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MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

University of Maine

Orono, Maine

QUARTERLY REPORT

January-March, 1963

Cooperating Agencies

Maine Department of Inland Fisheries and Game  
Wildlife Management Institute  
University of Maine  
U. S. Bureau of Sport Fisheries and Wildlife

Unit Personnel

Leader - Howard L. Mendall  
Assistant Leader - William L. Robinson  
Malcolm W. Coulter (on leave of  
absence, September 1-June 30)  
University Representative - Albert D. Nutting  
Faculty Collaborators - Sanford D. Schemnitz  
David C. O'Meara  
Chester F. Banasiak  
Graduate Assistants - Benjamin W. Day, Jr.  
Russell R. Hyer  
Graduate Student - Frank W. Ricker  
Secretary - Maxine L. Horne

NOT FOR PUBLICATION

The quarterly reports are usually statements of progress.  
The data presented often are incomplete and the conclusions  
reached may not be final. Consequently, permission to  
publish any of the information contained herein is withheld  
pending authorization from the Research Unit.

MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

Quarterly Report

January-March, 1963

RESEARCH PROJECTS

WATERFOWL RESEARCH

(a) Waterfowl Distribution and Experimental Management

Objectives: To obtain 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 breeding species, especially the black duck and the ring-necked duck.

Assignment: Howard L. Mendall, Leader

Inactive during the quarter.

Plans for next quarter: Field investigations will be initiated during April.

(b) Renesting and Homing Study

Objectives: To study renesting behavior and the degree of migrational homing exhibited by waterfowl, primarily the black duck, mallard and the ring-necked duck.

Assignment: Malcolm W. Coulter, Assistant Leader  
(Vermont phase conducted jointly with William Miller, former Waterfowl Project Leader, Vermont Fish and Game Service)

Inactive during the quarter.

Plans for next quarter: The regular spring studies will be carried out during the quarter. These will be conducted by Robinson, since Coulter is on leave of absence.

(c) Waterfowl Hunter Bag Checks

Objectives: To determine hunter success, crippling loss, and species, sex and age composition of the kill.

Assignment: Howard L. Mendall, Leader

Inactive during the quarter.

Plans for next quarter: Inactive.

WOODCOCK RESEARCHWoodcock Population Studies

**Objectives:** To conduct annual census and to obtain related ecological data on the Unit's permanent census routes in Maine.

**Assignment:** Howard L. Mendall, Leader

Inactive during the quarter.

**Plans for next quarter:** The usual spring studies will begin as soon after mid-April as the retarded seasonal chronology will permit. Mendall will conduct the work in eastern Maine, while Robinson will be in charge of the program at the Greenbush study area in Penobscot County.

ECOLOGY OF COASTAL HABITATClassification of Coastal Marshes and Mud Flats

**Objectives:** To devise a classification scheme for waterfowl habitat which occurs in the intertidal zone of the Maine coast. The classification scheme should possess the following prerequisites:

1. Ecological differences between the various habitats must be reflected.
2. The terms of description must be sufficiently clear and distinct so that field biologists with limited experience in coastal habitats may use the scheme.

**Assignment:** Russell R. Hyer, Graduate Assistant

Field testing of the trial classification scheme was completed during the winter. The data have now been analyzed and preparation of the thesis has begun.

**Plans for next quarter:** To complete the thesis write-up.

BIG GAME RESEARCHWinter Behavior of the White-tailed Deer

- Objectives:** (1) To determine environmental differences in two deer yards of contrasting cover types but with similar climatic conditions.
- (2) To determine variations in deer behavior within the two yards and to relate these to environmental factors.

**Assignment:** Benjamin W. Day, Jr., Graduate Assistant

Forty-one trips totaling 85 man-days were made to the study areas during the quarter. The trips were divided between the Middle Branch (Bog Brook)

and the Reed Stream (Springfield) study areas.

Heavy snow accumulation has been the most conspicuous feature of the 1962-63 winter in Maine. Snowfall during a 52-day period beginning in late December totalled 94 inches in contrast to only 20 inches during a comparable period in the 1961-62 winter. The maximum depth of snow was 63 inches attained during the last week of February in hardwood growth. From January 27 through March (with the exception of two brief intervals), average snow depth in the hardwoods was greater than 50 inches. In mixed growth and softwoods snow depth fluctuated, with averages of 44 and 32 inches respectively during that period. Snow depths the previous winter reached a maximum depth of only 35 inches and exceeded 20 inches for only a few weeks in February and March.

Temperatures in January in north-central Maine were near the long-term average. February was colder than normal. During that month only four days had temperature readings above 32°F. while 17 days had temperatures below zero. On the whole, however, temperatures during the winter of 1962-63 were milder than during the preceding winter.

Measurements and observations of deer behavior were continued at both study areas. Permanent transect lines were traversed once a week in each area. These lines passed through proportionate amounts of softwood, mixed-wood, and hardwood growth to those present on the study areas. The ratio of single tracks to multiple tracks (or trails) crossing the transect provided an indication of travel conditions and mobility of the deer. The distribution of deer tracks crossing the transect lines in different cover types also provided information on relative distribution of activity among softwood or hardwood types. During January and most of February deer movement was restricted to well-used trails in softwood cover. In late February and early March, however, activity began to shift toward mixed growth.

