



MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

Quarterly Report

January-March, 1950

RESEARCH PROJECTS

MUSKRAT MANAGEMENT

Objectives: A study of life history and environmental factors leading to management recommendations.

Assignment: Malcolm W. Coulter, Assistant Leader

The annual count of muskrat houses was made during the winter. Although most of this work was carried out in December, the study continued into January. Coulter was assisted by Haseltine and Rearden.

The population changes noted for the 4 and 5 years for which data are available for various areas reflect, to a large extent, water level conditions and trapping pressure. On untrapped areas the stage of the population build-up also may be a factor in recent changes. Data for the past several years are summarized as follows:

Open to Trapping		
Year	Davis-Holbrook Marshes	Mattanawcook Lake
1945	----	28
1946	70	5
1947	84	6
1948	53	0
1949	35	0
	Heavy trapping, water level very low in 1949	Very heavy trapping, considerable water level fluctuation

Closed to Trapping (Moosehorn Refuge)				
Year	Magurrewock Marsh		Barn Meadow Marsh	
	South	North	South	North
1945	32	2	11	58
1946	140	1	24	29
1947	287	8	52	9
1948	237	10	5	4
1949	120	0	40	3
	Water level controlled since 1944	Uncontrolled water level	Water level controlled since 1945. Development work in 1948 necessitated drawing water down	Uncontrolled water level

## RUFFED GROUSE MANAGEMENT

Sub-project: Cover requirements and populations

Objectives: To determine preferred cover types and population densities.

Assignment: Howard L. Mendall, Leader

Because of the pressure of other duties, the winter grouse studies were not carried out as extensively as in past winters. Mendall made one short trip each month during the quarter, checking a few of the regular study areas in northern and central Maine.

The first half of the winter was very mild. There were no bad ice storms and the snowfall was much below average. Grouse were found widely scattered through hardwood covers, often on high ground. February produced more typical winter conditions and March was a relatively cold, stormy month. By the middle of February a distinct trend by the birds toward coniferous, lowland covers was noted. Yet at no time throughout the winter were grouse as dependent on such habitat types as is usually the case in Maine. From the limited observations it appeared to have been a very favorable winter for the birds.

Little comparative population data were obtained. A definite increase in numbers of birds was indicated on the study areas of northern Penobscot County, but this was more than offset by continued decreases in central and southern Penobscot County and in southern Aroostook County.

## ECOLOGY OF THE BEAVER

- Objectives:
1. To determine the rate of utilization by beaver of available woody plants.
  2. To determine effects of beaver flowages to streams and adjacent areas.
  3. To determine size and composition of beaver colonies in relation to the number of lodges, dens, and other sign.

Assignment: Frank T. Haseltine, Graduate Assistant

Haseltine's field work on this project during the quarter was confined to contacting beaver trappers in an effort to obtain all carcasses taken at flowages in which the beaver had been ear-tagged. The information desired was: (1) whether or not the colony had been completely live-trapped, using the checks previously reported on; (2) length of time the ear tags remained on the animals and condition of ear; (3) movements of animals which had been transplanted from their original flowage.

The beaver season in Maine this year was from January 1 to February 7 inclusive. All areas were posted with a notice informing the trappers of the objectives of the study and where the technician could be located.

The trappers were also contacted personally and their cooperation was excellent.

Of the 27 beaver that had been tagged in areas open to trapping, 14 were recovered. In addition to these, three untagged beaver were taken from flowages which had previously been considered completely live-trapped. These were from three different flowages and were all beaver of the year.

The longest interval between date of tagging and recapture was 154 days. No evidence of infection or sloughing off of flesh around the tag was visible. All recaptured beaver had retained their tags in the same condition as when put on.

Recoveries of Transplanted Beaver from the Milford Area

Tag No.	Original Release	Recapture	Distance Travelled
566	2nd Stream 10-13-49	1st Stream 1-4-50	1.5 miles
559	2nd Stream 10-17-49	1st Stream 1-4-50	1.5 miles
558	2nd Stream 10-17-49	1st Stream 1-5-50	1.5 miles
574	2nd Stream 9-15-49	1st Stream 2-1-50	1.4 miles

Another beaver (No. 575), tagged September 1, 1949, was a two-year old animal living alone on Plank Brook in Costigan. Trappers cruising the area in November reported activity in the flowage. The animal was trapped February 1, 1950 on Mill Stream in East Eddington in a colony of other beaver at least 2.5 miles from Plank Brook. No beaver were taken from Plank Brook.

As may be seen from the dates given, it was very late in the fall when the beaver were released. None of the recaptured animals had moved in with other beaver and each had built a lodge and put in a substantial food pile. Numbers 566, 558, and 559 were originally from the same colony and were taken together even though they had been released some four days apart.

During the coming quarter Haseltine will complete the tabulation of all data and prepare his Master's thesis.

MISCELLANEOUS STUDIES

Identification of Waterfowl Nest Predators

A study of the methods used by different waterfowl nest predators in destroying nests was carried out in 1949 by Graduate Assistant Rearden as

a special problem under Mendall's supervision, in conjunction with the Unit's waterfowl project. This investigation was undertaken in an effort to reduce the relatively large number of "unknowns" ordinarily prevailing in connection with nests that have been found destroyed in previous years.

During the winter Rearden completed the laboratory portion of this study. Twenty-eight duck nests (10 black duck, 17 ring-necked duck, and 1 American goldeneye) were found to have been destroyed. In addition to studying these natural nests, 34 artificial nests were constructed of duck down and dry vegetation. Eight brown hen's eggs made up the clutch in each and they were placed in various types of waterfowl nesting habitat. Twenty-six of these were destroyed by predators.

No noticeable difference in the type of sign left by predators was apparent between the destroyed natural nests and the artificial ones. Evidence left at a destroyed nest by each species of predator was the prime consideration, and predator pressure was of secondary importance in this study.

It is usually a combination of different signs left at a nest that finally identifies a predator. Some of the signs found most useful in determining identity were as follows:

1. Condition of the destroyed nest
2. Presence or absence of egg shells at destroyed nests
3. Location of egg shells in relation to the nest
4. Appearance of broken egg shells
5. Presence of hairs at the site of a plundered nest
6. Droppings of mammalian predators near destroyed nests

Analysis of Predators Responsible for 1949 Nest Destruction

Predator	Kind of Nest				Total
	Artificial	Black Duck	Ring-neck	Goldeneye	
Raccoon	10	1	8	1	20
Mink	--	1	3	--	4
Skunk	2	--	--	--	2
Fox	4	4	--	--	8
Unknown Mammal	4	3	2	--	9
Crow	6	1	--	--	7
Type of predator undetermined	--	1	3	--	4
Number of destroyed nests studied	26	11	16	1	54
Number of artificial nests not destroyed	8	--	--	--	8
Total number of nests	34	11	16	1	62

Forty-three artificial and natural nests were destroyed by mammals. Of these 32 (74 per cent) yielded hairs sufficient for the identification of the mammals that had left them. Hair identification was verified by Mr. Charles C. Sperry, Biologist, U. S. Fish and Wildlife Service Research Laboratory, Denver, Colorado.

When an artificial nest was established, in every instance where it was possible, dead sticks or twigs were placed in such a position as to entangle hairs of a marauding mammal. Although the finding of a certain mammal's hair at the site of a destroyed nest does not constitute positive evidence of that mammal's responsibility for the destruction of the nest, it is felt that with the other indications at the nest, hair provides valuable additional evidence.

Thirteen nests (24 per cent) were destroyed by predators that remained unidentified; nine of these appeared to have been destroyed by mammals.

#### Snapping Turtle - Waterfowl Relationships

During the winter the digestive tracts of the snapping turtles collected last summer were analyzed in the Unit laboratory. (Details of collecting were given in the July-September report). Analysis was under Coulter's supervision, although all members of the Unit staff participated. Members of the Zoology Department assisted in identification of fish bones, as well as insects and other invertebrate material. Although all food items have not been completely identified as yet, it may be of interest to present a preliminary report at this time. This is in view of the suprisingly high proportion of ducks and other birds that were found to have been consumed by the reptiles.

A total of 35 turtles had been collected from July 4 to July 31 in areas where waterfowl broods were present. Three specimens contained no food material in the stomach or intestines. Thirteen (37 per cent) contained bird remains; in two others there were bone fragments, as yet unidentified, of vertebrates other than fish.

The birds that could be identified consisted primarily of ducks and pied-billed grebes. Five pied-billed grebes, 10 ducks, (3 ring-necked ducks, 2 goldeneyes, 2 blue-winged teal, 1 wood duck, 2 unidentified ducks), and 3 other birds were found. Ducks and grebes from the downy stage to adult birds were represented. Among the 9 waterfowl specimens which could be assigned approximate ages, 5 were less than one-half grown and 4 were over half grown or were adults. An adult rail, probably a sora, was also eaten. One turtle, weighing 31 1/2 pounds, had consumed three grebes and two ducks.

The turtles ranged in weight from 5 to 41 pounds (average approximately 18 1/4 pounds). It is of interest to note that a 6 1/2 pound female contained the remains of an American goldeneye believed to be 2 to 3 weeks old.

Of particular importance for future studies is the location of food items in the gastro-intestinal tract. Food was present in 32 intestines yet only 12 of the same specimens contained food in the stomach. Among

the 13 specimens with bird remains, these occurred in the intestines 12 times and in the stomachs only 2 times. Thus, if stomachs alone had been collected, only two instances of the consumption of birds (instead of 13) would have been detected. The importance of intestinal collections, primarily the large intestine, seems clearly demonstrated.

It must be recognized that the amount of actual predation is not proven, and possibly some of the birds represented carrion. However, snapping turtles are known to prefer fresh animal food over partially decomposed material, when animal food is being taken. Also, occasional observations of snapping turtle predation upon young ducks have been made during Unit field studies. The preference for fresh animal food, field observations, and the results of the analysis of the limited number of gastro-intestinal tracts would seem to indicate that predation must be strongly suspected in most instances. The results thus certainly warrant more intensive study in future seasons, and it is hoped to collect a larger series of turtles during the coming spring and summer.

