Rob Roy Trout Club. The club is situated on a branch of the Beaver River in the Township of Collingwood, Concession VIII, Lot 7, in Grey County. The club property encloses the headwaters of the creek which has no name. For the sake of convenience this creek will be hereafter mentioned as Meadowbrook Creek.

To establish the best management possible a long term study of the physical, chemical and biological properties of the stream should be undertaken. This report is based only on a short cursory examination and has been written on principles involving the general management of a trout stream. An effort has been made to reduce the number of biological terms and phrases.

Purpose

The purpose of this investigation was to determine the best method of producing trout of a larger size than are found at present. Speckled trout from eight to ten inches are taken but trout of larger size are the exception rather than the rule.

Description

Meadowbrook Creek commences as springs on the edge of the club property and runs for three miles on club property. The upper part is shallow and of medium flow being anywhere from three to six feet in width and four to six inches in depth. Another branch joins the main stream which widens into slow moving water of two to four feet in depth and twenty feet in width. Some single wing deflectors have been placed in this section but without much success as the gradient is low and little current in evidence. Some small holes have been dug at the ends of these deflectors by spring freshets. There is considerable silt in evidence throughout the stream both in the slow water and the medium velocity further downstream. A few locations are fortunate in having gravel and stone bottoms. Where silt has been left undisturbed, beds of water cress and coontail have established themselves. The temperature of the water was found to be 58° Fahrenheit. There are several backwaters to the mainstream which naturally have a warmer temperature (64° F.). These may be utilized to

good advantage as described later. The large numbers of Speckled Trout observed throughout the entire stream point up the fact that the water must be suitable to this species.

Food

Food is the number one requirement for good growth in trout. From observations made it would seem that food is the real problem. A common but erroneous conception is that all water must contain quantities of little organisms upon which fish can feed. Speckled trout inhabit cold pure spring water, which because of its coldness and pureness is relatively barren of these small organisms as compared to warm marshy lakes. These small water plants and animals are only the first link in a succession of food sizes. By this we mean that we must have these organisms to feed the minute insect life, the minute insect life must be present to feed the larger forms of insects, the larger forms of insects must be present to feed minnows and put growth on young trout, the minnows and very large insects must be available if we are to have those big trout that are necessary to good fishing.

Food is controlled by temperature and the type of water such as standing, medium or fast-flowing. The main stream had a temperature of 58° F., while this is not excessively cold, it would not produce the same volume of food as water 65° F. The size or volume of the food is most important. For example a minnow or dragon-fly larvae would produce more growth in a trout than would hundreds of small insects with a total comparable volume. A great deal more energy is exerted in capturing the hundreds of small insects.

There are several backwaters on this stream which could be partially isolated as potential nurseries for the rearing of minnows for food. By partial or complete isolation the water temperature could be raised to 75° F. A small amount of fertilizer might be added and minnows introduced. Some brush should be thrown around the edges to protect the young minnows from kingfishers etc. It will also provide a suitable place upon which the minnows can spawn. When the young minnows have reached an inch or longer the screen or barricade could be removed. The temperature will prevent the trout from entering the minnow pond but the young minnows will eventually enter the stream in search of food. They will then provide food for the trout and should induce better growth than you are experiencing at present. Fertilizing the stream would be very impractical as most of your nutrient value would soon be carried downstream by the current.

Silt

In various sections of the stream there is a serious silting problem. Due to the fact that the gradient is very low the current cannot be used either by itself or by constructed wing deflectors to remove the silt. The silt must be removed manually either by shovels or some dredging equipment. If such steps are taken to remove this silt it should be taken well away from the stream as melting snows and heavy rains would soon carry it back to the stream. Silt is detrimental in that it smothers out many of the more desirable types of aquatic life and covers potential spawning beds.

Cover

It would appear from the large number of fry and fingerlings evident in the stream that cover is ample. Comparing this stream with others of similar nature there is considerable cover in the form of brush, logs, bank vegetation and water cress. Cover should be present only in sufficient quantity to afford protection for the number of trout which the stream will support. When cover is in excess then more trout are protected than there is enough food to produce proper growth. Your section of the stream is inclined towards the latter condition.

Weeds

Weeds are attributed to two factors in this stream, the low velocity and the silt it accumulates. When weeds become established in a layer of silt they contribute to further silting by acting as a net or strainer for silt particles coming downstream. Weeds are not a serious problem in the stream, however, where they are contributing to excessive silting they should be thinned out.