Measurements were made of the depths to which deer sank in the snow in different cover types. It was found that until late February no prominent crust had formed on the snow, and, in many cases, when deer were off their trails they sank well up to their chests or deeper. The animals sank deepest in the hardwood growth and least in softwoods. In five separate instances deer startled by the observer attempted to bound away and soon became mired in the snow. In another case a deer was found helpless in five feet of snow.

By late February and early March, a few previously thin and insignificant crusts within the snow profile began to strengthen. Deer were then able to move about fairly readily, providing it was not necessary for them to run or bound. At this time the snow under hardwood growth provided best travel conditions. By mid-March, at the Reed Stream area, the deer had taken advantage of favorable travel conditions and had moved out of the dense softwoods, where food was scarce, and into mixed growth. The deep snow allowed browsing on vegetation at heights previously untouched by deer. The general outlook for survival at this time is good. Mortality, however, is usually not apparent until April.

Records were kept of the location of bedding sites. It was found that during the present winter there was a tendency for deer to use the same beds repeatedly with relatively few new ones being made. In contrast, during the winter of 1961-62 deer made new beds frequently. It is likely that the deep

snow of the present winter discouraged the animals from establishing new beds, when old ones or packed snow were available.

Characteristics of bedding sites were examined in detail. Data were recorded on the following features of fifty sites at the Reed Stream study area: volume of merchantable wood on a 1/5-acre plot surrounding the bedding site; number of beds in a group; amount of usage; distance from each bed to the nearest tree; elevation, slope, and aspect; also whether the site appeared favorable for its value as shelter; its exposure to the sun, or its offering of a view of the surrounding terrain. In addition to studying known bedding sites, 50 potential sites were chosen randomly within the study area and data were gathered similar to that obtained from actual sites. Preliminary comparison of the two sets of data reveals that deer choose heavier cover for their bedding sites and lie closer to the bases of trees than would be expected by random choice. More complete analysis of these data is currently proceeding.

Records of a general nature showed that more deer were sighted during the 1962-63 winter than the previous winter. Deep snows apparently hampered the retreat of deer and thereby allowed the observer to approach more closely. Fox and bobcat signs on the study area were less abundant during the present winter.

Plans for next quarter:

To continue field observations until the deer have dispersed from their winter concentration areas.

To complete analysis of data and to write the thesis.

COOPERATION, EDUCATION WORK AND MISCELLANEOUS ACTIVITIES

Unit personnel continued to furnish technical assistance to the State Department of Inland Fisheries and Game and to the general public.

Robinson, Schemnitz and Mendall provided several days' instruction at the annual State Game Warden School in Augusta.

Schemnitz and Mendall attended the North American Wildlife Conference and annual Unit Leaders' meetings in Detroit, Michigan.

PUBLICATIONS

Mendall completed the manuscript revision for his assigned chapter of Waterfowl Tomorrow. The revised draft has been sent to the editor.

PERSONNEL CHANGES

An important change in State personnel occurred during the quarter and is directly related to the Unit program. Ronald Speers was appointed as

Commissioner of Inland Fisheries and Game to succeed Roland Cobb who resigned late last fall. Commissioner Speers is a University of Maine wildlife graduate, with experience on the Information and Education staffs of Virginia and Maine, and is a former Chief of the Maine Game Division. During recent years he has held an executive position in private business and has served as a member of the Governor's Executive Council.

Respectfully submitted,

*Howard L. Mendall*

Howard L. Mendall, Leader  
Maine Cooperative Wildlife  
Research Unit

April 13, 1963



MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

Quarterly Report

April-June, 1963

RESEARCH PROJECTS

WATERFOWL RESEARCH

(a) Waterfowl Distribution and Experimental Management

Objectives: To obtain 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 breeding species, especially the black duck and the ring-necked duck.

Assignment: Howard L. Mendall, Leader

The regular seasonal studies were conducted throughout the spring. The annual production report was submitted as of July 20. Although this covers a period slightly longer than the current quarter, it is reproduced at this time in the interest of continuity. The tables that accompanied the original report have been omitted.

This report summarizes the results, to date, of the 1963 waterfowl breeding studies in northern, eastern and central Maine. Mendall was assisted during these investigations by other members of the Unit staff; also, on certain phases of the study, by game warden Lawrence Caron and biologist J. William Peppard of the Maine Department of Inland Fisheries and Game, and by John M. Dudley of Calais, Maine.

This is the 25th consecutive year of these studies. Techniques were the same as in recent years and have been described in earlier reports. Coverage was similar to that of 1962 except that less manpower was available for nest searches; consequently data on nest success are not as adequate as in most years.

Weather and General Breeding Conditions

The spring season was greatly retarded. Although ice-clearing dates were not exceptionally late, the snow cover lingered far beyond average dates. The period from mid-April to May 20 was characterized by above-normal precipitation (including three spring snowstorms) and temperatures that were considerably below average.