#### Fisher Study

It was pointed out in the last quarterly report that there was to be an open season on fisher in Maine this winter; and the Unit and State Federal Aid Division were to conduct a joint study to obtain all possible biological data. The work was set up under Coulter's supervision with Samuel Carney representing the Federal Aid Division.

Coulter devoted considerable time to a review of literature, the examination of carcasses submitted to the laboratory, and a limited amount of time collecting carcasses and field studies. Carney worked full time collecting carcasses, reviewing literature, assisting in laboratory examinations and conducting an analysis of gastro-intestinal tracts. Several other members of the Federal Aid staff assisted in collecting carcasses from trappers and in the field studies.

The trapping season, open for the first time since 1936, consisted of the month of January. The reported take, based upon records of skins submitted for official stamping, was 124 animals. Approximately half of the specimens were from Aroostook County. The remainder were taken in Piscataquis, Franklin, Somerset, and Oxford counties.

Because of the low prices paid for fisher pelts, few trappers actually made a special effort to trap these animals. The beaver season was in progress at the same time and most trappers felt that they could more profitably devote their efforts to beaver. It is quite apparent that many fisher "footed" themselves; some trappers actually lost more animals than they were able to capture successfully. Since some of those which escaped did so at the loss of a complete leg it is likely that many of them will perish. The actual kill may be appreciably higher than the reported take. Many of the better trappers agree that excessive footing was due to several factors:

1. Traps used were often too large because many trappers lacked previous experience with fisher.
2. Fisher traps were generally tended at irregular intervals.
3. "Cubby" sets on the ground were commonly employed. Leaning

pole sets are considered as good or better and are more likely to prevent escape through footing.

A total of 50 specimens (49 carcasses and 1 skull) was received for examination. Standard measurements were taken from carcasses when possible as well as carcass weight. Stomachs, intestines, skulls, and reproductive organs were saved for further study. Examination for parasites was performed by Dr. Marvin C. Meyer of the Zoology Department. Similar examinations were made of the carcasses of 11 marten that were also taken in fisher traps.

Thirty-five (70 per cent) of the fisher specimens were females and 15 (30 per cent) males. Since pelts from females are more valuable than those from males, one might suspect that this ratio reflected selective trapping. However, discussions with trappers indicate that they did not attempt to trap selectively and few felt that they could sex an animal with certainty from tracks under ordinary conditions. Carney has suggested that footing may have been more prevalent among males, thus distorting the ratio of animals actually captured.

The incidence of porcupine quills was much higher among males and may have some relationship to the overall sex ratio. Thirteen (87 per cent) of 15 male specimens had quills embedded in the flesh, while only 2 (5.8 per cent) of 34 female specimens showed signs of quills. In no instance could any indications of inflammation or infection resulting from quills be detected. However, some woodsmen have reported finding fisher which apparently died as the result of a large number of porcupine quills; one veteran wilderness trapper reports finding a fisher alive, but completely blinded from an encounter with a porcupine. It seems likely that some animals are lost in this manner, and if the sample examined is indicative, this loss may well operate more heavily against males. Of interest in the examinations for quills was their occurrence along the digestive tract, in the body cavity, and deep in the flesh. In some cases they had penetrated to the skull, leg or shoulder bones. In others they had pierced the stomach or intestine wall and were projecting into the body cavity.

Trappers received only \$5.00 to \$35.00 for pelts, with females selling for considerably more than males. The average price probably was around \$20.00 to \$22.00. A limited number of pelts was examined and all were considered to be prime.

The food analysis of gastro-intestinal tracts is not yet complete. Thus far, snowshoe hare, red and flying squirrels, mice, shrews, and porcupines appear to predominate. Members of the Zoology Department are assisting in the examination of reproductive tracts.

Coulter spent three days cruising a tentative study area in northern Piscataquis and Somerset counties. Several fisher tracks and one den were observed. These animals were traveling and hunting in dense coniferous growth for the most part. In at least one instance two animals were traveling together.

Established fisher crossings, as reported by veteran guides and trappers, were marked. Fisher were found to be using several crossings that were reported to have been in regular use for several winters. Information was also taken on the abundance of possible prey species.

One of the unfortunate aspects of the past open season on fisher was the kill of marten in northern Aroostook County. Many trappers in that section felt that there were actually more marten than fisher present. Both animals may be taken in the same type of sets. Reports indicate that several marten were caught and discarded - others were surrendered to the Fish and Game Department, as required by law. It is regrettable that so little is known, on a state wide basis, of the fisher and marten populations.

#### PUBLICATIONS

An article by Mendall entitled "A Memorial to John Pearce" was published in the January issue of the Journal of Wildlife Management.

#### COOPERATION AND EDUCATIONAL WORK

Mendall and Coulter continued in their capacity as technical advisors to the State's Federal Aid Program.

The regular service was maintained to the general public and to the State Game Wardens.

A considerable number of lectures was given to sportsmen's, civic, and educational groups. All members of the Unit staff participated in this work.

Unit personnel assisted in the annual State Game Warden School in Augusta. Lectures were given on three days of the School by Mendall, Coulter, Haseltine, and Rearden.

Dr. Kutz conducted the regular wildlife seminar and the undergraduate courses in game management and conservation.

The Unit was well represented at the Northeastern Game Conference, held in February at Syracuse, New York. Coulter, Haseltine, Rearden, Benson, and Peppard were in attendance.

Mendall attended the North American Wildlife Conference and the Unit Leaders' Meetings held in San Francisco, California in March. Following these meetings he spent five days inspecting big game and waterfowl areas in California and Utah, and in visiting the Utah Unit.

#### PERSONNEL CHANGES

In February a new Graduate Student, J. William Peppard was added to the Unit personnel. Peppard was graduated from the University of

Maine in 1949 specializing in Zoology and Wildlife. Following a semester as a special student he was admitted to the Graduate School at the start of the current semester. He has been assigned to the waterfowl project.

Respectfully submitted,

*Howard L. Mendall*

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April 11, 1950

(NOT FOR PUBLICATION)



MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

Quarterly Report

April-June, 1950

RESEARCH PROJECTS

MUSKRAT MANAGEMENT

Objectives: A study of life history and environmental factors leading to management recommendations.

Assignment: Malcolm W. Coulter, Assistant Leader

Coulter conducted the regular spring muskrat studies to determine population conditions. During this work, several litters were examined and the young ear-tagged.

The status of the breeding population of muskrats on various areas was evaluated whenever possible. As would be expected, in view of the closed season in effect since July 1949, most areas showed some improvement, although many still appear to be underpopulated.

Intensive checks of the breeding population were conducted on two areas, for the fifth consecutive year. The population at the Davis-Holbrook marshes has almost doubled over last year. An estimated 56-60 animals were believed present during the early June check. This is in contrast to 19 animals in 1946, 17 in 1947, 19 in 1948 and 30 in 1949. In addition to the animals noted on the study area several small marshy coves adjacent to the study unit also supported scattered muskrats. Many of these sites have been unoccupied during the spring checks of previous seasons. At Mattanawcook Lake where no breeding animals were tallied last season, an estimated two pairs were found this spring.

General surveys were made of several other marshes. The status of the muskrat population was evaluated on the basis of the amount of sign present with consideration to the quality and quantity of habitat. The results of these surveys are summarized in the following table:

Area	Town	County	Status of Breeding Population
Pushaw Stream	West Old Town	Penobscot	Fair
Penobscot River	North Lincoln	Penobscot	Fair
Penobscot River	South Lincoln	Penobscot	Good
Mattawamkeag River	Kingman & Drew	Penobscot	Fair
Mud Pond	Drew	Penobscot	Fair
Mud Pond Brook	Drew	Penobscot	Fair
Mattagodus Stream	Kingman	Penobscot	Good
Goose River	Swanville & Belfast	Waldo	Poor
Corinna Stream	Corinna	Penobscot	Poor
Wilson Stream	Farmington & Chesterville	Franklin	Good
Sandy Stream	Lexington & New Portland	Somerset	Good
Gilman Pond	Lexington	Somerset	Fair

ECOLOGY OF THE BEAVER (Summary of Final Report)

- Objectives:
1. To determine the rate of utilization by beaver of available woody plants.
  2. To determine effects of beaver flowages to streams and adjacent areas.
  3. To determine size and composition of beaver colonies in relation to the number of lodges, dens and other sign.

Assignment: Frank T. Haseltine, Graduate Assistant

The rate at which woody plants were utilized during a three year period was determined on two beaver colonies in Maine. These and other colonies were live-trapped and the animals weighed, measured, sexed, and ear-tagged in order to determine colony composition and movements of transplanted beaver. The carcasses of all tagged beaver taken for fur by trappers were collected during the 1950 trapping season. These were used to check on the accuracy of the previous sex determinations. The skulls were cleaned and measured to aid in determining the age of the animals. The conclusions resulting from this study are given below.

1. Colony Composition

a. With one exception, beaver colonies trapped in the fall were found to contain three age classes, if the colony had been active three or more years. The age classes were young of the year, year-old beaver, and adult beaver.

2. Movement

a. Beaver move the entire family when moving to a new location.

b. Transplanted beaver of the same colony rejoined their family even when released at intervals of several days.

c. The longest recorded movement of a tagged individual was 2.5 miles by water.

3. Plant Utilization

a. There was no observed increase in the rate of woody plant utilization as the colony population increased beyond the original pair.

b. Aspen, red maple, and alder were the leading species utilized.

c. Alder was cut the most often but was used largely for lodge and dam construction.

d. Aspen was the preferred woody plant with maple a second choice. These species were used primarily for food.

e. The preferred foods were cut in the order of accessibility, i.e., those which were in the open and nearest to the water were cut before those that were away from the water and surrounded by other plants.

#### 4. Techniques

a. The product of the length and breadth of the scaly portion of the tail was found to be the best measurement to use for aging the beaver.

b. Sexing of yearling and kit beaver through the cloacal opening was found to be impractical.

c. If sufficient fresh water and food is provided beaver can be kept for two weeks or more in holding pens.

d. Ear-tags of the monel metal locking type, style 1005, size no. 1 fingerling fish tags were found satisfactory.

e. The longest record of an ear-tag staying in place was 154 days. No evidence of any tags being lost was obtained.

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The foregoing is a summary of Graduate Assistant Haseltine's thesis. Haseltine completed all graduate requirements in June and was awarded the Master's degree in Wildlife Conservation.