Screen or Grate

A screen or grate would merely act as a safeguard for the planting of larger trout such as two year olds. These trout would then be confined to your property and you would be able to determine the value of the stocking. It would be only natural to suppose these fish had gone downstream if you did not have a screen and you caught only a few. It is suggested that the grating should be as large as possible to reduce the amount of flotsam that is bound to accumulate. The grate should be removed at the end of each fishing season and replaced just before stocking. Your grate should be located with two factors in mind. (1) Accessibility (the cleaning of the grate will be a constant chore); (2) a site which will allow a certain amount of flooding due to accumulation on the grate. It

might be wise to place the grate well back from the road to reduce tampering by outside individuals. I understand you received permission to screen this stream from the Department some years ago.

Stream Improvements

The success of deflectors depends upon the gradient and resulting velocity of the water. There are two ideal locations for double-wing deflectors. One just below the boat house, the other above what is known as the "Pot Hole." The wings of these deflectors should be set at an angle from the bank so that they will not reduce the natural velocity which is good at these points. A two foot gap between the ends of the deflectors should be ample. The sheeting should be as leak-proof as possible. This should produce a good hole immediately below the installation. More oxygen will be produced plus a more desirable type of insect life.

Diversion

A plan was outlined to divert the water through an old original stream bed. This bed contains some water and quantities of silt. In diverting the water this silt might be removed but would no doubt settle further downstream. Many aquatic insects spend from two to four years in various stages of development as larvae in the water before maturing. To divert the water from its present course would cause a setback in food supply for several years. There appears to be no advantage in diverting this water.

Restocking.

As stated before there is evidence of sufficient year classes to support the fishing pressure exerted. The problem is to promote better growth rather than to increase the numbers. It would, therefore, be impractical to stock fish of a size that is already present. The plan to stock two year olds seems good. This would be merely on a "put and take" basis. I would suggest that you take steps in the form of an experiment to determine the desirability of stocking with two year olds. The trout should be planted sometime in the second week of May after you have installed your screen. The trout should be marked for future identification by clipping the adipose fin as described to Mr. Clarke. This will enable you to differentiate between stocked fish and natural fish. By keeping careful records of the number of stocked fish you can easily evaluate this programme.

Records of each day's catch, the hours spent, the number and size of the trout and other data provide very useful information over a period of years. From this you can establish a sound management programme.

THE MANAGEMENT OF GAME FISH

by
H. R. McCrimmon

It seems difficult to realize that little over 300 years ago Ontario exhibited an extraordinary richness of vegetation perhaps unequalled elsewhere in the temperate part of the world. The productivity of the land was matched by that of the many waters which supported almost unbelievable numbers of fish as attested in the accounts of the early explorers and travellers.

Unfortunately, with the advance of civilization there was no realization that the treasures of forest and stream were exhaustible and the dominating interference of man soon disrupted the balance of nature which had characterized the land for untold millions of years. With the gradual settlement of the land and the tremendous increase in population the pristine abundance of fish, particularly stream fish, decreased rapidly. It would seem that the decreasing fish population received little attention until the 1850's when the attention of Samuel Wilmot, the father of Canadian fish culture, was directed towards the declining number of salmon in the streams flowing into Lake Ontario. Wilmot responded by constructing the first fish hatchery in Canada near Newcastle on the shore of Lake Ontario. Although fish culture practices developed slowly from this early start, it was many years before the possibility of the scientific management of fishing waters was realized. The importance of fisheries management has only recently been magnified to its present publicity by the cry for conservation which has been manifested throughout North America.

With the changes in environmental and economic conditions which accompanied the advance of civilization the position of fish has become greatly modified from the time of early colonization when fish were regarded primarily as a source of food and formed an important part in the daily food of the people. As the years passed certain species of fish became recognized for the sporting qualities exhibited during their capture and, although eaten with delight, their value as food might be considered overshadowed by the pleasure derived from their capture. And so eventually certain species became segregated into a group termed "game fish" in contrast to the group of "commercial fish" which were in demand solely as food. It is to the former group that our attention will be confined although certain species play a dual role as both a game

fish and a commercial fish. The Ontario Government recognized the importance of game fish in 1903 with an order-in-council which prohibited the sale of these species. Each year now fisheries laws were passed, and old ones modified, culminating in the present fisheries regulations which set aside closed seasons, limit the number of each species which may be caught, and set minimum lengths for many species.

