

MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

Quarterly Report

January-March, 1949

RESEARCH PROJECTS

MUSKRAT MANAGEMENT

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

Assignment: Malcolm W. Coulter, Assistant Leader

In December Coulter reactivated the muskrat project that had been under the jurisdiction of former Assistant Leader Gashwiler. Work on the annual winter house counts was begun the middle of that month and continued into January, but unseasonably warm weather and rains during the early winter prevented adequate coverage of many of the areas. The Davis-Holbrook and Moosehorn Refuge checks were completed, however.

Moosehorn Refuge

It has been explained in several previous reports that conditions at the Moosehorn Refuge have afforded an excellent opportunity to evaluate the effects of water level control on muskrats, since two important factors that might complicate interpretations (namely trapping and pollution) are both absent on these marshes. Water levels on the two "lower" marshes cannot be controlled; on the "upper" portions of both Magurrewock and Barn Meadow, dams enable the Refuge personnel to exercise reasonable control of the water levels under all save heavy flood conditions. During both 1946 and 1947 water levels remained very well stabilized in the "upper" marshes except during the May flood in 1947.

This season Coulter was assisted in the December house counts by the Refuge personnel and also by Graduate Assistant Rearden. The importance of water levels was even more strikingly apparent than during the previous years. Comparative census data for four years are presented in the following table. It should be pointed out that only lodges believed to be occupied are counted, and this system has been followed ever since the house counts were initiated; small houses used only for feeding and "pushups" are observed but not tabulated below:

MUSKRAT HOUSE COUNTS - MOOSEHORN REFUGE

Portion of Marsh	1945	1946	1947	1948	Water conditions, fall of 1948
Upper Magurrewock (*)	32	140	287	237	Slight fluctuation
Upper Barn Meadow (**)	11	24	52	5	Excessive fluctuation
Lower Magurrewock	2	1	8	10	Not controlled
Lower Barn Meadow	58	29	9	4	Not controlled
	103	194	356	256	

* Controlled by dam since 1944
 ** Controlled by dam since 1945

From the foregoing, it may be seen that muskrats on three of the four marsh units of the Moosehorn Refuge showed a house count decrease in 1948 of 18 per cent, but on the fourth -- Upper Barn Meadow -- the decrease amounted to 90 per cent. From August to November, the water in Upper Barn Meadow was kept at a very low level. Following marsh development work in November, all planks were put in the dam and the water was thereafter maintained at the highest possible level.

What happened to the muskrat population in Upper Barn Meadow cannot be stated. Apparently they did not move to other segments of the study area, however, so presumably they left the Refuge entirely.

Davis-Holbrook Area

This study area, contrary to the Moosehorn Refuge, is open to trapping. It consists of the marshy portion of Davis and Holbrook ponds, and an extensive marshy thoroughfare between those two ponds.

Populations of muskrats have been low in the Davis-Holbrook area, as pointed out in previous quarterly reports. Trapping pressure has been heavy during recent years, and, for the past two years, the area has been trapped both in spring and fall.

Coulter's census showed a house count decrease from 84 occupied houses in the winter of 1947 to 53 in 1948. Each year it appears increasingly evident that the area is being over-trapped.

In spite of a low population of animals, Coulter's studies during January and February indicated that the muskrats wintered well there. No evidence of mortality was found. Furthermore, fall water levels were reasonably satisfactory and the heavy rains of late December did not appear to have caused many harmful effects. Water fluctuation was not excessive throughout the entire fall and winter and there was no evidence of population shifts within the marsh or off the study area.

During the coming quarter, Coulter will obtain all possible data during the spring trapping season and will make post-trapping season censuses on those study areas that are open to trapping. The work will be expanded to give greater coverage in southern Maine.

RUFFED GROUSE MANAGEMENT

Sub-project: Cover requirements and populations

Objectives: To determine preferred cover types and population densities.

Assignment: Howard L. Mendall, Leader

Although an unusual amount of administrative work prevented adequate

coverage of the regular grouse check areas, Mendall was able to make at least one visit to each of the areas in northern and central Maine during January and February. A very mild, open winter prevailed through Maine. Temperatures were above average and snowfall was very light. Only one bad ice storm occurred and this was of short duration. Thus climatic factors were very favorable to grouse. The mild winter was directly reflected in the cover types utilized by the birds. They frequented hardwood covers much more than in an average winter. Likewise they did not resort to the more sheltered, lowland covers which were utilized so heavily in 1948. Very little population shift was noted between covers during the winter -- due no doubt to the absence of the abrupt weather changes that usually characterize Maine winters.

It was not possible to gather as much data as usual on populations. From information available, it appears as though the increase recorded last year in western and southern Maine had continued, although this was offset by a further decrease in northern Maine. Little change was apparent in central Maine. The evidence from eastern Maine is puzzling. Although a slight increase was apparent over last year, the expected "peak" in that year did not occur; nor did it occur this year -- unless the peak is a great deal lower than the last one, which was in 1937 and 1938.

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

During the fall and winter Haseltine has done considerable work in getting this new project started. Two intensive study areas have been selected. One is located on Third Stream of the Otter Chain in the town of Bradley, and the other in the town of Milford on Little Birch Stream -- both in representative habitat of Penobscot County in central Maine.

A base line was surveyed down the stream bed. Lines were run perpendicular to this base line at 100 foot intervals to determine the following: cover type changes; area flooded; available food; and past utilization.

The lines were extended away from the flowage as far as food was present or available to the beaver. Along these lines all woody food plants within a five foot strip were tallied according to species and age classes. In areas where the snow had melted sufficiently to reveal old cuttings, the stumps cut have also been tallied as to species, size class, and year cut. Those tallied thus far in the order of

importance are: aspen, red maple, alder, and black ash. This method will give a 5 per cent sample of all utilization.

Past History: An interview with State Warden Jackson revealed that both areas are in their third year of use. This coincides with existing sign. No beaver have been trapped legally.

Water samples: On both areas water samples were taken above the influence of the flowage - 10 feet above the dam, and 100 feet below the dam. At the time the samples were taken, both air and water temperatures were observed and pH ascertained. Water samples were preserved for oxygen content determination later.

General: Notes have been taken on all other animals using the areas. The following appear to concentrate at or around the flowages during the winter months: deer, red fox, snowshoe hare, red squirrel, and ruffed grouse.

Plans for next quarter, April 1 to July 1, include: completion of the utilization studies for this season; continuing the monthly water sampling; continuing all general observations and observing effects of silting on aquatic vegetation.

FOOD HABITS OF SEA DUCKS

Objective: To determine the effects of the food habits of sea ducks upon commercially important shellfish.

Assignment: Walter R. Welch, Graduate Student

This has been a special short-term study conducted by Welch under Mendall's supervision. It was initiated at the request of the Regional Office of the Fish and Wildlife Service and the Maine Department of Sea and Shore Fisheries. For several years various species of the so-called "sea ducks", especially the American eider and the white-winged scoter, have been increasing on the Maine coast. An increasing number of claims have been made by fishermen and coastal residents that the birds were causing heavy damage to beds of the blue mussel, soft shell clam, and scallop. Although the observations of competent biologists failed to substantiate such claims, nevertheless it was felt that a few ducks should be collected in the vicinity of some of the important shellfish beds and the stomachs analyzed to determine exact food content.

Hancock County was selected as the collecting area and most birds were obtained from the vicinity of Deer Isle and Mount Desert Island. The sea ducks are very abundant in this section of the coast, vast shellfish beds occur, and also most of the claims of depredation had originated in Hancock County.

A total of 64 stomachs was obtained in November and December, 1947 and 1948, and in April and May of 1948. Stomachs of the American

eider made up 26 of this number and scoter collections amounted to 38. The majority of the scoters were the white-winged variety, but a few surf scoters and American scoters were included.

During the past winter Welch completed his stomach examinations and submitted a report. The conclusions from this study are as follows:

1. The commercially important sea scallop was not found to have been consumed at all by any of the ducks collected.

2. Eiders had made no use of the soft shell clam as a source of food. Scoters had fed upon this shellfish to a very slight extent but not enough to give any occasion for alarm.