As would be expected, breeding chronology was likewise retarded. Spring migration was late for black ducks, goldeneyes and wood ducks. The first arriving black ducks found nesting habitat still under snow cover. Floods on some marshes of central and eastern Maine May 19-20 further aggravated the situation by causing some early nest losses. The later breeding ring-necked ducks and the two teals were closer to their usual schedules.

During the last 10 days of May and throughout all of June, a decided contrast in the weather pattern occurred. Temperatures were above average

and there was a marked deficiency of rainfall. This resulted in a lowering of water levels to a point where rearing conditions for broods on some marshes, especially in central Maine, were a matter of concern. Average precipitation thus far in July has improved conditions somewhat.

### Breeding Populations

As explained in previous reports, initial breeding populations are determined from 13 study areas. Over a period of years these have proven quite reliable indicators for northern, eastern and central Maine, especially for the two most numerous species--the black duck and the ring-necked duck. Data for other species have considerably less value in detecting annual trends.

The breeding population as a whole was disappointingly low in comparison with the high level of 1962. The substantial gain last year in the black duck was offset by a corresponding decrease this year. On the study areas, the species is approximately at the 1961 breeding level, somewhat lower than a 10-year trend. A somewhat encouraging aspect is seen, however, in that the decline was measured almost entirely in eastern Maine and may have resulted in part from a later spring break-up in that portion of the state. Populations in northern Maine showed little change from 1962. A slight increase was indicated in central Maine, although this is based on more limited data.

The ring-necked duck exhibited a modest increase which was gratifying after its heavy decline of a year ago. No special significance is attached to the decrease in teals since these species are secondary in Maine in any year. The high level of the previous two years reached by the blue-winged teal had never been attained in the past, insofar as is known.

Breeding pair counts or estimates are summarized as follows:

<u>Species</u>	<u>Status in 1963</u>
(Measured on census areas)	
Ring-necked Duck	11% increase
Wood Duck	11% decrease
Black Duck	16% decrease
(Estimated)	
Common Goldeneye	No change
Green-winged Teal	Slight decrease
Blue-winged Teal	Moderate decrease

### Nesting Success

A total of 27 nests (all ring-necked ducks and black ducks) were under observation. This is too small a sample on which to base strong conclusions relative to nesting success. Nevertheless, the data served well to supplement other observations as to the breeding season. By mid-July, three nests were still being incubated. Of the remainder, 12 (50 per cent) were successful and 12 were destroyed or deserted. Hatching success for the ring-necked duck was similar to the long-term average, but that for the

black duck was much lower than usual. These limited data were substantiated on several study areas by observed ratios of breeding pairs to broods.

Predation was somewhat higher than usual in 1963, with the red fox being identified most frequently as the cause of loss.

#### The Brood Season

Major hatching periods for all species except the ring-necked duck have been considerably later than usual. This has been especially noticeable for the normally early nesting black duck and wood duck. The black duck hatching peak was not reached until approximately June 17, which is about two weeks later than the long-term average. This is believed due to a combination of the retarded seasonal phenology plus an appreciable number of early nest losses, with resultant renesting. By contrast the ring-necked duck, a late nester, was little affected. Nesting success appeared average for this species, resulting in a hatching peak close to long-term average dates.

Based upon nest and brood observations 16 per cent of black duck hatchings, and 25 per cent of wood ducks, occurred after July 1--an unusually high proportion. It is obvious that many ducklings in Maine will not attain flight until September.

Very few Class III broods (young 2/3 grown to flying age) had been recorded as of July 20. Comparisons of the other age classes with those of 1962 were favorable except in the case of the black duck. Average sizes of Class I and Class II broods of blacks were appreciably lower than a year ago. This would be expected with lower nesting success and late hatching peaks occasioned by more renesting.

Rearing success as a whole should be relatively favorable since average to slightly above average precipitation has occurred during the first three weeks of July.

#### Conclusions

1. Breeding populations of most species of waterfowl on Unit study areas were decreased from those of 1962. Only the ring-necked duck showed an increase. Most noticeable decline was in the black duck, although this was largely confined to eastern Maine.

2. Nesting success was lower for the black duck but higher for the ring-necked duck than that a year ago.

3. Breeding chronology was greatly retarded in 1963 especially for the early nesting species. A relatively high proportion of black duck and wood duck hatchings occurred after July 1.

4. Rearing conditions in most marshes are considered fairly satisfactory at the present time, although not as good as a year ago.

5. Considering both initial populations and nesting success, it may be expected that, with the exception of the ring-necked duck, waterfowl production on the areas studied in 1963 will be lower than in 1962.

Plans for next quarter: To conclude the season's studies.

(b) Renesting and Homing Study

Objectives: To study renesting behavior and the degree of migrational homing exhibited by waterfowl, primarily the black duck, mallard and the ring-necked duck.