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#### WATERFOWL DISTRIBUTION AND MANAGEMENT

Objectives: To obtain all possible data on the abundance, distribution, and migration of waterfowl species in Maine; and to conduct research that will assist in the management of the important species breeding in Maine, especially the ring-necked duck and the black duck.

Assignment: Howard L. Mendall, Leader

During the quarter Mendall devoted nearly half time to obtaining the annual migration and pre-breeding season census data, and to conducting the nesting productivity studies. Much assistance was given by other members of the Unit staff. Coulter and Benson handled that phase dealing with hole-nesting ducks and assisted in censusing and nest hunting on many of the study areas; Haseltine and Peppard were in charge of the Goose River and Corinna areas, respectively; and Rearden assisted on the Washington County areas.

#### Waterfowl Populations

As of June 25, approximately 80 per cent coverage had been obtained on the Unit's census areas. Since the most important ones were surveyed first it is not likely that final figures will show a great deal of variation from those herein presented.

Populations

The status of breeding waterfowl in Maine continues at a relatively favorable level. Although no appreciable change is indicated from last year, it will be recalled that the 1949 population was very satisfactory. Only the goldeneye shows a decrease this year. The heavy gain indicated for the blue-winged teal might be misleading unless it is borne in mind, that both species of teal are not very common breeders in Maine in any year; hence their status, as shown by Maine data, is of little significance. The increase for the black duck - though slight - is significant in view of the fact that 1950 thus marks the fourth consecutive year that this important species has registered a gain.

The 1950 populations of the six breeding species of ducks, exclusive of mergansers, is estimated as follows:

<u>Species</u>	<u>Status as compared with 1949</u>
Blue-Winged Teal	50% increase
Black Duck	5% increase
Ring-necked Duck	No change
Wood Duck	No change
Green-winged Teal	No change
American Goldeneye	10% decrease

General Breeding Conditions

The spring season was somewhat retarded from the average in Maine this year and greatly retarded from 1949. The break-up of ice in the principal waterfowl breeding areas of the State took place from 6 to 15 days later than a year ago, and the migration, as well as nesting, was correspondingly later. This fact proved to be very desirable, however, for heavy floods occurred from April 21-23 which, under normal conditions, would have caused serious nesting losses to black ducks. As it was, very few ducks had started to nest at the time of the flood. Therefore the only noticeable effect of the spring climatic conditions has been a retarded nesting season for the early breeding species -- black ducks, wood ducks, and goldeneyes. The late breeding birds (ring-necks and the two teal) nested at about average times.

An excellent breeding season is indicated to date. Following the April flood, precipitation has been light, and water levels have remained good, showing a steady, slight decline with no sudden fluctuations. Clutch sizes have been large and nest losses less than usual. Although many of the 90 nests under observation have not hatched at the time of this writing, predation to date has been considerably under that of last year. It has been noted in previous years that early nesting often coincides with heavy predation so it may well be that the backward spring of 1950 has been of considerable benefit to the birds.

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During the coming quarter the population studies will be continued. All nests will be kept under observation until hatched or destroyed. Sample brood counts will be made to assist in evaluating the season's productivity.

WOODCOCK RESEARCH

Sub-project: Woodcock Cover Utilization (Summary of Final Report)

Objectives: To determine the seasonal utilization by woodcock of the cover improvement practices carried out on the Moosehorn National Wildlife Refuge.

Assignment: Jim D. Rearden, Graduate Assistant

An investigation was made of improved woodcock covers on the Moosehorn National Wildlife Refuge in the fall of 1948, the spring, summer and fall of 1949, and the spring of 1950.

The improved covers are areas where the old growth vegetation was cut in order to encourage the establishment of young hardwood stands that are favored by woodcock in eastern Maine.

Five divisions of cover types were established for the improved areas as follows:

1. pure alder
2. mixed growth, with alder predominating
3. pure hardwood
4. mixed hard and softwood, softwood predominating
5. mixed hard and softwood, hardwood predominating

In addition, the improved areas were classified according to thick, medium, thin, and open, which are the relative terms employed. Relative moisture content of a cover was expressed as lowland, intermediate, and upland.

A sample was selected for intensive study, and a bird dog was used to find the woodcock. Number of birds flushed in each type, in addition to recorded woodcock sign, constituted the basis for determining cover usage. Undeveloped covers immediately adjacent to the improved areas were used as control plots.

The following conclusions were reached from the study:

(1) In the breeding season (April 15 to July 15) the preferred type was hardwood, with alder as second choice. In the summer (July 15 to September 15) preferred cover was alder, with hardwood as next choice. During early fall (September 15 to October 15) preferred covers were pure alder, with hardwood and mixed hard and softwood as second choices. In late fall preference was more strongly for alder than in any previous season, with hardwood a poor second choice by the birds.

(2) A preference for the usage of the improved covers was exhibited by woodcock. Male birds utilized the openings of the developed covers extensively for singing grounds, and young woodcock were found to use the managed areas much more extensively than the nearby unimproved cover. During the molting period of summer when woodcock are difficult to find,

the only birds that could be located on the refuge were in the developed areas. Heavy usage was also made of these covers during the fall months.

(3) It seems apparent that the strip cuttings in the Moosehorn and Mahar valleys have been much more effective than either the stumpage cuttings or strip cuttings in upland dry areas. Since there still remain many undeveloped lowland and intermediate covers on the refuge, it would appear advisable that such areas within the refuge be given preference in the future woodcock management program.

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The foregoing is a summary of Graduate Assistant Rearden's thesis. Rearden completed all graduate requirements in June and was awarded the Master's degree in Wildlife Conservation.

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Sub-project: Census study of woodcock

Objectives: To take an annual census on the Unit's permanent census areas in Maine; and to correlate census results of cooperators through the northeastern states.

Assignment: Howard L. Mendall, Leader

From mid-April through May, Mendall carried out the annual woodcock studies. Data were obtained as usual on the Unit's regular areas in central and eastern Maine, this being the 14th consecutive year Unit personnel have conducted such investigations. In addition, the results from the cooperator areas in other parts of the New England states and New York were analyzed and tabulated. The number of these cooperator areas has now reached 51, and good coverage is being obtained throughout most of the northeastern states.

Since a complete report on the 1950 census studies has been presented previously, only the summary of that report will be repeated at this time. The figures given refer to the number of occupied woodcock "singing grounds" recorded.

#### Summary

The following tabulation shows, in condensed form, the totals by states on all census areas:

State	1949 Total	1950 Total
Maine	197	211
New Hampshire	12	11
Vermont	117	100
Massachusetts	63	72
Connecticut	53	44
New York	122	134
Grand Total	564	572

From these data it may be concluded that the status of breeding woodcock in northeastern United States was virtually unchanged in 1950 from a year ago, with a very slight gain recorded. Thus, a favorable population trend has been maintained for three consecutive years.

As is usually the case each year, considerable local fluctuation occurred. Throughout eastern Maine as a whole the population showed little change, due largely to the fact that a decrease occurred on the Moosehorn Refuge for the second straight year; it may be that a saturation point has been reached on the portion of the refuge that was developed for woodcock several years ago. In northern, western, and southern Maine, substantial increases were observed. Massachusetts had an increase on most of the census areas and a very heavy increase at Newburyport; only the Leverett area in Franklin County had fewer birds. In New York, substantial gains occurred in Albany, Rensselaer, Jefferson and Chenango counties, with the State as a whole presenting a satisfactory outlook. Connecticut's losses were most noticeable in Tolland County. Favorable woodcock populations were found throughout most of Vermont except in Rutland County where a heavy decrease was evident; the State as a whole showed a decrease. New Hampshire recorded a slight loss.

It was of interest to note that, except for Massachusetts and New York - where gains were registered both years, the various state population trends of 1950 showed the reverse of 1949; that is, those states recording increases a year ago had decreases this year, and vice versa. This well illustrates the need for as many census areas as possible in each of the states of the northeast in order to establish reasonably accurate annual trends.

MISCELLANEOUS STUDIES

Growth and Spawning of the Sea Scallop

Graduate Student Walter Welch completed all work on his thesis and was awarded the Master's degree in Wildlife Conservation in June. This study was under the immediate supervision of the staff of the Zoology Department. The thesis was entitled: "Growth and Spawning Characteristics of the Sea Scallop, Placopecten magellanicus (Gmelin), in Maine Waters." The thesis summary is as follows:

1. Anatomical studies of Placopecten magellanicus agree with previous investigations, except that a crystalline style is demonstrated, although it occurs only in fresh specimens.

2. In commercial fishing, ring mesh size of the dredge affects the relative frequency of the various size classes caught. Of all scallops dredged, 97.7 per cent are commercially usable. Skewed size frequency curves from commercial beds may indicate overfishing. Low frequency collections, ranging from 133 to 183 in number, were reliable samples of the part of the population subject to being taken by dredge.

3. Growth is most rapid during the first five years and slows down a great deal after the seventh. The present commercial minimum size limit, purely voluntary, of about 80 millimeters, is reached between the third and fourth winters. Ages through seven years comprised 60.8 per cent of the commercial catch, and ages through five years comprised 38.8 per cent. The maximum age is well over 19 years. There is no indication of great variations in growth having occurred in the past 10 to 15 years.

4. In 1948, spawning occurred during August and early September. Macroscopic, microscopic and statistical studies of gonadal changes indicate that gametogenesis begins immediately after the spawning period. Although the minimum size and age for spawning is not definitely known, well-developed gonads appeared in sizes down to 60 millimeters, a size which is attained during the third summer. Most scallops mature prior to the fourth winter, at about 80 millimeters. These latter, taken commercially, are lost to the breeding stock after one spawning. The sex ratio is 0.9 females per male.

5. Two hundred and fifty tagged and released scallops yielded 5.2 per cent recoveries. The only conclusive movement was from shallow into deeper water.

6. Dredging caused little harm to the population through the unused few that are brought to the surface, but effects on the bottom population are not known. Harmful organisms are: the arctic rock borer, Saxicava arctica; the boring sponge, Cliona celata; and the starfish, Asterias vulgaris.