3. The blue mussel made up an important part of the diet of both eiders and scoters. However, it is believed that this feeding activity by the ducks may actually help to increase the growth of the blue mussel, by thinning out many of the badly overcrowded beds. No evidence of depletion was found in the examination of two large mussel beds, even though these particular beds had been subjected to unusually heavy feeding by the birds both in spring and fall.

4. Both the eiders and scoters fed upon mollusks more heavily in spring than in fall. Echinoderms were utilized more heavily in the fall.

5. Few differences in food habits existed between the scoters and eiders other than the fact that the latter fed more extensively on the blue mussel.

* * * * *

The study gave further support to previous field observations to the effect that, despite a high population, neither the eiders nor scoters along the Hancock County coast are causing any appreciable drain on the supply of commercially important mollusks.

PUBLICATIONS

The final report on his muskrat project by former Assistant Leader Gashwiler, was published, in January, as a bulletin of the Maine Department of Inland Fisheries and Game. It was entitled "Maine Muskrat Investigations."

A paper by Mendall, entitled "Food Habits in Relation to Black Duck Management in Maine" was published in the January issue of the Journal of Wildlife Management.

COOPERATION AND EDUCATIONAL WORK

Unit personnel continued to serve as technical advisors to the State's Pittman-Robertson projects.

A large number of lectures was given during the quarter to sportsmen's, service, and educational organizations. It was the busiest winter, in this respect, since the early years of the Unit. All members of the Unit personnel participated in these speaking engagements.

Dr. Kutz conducted the Wildlife Seminar and the undergraduate wildlife courses.

Coulter and Mendall attended the annual Unit Leaders' meetings and the 14th North American Wildlife Conference held in Washington in March. Mendall presented a paper at the waterfowl session entitled "Breeding Ground Improvements for Waterfowl in Maine." Coulter also attended the Farm Game Conference of the Northeast Section of the Wildlife Society, held at the University of Maryland in conjunction with the Washington Conference.

Unit personnel participated in the annual State Game Warden School at Augusta during March. Coulter, Haseltine, and Rearden gave lectures at the school.

PERSONNEL CHANGES

Gerardus C. deRoth, graduate student in fisheries, completed his studies and was awarded his Master's degree at the February Commencement. He is now enrolled at the University of Michigan where he is working for a doctorate.

Respectfully submitted,

Howard L. Mendall

Howard L. Mendall, Leader
Maine Cooperative Wildlife
Research Unit

University of Maine
Orono, Maine
April 16, 1949

(NOT FOR PUBLICATION)

MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

Quarterly Report

April-June, 1949

RESEARCH PROJECTS

MUSKRAT MANAGEMENT

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

Assignment: Malcolm W. Coulter, Assistant Leader

During the quarter, Coulter devoted nearly half time to field work on the muskrat project, being assisted during the population and litter checks by Haseltine and Rearden. Chief emphasis was placed on the spring trapping season, and on population studies. In view of the past work done at the Unit on litter counts, this phase of the project is not being emphasized so much this year.

Spring Trapping Season*

For the fourth consecutive year data were gathered in central and eastern Maine concerning muskrat trapping during the spring season. This year, for the first time, coverage was extended to parts of southern Maine by including checks in Kennebec and Sagadahoc Counties -- at Cobbosseecontec Stream, Horseshoe Pond, Pleasant Pond, Bunker Pond and Purgatory Pond. This additional coverage is of particular interest since considerable opposition to the abolishment of spring trapping apparently originated in this part of the State, primarily on the grounds that muskrat populations have been holding up well under the spring trapping regulation. A brief summary of the situation as found this spring seems desirable.

Several trappers were contacted at the areas and 16 miles of water course were cruised by canoe to observe muskrat sign, trapping pressure, and general conditions.

Trapping pressure in the new areas exceeded that of any other section examined. In one case it was found that there was one trapper per .4 miles of stream in an area where muskrat habitat is limited to a narrow and intermittent belt along the shoreline. One experienced trapper left after one trap night because of excessive competition and the lack of muskrat sign. Two men, in partnership, took a total of 7 animals in two trap nights with over 100 sets out each night. All trappers reported poor catches with individual estimates of total catches running from 25-50 per cent less than previous seasons.

* An act of the recent legislature abolished all spring muskrat trapping, and set the season as the month of November. No muskrat trapping will be allowed until the fall of 1950. The Unit studies, reported by former Assistant Leader Jay S. Gashwiler, were an important factor in bringing about this seemingly very desirable change.

As regards the season for all areas it may be of interest to compare this year's data with that of previous periods. The low success this season, despite favorable weather conditions for trapping, is reflected in table 1.

Table 1

Average Catch Per Trapper

Year	No. Trappers Contacted	No. Muskrats Caught	Range of Catch	Average Catch Per Trapper
1946	6	380	12-146	63.6
1947	10	991	21-206	99.1
1948	10	513	0-148	51.3
1949	19	698	11-200	36.7

Apparently the number of waterfowl taken in traps in southern Maine is, contrary to the claims of some observers, similar to that in other sections. Because the trappers contacted were new cooperators, it was difficult to obtain as much data as was desirable on this subject, although most trappers agreed that they caught ducks regularly.

The proportion of muskrats and waterfowl taken in traps during the 1949 season as compared with previous years is shown in table 2. This includes southern, central, and eastern Maine.

Table 2

Year	No. Muskrats	No. Ducks	No. Muskrats per Duck
1946	279	19	14.7
1947	460	26	17.7
1948	572	27	21.2
1949	470	34	13.8

Muskrat trappers usually take the bulk of their catch during a comparatively short period. During a long season many trappers continue to trap, often times at a second area, even though the results are not especially productive. This practice has two very objectionable features: (1) it seriously depletes the scattered breeding stock remaining after the initial harvest, and (2) it discourages individual trappers from leaving ample "breeders". They know that if they cease trapping someone else is likely to continue.

An extreme example of the reality of this attitude and its seriousness is illustrated by the activities of two trappers who are greatly interested in the welfare of the muskrats as well as their own catch. In order to save breeding stock, they left their sets out after taking what they considered a reasonable harvest, but blocked the trigger mechanisms so as to prevent further captures. The presence of their tally poles and sets gave the impression they were still trapping, thereby tending to discourage others from moving in after harvesting their initial areas.

Table 3 presents data gathered concerning the percentage of the catch taken during the first ten days of the season. It is of interest to note that 94.6 per cent of the catch was made in the first ten days or less, although the season ranged from 15 to 31 days, depending on the county.

Table 3

Trapper	Catch first 10 days or less	Total catch for season	Per cent catch first 10 days or less
1	129	145	88.9
2	50 (8 days)	50	100
3	41	44	93.1
4	22 (7 days)	22	100
5	17	17	100
6	70	70	100
7	11	12	91.6
8	12	12	100
9	72	76	94.7
Totals	424	448	94.6

Prices were lower than those of previous spring seasons. During the early part of the season, lots sold for an average price of \$2.10 to \$2.20 per pelt, but dropped to \$1.66 to \$2.00 by late season. Late season prices are nearly comparable to the return per pelt last fall.

Post-season Populations

Intensive post-season population checks on two study areas were again conducted, also for the fourth consecutive season. At the Mattanawcook Lake area, where only 3 to 5 breeding animals have been found in past years, no breeding animals at all were tallied this season. In addition to heavy trapping, this area is subject to considerable water level fluctuation.

At the Davis-Holbrook Area, where water levels have been quite satisfactory and where the wintering population appeared to survive better than usual, an increase was noted. In past years 17 to 19 potential breeders have been estimated, whereas 30 were estimated to be present this spring at the conclusion of the trapping season.

Table 4

Population Data from the Davis-Holbrook Area

Year	Pre-trapping Population	Post-trapping Population	Per cent of Population trapped
1946	165	19	88.5
1947	84	17	79.8
1948	93	19	79.8
1949	153	30	80.4

Five parties of trappers, in contrast to the usual two or occasionally three, trapped the area, but four became discouraged at an early date and ceased operations. The fifth was not familiar with the area and did not trap several pockets that are ordinarily trapped out.