Assignment: Malcolm W. Coulter, Assistant Leader  
(Vermont phase conducted jointly with William Miller, former Waterfowl Project Leader, Vermont Fish and Game Service)

In Coulter's absence on leave, the spring studies were carried out by Robinson. He was assisted by graduate assistants Day and Hyer, and, in Vermont, by Neil King of the Vermont Fish and Game Service. A summary of the season's progress will be presented in the next quarterly report.

Plans for next quarter: To continue the field studies throughout July.

(c) Waterfowl Hunter Bag Checks

Objectives: To determine hunter success, crippling loss, and species, sex and age composition of the kill.

Assignment: Howard L. Mendall, Leader

Inactive during the quarter.

Plans for next quarter: Inactive.

WOODCOCK RESEARCHWoodcock Population Studies

Objectives: To conduct annual census and to obtain related ecological data on the Unit's permanent census routes in Maine.

Assignment: Howard L. Mendall, Leader

Spring census studies in eastern Maine were conducted by Mendall. The live-trapping program at the Greenbush study area was carried out by Robinson, assisted by Sergeant David Bell of the University Military Department; also by Schemnitz, graduate assistants Day and Hyer, and undergraduate students in forestry and wildlife.

Census results on Unit study areas showed a 20 per cent decline from the high level of 1962. This is a greater decrease than that registered for the state as a whole.

The Greenbush trapping and banding work was conducted for the fourth consecutive year in cooperation with the woodcock-pesticide investigations of the Patuxent Wildlife Research Center. A total of 23 birds was caught this spring, one being a female and the others males. Of the latter 13 were

adults and 9 were yearlings, as aged by Martin's recent key. Four of the adults were returns from previous bandings, three from 1962 and one from 1961.

As has been the case in former years, the live-trapping program has attracted much interest on the part of undergraduate students. A large part of the necessary manpower was provided by them.

Plans for next quarter: Inactive.

## ECOLOGY OF COASTAL HABITAT

### Classification of Coastal Marshes and Mud Flats

**Objectives:** To devise a classification scheme for waterfowl habitat which occurs in the intertidal zone of the Maine coast. The classification scheme should possess the following prerequisites:

1. Ecological differences between the various habitats must be reflected.
2. The terms of description must be sufficiently clear and distinct so that field biologists with limited experience in coastal habitats may use the scheme.

**Assignment:** Russell R. Hyer, Graduate Assistant

Hyer completed the thesis preparation during the quarter and was awarded the Master's degree at the June commencement. The thesis summary is as follows:

The objective of this investigation was to devise a scheme for the classification of intertidal habitats occurring in Maine. A review of previous studies suggested that certain environmental factors, such as soil, vegetation, invertebrate populations, salinity and water temperature, reflect ecological conditions. It was felt, therefore, that such factors might be used as possible criteria for classification.

Environmental factors were examined on 16 intertidal areas located in the central portion of the coast of Maine. Water salinities and temperatures were measured to determine differences between marine and estuarine environments. A classification of soil particle sizes was devised and the surface and subsurface soils of unvegetated areas (flats and beaches) were categorized. Invertebrate populations on these unvegetated areas were sampled; certain animal species present were found to correlate broadly with soil particle size. On vegetated areas (marshes) major vegetation types were determined. These types were found to be related to tide levels and reflect the prevailing ecological conditions.

A key to the classification of intertidal habitats was devised. The following considerations were incorporated in this key:

1. Coastal habitats were divided into two major environmental types, marine and estuarine, according to location, relative effects of river and tidal currents, and salinity.
2. Marshes were distinguished from flats and beaches by the relative percentage of the area covered by vegetation.
3. Further classification of flats and beaches was based on the size classes of the dominant soil particles--clay, silt, sand, gravel, rock, cobble, and boulder.
4. The classification of marshes was further divided according to major vegetation types--salt-marsh cordgrass, salt-meadow cordgrass, sea-blite - glasswort, black rush, bayonet-grass, and salt-marsh sedge.

In some cases, mixtures of the types discussed in the key were found. Such heterogeneous areas could be classified, however, by considering the characteristics of their component parts.

Several recommendations of management practices that might increase plant and invertebrate animal populations of intertidal habitats were made. The investigation disclosed the need for a study on the feasibility of identifying habitat types from aerial photographs; an investigation of the usage of the various habitat types by waterfowl; and an evaluation of environmental factors, such as pollution, soil firmness, soil fertility, and human disturbance as related to waterfowl utilization of coastal areas.

NOTE: This is a completed project.

#### BIG GAME RESEARCH

##### Winter Behavior of the White-tailed Deer

- Objectives: (1) To determine environmental differences in two deer yards of contrasting cover types but with similar climatic conditions.
- (2) To determine variations in deer behavior within the two yards and to relate these to environmental factors.

Assignment: Benjamin W. Day, Jr., Graduate Assistant

The thesis write-up was completed during the quarter. Day was given his oral examination the last of June and will be awarded the Master's degree at the August commencement. A summary of his thesis will be presented in the next quarterly report.

#### COOPERATION, EDUCATION WORK AND MISCELLANEOUS ACTIVITIES

Unit personnel continued to furnish technical assistance to the State Department of Inland Fisheries and Game and to the general public.