7. The commercial catch per unit of effort on four beds ranged from 0.22 to 0.40 gallons for every 10,000 cubic feet of bottom dredged per hour and gave an approximate indication of abundance. Variables influencing this relationship are: type of gear, type of bottom, experience of crew

and time of season. On six beds, the average area dredged to obtain a single commercial sized scallop ranged from 182.4 to 364.8 square feet.

8. It is recommended that:

- a. A four inch minimum law, enforced by regulation of dredge ring mesh size be seriously considered.
- b. The present open season be continued.
- c. Scallopers be urged to destroy all starfish dredged.
- d. An intensive study of one bed be made over a full year period.
- e. Further studies be made to include catch per unit of effort, age and growth, migration, early developmental stages, mortality and hydrographic characteristics of scallop beds.

#### FISHER STUDY (Under the supervision of Assistant Leader Coulter)

The carcasses of fisher collected last winter were examined for parasites after the intestinal and reproductive tracts were removed. A summary of the carcass data was presented in the last quarterly report. Since then Dr. Marvin C. Meyer of the Zoology Department has submitted a report concerning parasites found in the thirty-six carcasses that were examined. Fourteen specimens were negative, 18 contained cestodes, Mesocestoides sp., 5 disclosed nematodes, and 1 digenea, Alaria sp. More specific determinations will be attempted later.

A questionnaire sent to fisher trappers resulted in additional information on trapping success, baits, and location of catches. Losses through footing amounted to 18 per cent or approximately 1 animal for every 5 taken successfully. How accurately trappers reported losses through footing is unknown, but it is felt that the answers to this question probably represent the minimum loss.

An analysis of the distribution of the catch shows that some animals were taken in localities from which they have long been absent. In the event that another fisher season is established, special consideration should be given to these areas. The fisher has demonstrated its ability to come back and to become reestablished in many areas - some relatively close to settlement or logging areas.

During the quarter some time was devoted to measuring skulls with the objective of aging the specimens. This work is not yet complete.

#### COOPERATION AND EDUCATIONAL WORK

Mendall and Coulter continued in their capacity as technical advisers to the State's Federal Aid program.

The usual service was rendered to the general public and to State game wardens in answering inquiries, giving professional advice, performing autopsies, and identifying specimens.

PERSONNEL CHANGES

A number of personnel changes took place during the quarter.

Dr. H. L. Kutz, Assistant Professor of Game Management, and Unit Collaborator, resigned his position effective June 30. Dr. Kutz left the University of Maine to return to Norwich University as Acting Head of the Zoology Department.

Graduate Assistant Frank Haseltine satisfactorily completed his graduate program and is now employed as Biologist with the Vermont Fish and Game Service. He is in charge of the fur research project there.

Graduate Assistant Jim Rearden satisfactorily completed his graduate program and is now employed as Assistant Leader of the new Alaska Unit.

Graduate Student Denis Benson completed his year in residence at the Unit and has returned to his position as Chief Biologist of the Nova Scotia Game Department. He will conduct his thesis on big game in Nova Scotia.

Respectfully submitted,

*Howard L. Mendall*

Howard L. Mendall, Leader  
Maine Cooperative Wildlife  
Research Unit

University of Maine  
Orono, Maine  
July 30, 1950

(NOT FOR PUBLICATION)

Office Paper

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MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

University of Maine

Orono, Maine

QUARTERLY REPORT

July-September, 1950

Cooperating Agencies

Maine Department of Inland Fisheries and Game  
Wildlife Management Institute  
University of Maine  
United States Fish and Wildlife Service

Unit Personnel

Leader -- Howard L. Mendall  
Assistant Leader -- Malcolm W. Coulter  
University Representative -- Prof. Robert I. Ashman  
Faculty Collaborator -- Prof. Horace Quick  
Graduate Assistant -- Robert D. Hyers  
Graduate Students -- Frederick C. Dean  
                            William R. Nicholson  
                            J. William Peppard  
Clerk -- Maxine L. Horne

MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

Quarterly Report

July-September, 1950

RESEARCH PROJECTS

WATERFOWL DISTRIBUTION AND MANAGEMENT

Objectives: To obtain all possible data on the abundance, distribution, and migration of waterfowl species in Maine; and to conduct research that will assist in the management of the important species breeding in Maine, especially the ring-necked duck and the black duck.

Assignment: Howard L. Mendall, Leader

During the quarter, Mendall completed the annual population and breeding studies, as described in the last quarterly report. Coulter and Peppard assisted in these studies.

Breeding Populations - 1950

Final compilation of the census data showed a few changes from the estimates previously given. Several species showed additional slight gains, especially the wood duck. This was particularly pleasing, coming on top of the heavy gain recorded for the species a year ago. Wood ducks appear to be making a good recovery in Maine from their precarious position of 1945-1947. The increases noted for the black duck and ring-neck (even though of little significance in the case of the latter) were of importance since this marked the fourth consecutive year the two species have shown an increase. The slight gain made a year ago by the goldeneye was more than offset by the 10% decrease of 1950. Breeding goldeneyes now appear to be at the lowest level in the State that they have reached at any time during the past 14 years.

Final census figures for 1950 are presented in the following tabulation for the six breeding species of ducks, excluding mergansers.

<u>Species</u>	<u>Status in 1950</u>
Blue-winged Teal	50% increase
Black Duck	7% increase
Wood Duck	6% increase
Ring-necked Duck	1% increase
Green-winged Teal	No change
American Goldeneye	10% decrease

The Nesting Season

During the sample nesting study, a total of 92 nests was located; 85 of these were of three species - ring-necked duck, black duck, and wood duck.

Periodic checks were kept of 89 of the nests until hatched or destroyed. Hatching success was 74 per cent (66 nests). This represents the highest hatching rate recorded at any time during the 14 years of the Unit's waterfowl program.

Flood losses were of little significance, accounting for only 3 of the 23 nest losses, and were all confined to one marsh in eastern Maine. Predation was lighter than a year ago and was caused primarily by the mink, raccoon, and crow. Few losses occurred from the activity of the red fox this year, in contrast to the situation of 1949.

### The Brood Season

It was explained in the last quarterly report that hatching peaks were later than in 1949, and this, together with higher water levels resulted in fewer broods being recorded during the time available for checking. A total of 176 broods, where complete counts were believed made, were classified on an age basis. The average size of 46 Class III broods (birds at or approaching the flying stage) was 5.6 young per brood. This was nearly equal to the record high of 1949 and was considerably above the long-term average.

In conclusion, it appeared that Maine's breeding waterfowl as a whole had enjoyed an unusually successful breeding season.

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During the coming quarter the Unit's waterfowl studies will be centered on the fall migration and the compiling of hunters' bag check data.

Sub-project: Waterfowl Ecology of Corinna Stream

Objectives: A study of the ecology of migratory and resident waterfowl in a cat-tail marsh in central Maine.

Assignment: J. William Peppard, Graduate Student

For many years Corinna Stream in western Penobscot County constituted one of the most important waterfowl breeding marshes in the State. In more recent times increased settlement, boating activity, excessive water fluctuations, and heavy industrial pollution have had a decidedly adverse effect on ducks and muskrats. However, in spite of a rather unfavorable environment, the breeding waterfowl population has remained higher than might be expected; moreover, heavy migratory flights still occur there and the area has an unusually high population of rails and shorebirds. Although several Unit studies have been carried out at Corinna in the past, none has related specifically to waterfowl. Accordingly it seemed appropriate to conduct an ecological study there; this was assigned to Graduate Student Peppard.

\*\*\*\*\*

The spring migration reached its peak on or about May 1, 1950 with a total of approximately 200 ducks on the area. The species represented were black ducks, wood ducks, ring-necks, green-winged teal, blue-winged teal, goldeneyes, buffleheads, and ruddies as well as both the American and hooded mergansers.

Early in May breeding activities were observed among the early-nesting ducks and consequently nest hunting was started and carried on until the end of June. The first three weeks in July were devoted to trapping snapping turtles, and observing broods and brood activities on the area. Then, in order to obtain a more complete knowledge of the use of the area by waterfowl, brood checks were made at several other areas surrounding the marsh at an extreme radius of 10 miles. Eventually these same areas were checked by air for population data through the courtesy of the Maine Department of Inland Fisheries and Game, making use of the State research plane. Flights were made at weekly intervals, depending on the weather and availability of the plane, until the opening of the hunting season in October. It is hoped that these flights may be continued between the split hunting season as long as the marshes remain free of ice.

#### RACCOON RESEARCH

**Objectives:** To obtain life history data on the raccoon especially as related to the sweet corn interests in central Maine.

**Assignment:** J. William Peppard, Graduate Student

This a new, short term project initiated in July. To date Peppard's work has dealt largely with live-trapping animals and in obtaining carcasses for subsequent laboratory study. A total of 18 animals were live-trapped, tagged and released; the carcasses of 15 raccoons were obtained.

All of the 18 individuals tagged and released were weighed and sexed in order to obtain data on the growth and movement of the raccoons. The weights and sex ratios are as follows:

10 adults (6 males and 4 females)	from 12 to 20 lbs., averaged 14.5 lbs.
8 young (5 males and 3 females)	from 2 to 7 lbs., averaged 4.5 lbs.

Raccoons were captured for tagging purposes after they were treed by a hound. Then a wire noose were placed around the raccoon's neck and the animal was lowered to the ground. The animals then were sexed, weighed, and tagged by placing them into a wire mesh live-trap where they could be conveniently examined. Monel metal fingerling fish tags, size No. 1, were placed in each ear.

All of these animals were captured and released in central Maine, in one of the State's sweet corn belts. The area is characterized by gentle rolling farm lands dispersed with second growth timber and containing numerous small streams, marshes and lakes.

According to previous reports, raccoon damage to sweet corn is extensive in this region. Some time was devoted to an examination of corn fields with local wardens and also in conferring with corn farmers.

Generally speaking, raccoons do not eat corn until it is ripe or nearly so. Their habits in a corn field consist of picking an ear, husking it, and eating every kernel. Sometimes they eat it in the field, or at other times they may retreat to a stonewall or to the edge of the woods.

In sharp contrast, it was found that porcupines start eating corn when it is still far from ripe and continue to do so until it is harvested. Also, the porcupines climb and break the stalks down, and when feeding on an ear they eat through the husk, kernels, and some of the cob. They seldom clean an ear, but more often nibble on one, and then go to another.