The location of the breeding territories again follows the trapping pattern - those areas missed or only lightly trapped contained most of the breeding animals.

Litter Checks

The earliest litters in 1949 were born during the first week of May. Eleven litters have been examined so far, and the young ear-tagged whenever they were large enough to properly insert the tag. From the small sample to date, litter data in general do not appear to differ from previous years. Of interest is one complete litter of 6 males that has been handled on two separate checks.

During the next quarter, Coulter will continue to make a few sample litter checks. He will also carry out live-trapping and tagging in the Magurrocock Marsh and Davis-Holbrook area in an attempt to obtain survival and dispersal data from previously tagged populations.

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

During the spring quarter, Haseltine made frequent trips to his two study areas -- the Otter Chain flowage in Bradley and Little Birch Stream in Milford.

Mapping and Sampling: Because the beaver on the Otter Chain flowage in the town of Bradley erected a new dam some 1,700 feet downstream from the original dam, the sampling is not yet completed for this year. It will be interesting to ascertain the cause of this, through use of the live traps, that is, whether it is merely a migration in search of food or whether the two year-old animals have been driven out as some writers maintain.

Water Samples: The monthly water samples show a rise in water and air temperatures and a decrease in pH and oxygen content. The oxygen content, however, has not shown the decrease that had been expected.

Use by Other Species: It was noted that whereas the stream on both flowages received very little utilization by waterfowl, the beaver flowages themselves were well populated. On the Little Birch flowage in Milford, two broods of wood ducks and one of blacks were hatched successfully, and on the Otter Chain flowage two black duck broods and one wood duck brood have been seen to date. Muskrat sign is very much in evidence on both flowages and the animals appear to be more numerous than last year. The deer, red foxes, snowshoe hares, red squirrels, and grouse - commonly observed around the beaver flowages during the winter - seem to have dispersed during the spring months.

During the coming quarter, the food utilization studies will be completed and the periodic water sampling will be continued. Live-trapping and tagging of beaver in an effort to determine the exact size of the colonies, will be initiated during the latter part of the summer.

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 about half time to obtaining the annual migration and census data, and to conducting the breeding productivity studies. Considerable assistance was given by other members of the Unit staff. In addition to the major studies on the black duck and ring-necked duck, several additional phases of the over-all waterfowl project received particular attention -- Coulter and Carter conducted a study of hole-nesting ducks; Haseltine is carrying out a detailed population and productivity study on the Goose River and Corinna Stream areas; and Reardon is making a special investigation of mammalian predation of ground-nesting ducks, using artificial nests to supplement the natural nests under observation.

Waterfowl Populations

The status of breeding waterfowl in Maine this year is very favorable. As of the first week of July the 1949 census on the permanent study areas was approximately 90 per cent complete and the results as a whole show a continuation of the increased breeding stock recorded a year ago. A heavy increase occurred in the number of wood ducks and substantial increases are apparent for the important black duck, as well as the ring-necked duck.

The present status of the six breeding species of ducks, exclusive of mergansers, is as follows:

<u>Species</u>	<u>Status as compared with 1948</u>
Wood Duck	45% increase
Ring-necked Duck	20% increase
Black Duck	10% increase
American Goldeneye	No change
Green-winged Teal	No change
Blue-winged Teal	No change

General Breeding Conditions

From the standpoint of climatic and weather conditions, this is proving to be the most favorable breeding season in 14 years. Precipitation, although less than normal, has been ample, and has not occurred too heavily at any time.

Flood losses have been almost non-existent this year. Although nest predation is proving to be slightly greater than a year ago, this is being offset by the absence of flood losses. Good water levels and the advanced plant phenology this year are constituting nearly perfect brood rearing conditions on most areas.

The remarkably early nesting season this year will result in the young maturing much ahead of 1948 and there is little danger of flightless or "pin-feathery" young by the time the hunting season opens. The hatching peak for the early nesting species (black duck, wood duck, and goldeneye) occurred about a week ahead of average; that for the normally late-nesting ring-neck and the two teal has already taken place - from 10 days to two weeks ahead of their average.

Nesting Studies

The nesting studies resulted in the largest number located during a single season, with over 100 found to date. Most of these are of three species: ring-necked duck, black duck, and wood duck. All of them are being kept under periodic observation until hatched or destroyed.

During the coming quarter the population studies will be continued and the nesting study concluded.

WOODCOCK RESEARCH

Sub-project: Census study

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

Assignment: Howard L. Mendall, Leader

From mid-April through May Mendall carried out the annual woodcock studies. In addition to obtaining data on the Unit's regular areas in central and eastern Maine, the results from 40 cooperator areas in other parts of the New England States and New York were analyzed and tabulated.

The complete census data were presented in a special report submitted earlier, so only a summary will be given at this time.

The status of breeding woodcock in northeastern United States was nearly the same in the spring of 1949 as at the start of the 1948 nesting season. Actually a slight gain was recorded although it amounted to less than 4 per cent. This may be interpreted as indicating a continuation of the relatively favorable population of birds of a year ago in the New England States and New York. Considerable local fluctuation occurred within the region. A decrease of a little more than 10 per cent was apparent on the extensive eastern Maine breeding areas, and Maine as a whole showed a decrease. A very slight increase was recorded in New York. More substantial increases were noted in New Hampshire, Vermont, Massachusetts and Connecticut.

Like the waterfowl, woodcock also enjoyed the benefits of the very favorable weather conditions that prevailed in Maine this spring. The breeding season was early, and there were no freeze-ups, snows, or heavy rains during the entire nesting period.

Sub-project: Woodcock Cover Utilization

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

The field work for this new study was initiated April 22 when Rearden started working at the Moosehorn National Wildlife Refuge at Calais. During late April and early May he became well acquainted with the study area and assisted in the annual woodcock census work.

In early May, woodcock broods were hunted with bird dogs and several broods were found and banded. Work in classifying the cover management strips was begun the latter part of that month.

In 1940 and 1941 the Civilian Conservation Corp cut 20 development strips on the Mooschohn Refuge in eastern Maine to open up the dense second growth woodland for the benefit of woodcock. These cuttings were in covers that once were heavily utilized by woodcock but which, by 1940, were too old for further use by the birds. The cuttings are of three main types. The most common one consists of a series of 150 foot square blocks that were cut in a checkerboard pattern, that is, they alternate and are joined corner to corner, thus forming two parallel strips that make a 300 foot wide checkerboard pattern. There are 18 of these strips, each ranging up to about 3,000 feet in length.

The next type of cutting consists of a series of blocks 150 by 300 feet, laid out in the same fashion as the above. There are five of these strips.

The third type of strip is simply a clear cut area 150 feet wide and from 1,000 to 3,900 feet long. There are 9 strips of this type.

The cuttings were not made to create "singing grounds" but to create new woodcock cover; hence no effort was made to maintain them as openings as was done on another part of the refuge where experimental singing grounds were established.

Seventeen of the development strips are parallel, running east and west, and are 600 feet apart. The three other strips are several miles distant, and run north and south. They are 300 feet apart.

In addition to the 20 development strips there are 12 or more sizeable areas on the refuge that have been cut over for fire wood since 1941. These will be included in the study with the 20 development strips, and afford an opportunity to obtain data on use of more recent cuttings.

The purpose of the study is to determine the relationship of the improved areas to: (1) woodcock singing ground selection, (2) nesting cover, (3) brood rearing cover, (4) molting cover, and (5) fall flight cover.

The development blocks have been classified according to ground moisture, plant density, and dominant plant species.

Representative covers of each type have been selected and are being searched for woodcock at regular intervals with a bird dog. Flushes per unit area covered is the basis for comparison. This work will be continued throughout the summer and fall.

PUBLICATIONS

A paper by former Assistant Leader Gashwiler entitled: "The Effect of Spring Muskrat Trapping on Waterfowl in Maine" was published in the April issue of the Journal of Wildlife Management.