A meeting of the Unit Coordinating Committee was held in Orono in early April. This was the first meeting since Fish and Game Commissioner Speers took office and was in the nature of an organizational meeting. The new Coordinating Committee consists of Commissioner Speers, Director Nutting of the School of Forestry, and Unit Leader Mendall.

Mendall organized and presided over the half-day wildlife program as part of the University of Maine's annual Farm and Home Week. Schemnitz and Robinson were speakers at this session. Graduate assistants Day and Hyer presented summaries of their thesis accomplishments at the Forest Forum meeting also held in conjunction with Farm and Home Week.

Mendall, Robinson and Schemnitz were in attendance at the Northeastern Wildlife Conference, held in Portland, Maine during April. Schemnitz served as chairman of the upland game session. Mendall was summarizer of the waterfowl panel.

At the request of Regional Director Gottschalk, Mendall participated in a waterfowl conference in June at the Migratory Bird Populations Station at Laurel, Maryland. Purpose of the meeting was to discuss various aspects of the black duck banding analysis being carried out by station personnel.

Unit personnel participated in two of the cooperative pesticide studies being conducted by the Patuxent Wildlife Research Center. Special specimens of various species of birds were collected for pesticide analyses this winter at the Patuxent Center.

#### PUBLICATIONS

Day, Benjamin W., Jr.  
1963. Winter Behavior of White-tailed Deer in North-Central Maine.  
M.S. Thesis, Univ. of Maine, Orono. 151 pp.

Hyer, Russell R.  
1963. A Classification of Intertidal Habitats in Maine. M.S. Thesis,  
Univ. of Maine, Orono, 120 pp.

#### PERSONNEL CHANGES

Assistant Leader Coulter returned to Orono from Syracuse University following his leave for PhD studies. He will officially resume duties on July 1.

Graduate Assistant Hyer completed work with the Unit in June. He is at his home in Indiana awaiting expected military duty.

Respectfully submitted,

*Howard L. Mendall*

Howard L. Mendall, Leader  
Maine Cooperative Wildlife  
Research Unit

August 15, 1963

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MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

University of Maine

Orono, Maine

QUARTERLY REPORT

July-September, 1963

Cooperating Agencies

Maine Department of Inland Fisheries and Game  
Wildlife Management Institute  
University of Maine  
U. S. Bureau of Sport Fisheries and Wildlife

NOT FOR PUBLICATION

The quarterly reports are usually statements of progress. The data presented often are incomplete and the conclusions reached may not be final. Consequently, permission to publish any of the information contained herein is withheld pending authorization from the Research Unit.



### Introduction

Effective September 1, both Professors Coulter and Schemnitz are serving as members of the Unit staff as well as the wildlife teaching staff of the School of Forestry. This means that two half time assistant leaders now participate in the Unit program rather than one full time assistant as formerly. It is expected that this change will strengthen and better coordinate the entire wildlife research and training program at Orono.

## MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

Quarterly Report

July-September, 1963

RESEARCH PROJECTSWATERFOWL RESEARCH(a) Waterfowl Distribution and Experimental Management

Objectives: To obtain 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 breeding species, especially the black duck and the ring-necked duck.

Assignment: Howard L. Mendall, Leader

The season's field studies were concluded during the quarter. Final nest and brood checks revealed no significant changes from the conclusions of nesting success and production, already summarized in detail in the last quarterly report.

Plans for next quarter: Limited data on fall populations and migration will be obtained in connection with work on sub-project (c).

(b) Renesting and Homing Study

Objectives: To study renesting behavior and the degree of migrational homing exhibited by waterfowl, primarily the black duck, mallard and the ring-necked duck.

Assignment: Malcolm W. Coulter, Assistant Leader  
(Vermont phase conducted jointly with William Miller, former Waterfowl Project Leader, Vermont Fish and Game Service)

The spring field work was carried out in Maine and Vermont by William Robinson. He was assisted in Vermont by Neil King, Vermont Fish and Game Service, and by Owen Seelye, U. S. Game Management Agent; and in both Vermont and Maine by Graduate Assistant Benjamin Day.

As was the case last year, primary emphasis was directed toward determining the number of nesting hens, previously banded, that returned to the study areas. Hens were trapped at their nests and released after banding or identification of an existing band. One case of renesting was observed when a banded mallard renested after her first nest was destroyed by a raccoon.

A total of 34 nests were studied (10 mallard and 24 black duck). Twenty-one hens were trapped (6 mallard, 15 black duck). Twelve, or about 57 per cent of the nesting hens trapped were individuals that were known to have nested on the study areas during previous seasons.

Results of the past three years suggest that on the study areas half or more of the breeding population may consist of females that have previously nested on these areas. In view of current knowledge about survival rates it appears that the bulk of the surviving hens return to the same small islands to nest. Many interesting relationships with respect to covers selected, laying dates and clutch sizes are suggested by the data gathered.

A final analysis and report is in progress. Further summaries on this project will not be made in quarterly reports until the final analysis has been completed.