Thus, until further information is obtained, it appears as though porcupines do more damage to corn than the raccoons. They cause this by the breaking of many stalks and by not completely utilizing each ear of corn.

This particular situation poses a problem of financial interest, in light of the above, since the State pays farmers for raccoon damage to corn, but not for porcupine damage.

From the 15 dead specimens the weights and sex ratios were obtained as follows:

6 adults (4 males and 2 females)	averaged 16.1 lbs.
9 young (4 males and 5 females)	averaged 7.6 lbs.

The skulls, digestive tracts, and reproductive organs were saved and preserved for further analysis. Some time has been spent making contacts with local raccoon hunters and it is hoped that the hunting season will make many more specimens available.

During the coming quarter Peppard will concentrate on obtaining as many carcasses as possible for the collection of skulls, digestive tracts, and reproductive organs.

## MISCELLANEOUS STUDIES

### Banding

At various times during late July and early August Unit personnel under Coulter's direction attempted "drives" of ring-necked duck broods for banding purposes. Part of the drives were conducted in cooperation with Atlantic Flyway Biologist, C. E. Addy. They were carried out at areas in eastern and central Maine in marshes where ring-neck broods were numerous.

These drives were conducted by attempting to herd broods into an enclosure made of netting staked to the bottom and extending 12 to 18 inches

above the water. The design of the enclosure, or trap, was varied during different trials, but the style that showed the greatest promise was approximately 20 feet long and 3 feet wide. Long leads, also made of netting, were run in the form of a wide "V" out into the marsh or lake to help guide the birds to the entrance of the trap. An extra piece of net was provided to close the entrance once birds were within it.

Most of the trials were unsuccessful, but they did yield information that should be of assistance in future work another year. A total of 21 ring-necks and 8 blue-winged teal was obtained.

From August 20 to September 30, Coulter devoted full time to running the Unit's regular waterfowl banding station on the Penobscot River. Seven traps were in operation on the islands between Howland and Lincoln. In addition, a special allotment of funds was made to the Unit by the Fish and Wildlife Service to enable the banding work to be expanded; this permitted the establishment of six new traps near Passadumkeag, slightly below the regular area. For the early part of the banding period a full time field assistant, Robert W. Fuller who is a Senior student in wildlife, was hired to work at Passadumkeag under Coulter's supervision. Graduate Assistant Hyers handled the Passadumkeag traps during the latter part of banding.

Pre-baiting of banding sites was carried out by Coulter again this year. This, together with the expanded coverage of the river, enabled a record number of ducks to be banded in spite of less favorable water levels and an earlier departure of resident birds. A total of 728 birds was tagged. The breakdown by species was: wood duck - 410, black duck - 302, blue-winged teal - 10, mallard - 3, green-winged teal - 2, and hooded merganser - 1. In addition to banding the birds, many valuable data were obtained on molting and plumage changes; 50 of the black ducks also were color-marked with white paint before being released.

#### Snapping Turtle - Waterfowl Relationships

During the summer of 1949 preliminary studies of snapping turtle - waterfowl relationships were initiated. Data concerning this work were presented in previous quarterly reports. Briefly, 35 snapping turtles were taken, 13 of which contained definite bird remains and including 10 ducks and 5 pied-billed grebes. In view of last year's interesting results, plans were made to conduct more intensive work this past summer. The study was under Coulter's supervision and resulted in the capture of 87 specimens. In this connection, Peppard conducted or assisted with much of the trapping.

Turtle trapping was confined to two areas believed to have rather high snapping turtle populations and known to support high populations of breeding waterfowl. The Corinna Stream area, located in central Maine yielded 33 turtles during last year's work. Seventy-three turtles were taken there this summer. Fourteen specimens were collected at the Pocamoonsshine area in extreme eastern Maine. Trapping was conducted between June 29 and July 30. During this period several species and age classes of ducklings were abundant on each area trapped.

The combined take of snapping turtles for the two seasons from Corinna is especially interesting. This marshy stream is heavily polluted with industrial and domestic wastes. Only a small portion of the stream was trapped - a section approximately 1 mile long and varying from 100 to 300 yards in width. Average water depths are 3 to 4 feet. The bottom is overlaid with deep deposits of mill wastes and organic material. A total of 106 snapping turtles was taken there during the two seasons. These specimens ranged from 3 to 46 pounds in weight and totaled 2103 pounds. At the close of trapping on that area turtles were still being taken regularly; the last 4 days of trapping (44 trap nights) yielded 12 specimens. Despite the large number of turtles taken there, it is uncommon to see the reptiles when cruising the water.

Results in eastern Maine were again disappointing. In contrast to the Corinna area, snapping turtles are frequently seen on the Pocamooshine waters. Yet only 14 specimens were collected there despite intensive trapping efforts. Last year's success was low in several other areas in eastern Maine as well, where 108 trap nights had yielded but 2 specimens.

The data for the 1950 trapping may be summarized as follows:

Corinna Stream

Sex	No.	%	Weight Range	Ave. Wt.	Total Wt.	Trapping Success	
						Trap nights per Turtle	
						Nets	Set lines
♂	45	61.6	3 to 46 lbs.	24 lbs.	1095 lbs.	3.8	17
♀	28	38.4	5 to 22 lbs.	13 lbs.	372 lbs.		
Total	73	100.0	3 to 46 lbs.	20 lbs.	1467 lbs.		

Pocamooshine Area

Sex	No.	%	Weight Range	Ave. Wt.	Total Wt.	Trapping Success	
						Trap nights per Turtle	
						Nets	Set lines
♂	8	57.1	8 1/2 to 37 lbs.	17 lbs.	138 1/2 lbs.	14.8	63
♀	6	42.9	9 to 23 lbs.	15 lbs.	90 lbs.		
Total	14	100.0	8 1/2 to 37 lbs.	16 lbs.	288 1/2 lbs.		

Combined Data

Sex	No.	%	Weight Range	Ave. Wt.	Total Wt.	Trapping Success	
						Nets	Trap nights per Turtle Set lines
♂	53	60.9	3 to 46 lbs.	23 lbs.	1233 1/2lbs.	5.5	24.8
♀	34	39.1	5 to 23 lbs.	13 1/2 lbs.	462 lbs.		
Total	87	100.0	3 to 46 lbs.	19 1/2 lbs.	1894 1/2lbs.		

Of interest is the size range of the specimens. No female turtle weighing over 25 pounds has been taken during the two seasons, yet several males weighing over 30 and 40 pounds have been trapped. In general, the sex ratio favors males which made up about 60 per cent of the sample.

Several types of bait were tried. Freshwater fish, marine fish, canned sardines and turtle meat were used. Although there was not enough variation or sufficient trials to warrant conclusions, it was again evident in 1950 that fresh bait yielded the best results.

The entire gastro-intestinal tracts of all specimens have been preserved and will be analyzed during the winter. Moss samples, measurements, notes on the abundance and size of eggs in females and other data were also collected or recorded for each specimen.

COOPERATIVE AND EDUCATIONAL WORK

The usual service was rendered by Unit personnel as technical advisers to Maine's Federal Aid program. Coulter and Mendall participated in several conferences and inspection trips in connection with the State refuge development.

Because of the vacancy in the wildlife teaching staff, the Unit was requested to give assistance at the wildlife summer camp session. Coulter devoted several days to this work in July.

PERSONNEL CHANGES

The teaching vacancy caused by the resignation of Dr. Kutz was filled in September by the appointment of Horace F. Quick. Professor Quick recently completed residence requirements for his doctorate at the University of Michigan. He has had a wide range of experience in the wildlife field including teaching at Colorado A and M College, field research and management with the Fish and Wildlife Service, and fur research in northern British Columbia with the Wildlife Management Institute and the National Wildlife Federation.

The Unit Assistantship was filled in September by the appointment of Robert D. Hyers. Hyers is a graduate of Purdue in wildlife and forestry. His thesis study will be on upland game.

A new graduate student, William R. Nicholson, reported to the Unit in September. Nicholson is a graduate of Rutgers University where he majored in biology. His thesis study will be on waterfowl.

Another new graduate student, Frederick C. Dean, commenced his duties at the Unit September 1. Dean is a graduate of the University of Maine, majoring in wildlife. Dean's thesis will involve a cooperative investigation with the State's Federal Aid Division; it will consist, in part, of an evaluation of habitat changes during development of the State's refuges. Since Dean was approved for graduate study last spring he was able to initiate field work during the summer.

Respectfully submitted,

*Howard L. Mendall*

Howard L. Mendall, Leader  
Maine Cooperative Wildlife  
Research Unit

University of Maine  
Orono, Maine  
October 30, 1950

(NOT FOR PUBLICATION)

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Return to

MAINE COOPERATIVE WILDLIFE  
RESEARCH UNIT  
UNIVERSITY OF MAINE  
ORONO, MAINE

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MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

University of Maine

Orono, Maine

QUARTERLY REPORT

October-December, 1950

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Wildlife Management Institute  
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Faculty Collaborator - Prof. Horace Quick  
Graduate Assistant - Robert D. Hyers  
Graduate Students - Frederick C. Dean  
William R. Nicholson  
J. William Peppard

Clerk - Maxine L. Horne

# MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

## Quarterly Report

October-December, 1950

### RESEARCH PROJECTS

NOTE: As a result of several inquiries that have been received during the past year, it may be desirable to re-state the policy that has always been followed at the Maine Unit with respect to quarterly reports. Only those projects are listed upon which substantial progress was made during the particular three month period that is covered by the report. Several projects are seasonal and thus may be reported upon only once or twice during the course of a year. In addition to projects discussed in the present report, the Maine Unit is maintaining active projects during the current fiscal year on the ruffed grouse, pheasant, woodcock, fisher, raccoon, and snapping turtle.

### MUSKRAT MANAGEMENT

**Objectives:** A study of life history and environmental factors leading to management recommendations.

**Assignment:** Malcolm W. Coulter, Assistant Leader

During November, Coulter devoted considerable time to field work in connection with the muskrat trapping season. He was given assistance by Peppard and Dean. The fall season, consisting of the month of November, was the first open season on muskrats in Maine since the spring of 1949. It also represented the first straight fall season in many years (as opposed to a spring trapping period or a combination of autumn and spring trapping). Unit personnel accompanied trappers on their lines, inspected catches, and examined pelts. A few selected trappers also cooperated by keeping daily records of their activities.