A paper by Mendall entitled "The Ducks that Maine Hunters Shoot" was published in the April issue of the Bulletin of the Maine Audubon Society.

COOPERATION AND EDUCATIONAL WORK

Unit personnel continued to serve as technical advisors to the State's Pittman-Robertson projects. Several conferences were held in Orono and Augusta between Unit and P-R personnel. In July Coulter spent several days with one of the State men making a plant survey at the newly acquired Great Works Pond Refuge in eastern Maine.

The usual service was rendered to the general public and game wardens - in identifying and autopsying specimens, and in answering inquiries on wildlife matters.

Dr. Kutz conducted the undergraduate wildlife courses during the spring semester and also at the summer wildlife camp session.

SPECIAL NOTE

During July the Unit will move to new, and greatly improved, quarters on the University of Maine campus. Effective July 20 the address will be changed from 9 Coburn Hall to 121 East Annex.

Respectfully submitted,

Howard L. Mendall

Howard L. Mendall, Leader
Maine Cooperative Wildlife
Research Unit

University of Maine
Orono, Maine
July 12, 1949

(NOT FOR PUBLICATION)

MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

Quarterly Report

July-September, 1949

RESEARCH PROJECTS

MUSKRAT MANAGEMENT

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

Assignment: Malcolm W. Coulter, Assistant Leader

Sample litter checks were completed at the Moosehorn National Wildlife Refuge and at the Davis-Holbrook Study Areas. Twenty litters were recorded, although no checks were made during the last peak of litter production in mid- and late August. Breeding populations on several areas examined appear to be no better than during the past three or four years. In general, no areas, with the exception of the marshes at the Moosehorn Refuge, have breeding populations of more than one pair to each several acres of habitat.

A limited amount of live-trapping was accomplished at the Moosehorn Refuge in an attempt to recover previously tagged animals. Since more intensive trapping is planned for the next quarter, a summary of this work will be presented in the next report. Several days were spent observing marsh conditions in New Brunswick and in northern Maine.

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

During the quarter, Haseltine spent most of his time in conducting intensive field research.

Mapping and Sampling: The mapping and sampling work was completed on the Otter Creek study area where the beaver had expanded their flowage in the spring. These data made possible a map showing the course of the channel, channel width, area flooded, and a type map of the area. The sampling data give a five per cent sample of the available woody plants and the rate at which they are utilized.

It was noted throughout the summer that very few woody plants were eaten and the aquatics present in the flowages constituted the bulk of the beavers' diet. The data have not been completely worked up as yet but it is evident that aspen will lead the list with alder a close second; however, the utilization of alder has not been so much for food as for house and dam construction. Practically every woody species present on the area is cut to some extent, even the conifers.

Live trapping and sight observations determined that the expansion at Otter Creek was not a new flowage created by two-year olds from the mother colony.

Population of Colonies: To date five beaver colonies have been live-trapped. Two of these were the intensive study areas. At the request of the State Game Warden the outlet to Davis Pond in East Eddington was trapped and the beaver transplanted, as they were flooding a bridge and hindering a logging operation. Hazelton Brook in Costigan was trapped and the beaver transplanted to a more suitable location (also at the request of the warden), because they were plugging and washing out a culvert under a railroad bed. Plank Brook in Clifton was trapped solely for the data.

POPULATION COMPOSITION

<u>Location</u>	<u>Composition</u>
Otter Creek Milford	4 = 1 adult female; 1 yearling female; 2 kits
Little Birch Stream Milford	7 = 1 adult male; 1 adult female; 3 yearlings (1 male and 2 females); 2 kits (both males)
Hazelton Brook Costigan	7 = 1 adult male; 1 adult female; 1 questionable adult; 1 yearling female; 3 kits (1 male, 1 female, 1 unsexed)
Davis Pond Outlet East Eddington	2 = 1 adult male and 1 adult female
Plank Brook Clifton	1 = 1 adult female

As the beaver are removed from the live traps, they are weighed, sexed, measured, tagged with ear tags such as are used in the muskrat investigations, and then placed in holding pens until all members of the colony are trapped. The use of a wire cone facilitates this work greatly when one man is working alone. A colony is considered completely trapped when no more fresh cuttings appear and holes in the dam at the dam sets are not repaired for several nights.

During the next quarter Haseltine will continue live-trapping as many colonies as is feasible until cold weather endangers the animals through exposure. The utilization studies will be made as soon as the freeze-up stops the cutting activity.

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 concluded the seasonal population and breeding studies that were discussed in the last quarterly report. Assistance on this project was given by Coulter, Haseltine, and Rearden.

Breeding Populations - 1949

Final compilation of the census data indicated that the number of breeding ducks in Maine at the start of the 1949 nesting season was substantially increased for the third consecutive year. A heavy gain was shown by the wood duck which, coupled with the slight increase of 1948, is very gratifying in view of the serious decline of this species from 1945 through 1947. The important black duck and the ring-necked duck showed noticeable increases for the third year in a row. A slight gain was noted for the golden-eye - the first increase recorded in several years for this species. Neither species of teal showed any increases on the census areas. However, as has been emphasized in previous reports, the teal are not important breeding birds in Maine in any year, and their numbers here have little bearing on the total teal populations of the Northeast. Even so, it is the author's impression that, over the State as a whole, the status of the blue-winged teal is better than the census studies indicate.

In the following tabulation, the final census figures for Maine in 1949 (excluding mergansers) are presented:

<u>Species</u>	<u>Status in 1949</u>
1. Wood Duck	52% increase
2. Ring-necked Duck	18% increase
3. Black Duck	12% increase
4. American Golden-eye	5% increase
5. Blue-winged Teal	No change
6. Green-winged Teal	No change

The Nesting Season

The Unit's sample nesting study resulted in locating 106 duck nests of six species; those of the ring-neck and black duck made up 89 of the total. All but one of these nests were kept under periodic observation until hatched or destroyed.

A total of 71 of the nests (68 per cent) hatched. This figure was nearly equal to the exceptionally high hatching success of 1948 (71 per cent). Actually it represents a somewhat greater degree of productivity for 1949, because this year's hatching success was based mainly on original nestings whereas last year's figures represented a large number of renestings - those renestings, even though successful, resulted in smaller, late-hatched broods.

Flood losses were almost non-existent this year, but predation was somewhat heavier than in 1948; principal offenders were the raccoon, red fox, and mink. It was of interest to note that crow depredations were very light this year, but losses by raccoons were the heaviest recorded in twelve years. The difference in predator pressure by localities was strikingly shown on two of the widely separated study areas. On one, in central Maine, only five of twelve nests (black duck and ring-neck) hatched; on the other area, in northern Maine, every one of 15 nests (black duck, ring-neck, blue-winged teal) hatched successfully.

The Brood Season

The favorable climatic conditions of the spring continued during the summer. Precipitation, although much less than normal, was adequate from the standpoint of waterfowl in this region. The advanced plant phenology resulted in ideal brood cover throughout the entire rearing season.

During the season, a total of 224 waterfowl broods was recorded. These were classified on an age basis. Brood success was noticeably improved over 1948, reflecting the favorable nesting season and excellent rearing conditions. The average size of 75 Class III broods (those at or approaching the flying stage) was 5.7 young per brood. This figure is nearly 2 birds per brood higher than a year ago.

WOODCOCK RESEARCH

Sub-project: Woodcock Cover Utilization

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

Rearden spent the entire summer on the Moosehorn Refuge conducting field work. Part of the time was devoted to mapping and classifying the development strips and the remainder to obtaining woodcock population data.

The improved areas have been classified as to cover types as follows:

- (1) Pure Alder
- (2) Mixed growth, with alder predominating
- (3) Pure hardwood
- (4) Mixed hard and softwood, with hardwood predominating
- (5) Mixed hard and softwood, with softwoods predominating

Fifty 150-foot square blocks of each of the five cover types were searched at regular intervals with a bird dog. Flushes per unit area covered was the basis for comparison.