With an ever increasing demand on the fishing resources it is necessary that those involved in fisheries work critically examine those practices now employed and evaluate their use in the successful management of fishing waters. It is no secret that a great deal of what is being called successful fishery management lacks any clearly successful practice. Even the assessment of the results of any fisheries management programme in itself poses a difficult problem in an aquatic environment characterized by complexity, diversity and changeability. Although the quantity of fish caught is the final criterion, successful management can only result from an accurate knowledge of the fish populations at all other stages as well as at the stage of capture for use.

The objectives of a successful fish management programme must be (1) to make the best possible use of available waters to produce as large a population of desirable fish as possible, (2) make the fish which are produced as available as possible to the angler, (3) increase the stock of those species in demand by anglers to a maximum, (4) provide an equitable distribution of the fish resources when practical, (5) carry out those technical projects, either research or otherwise, which will assist in the assurance of a continuous production of game fish for angling, (6) formulate and enforce such fisheries laws as are biologically and economically sound, and (7) through public education implant a definite and practical conservation attitude in the minds not only of anglers but of all citizens, particularly guides and resort owners so dependent on fish resources.

Unfortunately, the development of successful fisheries management cannot be expected to happen overnight but may take years to realize. Fisheries biology is still a rather new field of study and lacks knowledge of many fundamental principles in certain fields which delays progress in discovering the factors responsible for unfavourable conditions for each species, in devising procedures to remedy the mal-conditions, and finally in perfecting the procedures. In general it is necessary to study the fish in nature rather than in the laboratory, and, with nature's dynamic complexity, it is obviously difficult to discern

what factor or factors in nature may be responsible for the peculiar behavior of each species of fish. A knowledge of the fundamental behavior of each species in movement, reproduction, feeding, and the like, is most necessary to interpret any fishery. Although a fisheries practice with predicted and verified results has seldom, if ever, been found for any kind of freely roaming fish, considerable information is being accumulated which should eventually result in successful fisheries management.

Through an increased emphasis on fact-finding in fisheries work, considerable light has been shed on the value of methods presently employed in fisheries management. It is now proposed to discuss somewhat superficially both those methods which have been in vogue for many years and several of the newer methods initiated in an attempt to improve management.

For many years the management of fishing waters was more-or-less dependent on two practices, regulations - the formulation and enforcement of fisheries laws, and a stocking programme. One of the most important objectives in the development of a successful fisheries management must be a critical examination of both practices to determine the degree to which they are biologically sound and to modify the practices to conform to existing conditions.

A survey of fisheries regulations shows that many of the laws were set up arbitrarily with little factual basis. Laws were enforced which were merely copied from other places with little or no consideration. In recent years fisheries workers have emphasized the evaluation of existing fishing laws and their alteration according to proven need. This work has resulted in the realization that no one set of standard regulations can be used to manage different bodies of waters, each with its peculiar characteristics. Although only initial investigations have been made along this line, the results have already indicated the necessity for changes in the minimum lengths for certain species of fish, for a revision of closed seasons and the like. As modifications in existing laws must be based on conclusive facts which may require years of study, no radical changes may be expected.

For many years fish stocking was regarded as the general answer to fishing problems although actual evidence of its effectiveness was generally lacking. Investigations, in disclosing that the costly artificial production and stocking of fish has not resulted in the anticipated return, have caused a revaluation of stocking practices. In spite of the conclusions of certain investigators that the re-stocking of waters with species already there is not only

unsatisfactory but even harmful, the policy widely adopted has been to change from wide, indiscriminant plantings to practical plantings in only those waters in which it is warranted. Although many waters are stocked more for the psychological value than for known biological value, hatchery-raised fish, particularly speckled trout, have been used extensively to populate depleted waters and provide fishing in heavily fished areas. Further, hatchery-raised stock has been used extensively to introduce suitable species of fish both to those waters which are no longer biologically suitable for the native species and to newly constructed ponds, a practice employed in the majority of fish management programmes.

The two foregoing well-established practices are gradually being supplemented by the utilization of an increasing number of methods in the management of fresh-water resources. The importance of environmental conditions has been emphasized. With this has come the realization that the productivity within the aquatic environment is directly or indirectly dependent on the terrestrial environment and that successful fisheries management may result only from a wise conservation policy embracing land and water alike.