November was unusually warm and wet. At some weather stations precipitation for the month approached the all-time record. The first two weeks presented ideal conditions for muskrat trapping. Heavy rain during November 4 and 5 caused water levels to rise sharply in many areas and trappers lost a day or so at this time. However, at some areas the higher water levels gave trappers access by boat to potholes and channels that were previously inaccessible. Commencing with November 21, flood conditions prevailed over a wide area of the State.

### Trapping Pressure

Trapping pressure was not as heavy this fall in most areas as during previous years in the spring. Many who might have trapped muskrats devoted their time to mink trapping, guiding, and other seasonal work. At 9 areas for which data are available, 12 muskrat trappers were active, whereas 22-25 usually trapped these same marshes in past seasons. The lack of excessive competition was beneficial in that it was possible for trappers to cease their activities soon enough to leave reasonable breeding stock.

When competition is keen trappers are inclined to trap as long as any sign remains with the thought that if they do not catch as many muskrats as possible someone else will. This attitude, prevalent among trappers in past years, has been directly responsible for much of the overtrapping that has occurred.

#### Trapping Success

Trapping success was higher than usual with individual catches varying from 51 to 246 muskrats. Among 9 trappers where specific data were obtained a total of 1632 muskrats was taken, or an average of 181 animals per trapper. This is in contrast to averages of from 36 to 99 muskrats per trapper in the last few years of spring trapping.

A slightly longer period was required to make the harvest. For example, during the spring seasons of 1948 and 1949, over 90 per cent of the harvest was made in the first 10 days of trapping. This fall only about 60 per cent of the harvest was made by November 10. Most trappers were forced to cease activities during the period November 20 to 24 because of ice and high water.

#### Capture of Other Species

The spring season usually results in the capture of many ducks. In the past the take of waterfowl has varied from 1 duck per 13 muskrats to 1 duck per 21 muskrats. This season 9 ducks were taken during the trapping of 1090 muskrats, or a ratio of about 1 duck per 121 muskrats.

The lower incidence of ducks taken in muskrat sets is due in part to a difference in trapping methods. A large part of the autumn sets are at floating feed platforms or in runways. The majority of the spring sets are on floating logs and planks. The latter sites are more frequently used as loafing spots by ducks. In addition, wood ducks, common during the spring and frequently taken in muskrat traps at that time, are not common during November in many sections of Maine.

Other animals that were taken occasionally in muskrat traps this fall included woodcock, raccoon, mink, and snapping turtles.

#### Number of Kits

It had been feared by many trappers that a fall season would result in a large proportion of kits in the catch. A special effort was made to gather specific data on this subject. Kits were regarded as animals which were so small and young that little or no guard hair was present; the skins were very thin and paper like. Such pelts are almost worthless. Of a total of 3508 pelts examined, seventy-two (approximately 2 per cent) were classified as kits. The low number of kits was surprising to all persons concerned with the muskrat harvest.

#### Pelt Damage

Pelt damage, resulting from fighting or strife among the animals, varied from 5.3 per cent to 16.5 per cent on different areas. The average

was 7.4 per cent among 1078 pelts. Most of this damage was slight, that is, it resulted in holes less than one square inch in area. Pelt damage during spring seasons varied from about 14 per cent during early April to around 40 per cent in late April.

### Pelt Prices

The average price paid for pelts from central and eastern Maine was about \$1.70. Individual lots sold from \$1.50 to \$1.75. Some groups of pelts, selected from individual catches sold for slightly higher prices. Prices paid to trappers in northwestern Maine appeared to be somewhat lower, and some lots sold for \$1.32 per pelt.

### Sex and Age Ratios

Whenever possible, sex and age ratios were recorded by specific areas. In addition data were obtained for general regions of the State, based upon the examination of pelts at fur houses.

Considerable variation was evident in the sex and age ratios for individual areas. The age ratios in particular may reflect varying degrees of trapping pressure or differences in trapping methods.

The sex ratio for immature animals ranged from 114:100 (males:females) to 300:100 with a total of 1380 animals averaging 158:100; that for adults varied from 92:100 to 150:100 with 428 animals averaging 131:100. The age ratio of 1798 animals was 24 per cent adults to 76 per cent immatures.

### Productivity

Counts of placental scars or placental sites were attempted. Forty-two adult females with placental scars were examined. Counts of scars varied in individuals from 7 to 26. A total of 626 scars was counted, or an average of 14.9 per animal. The reliability and interpretation of placental scar counts in muskrats has not been determined, although the average obtained in this series closely agrees with other studies reported upon in the literature.

The ratio of adult females to immature animals may also have some value in interpreting productivity. These data were also recorded for specific areas as well as for sections represented in the purchase of several lots of pelts. The ratio of adult females to immature animals in the total sample of 1808 averaged 1:8.4.

No attempt can be made at the present time to appraise the fall season. It would not be possible to determine whether or not higher annual catches can be made and whether or not the total return to the trapper will be greater unless the present season is given a trial for at least 3 or 4 years.

Flood conditions during late November and December may make any accurate evaluation of breeding stock impossible this year. In some areas, especially Washington County, near-record flood crests prevailed. Floods, especially during periods of cold weather, are believed to cause considerable mortality among muskrats. Animals that are forced to vacate established sites

and attempt reestablishment elsewhere are often subject to greater predation. New sites established late in the season, under conditions of decreasing water levels, are also likely to prove unsuitable before the winter is over, thereby causing further mid-winter wandering. Previous studies have indicated that muskrats travelling during January, February, and early March are often victims of mortality. In the event that low populations are found in the winter checks it will be impossible to state that either the fall trapping or the flood was primarily responsible. However, at this time field observations and discussions with trappers seem to indicate that more animals were left at the close of trapping than at any time in the past 4 or 5 years.

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During the coming quarter, Coulter will conduct a few winter checks on the Unit's study areas. This work will not be as extensive as usual, because the annual house count censuses have been disrupted as a result of the late fall flood.

#### HABITAT CHANGES ON STATE REFUGES

**Objectives:** To obtain information on the environmental changes resulting from management practises that are being instigated on the newly acquired State game management areas; and to measure the responses of wildlife species, particularly waterfowl, to these ecological changes.

**Assignment:** Frederick C. Dean, Graduate Student

Although Dean initiated work on this new project during the previous quarter, insufficient progress had been made at that time to warrant a report. Throughout the past 3 months he has devoted considerable time to field work on several of the refuge areas. This study is being undertaken in cooperation with the State Federal Aid Division, and is being partly supported, financially, by that organization.

Dean has established sample plots to obtain data on vegetation changes as habitat improvement work is carried out, and also to determine seeding rates of aquatic plants. He also obtained information on waterfowl and muskrat usage of the newly flooded areas during the fall. It is planned to conduct the most intensive study at Ruffingham Meadows in Waldo County since the most striking environmental changes are expected to occur on that refuge. Supplementary data are being obtained at the Great Works, Scamman, Madawaska, and Chesterville refuges.

WATERFOWL DISTRIBUTION AND MANAGEMENT

Objectives: To obtain all possible data on the abundance, distribution, and migration of waterfowl species in Maine; and to conduct research that will assist in the management of the important species breeding in Maine, especially the ring-necked duck and the black duck.

Assignment: Howard L. Mendall, Leader

Throughout the quarter, Mendall devoted as much time as possible to the annual fall waterfowl investigations. Migration studies were conducted throughout the period. Considerable assistance was given by Peppard, who made weekly ground checks in the Nowport area and supplemented these with several aerial flights in the State Federal Aid plane. Coulter also assisted in gathering migration data in the Lincoln-Old Town section. During the hunting season, emphasis was placed on the bag check studies with the entire Unit staff participating. This phase of the project has been carried out for the past 3 years in cooperation with the Federal Aid Division of the State Department of Inland Fisheries and Game.

A special report covering the hunting season has recently been submitted by Mendall. Since this cannot be abstracted without loss of data, the entire report, even though of considerable length, is reproduced at this time.

THE 1950 WATERFOWL HUNTING SEASON IN MAINE

Waterfowl Populations

In spite of the fact that the 1950 breeding season in Maine had been the most successful in 14 years, the fall populations of ducks throughout the State were disappointingly low for many species. The unusual weather conditions that have characterized the past 4 seasons continued and were actually intensified. It was a summer and fall of extremes. The drought of late summer was nearly as severe as in 1947; fall temperatures were as high or higher as in the record-breaking year of 1948; as a climax, the drought was broken in November by heavy precipitation that reached flood proportions the last of the month and in early December.

The effect of the abnormal weather on waterfowl is difficult to measure but two features seemed to be quite apparent as based on ground checks and aerial surveys made throughout the period: (1) Possibly because of the prolonged drought of July, August, and September, a marked departure of birds from the interior of the State occurred prior to the opening of the hunting season - with the exception of the wood duck and ring-necked duck. (2) The unusually warm weather that prevailed in early autumn throughout eastern Canada greatly retarded the movement of northern birds into the State. Thus the pattern of the fall migration followed closely that of the last two years except that there was a much more marked departure of breeding birds from Maine during late summer. This departure was noted on some of the Unit study areas as early as mid-August and was unprecedented in the past 14 years.

As may be surmised, the relative abundance of waterfowl during the period of the two split hunting seasons was considerably less than at anytime in recent years. This is in direct contrast to the 1950 status of the breeding population which was very favorable, not merely in Maine but throughout most of the northeast as well. The breakdown by species, in comparison with 1949, of those on which sufficient data were gathered during October and November is as follows:

Increase - Canada Goose, wood duck, ring-necked duck

No change - Mallard, green-winged teal, greater scaup, lesser scaup, bufflehead, ruddy

Decrease - Black duck, pintail, blue-winged teal, goldeneye

Surveys do not include comparative data for the sea ducks. General observations, however, and reports of reliable individuals, indicate a continuation of the high populations of recent years among the eiders and old squaws. On the other hand, the scoters did not appear to be as numerous as in 1949.