During the period July 15 to September 15, 46 flushes were recorded. It is during this season of the year that woodcock in the Northeast are most difficult to find. The molt occurs during this period, and summer droughts usually occur. Because of the molt, the birds are naturally retiring at this time. The drought forces the birds into low ground where moist conditions are found. The combination of the two make wet thickets necessary for the well being of the birds.

Wet alder thickets were found to constitute the favorite type of summer cover. Pure stands of alder 6 to 12 feet in height, with a closed crown that has shaded out ground reproduction forms ideal summer woodcock cover in eastern Maine. Such stands are most common along stream banks, around beaver flowages, and in low swales. The nearly bare moist soil found beneath such growths provides the birds with a preferred type of site.

By early September the birds were easier to locate, and they were found to be using more varied cover types than in August.

Determination of cover preferences was not entirely on a basis of birds flushed. Presence of droppings, probings, and feathers were all considered.

Rearden will continue his field studies throughout the fall as long as woodcock remain in the area.

MISCELLANEOUS STUDIES

Banding

Coulter devoted the greater part of his time between August 20 and

the last of September to running the Unit's regular waterfowl banding station on the Penobscot River. Eight traps were in operation on the islands between Howland and Lincoln. A total of 503 ducks was banded, as follows: wood duck - 315; black duck - 185; mallard x black - 2; mallard - 1.

Not only was it an unusually successful banding season from the standpoint of total number of birds tagged, but also because of an unexpectedly high catch in the last week of August and in early September. This resulted in the accumulation of much-desired data on molt and plumage development, through the handling of flightless birds - both adults and young.

This year's high degree of success was due in part to an increased population of ducks. But an important factor was apparently the prolonged period of pre-baiting. Coulter started putting out bait at some of the trap sites the last of July and continued this whenever he was passing by the locality en-route to and from his eastern Maine muskrat areas. This long period of pre-baiting required only a little extra time or effort but paid good dividends. It appeared that many ducks had acquired a taste for grain before the wild rice ripened. Thus even after the latter became available, the birds still showed interest in the grain. In previous years, it has been difficult to catch birds during the peak of the rice availability.

Snapping Turtle - Waterfowl Relationships

This study was initiated in early July on an experimental basis. Objectives were to determine the extent of predation, if any, by snapping turtles on waterfowl in areas where both were common; also to learn more of the distribution of the snapping turtle in Maine. Field work was carried out mainly by Haseltine and Rearden, under Coulter's direction.

Twelve Smith turtle traps were used and trapping was confined to small marsh areas where broods of ducks were plentiful. Trapping ceased when the majority of the ducklings approached maturity.

About 40 snapping turtles were obtained. Digestive tracts were preserved, and although they have not been examined as yet, some of them are known to contain duckling remains.

The work this summer was only experimental and was carried out incidental to other duties, but even so several interesting facts were brought to light:

1. The intestinal tract of a turtle appears to be of as great a value as the stomach in recovering duckling remains.
2. Snapping turtle populations appear to vary considerably over the State. For example, in central Maine six trap-nights yielded nine turtles weighing a total of 171 pounds. In eastern Maine, on the other hand, a long period of trapping

on several areas yielded but two turtles. Some central Maine areas apparently have a high snapping turtle population.

3. Even during warm weather in mid-summer, water and air temperatures appear to influence noticeably the activities of snapping turtles.

COOPERATION AND EDUCATIONAL WORK

Unit Personnel continued to serve as technical advisors to the State's Pittman-Robertson projects. Several of the proposed State refuges were inspected by Coulter and Mendall. Assistance was rendered to the general public, and a number of specimens were autopsied for game wardens.

On September 24, a Unit Coordination meeting was held in connection with an informal "open house" in the new Unit offices and laboratory. It was very successful and was well attended. Dr. Leedy was present from the Washington office of the Fish and Wildlife Service; also Messrs. Gutermuth and Barske from the Wildlife Management Institute.

At various times during the quarter, Mendall conducted parties of visitors over the waterfowl management demonstration area at Calais, being maintained jointly by the Unit and the Moosehorn Refuge. Considerable interest has been shown in this project by the general public and by technicians from other states.

PERSONNEL CHANGES

In September, Denis A. Benson reported to the Unit as a graduate student. Benson was graduated in forestry from the University of New Brunswick, and has had experience as a field assistant with the Northeastern Wildlife Research Station. He is the first recipient of the newly created Maritime Province Scholarship of the University of Maine. His thesis study will deal with big game investigations in Nova Scotia.

Respectfully submitted,

Howard L. Mendall
Howard L. Mendall, Leader
Maine Cooperative Wildlife
Research Unit

University of Maine
Orono, Maine
October 31, 1949

(NOT FOR PUBLICATION)

MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

Quarterly Report

October-December, 1949

RESEARCH PROJECTS

MUSKRAT MANAGEMENT

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

Assignment: Malcolm W. Coulter, Assistant Leader

In early October, Coulter conducted live-trapping operations at Magurrewock Marsh on the Moosehorn Refuge in eastern Maine. A total of 112 animals was tagged. Since 14 others had been caught by hand during litter studies, this made 126 muskrats marked in 1949.

Muskrats have been ear-tagged on this marsh since 1946 to obtain information on dispersal and population turnover on an area closed to trapping. From 1946 to 1948 most of the animals tagged were young less than a month old, obtained during the litter studies carried out by Gashwiler. Since the data have not been reported previously, a summary of progress is given at this time.

Several streams and ponds adjacent to this marsh are subject to trapping. Close contact has always been maintained with trappers to recover ear tags, but the use of live traps this summer and fall was the first attempt to recapture tagged muskrats on the marsh itself.

During the spring trapping season of 1948, 17 of the animals tagged in 1947 were recovered at nearby streams and ponds at points ranging from 1,320 feet to over 3 miles (17,490 feet) from Magurrewock Marsh. All of these recoveries were from animals that were 7 to 28 days of age at the time of tagging. In five instances litter mates were taken on separate watercourses; in only one, were litter mates recovered at the same area.

No recoveries at all were reported during the trapping season last spring. Moreover, during the summer of 1949, 250 trap-nights in 8 days of trapping resulted in 182 captures, yet only two animals tagged in previous years were recovered. One had been tagged when 14 days old in 1947; the other was 6 days old when captured in 1948.

The tagging that has been accomplished on this area during the past four seasons will be followed by more live-trapping next summer. Also a special effort will be made during the next open muskrat season (Fall, 1950) to obtain recoveries on any tagged animals obtained by trappers.

Data on the live-trapping are given in the following tabulation.

Year	Total Number tagged	Number tagged by Ages		Recoveries
1946	37	37	3 to 10 days	None
1947	119	118	4 to 31 days	17 by trappers in adjacent
		1	adult	watercourses in 1948. 1
				by live-trapping in 1949.
1948	67	65	5 to 25 days	1 by live-trapping in 1949.
		2	adults	
1949	126	10	8 to 21 days	
		73	1 to 6 months	-----
		43	adults	

ECOLOGY OF THE BEAVER 249

- 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 continued field work on his regular study areas and obtained supplemental data from other, nearby beaver colonies.

Mapping and sampling: The rains of mid-December removed the snow which had been hindering the completion of the utilization studies since the freeze-up. This sampling was concluded by the end of the month. The data have not been worked up as yet pending completion of the beaver trapping season which is now in progress, as it was felt that this might throw a bit more light on the population.

Population of colonies: The early freeze-up allowed only one additional flowage to be completely live-trapped since the last quarterly report was prepared. This was Boynton Brook in the town of Bradley. The flowage had been open to trapping during the previous season and the two men who trapped there expressed the belief that only one beaver remained-- an animal that had been "footed" in a trap. However, live-trapping produced the following results: 1 adult male (minus one front foot), 1 adult female, and 2 kits.

All of the regular study areas, all streams where transplanted beaver were released, and all adjacent areas to which these beaver might travel have been declared open by the Fish and Game Department to trapping during

the current season. Haseltine has placed notices at conspicuous places along these waterways, requesting the beaver trappers to cooperate with the Unit personnel by making available the carcasses and the accompanying ear tags of animals captured. In addition, all known trappers have been contacted personally and all seem willing to assist. Thus it is hoped that considerable data of value will be forthcoming this winter.