(c) Waterfowl Hunter Bag Checks

Objectives: To determine hunter success, crippling loss, and species, sex and age composition of the kill.

Assignment: Howard L. Mendall, Leader

Inactive during the quarter.

Plans for next quarter: Field bag checks will be conducted as usual by all members of the Unit staff.

WOODCOCK RESEARCH

Woodcock Population Studies

Objectives: To conduct annual censuses and to obtain related ecological data on the Unit's permanent census routes in Maine.

Assignment: Howard L. Mendall, Leader

Inactive during the quarter.

Plans for next quarter: Inactive.

BIG GAME RESEARCH

Winter Behavior of the White-tailed Deer

Objectives: (1) To determine environmental differences in two deer yards of contrasting cover types but with similar climatic conditions.

(2) To determine variations in deer behavior within the two yards and to relate these to environmental factors.

Assignment: Benjamin W. Day, Jr., Graduate Assistant

Graduate Assistant Day completed all Unit duties during the quarter and

was awarded the Master's degree at the August Commencement.

The summary of his thesis is as follows:

The behavior of white-tailed deer under natural conditions was studied during two winters, 1961-62 and 1962-63. The objectives of the investigation were: (1) to determine environmental conditions in two deer yards of contrasting cover types, but with similar climatic conditions; and (2) to determine variations in deer behavior within each yard, and between the two yards, and relate these to environmental factors.

Two study areas - portions of established deer yards in north-central Maine - were selected that typified areas in two common forest zones in that portion of the state. The Reed Stream area in Springfield in central Penobscot County was low-lying, flat, and largely composed of mature and nearly mature softwoods. The Middle Branch area in T5 R9 in southern Piscataquis County was higher in elevation, had more varied relief, and the softwood cover was well interspersed with stands of mixed growth and hardwoods. Both study areas had similar climates.

The winter of 1961-62 was colder than normal, but less snowfall than usual was recorded. The period of confinement of deer lasted for approximately one month. Travel was aided through most of the winter by development of a strong crust in early January.

The winter of 1962-63 was likewise colder than normal, while snowfall from December through March was the greatest in several decades. The period of confinement lasted for approximately three months. Deer were limited to much smaller areas than in the previous winter. The deer on the Reed Stream area were especially restricted. Travel conditions were poor through January and February and strong crusts did not develop until mid-March.

During the confinement period the softwood cover on each area was the center of all deer activity. Movement, bedding, and feeding activities were most prominent in and adjacent to the coniferous stands. Softwood cover served to reduce snow accumulations, moderate and stabilize the temperature, and provide protection from winds and storms.

Deer mobility was shown to be directly limited by the depth to which the animals sank in the snow. These depths were found to be greatly affected by the presence or absence of crusts in the snow cover. Strong crusts improved deer travel conditions; weaker crusts were found to hinder travel.

Movement, as affected by extremes in temperatures was difficult to determine because of the apparently stronger influences of snow depth and food availability which operated simultaneously. It was noted, however, that cold periods limited deer travel to the heaviest cover and nearby sunning spots. Temperature extremes were also responsible for crust formations.

Movement of deer during periods of deep snow was believed to be strongly influenced by the availability and abundance of food. Deer on the Middle Branch area traveled considerably more during both winters than did deer at Reed Stream. This was believed to be related to the fact that more food interspersed throughout the cover was available on the Middle Branch area.

A lack of food on the Reed Stream area was also found to be the likely cause of a movement from an area largely depleted of food to another a quarter mile away with an adequate food supply. Spring dispersal occurred earlier and over a shorter period of time on the Reed Stream area; this also was believed to be a direct result of food scarcity which forced deer to seek better supplies as soon as travel conditions permitted.

Bedding appeared to be influenced by the increased depths of snow during 1962-63. When deep snow accumulated, many lightly sheltered bedding sites were deserted on both study areas. "Spare" beds on many bedding sites were also abandoned, presumably because of the difficulty in maintaining them. Little variation in cover types selected for bedding was found during the two winters. In the cedar type on Reed Stream, however, a decrease in number of bedding sites was found in 1962-63 because of excessive snow depths.

An increase in the amount of repeated use of bedding sites was recorded during the winter of 1962-63. This was believed to be the result of deep snow that hindered the establishment of new sites.

Deer usually bedded at night in the warmer stands of coniferous cover on the warmest portions of the slope. Exposed bedding sites were apparently chosen to take advantage of the sun's warmth, and were most commonly used on fair sunny days. The direction of slopes (aspect) chosen by deer for bedding sites was shown to favor southerly exposures, particularly those facing southwest.

Evidence gathered from the number of beds per site coupled with observations of deer indicated that deer existed most commonly alone or in groups of two or three animals.

Feeding, as well as general movement by deer on both study areas was affected by the depth to which the animals sank in the snow. Excessive snow depths, as were experienced during 1962-63, buried considerable amounts of hardwood sprout growth on the Middle Branch area. Pawing by deer through snow cover to obtain food was observed once.

The strong winds accompanying the blizzard of December 30-31, 1962, blew down many trees and branches. This new food supply was quickly and thoroughly utilized by the deer.