A few explanations should be given in connection with the above listings. The three birds showing an increase exhibited very heavy gains. With the wood duck and ring-neck, this situation was in line with the favorable breeding season for these species. Moreover, these ducks remained on many of the breeding marshes throughout both drought and

flood conditions. It was obvious that whatever the climatic or unknown factors were that caused the departure of black ducks and teal, these did not affect wood ducks and ring-necks. Both species were still quite numerous on inland waters of eastern Maine in mid-November - long after their usual migration times.

It was likewise apparent that the factors that retarded the migration of northern black ducks and goldeneyes into Maine did not operate with the Canada Goose. The early flights of geese were the heaviest recorded in several years.

Although four species, including the important black duck, showed decreases over 1949, these were all slight except in the case of the goldeneye. It is doubtful if there were over half the goldeneye population that was present a year ago.

It should be understood that the foregoing discussion is not to be considered as representing the actual status of the ducks in Maine; it is merely a listing of the relative abundance of waterfowl during the two hunting periods.

#### The Hunting Season

For the fourth consecutive year, Maine sportsmen requested a split season. This year the periods were October 6-21 and November 24 to December 9. During this time the personnel of the Maine Unit again joined with the Federal Aid Division of the State Department of Inland Fisheries and Game in making a bag check of duck hunters. Supervision of Unit personnel was by the writer, while the State technicians were under the direction of John H. Maason, Jr. The following individuals participated in the study, although several of them worked only on opening days and Saturdays: for the Maine Unit - Walter Bisset, Jr., Malcolm Coulter, Frederick Dean, John Dudley, Robert Fuller, Robert Ryers, William Nicholson, J. William Peppard, and Howard Mendall; for the Federal Aid Division - George Aiken, Robert Bacon, Donald Dorr, Robert Dyer, Kenneth Hodgdon, Winfield Howe, John Hunt, Wilbur Libby, Douglas Marston, Richard Parks, Stephen Powell, and John Maason, Jr.

Each man was given training in identification, sexing, and aging prior to the opening of the hunting season. Most of the important waterfowl areas of the State were sampled, but because of physical limitations the largest and most accessible areas received greatest attention.

A total of 2403 hunters were personally contacted, which was 300 more than during the 1949 studies. These hunters had killed 2777 birds, a figure about 450 less than a year ago.

#### Hunting Success

Hunting conditions apparently were the poorest that they have been in many years. Although specific data through bag check studies are available for only four years, there seems little doubt but that it was

the most disappointing season in two decades. The writer has been studying migratory birds in Maine since 1932 and at no time since then, even during the "duck depression" of the mid-1930's, did the combination of low populations of birds, adverse water levels, and unfavorable hunting weather more effectively curtail the duck hunters' endeavors.

During the early season a marked scarcity of black ducks and teal prevailed at many of the large marshes through the interior of northern, eastern, and central Maine. Had it not been for the ring-necked duck and the wood duck in this general region (as pointed out in greater detail later), hunting would have been of little avail.

In the coastal belt, fairly good numbers of black ducks were present in the October season but "bluebird weather" kept them safely out of the gunners' reach during much of the period.

Only in Merrymeeting Bay and vicinity could the October hunting even be termed fair, and there, conditions were very poor for bagging ducks after the first few days of the season. By contrast, however, goose shooting in Merrymeeting Bay was better than average in the early season.

As disappointing as the October season had been, the late hunting period (November 24 - December 9) was worse. Aerial surveys showed at least 25 per cent more ducks in the State than in October but this fact was of little benefit to the hunters. Record-breaking mild weather kept inland waters open even into December and small flocks of birds were scattered throughout much of the State. On the coast the complete absence of winter conditions permitted the birds to scatter rather than to concentrate. Large numbers of goldeneyes, scaup, and black ducks remained rafted in open water for long periods of time - often around the off-shore ledges far from the hunting areas. When the birds were driven in-shore by storms, the latter were of near-hurricane intensity so again the hunters did not benefit. By the beginning of the last week of the season many hunters had given up their endeavors and had hung up their guns for the year.

As was the case in October, Merrymeeting Bay fared somewhat better than the remainder of Maine, as measured by hunting success data for the late season. Eastern Maine, including the important coastal gunning areas of Washington, Hancock, and Waldo Counties, had the poorest hunting conditions of any of the sections checked.

The compilation of the figures on hunting success is presented in table 1. The method of arriving at the figures should be explained as was done in the reports of previous years. If a man hunted part or all of both morning and afternoon he was credited with having hunted a full day. On the other hand, if he hunted part or all of either morning or afternoon, but not both, he was credited with only a half day. Since some of the studies conducted elsewhere are figured on a straight man day basis, comparison of those with the present data would indicate Maine hunters to be more successful than is actually the case, unless allowance is made for the method of recording. It should be further pointed out that conditions in Maine do not lend themselves to tabulating these data on a straight man day basis. With potential hunting areas scattered throughout

the State - even in the vicinity of urban sections - many factory workers, clerks, and farmers often are able to get into the marshes for an hour or so mornings or afternoons; and to classify such hunters on an equal basis with the gunners who are out all day does not seem logical.

Table 1

1950 Hunting Success

A. Tabulation of All Areas Combined

Period	No. of Hunters	Man Days Hunted	Ducks Bagged	Kill Per Man Day
October 6-21	1704	1226	2165	1.8
November 24- December 9	699	469	612	1.3
Both Periods	2403	1695	2777	1.6

By way of comparison the hunting success for both periods a year ago was 2.4, and in 1948 it was 2.0.

B. Tabulation by Periods and Areas

Area	Ducks bagged per man day	
	Early Period	Late Period
Southwestern Maine (Inland & Coastal)	1.3	1.4
Northern Maine (Inland)	1.4	--
Eastern Maine (Inland)	1.5	--
Eastern Maine (Coastal)	1.6	1.1
Central Maine (Inland)	1.8	--
Merrymeeting Bay	1.9	1.5

Crippling Loss

It was gratifying to note a slight reduction in the crippling loss this year. As based on 2680 birds bagged, 640 others were lost as cripples. The loss amounts to 24 per cent as compared with about 27 per cent in 1949. An analysis of the data reveal a situation similar to that of previous years with the heaviest loss being on opening day in central Maine (where much of the hunting is in cattail and flooded timber areas). The lightest losses occurred during the late season in the Bagaduce River areas of Hancock County, but were comparatively light in all sections (19 per cent) during this period.

Regardless of a slight improvement this year, the crippling loss in Maine appears to be unnecessarily high.

Bag Composition

The tabulated kill by species of the ducks that made up the hunters' bag is given in table 2. Sea ducks are excluded because it was impractical to obtain a representative sample of this very restricted type of hunting.

It has been pointed out in previous reports that Merrymeeting Bay is sampled somewhat heavier than the rest of the State during the bag check studies, because of its ease of coverage and the concentrations of hunters there. However, the sampling was in about the same proportions this year as in 1948 and 1949. With a few exceptions it is believed that table 2 constitutes a reasonably good picture of the importance of the various species to Maine hunters.

Table 2 - Kill by Species - 1950

(Exclusive of Sea Ducks)

Species	No. Killed Early Season	No. Killed Late Season	No. Killed Entire Period	Percent
Black Duck	1056	329	1385	49.9
Green-winged Teal	445	44	489	17.6
Wood Duck	196	--	196	7.1
Goldeneye	24	86	110	4.0
Ring-necked Duck	92	9	101	3.6
Blue-winged Teal	87	--	87	3.1
Greater Scaup	41	23	64	2.3
Canada Goose	41	19	60	2.2
Ruddy	53	4	57	2.1
Bufflehead	5	50	55	2.0
Mergansers (3 species)	36	17	53	1.9
Pintail	28	2	30	1.1
Mallard	22	4	26	0.9
Lesser Scaup	9	6	15	0.5
Baldpate	7	2	9	0.3
Black x Mallard Hybrid	4	--	4	0.1
Shoveler	1	--	1	0.05
Gadwall	1	--	1	0.05
Unidentified(*)	17	17	34	1.2
Totals	2165	612	2777	100.0

(\*) Includes birds which were plucked and dressed when examined.

The tabulated data present some very interesting aspects, particularly when viewed in the light of the relative abundance of each species and when compared with figures from previous years. The black duck and the green-winged teal headed the list for the third consecutive year. The importance of these two ducks seems clearly established.

Several species increased in importance in the bag this year to a rather surprising degree. The wood duck (ranking in fourth place last year) came up from 3.3 per cent to 7.1 per cent and exceeded the goldeneye in importance. The early season bag in central Maine found the wood duck even predominating over the black duck. Equally surprising was the rise in the ring-necked duck, the bag composition of which was more than trebled over last year. The bird came from 13th place at 1 per cent in 1949 to 5th place at 3.6 per cent in 1950 - thus ranking ahead of the blue-winged teal. In this connection, it is of interest to note the situation that existed in northeastern Maine. In the hunter checks of Aroostook and Washington counties, the ring-neck made up 43 per cent of the entire bag and exceeded the black duck by a considerable margin.

The importance this year of the wood duck and the ring-neck is in direct accord with the population data as previously discussed. Both species were present in greater numbers than in 1949 and they remained on the inland waters long after the black ducks and teal had departed. Duck hunters of Aroostook, Washington, Penobscot, and Somerset counties would have had a much more disappointing season than they did had it not been for these two birds.

Both species of teal showed slight increases in the bag this year, with the gain occurring in Merrymeeting Bay. Since teal were believed to be present in slightly less numbers than in 1949 it is probable that they were subjected to heavier gunning pressure this year because of fewer available black ducks.

The greater scaup occurred in similar numbers to 1949 yet the kill was doubled in 1950 and the species rose from 11th place to 7th place in the rating. The same explanation that was given for the teal probably holds true for the scaup, since it was in Merrymeeting Bay and, surprisingly enough, during the early season that the gain took place.

Merrymeeting Bay gunners, in particular, had cause for rejoicing in the goose kill. The proportion of Canada geese was doubled in the bag this year, in comparison with 1949, and the species came up from 11th to 8th place. Goose flights through Maine this fall were the heaviest in several years although few were bagged anywhere except in Merrymeeting Bay.