During the coming quarter, Haseltine will concentrate his efforts on the trapping season. Carcasses from tagged beavers will be examined for general condition of the animals, condition of the ear tags, condition of reproductive organs and signs of sexual activity, and methods of aging the younger animals.

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 spent as much time in the field as possible obtaining population and migration data. During the hunting season, Unit and State Federal Aid personnel again entered into a joint bag check study, such as was conducted a year ago. A detailed report of this study has already been prepared but since it does not lend itself well to abstracting, it is reproduced in full at this time.

THE 1949 WATERFOWL HUNTING SEASON IN MAINE

Waterfowl Populations

The population of waterfowl during the fall of 1949 was noticeably greater than in 1948 with most species showing gains. Flight patterns throughout the State during the early migration showed a considerable departure from the normal. Probably due to the prolonged drought of late summer and greatly lowered water tables, there was an unusually early shift of locally-bred birds from northern and eastern Maine to the larger marshes of the central and southern part of the State and along the coast. This was coupled with summer-like weather during September. As a result, although there appeared to be little migration out of the State prior to the opening of the hunting season (except in the ring-necked duck), there were very few movements of Canadian-reared birds into northern and eastern Maine until late October.

Weather conditions in the last half of October and throughout November were nearly average for Maine, and large flights of black ducks, goldeneyes, and greater scaup came into the State during November.

Considering the fall season as a whole, the following is the status, as compared with 1948, of those species on which sufficient data were obtained:

Increase - Canada goose, black duck, mallard, pintail, blue-winged teal, wood duck, greater scaup, goldeneye

No change - Green-winged teal, ruddy, bufflehead

Decrease - Ring-necked duck, lesser scaup

No comparative data were obtained for the sea ducks but reliable observers who are in a position to check these birds regularly were unanimous in their reports that the tremendous numbers of the past two years were again present in 1949. This is particularly true for the American eider, the white-winged scoter, and the old squaw.

The decrease reported above for the ring-necked duck was surprising and difficult to explain. The species is now the second most numerous breeding duck in Maine; it had a remarkably successful nesting season in 1949, and the July and August populations on the breeding marshes were very high. Throughout September, however, there was a gradual departure of ring-necks from the breeding grounds and by early October only a few could be found. It had been expected that they would show up at the larger concentration points of southern Maine, such as Merrymeeting Bay, but this was not the case. Aerial checks made late in September failed to reveal them, and (as may be seen in table 2) they were of little consequence in the hunters' bags. It would be logical to expect that whatever factor had induced an early migration of Maine ring-necks, likewise would have brought a wave of New Brunswick ring-necks into Maine, especially since weather and water level conditions were similar. Actually, however, the New Brunswick ring-necks were still in the breeding marshes in early October while their more southerly Maine neighbors had been gone for upwards of a month.

The Hunting Season

Maine had a split season again in 1949, the periods running from October 7-22, and November 23-December 8. In order to obtain all possible data at those times, the personnel of the Maine Unit again pooled forces with the Federal Aid Division of the State Department of Inland Fisheries and Game in making an intensive bag check. Unit personnel were under Mendall's supervision and State personnel worked under the direction of Nathan W. Fellows, Jr. The following individuals participated in the study, although many of them worked only for limited periods of time such as opening days or Saturdays: for the Maine Unit -- Denis Benson, Walter Bisset, Jr., Walter Buckley, Malcolm Coulter, Frederick Dean, John M. Dudley, Robert Fuller, Frank Haseltine, H. L. Kutz, William Peppard, Jim Rearden, and Howard L. Mendall: for the Federal Aid Division -- William Barron, Samuel Carney, Donald Dorr, Richard Harlow, Kenneth W. Hodgdon, Dana Holmes, Winfield Howe, John Hunt, John H. Maasen, Walter Palmer, Stephen Powell, Arthur Stone, and Nathan Fellows, Jr.

Each man was "schooled" in identification, sexing, and aging, before the hunting season opened. Most of the important waterfowl areas of the State were sampled, but because of limitation as to time, travel, and personnel, the largest and most accessible hunting areas received greatest attention.

The results of this study were very gratifying. During the two periods, a total of 2,103 hunters were personally contacted and 3,204 birds were checked. This was more than double the figure obtained during the 1948 study.

Hunting Success

Hunting conditions in Maine varied much more by localities and by periods than they did a year ago. They were determined directly by the population shifts previously explained and by local weather conditions. In the early season, northern and eastern Maine had fewer ducks than usual the first week of October and weather conditions were such that no flights came in from Canada until the end of the month; consequently hunting success was much poorer than in 1948. By contrast, central and southern Maine had many more birds in the early season than a year ago, and they remained, for the most part, throughout the October period. Thus hunting success in that part of the State was very much higher than in 1948. Veteran hunters in Merrymeeting Bay (the State's most important gunning area) asserted the October season to be the best for many years and the statistics bore this out.

The late season showed a decided contrast from October conditions. Southern Maine had very spotty shooting and in Merrymeeting Bay it was very poor -- the poorest of any of the major check areas in fact, for prolonged cold had frozen part of the Bay and extremely rough weather made travel in frail sneak boats risky on many days. But eastern Maine, where gunners had found few ducks in October, had the highest success during the late season of any part of the State.

The overall hunting success is given in table 1. The method of arriving at the figures should again be explained, as was done in last year's report. 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 Maine data would indicate Maine hunters to be more successful than is actually the case, unless allowance is made for the method of recording.

There is a growing tendency in some states where similar studies are made to report the kill on the basis of number of ducks per hour of hunting. Since there is still a lack of uniformity, however, the Maine data are again presented on a half day basis in order to be consistent with the material already worked up for both 1947 and 1948. Moreover, trying to break down the data on an hourly basis appears to increase inaccuracies, under conditions of duck hunting in Maine, as too many unknown factors enter the picture.

Table 1

1949 Hunting Success -- All Areas Combined

Period	No. of Hunters	Man Days Hunted	Ducks Bagged	Kill Per Man Day
October 7-22	1386	807.5	2146	2.7
November 23- December 8	717	523.5	1058	2.0
Both Seasons	2103	1331	3204	2.4

By way of comparison, hunting success in 1948 was 1.7 for the early season and 2.4 for the late season.

Crippling Loss

During the two previous years, crippling loss was found to run about 25 per cent -- a very serious consideration. This year it was actually a little worse, being nearly 27 per cent. This was based on 3133 ducks bagged, during which 839 others were lost as cripples. As was noted in previous years, this loss was found to be highest on the opening day of the October season. At this time marsh vegetation is at its heaviest, ducks are very plentiful, hunters are the most numerous and consist of the largest number of novices. The novices not only shoot at more excessive ranges than do veteran gunners, and consequently wound more birds without killing them, but also many of them lack boats or dogs with which to retrieve even their dead birds. As the season progresses and hunting becomes more difficult, the novices tend to diminish in number and crippling losses become fewer.

Bag Composition

The kill by species among hunters whose bags were checked is given in table 2. No sea ducks were included as it was impractical to contact enough sea duck hunters to obtain a representative sample.

The material of table 2 requires some qualifying comments. Because of the ease of coverage and the heavy concentration of hunters, Merrymeeting Bay was sampled heavier than the rest of the State (although in similar proportions to 1948). Therefore, the tabulation may show somewhat greater emphasis than Statewide conditions would warrant for the green-winged teal, pintail, mallard, and ruddy. By the same token, under-emphasis is probably placed on the wood duck, goldeneye, ring-necked duck, and perhaps the bufflehead and greater scaup as well. However, with a few minor exceptions it is believed that the data give a reasonably good idea of the species that were important to Maine hunters. It was of interest to note that the order of the three top species was exactly the same as in 1948. The goldeneye did, however make a substantial gain on the green-winged teal (last year the former made up 9 per cent and the latter 18 per cent of the kill).