Difference in foods consumed were noted between study areas and from year to year. The principal cause for all such variations noted was apparently availability.

Five known cases of deer mortality occurred during the study; four of these were found during the moderate winter of 1961-62. In spite of the severity of the winter of 1962-63, no important mortality of deer was known to occur on either study area.

NOTE: This is a completed project.

### Miscellaneous Studies

In the quarter Coulter and Mendall visited several islands in Penobscot Bay that are used by breeding eider ducks. This was in line with similar trips they have made during the past 3 years to study the opportunity for accomplishing needed research on factors that influence the production of eiders along the Maine coast. This exploratory work has shown that a group of islands located in Penobscot Bay near Isleboro, Waldo County appear suitable for a series of detailed studies. At least 250 eider ducks have attempted to nest during recent years on this group of 6 or 7 small islands. These islands are reasonably accessible with a small boat, and are located close enough to Isleboro so that adequate accommodations for field personnel are available.

In view of the high breeding population of eiders, concentrated on small islands, conveniently located and within 50 miles of Orono, it is anticipated that the first segment of study will be initiated this fall as a thesis project by Graduate Assistant Choate.

### COOPERATION, EDUCATION WORK AND MISCELLANEOUS ACTIVITIES

Unit personnel continued to furnish technical assistance to the State Department of Inland Fisheries and Game and to the general public. Several conferences with various State personnel were held both in Orono and Augusta.

A meeting of the Unit Coordinating Committee was held in the State Capitol in Augusta during September. Attending from Orono were Messrs. Nutting, Coulter and Mendall. Representing the Department of Inland Fisheries and Game at this meeting were Commissioner Speers, Deputy Commissioner Bucknam, and Director of Planning and Research Johnson.

Unit staff members participated in several meetings or professional conferences. On August 16 Mendall participated in the annual meeting in Augusta of the Maine Waterfowl Advisory Council. On September 30 he conferred in Fredericton, N. B. with staff members of the New Brunswick Fish and Wildlife Branch. On that same date, Coulter participated in a meeting in Augusta of the Game Division of the Maine Department of Inland Fisheries and Game.

Several days were devoted by the Unit staff during the quarter to drafting proposed projects for consideration in allocating anticipated funds through the McIntire-Stennis legislation.

### PUBLICATIONS

- Hartman, Fred. 1963. Estuarine winter habitat for black ducks. J. Wildl. Mgmt., 27(3):339-347.
- Moulton, John C. 1963. Notes on the small mammals of the Weskeag River Region, Knox County, Maine. Maine Field Naturalist, May, 1963, pp. 67-70.
- Robinson, William L. 1963. Winter record of the American coot in Maine. Maine Field Naturalist, May, 1963, p. 71.

PERSONNEL CHANGES

Temporary Assistant Leader William L. Robinson, who replaced Coulter during his leave of absence at Syracuse University, completed work with the Unit August 1. He accepted a position on the Zoology staff at Middlebury College in Middlebury, Vermont.

Graduate Assistant Benjamin Day, Jr., was awarded the Master's degree at the August Commencement. He has obtained a position as biologist with the Vermont Fish and Game Service and is in charge of deer research, stationed in Montpelier.

Three new graduate assistants began their duties at the Unit in September. These are:

Choate, Jerry S., a 1963 Cornell graduate in wildlife management. His thesis study will deal with the breeding biology of the eider duck.

Gore, James F., a graduate in wildlife management in 1963 from South Dakota State College. Gore's assistantship will be financed through P-R funds and will deal with a segment of the State's project on salt marsh ecology.

Gramlich, Francis J., was graduated from the University of Maine with a degree in wildlife management. His study will be on the white-tailed deer and will be financed through P-R funds.

Respectfully submitted,



Howard L. Mendall, Leader  
Maine Cooperative Wildlife  
Research Unit

October 9, 1963

*Free  
copy*

MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

University of Maine

Orono, Maine

QUARTERLY REPORT

October-December, 1963

Cooperating Agencies

Maine Department of Inland Fisheries and Game  
Wildlife Management Institute  
University of Maine  
U. S. Bureau of Sport Fisheries and Wildlife

NOT FOR PUBLICATION

The quarterly reports are usually statements of progress. The data presented often are incomplete and the conclusions reached may not be final. Consequently, permission to publish any of the information contained herein is withheld pending authorization from the Research Unit.



## MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

Quarterly Report

October-December, 1963

RESEARCH PROJECTSFUR ANIMALSEcology and Behavior of the Fisher

- Objectives: (1) To study patterns of range expansion, food habits and habitat preferences of fisher.  
(2) To study behavior patterns of the animal.  
(3) To evaluate the current role of the fisher in its new status as a major component of the carnivorous fauna of Maine.

Assignment: Malcolm W. Coulter, Assistant Leader

## Introduction:

A new project on the fisher was begun during the quarter. This is largely a reactivation of a previous major project that has been inactive for several years. Marked changes in the distribution and abundance of fisher have occurred in Maine since 1950. These changes have been especially pronounced in southern and central Maine during the past three or four years. Scores of fisher are being trapped in the coastal belt and in farming districts where the species was unknown six or seven years ago.