In contrast to the gains of the foregoing species, others showed losses. The most spectacular and most serious this year was recorded for the goldeneye, which ranked behind the wood duck. A year ago goldeneyes constituted almost 13 per cent of the bag but in 1950 they made up only 4 per cent. As previously pointed out, the birds were not only greatly reduced in numbers this fall but were widely scattered. This fact made for many disappointed hunters, since "whistler" shooting in December is held in high esteem by many coastal gunners of Washington, Hancock, and Lincoln Counties, and in the Casco Bay region. Moreover, as a result of

the lack of goldeneyes, the hunting pressure on the black duck probably was increased unduly.

The ruddy, pintail, and mallard were the principal remaining species that were decreased in the bag composition. Of these, the pintail showed the heaviest decline, dropping from 3 per cent in 1949 to slightly over 1 per cent this year. The pintail, which had exhibited a substantial population increase as a migrant in 1949 was observed in very limited numbers in 1950.

#### Sex and Age Ratios

During the course of the bag inspections a total of 2777 birds was examined. Of this number, 2075 were sexed and aged. These data are presented for the leading species in tables 3,4, and 5.

It has been explained in the 1948 and 1949 reports that conditions in Merrymeeting Bay warrant a separate tabulation of sex and age data during the October hunting period. The Bay is an important summer molting area for adult ducks. These are still present in early October but whether or not they are joined by appreciable numbers of young birds is dependent on the flight patterns from the breeding marshes.

In the interpretation of sex and age data, great care must be used in considering Maine figures for any given year by themselves. In some instances the samples are too small and too localized to have much significance at this time. In other cases the figures must be combined with data throughout more of the range of the particular breeding population involved in order to be of value. Discrepancies in Maine may be counteracted elsewhere or vice versa. Even with the leading species we are dealing, in two instances, with birds killed in Maine but which were largely raised elsewhere -- and with the origin unknown. Only the black duck is raised in appreciable numbers in Maine and also killed in appreciable numbers. Even here, interpretations are difficult. During the late season there are obviously both Maine-raised and Canadian-raised birds shot. Therefore, it is only during the early season and only with the black duck that the Maine sex and age data, considered alone, can safely be subjected to analysis. Observations and banding returns indicated that in October, Maine hunters were killing largely their own black ducks. Although the ring-necks and wood ducks shot in Maine are primarily local birds, the size of the sample does not permit as definite an analysis as with the black duck.

An examination of table 3 indicates a relatively satisfactory situation with respect to the kill of black ducks. Gun pressure by sex is well correlated with sex ratios of breeding birds in Spring. More than twice as many young as adults were killed and this indicates a fairly healthy condition, although it is not quite as good as in 1949 when the age ratio ran 1:2.6.

In turning to table 4, however, the data from Merrymeeting Bay may be indicative of rather serious concern, for twice as many adult black ducks were shot as young birds. This is in contrast to 1949 when the age ratio was 1:1.2, and is similar to the 1948 data which ran 1:0.5. Sex ratio figures were satisfactory.

Table 3 - October Season - 1950

Maine - Exclusive of Merrymeeting Bay

(Loading species only)

Species Check	Ad.♂	Ad.♀	Im.♂	Im.♀	Misc.*	Ad.-Im. Ratio	Sex Ratio Male-Female	Total
Black Duck	42	35	94	72	228	1:2.2	56:44	471
Wood Duck	38	20	34	24	57	1:1.0	62:38	173
Gr.w. Teal	4	4	20	20	22	1:5.0	50:50	70
Ring-neck	4	7	23	21	9	1:4.0	49:51	64
Totals (18 species)	97	74	186	150	366	1:2.0	56:44	873

Table 4 - October Season - 1950

Merrymeeting Bay

(Loading species only)

Species Check	Ad.♂	Ad.♀	Im.♂	Im.♀	Misc.*	Ad.-Im. Ratio	Sex Ratio Male-Female	Total
Black Duck	190	144	90	83	78	1:0.5	55:45	585
Gr.w. Teal	90	77	91	63	54	1:0.9	56:44	375
Bl.w. Teal	13	12	11	12	16	1:0.9	50:50	64
Ruddy	7	1	19	15	11	1:4.3	62:38	53
Totals (18 species)	348	278	268	209	192	1:0.8	56:44	1295

Table 5 - Late Season - Statewide - 1950

(Loading species only)

Species Check	Ad.♂	Ad.♀	Im.♂	Im.♀	Misc.*	Ad.-Im. Ratio	Sex Ratio Male-Female	Total
Black Duck	66	67	46	54	96	1:0.8	48:52	329
Goldeneye	17	28	9	12	20	1:0.5	39:61	86
Bufflehead	9	10	7	21	3	1:1.5	34:66	50
Gr.w. Teal	18	11	4	9	2	1:0.4	52:48	44
Totals (15 species)	130	132	93	110	147	1:0.8	48:52	612

\*Birds recorded by species but not sexed or aged.

The only apparent explanation for the distorted age ratio for Merrymeeting Bay lies in the fact that the summer population build-up consisted primarily of adult birds, with few young coming in to swell the ranks. Hunters' bag checks in Maine have been carried out for only 4 years, and in the first year Merrymeeting Bay was inadequately sampled. Yet it may well be of some significance that in two of the last three years, the kill in the Bay has drawn far too heavily into the supply of adult birds. Since it is with the adults that the homing instinct is most strongly fixed, it is this group which is of most importance to local hunters in the maintenance of an adequate breeding stock. Merrymeeting Bay is the most extensive single hunting area of the State and the situation which prevailed in 1948 and again in 1950 could be (if this proves to be of regular occurrence) a matter not to be dismissed lightly. It is fortunate, indeed, that in the two years in question the kill was more balanced in the other marshes of Maine.

Although having little analytical value until additional data from bag checks of future years are available, it is of interest to note that in several other species the sex and age composition of the kill shows considerable similarity to that of the black duck, both for Merrymeeting Bay and elsewhere in the State.

#### Miscellaneous Observations

During this study an opportunity was afforded to obtain information on various aspects of the hunting season, some of which is deemed of sufficient interest to include at this time.

#### Hunters' Attitudes

The duck hunters in Maine have been found to be very cooperative throughout the duration of this study. Many of them have gone to considerable personal inconvenience to make specimens available to the technicians. Some have even refrained from dressing their birds at their homes until after the field men had visited them in the evening. Such cooperation permitted much greater coverage of the hunting areas than would otherwise have been the case. Many of the hunters have become thoroughly interested in the bag check study and in the practical applications of it. This desirable situation cannot help but improve the working relationships with the sportsmen for both research technicians and law enforcement officers.

#### Time of the Hunting Season

In view of the wide range of opinions by Maine duck hunters that prevailed after the close of the 1949 season (which was a successful year), it is not surprising that the controversy is more intense this year. Most hunters are already agreed that the time of the 1950 season was wrong - from their standpoint. In all probability the sportsmen will ask for a change in dates for 1951, yet the requested changes will be as varied as are Maine's hunting areas. There is universal disappointment in the past

season, yet most of those hunters who have been contacted by the writer realize that it was primarily due to weather conditions that their season was poor - climatic factors not merely in Maine during the fall, but throughout August and September as well, and also factors that prevailed for many miles north of the Maine border.

On the basis of long-term weather records and migration data, and considering the welfare of the ducks as well as the interests of the hunters, it appears that the seasons as set this year were about as good as could be selected. Unless the time comes when the population of birds in the Atlantic Flyway will justify a 45- or 50-day open season, then the split season will be the most fair for the largest number of Maine hunters. The split season is the only logical way of providing for the interests of both the inland hunters - particularly those in northern, central, and eastern Maine - and the coastal hunters.

As for the time of opening, in general the dates similar to those of the past 4 years would appear reasonably satisfactory. In order to give proper protection to the breeding stock, the first hunting period should not open any earlier than it has during recent years. Based on waterfowl life history studies in the State, it seems evident that the 7th to the 10th of October is the earliest that the season should open. In view of this, it might seem logical to suggest an opening date of mid-October. However, under average weather conditions (1948-1950 have been exceptions) freezing marshes would eliminate hunting in many inland areas by the latter part of the month. Thus an unfair penalty would be imposed on the inland gunners of northern, eastern, and central Maine - particularly since these hunters get little or no benefit from the late shooting. Therefore, the selection of a date between the 7th and 10th appears to be fairest to the hunters as well as biologically sound.

#### Conclusions

1. The 1950 populations of waterfowl in Maine, during the hunting season, were noticeably reduced from 1949.
2. Because of fewer birds, abnormally mild weather, and adverse water levels, duck hunting conditions were poorer than for several years. Hunting success was lowest in northern and in southwestern Maine; it was highest in Merrymeeting Bay.
3. A greatly reduced kill was evident in comparison with 1949.
4. Five species made up 86 per cent of the bag during the October season. In the order of their importance these were: black duck, green-winged teal, wood duck, ring-necked duck, and blue-winged teal.
5. The black duck alone made up 54 per cent of the late season kill. This species was followed, but far behind, by the goldeneye, bufflehead, and green-winged teal.

6. For the third consecutive year the black duck and green-winged teal have constituted the two most important species to Maine hunters. Most striking increases in this year's bag occurred in the wood duck and the ring-necked duck. A very heavy decrease was recorded in the number of goldeneyes shot.

7. Goose hunting in Merrymeeting Bay was better than for several years.

8. The age ratios of birds killed were far less satisfactory than in 1949. More adult black ducks were killed, particularly in Merrymeeting Bay, than should have been the case.

9. In considering the welfare of the ducks and the interests of all groups of Maine hunters, the split season appears to be the most satisfactory regulation that can be accorded, as long as the current restricted seasons are necessary.

10. In order to adequately safeguard local breeding stock, the period October 7 to 10 should be considered as the earliest possible opening date.

COOPERATION AND EDUCATIONAL WORK

Unit personnel continued to serve as technical advisers to the State's Federal Aid Program. The regular service in identifying and autopsying specimens was given to the game wardens and to the public.

Several speaking engagements were given during the quarter by Quick, Hyers, Coulter, and Mendall.

Quick conducted the undergraduate courses in game management and in conservation; also the wildlife seminar.

PUBLICATIONS

An article by Mendall, entitled "Game Management and Non-game Species" was published in the Bulletin of the Massachusetts Audubon Society, Vol. 34, No. 4, pp. 155-157.

Respectfully submitted,

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(NOT FOR PUBLICATION)