Several facts of considerable interest are shown in table 2, and indicated a lack of correlation with breeding ground conditions or fall populations or both. The wood duck and the ring-neck had shown the heaviest increases of any ducks on the breeding grounds, but each showed heavy drops in the hunting kill. (7 per cent to 3 per cent for the wood duck and 4 per cent to 1 per cent for the ring-neck). It has already been pointed out that the ring-necks apparently migrated very early this year but this was not true with the wood ducks. It appeared that black duck hunting was sufficiently good in 1949 so that many hunters deliberately passed up chances for shooting wood ducks. A similar situation was said to prevail in Merrymeeting Bay, with blue-winged teal -- and to a lesser extent green-wings -- being deliberately passed up by many gunners because there were ample black ducks. The number of Canada geese was apparently greater in Maine than a year ago, yet fewer were shot and the species dropped from 2 per cent of the bag in 1948 to 1 per cent this year. Greater scaup were taken in about the same proportion as last year, although the population was considerably higher this year.

Most spectacular increase in the bag this year was in the all-important black duck which rose from 43 per cent in 1948 to practically 50 per cent in 1949. The principal gain was in the October season and this appeared to reflect directly the favorable breeding season. The gain in the goldeneye has already been mentioned. Two species that are usually of very minor importance showed substantial gains -- the mallard and pintail. These birds were both present this fall in considerably greater numbers than usual.

Sex and Age Ratios

During the bag inspections a total of 3,204 birds was examined. Whenever possible, these were sexed and aged, but for one of several reasons such data

could not always be obtained. Some hunters were in a hurry and were reluctant to spend time for their birds to be thoroughly examined. At times it was too dark to accurately sex and age the birds, especially if they were frozen, as during the late season. At other times when hunters were checked in their camps or homes, some of their birds were already dressed. In spite of these difficulties a total of 2507 birds were both sexed and aged.

It was explained in the 1948 report that conditions in Merrymeeting Bay are not always typical of the rest of the State. The area is an important summer molting area for adult ducks. Consequently, there are always many adults in the Bay in early October but the number of young birds which may be present is dependent on how much early fall movement there is into the Bay from breeding marshes in other parts of the State. It was found a year ago that the sex and age ratios of birds killed in October were not at all in keeping with the rest of Maine in that the kill was top heavy in adults, especially males. Accordingly data for the October season were tabulated separately from those of the remainder of the State. This same procedure was followed again this year. During the late season, data from the entire State are combined as the early season discrepancies in Merrymeeting Bay do not prevail.

In tables 3, 4, and 5 the sex and age data are presented for the leading species only; and the totals of all species.

As was pointed out in the 1948 report, caution should be used in attempting to draw conclusions from sex and age data such as are contained in the several tables. 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 three 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.

Turning then to table 3 it may be seen that both sex and age ratios for black ducks were very satisfactory. The age ratio was higher in young birds than a year ago and bore out the general observations during the summer that it was a successful breeding season. In Merrymeeting Bay (table 4) less favorable sex and age ratios were obtained but even here they were greatly improved over 1948 (when twice as many adults as young were shot and the sex ratio ran 61:39). This indicated, as did the general population observations, that in 1949 many more females and young had come into Merrymeeting Bay during September from outside breeding marshes, and the kill in the Bay was more balanced. The overall black duck kill for October throughout the State (including Merrymeeting Bay) not only indicated a good breeding season but

showed that the early hunting season this year was not taking an undue number of birds from one sex or age group.

In view of the difficulties involved in drawing conclusions from the remainder of the sex and age data, only a few general comments will be made. Apart from the black duck the sex and age ratios in general for October were more satisfactory than those of a year ago. (The totals for Merrymeeting Bay in 1948 showed an age ratio of 1:0.8 and a sex ratio of 59:41; for the remainder of the State in 1948 the age ratio was 1:2.1 and the sex ratio was 53:47). It may be of significance that for the third consecutive year the wood duck kill has been predominantly on males, but the small size of the sample precludes definite conclusions. The fact that the late season bag showed an unsatisfactory age ratio for both the black duck and the goldeneye might be of concern if the origin of the birds shot was known and if sex and age data were available from there, as well as for intermediate points.

These data emphasize that hunters' bag studies must be carried on for quite a number of consecutive years, and that similar data are needed for several adjoining states or provinces before the figures from any one can be of much value. In Maine this was the third year of such a study but only in 1948 and 1949 was the work carried out intensively. It is planned to continue it as a joint Unit and Federal Aid project for several more years.

Miscellaneous Observations

During the study of hunting conditions, a considerable amount of miscellaneous information was obtained, some of which may be worthwhile to record:

Early morning shooting as related to crippling loss

Last year criticism was leveled by some people at the Fish and Wildlife Service for recommending that the shooting day start 1/2 hour before sunrise. The basis for this criticism was the claim that the hour was too dark for shooting and that many cripples were lost as a result. With this in mind, special attention was given this year during the Maine studies to noting any adverse effects -- both as to crippling loss and as to the kill itself. This study seemed especially timely in view of an article in one of the well-known sporting magazines which appeared during the hunting season and which alleged heavy losses to waterfowl by the ducks being "shot before sunrise".

Based on conditions in Maine, there was not the slightest evidence that the crippling loss was increased by this particular regulation. Practically all hunting in this region is done in open marshes or bays, and even on an overcast morning there was adequate light several minutes before the legal opening. Occasionally a little hunting is done on small woodland ponds and under such conditions the light is not so good, particularly if it is a cloudy or stormy morning, but even then it was found by experience that the so-called "legal darkness" was not more than 5 minutes duration and it was getting lighter all the time; thus any birds dropped could be spotted in a few minutes.

It is doubtful too, if the legal kill is appreciably increased in the extra 30 minutes of shooting available before sunrise. In the interior of Maine the black ducks are already flying even at the legal opening. Along the coast the best shooting is governed by the tides rather than the time of day. Furthermore only the veteran duck hunters, and those who have permanent shooting stands, are likely to be able to be in hunting position 1/2 hour before sunrise; such hunters in this State are in the minority.

Time of the hunting season

It would be impossible for all of Maine's hunters to agree on what they preferred for a hunting season, and this year was no exception. Eastern Maine hunters were disappointed in October and overjoyed in the late season -- exactly the reverse of the southern Maine gunners. Those in central and east-central counties got fairly good shooting in both seasons. Those in extreme northern Maine were disappointed in both; for the early season they had the long term migration averages in their favor, but the Canadian ducks didn't cooperate by crossing the border until after the October season had closed.

Nevertheless, those hunters who tried to be fair were agreed that the seasons as set this year probably afforded the best shooting for the largest number of hunters that was possible on the basis of number of hunting days allotted. Biologically, the split season as in effect this year appeared very beneficial to the birds. Early season shooting cuts into local breeders but a greater variety of ducks bear the burden; late season shooting is much more on northern ducks but is largely restricted so that two species are obliged to take the brunt of the attack. If a continuous early season of 30 or 35 days were selected this would not only intensify the kill of locally-bred birds but it would not be fair to the sportsmen who prefer to hunt the coastal areas. On the other hand a continuous late season would mean that the vast number of sportsmen who hunt the inland marshes would get no shooting whatsoever. Thus unless the time should come when at least a 45-day season is possible, the split season, similar to that of 1949, appears to be both biologically sound and the fairest to the largest number of hunters. As to dates, the opening dates of this year appeared desirable. It would seem very unwise, for the sake of the breeding population, to open the season in Maine earlier than October 7 or 8. Also in fairness to the coastal hunters who are not able to shoot on the outer bays and off-shore islands, it would appear undesirable for the late season to open much, if any, later than it has in the past two years.

Very little complaint of the noonday opening on the first day of each split season was expressed. In fact, now that they are used to this regulation, many hunters actually welcome it for to some it affords an opportunity for first day hunting that they would otherwise not have. It enables a man who does not have a permanent blind or has not had time for advance "scouting" to get into a marsh and get ready for hunting while the season is still closed.

Conclusions

1. The 1949 waterfowl populations in Maine were very good and most species were increased over 1948.

2. Hunting conditions and hunting success were generally better than in 1948 but showed much local variation and, geographically, were the reverse of last year; this year the best hunting in central and southern Maine was in the October season, while in eastern Maine the late season was the best.

3. Sea duck shooting continued equally as good, if not better, as in 1947 and 1948.

4. Five species made up 89 per cent of the bag in the October season with the black duck and green-winged teal heading the list by a wide margin. These were followed, in order, by the wood duck, pintail, and blue-winged teal.

5. Two species, the black duck and the goldeneye, constituted 78 per cent of the late season bag. No other duck was killed in significant numbers.

6. For the second consecutive year, the black duck, green-winged teal, and goldeneye, in that order, have comprised the bulk of the shooting for Maine duck hunters. Between them they made up 78 per cent of the hunters' bags; the remaining 22 per cent was divided among 16 species.

7. Sex and age ratios of birds killed were more satisfactory in 1949 than in 1948.

8. No evidence was found to indicate that shooting 1/2 hour before sunrise had any adverse effects, either by increasing crippling losses or by increasing unduly the legal kill.

9. Considering both the welfare of the waterfowl and the interests of the largest number of hunters in inland and coastal Maine, it appears that a split season, with opening dates similar to those of 1948 and 1949, is very satisfactory.

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Table 2 - Kill by Species - 1949

(Exclusive of Sea Ducks)

Species	No. Killed Early Season	No. Killed Late Season	No. Killed Entire Period	Percent
Black Duck	1147	439	1586	49.6
Green-winged Teal	492	26	518	16.2
Goldeneye	16	388	404	12.6
Wood Duck	107	--	107	3.3
Pintail	88	8	96	3.0
Ruddy	50	41	91	2.8
Blue-winged Teal	83	--	83	2.6
Mergansers (3 species)	15	46	61	1.9
Bufflehead	11	46	57	1.8
Mallard	36	5	41	1.3
Greater Scaup	13	26	39	1.2
Canada Goose	11	23	34	1.1
Ring-necked Duck	31	1	32	1.0
Baldpate	13	--	13	0.4
Lesser Scaup	4	2	6	0.2
Barrow's Goldeneye	--	4	4	0.1
Shoveller	2	--	2	0.1
Miscellaneous (*)	27	3	30	0.9
Totals	2146	1058	3204	100.0

(*) Birds which were dressed when examined; also includes one black-mallard hybrid.

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Table 3 - October Season - 1949

Maine - Exclusive of Merrymeeting Bay

(Leading species only)

Species Check	Ad. ♂	Ad. ♀	Im. ♂	Im. ♀	Misc.*	Ad.-Im. Ratio	Sex Ratio Male-Female	Total
Black Duck	42	45	113	114	148	1:2.6	49:51	462
Gr. w. Teal	11	10	41	46	15	1:4.1	48:52	123
Wood Duck	21	8	27	19	14	1:1.6	64:36	89
Bl. w. Teal	3	3	7	12	8	1:3.2	40:60	33
Pintail	--	3	9	14	3	1:7.7	35:65	29
Totals (14 species)	82	73	215	234	228	1:2.9	49:51	832

Table 4 - October Season - 1949

Merrymeeting Bay

(Leading species only)

Species Check	Ad. ♂	Ad. ♀	Im. ♂	Im. ♀	Misc.*	Ad.-Im. Ratio	Sex Ratio Male-Female	Total
Black Duck	131	130	185	132	107	1:1.2	55:45	685
Gr. w. Teal	67	46	111	102	43	1:1.9	55:45	369
Pintail	7	3	26	21	2	1:4.7	58:42	59
Bl. w. Teal	10	9	7	11	13	1:1.0	46:54	50
Totals (17 species)	263	204	387	293	167	1:1.5	57:43	1314

Table 5 - Late Season - Statewide - 1949

(Leading species only)

Species Check	Ad. ♂	Ad. ♀	Im. ♂	Im. ♀	Misc.*	Ad.-Im. Ratio	Sex Ratio Male-Female	Total
Black Duck	103	70	85	70	111	1:0.9	57:43	439
Goldeneye	79	54	51	72	132	1:0.9	51:49	388
Bufflehead	15	7	5	10	9	1:0.5	54:46	46
Ruddy	4	2	14	4	17	1:3.0	75:25	41
Totals (15 species)	231	150	191	189	297	1:1.0	55:45	1058

* Birds identified but not sexed or aged.

WOODCOCK RESEARCH

Sub-project: Woodcock Cover Utilization

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

During the fall period Rearden spent 13 days on the Moosehorn Refuge study area obtaining data on fall cover preferences and utilization of the managed covers. In addition he devoted as much time as possible during the hunting season to obtaining information from areas outside the Refuge on hunting conditions and fall flights.

The increased use by woodcock of alder covers throughout the last half of October and early November was very noticeable, both on the study area and in adjacent covers.

The woodcock hunting season in Washington County was rather disappointing. Birds were scarce in most of the important gunning sections and it appeared that the majority of the locally-reared birds had moved out before the October 1 opening. As an example, two hunters using an experienced and first class dog flushed only 21 birds on opening day in a series of covers that could be expected to produce 50 to 60 birds under favorable hunting conditions. As the season progressed, a few fairly good flights came in from Canada, but even so only "spotty" hunting was obtained.

The spring breeding population had been high, and a favorable nesting season had prevailed. Therefore the only logical explanation for the scarcity of woodcock in October would appear to be that the birds had migrated early because of the severe drought of late summer. Certainly there had been no cold weather to induce early movements -- either of birds out of eastern Maine covers or into them from Canada. Thus the situation in eastern Maine (which usually provides the State's best woodcock hunting) was considerably different from that which prevailed in central and western Maine this fall; there, good populations of woodcock were found throughout October and reasonably good hunting was obtained. It is of interest to note that hunting conditions and October populations of woodcock in the various sections of Maine closely paralleled those which prevailed for waterfowl -- as pointed out on page 4 of this report.

MISCELLANEOUS STUDIES

Banding

With mild weather prevailing in late October there were considerable numbers of black ducks on the Penobscot River after the close of the first portion of the split waterfowl season. It was decided to reopen the Unit's banding station between Howland and Lincoln. Coulter spent about 10 days running the traps during the last few days of October and in early November.

He banded 166 black ducks, 5 wood ducks and 2 mallards. These, with the 503 birds banded and reported upon last quarter, gave a total of 676 for the season.

Fisher Study

At the last session of the Maine legislature, a statewide open season on the fisher was set for the month of January, 1950. This is the first time in more than 12 years that trapping has been permitted of this rare and valuable fur animal. It was decided to take full advantage of this legislation to obtain as much biological data as possible. Accordingly a joint project for this purpose has been set up between the Unit and the State Federal Aid Division. The work is to be under Coulter's direction. As many carcasses as possible will be obtained for detailed laboratory examination; also pelts will be checked for quality and primeness. Considerable time was spent in December contacting wardens and trappers in the northern counties where most of the fisher trapping will occur.

COOPERATION AND EDUCATIONAL WORK

Mendall and Coulter continued to serve as technical advisors to the State's Federal Aid program, and several conferences were held in Orono and Augusta between Unit and Federal Aid personnel. The usual service was rendered to the general public and to the State Game Warden division; a considerable number of specimens were examined and autopsied during the quarter.

Several public lectures were given by Unit personnel to sportsmen's, civic, and educational groups.

Dr. Kutz conducted the regular Wildlife Seminar and the undergraduate courses in game management and conservation.

The Unit participated to a considerable extent in the "Maine Resources Day" program which was held November 5 on the University of Maine Campus. The program, an all day affair, consisted of general sessions in the forenoon with outstanding speakers discussing various phases of Maine's resources -- both industrial and natural. In the afternoon a series of panel discussions was held, one being devoted to wildlife and fisheries. Mendall served as chairman of this panel and Coulter presented one of the papers.

Respectfully submitted,

Howard L. Mendall
Howard L. Mendall, Leader
Maine Cooperative Wildlife
Research Unit

University of Maine
Orono, Maine
January 16, 1950