Public attitude about this animal has also changed. Not long ago fisher were regarded as rare, almost mysterious animals, closely protected and viewed as a relic of the past. Today, however, many groups are expressing concern about the fisher as a predator. Because of relatively low prices for furs, trapping is heavy, for the most part, only in the more accessible areas. A few people have shown some interest in pursuing fisher with dogs, largely for sport. A four-month statewide trapping season was established by the last legislature. Because this animal has not been well known in Maine, misconceptions about its habits and behavior are more prevalent than for any other fur animal. Thus its current status provides a unique opportunity to continue research.

Plans were made during the quarter for obtaining further series of specimens from several parts of the State. Seventy-six carcasses from animals taken during November or December were processed in the Unit laboratory. The Warden Service of the Department of Inland Fisheries and Game and Regional Game Biologists have been very helpful in obtaining specimens from trappers.

Preliminary plans have also been developed for holding fisher in pens to study certain aspects of behavior. One young animal, now in captivity

will be made available in January. Wild-trapped adults will be obtained later in the winter.

Plans for next quarter:

1. Continue to collect and process specimens.
2. Construct two additional holding pens.
3. Conduct limited field checks on study areas.

WATERFOWL

(a) Waterfowl Distribution and Experimental Management

Objectives: To obtain 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 breeding species, especially the black duck and the ring-necked duck.

Assignment: Howard L. Mendall, Leader

Data on fall populations and migration were obtained and are included under sub-project (c).

Plans for next quarter: Inactive.

(b) Renesting and Homing Study

Objectives: To study renesting behavior and the degree of migrational homing exhibited by waterfowl, primarily the black duck, mallard and the ring-necked duck.

Assignment: Malcolm W. Coulter, Assistant Leader  
(Vermont phase conducted jointly with William Miller, former Waterfowl Project Leader, Vermont Fish and Game Service)

Inactive except for tabulation of data and manuscript preparation.

(c) Waterfowl Hunter Bag Checks

Objectives: To determine hunter success, crippling loss, and species, sex and age composition of the kill.

Assignment: Howard L. Mendall, Leader

For the 16th consecutive season personnel of the Maine Cooperative Wildlife Research Unit at the University of Maine and the State Game Division cooperated in field bag checks of waterfowl hunters. Additional assistance was given by Robert Rupp, Fisheries Biologist of the Maine Department of Inland Fisheries and Game, Judge John M. Dudley of Calais and personnel of the Moosehorn National Wildlife Refuge. Data from the field studies provide valuable information to supplement the statistically designed samples from federal and state postal surveys.

A split season, evenly divided, was in effect on ducks with open dates October 5-26 and November 22-December 14. The bag limit was 3 birds, an increase of one from a year ago. Only two black ducks or mallards, singly or in the aggregate, could be included in the bag.

The season for geese was October 5 to December 13. Special regulations on sea ducks (eiders, old squaws and scoters) permitted a longer season and larger bag limit. As pointed out in previous reports, the field bag check studies are not designed to measure sea duck or goose hunting.

A total of 750 hunter contacts, representing 407 hunting parties, was made and 896 birds were examined; by coincidence this is the same number of ducks checked as a year ago. Hunting pressure on opening day and the second Saturday of the early season appeared to be slightly heavier than in 1962. Thereafter, the number of hunters afield was very low on any given day. Throughout much of the season the prevailing weather was not conducive to successful duck hunting. This is discussed in more detail under Hunting Success.

#### Fall Populations

It was the concensus of biologists and wardens that populations of most species were at high levels during the fall as a whole. Opening day numbers, however, appeared to be somewhat less than in 1962. This was expected since breeding ground surveys had indicated slight declines in Maine and New Brunswick. By contrast, subsequent concentrations of ducks at both inland and coastal areas were believed equal to the favorable numbers of a year ago.

Principal migratory flights of northern birds into the State occurred as two peaks this year - the first much earlier than usual and the second quite late. The former coincided with an unseasonable cold spell the last of September. Thereafter, there was little evidence of extensive migration until the second and third weeks of November. Unfortunately for inland hunters this occurred during the split between seasons.

#### Hunting Success

Average hunter success, based on bag check data, was approximately 2 (1.95) birds per man-day. Arithmetically this was very similar to the figure of 1.9 of a year ago. However, it actually represents considerably lower success this year since the bag limit was 3 ducks in comparison with 2 in 1962. In other words, the average hunter shot no more ducks per trip this year even though there was a 33 per cent increase in legal bag. Even on opening day only one-fourth (26 per cent) of all hunting parties contacted had limit bags; the proportion for the entire season was but 14 per cent. However, it was of interest to note that 34 per cent of the parties averaged 2 birds per man - the 1962 limit. It should be pointed out, also, that the species regulation limiting the black duck bag at 2 undoubtedly had some bearing in this respect. Some hunters were interested only in black ducks and stopped shooting for the day after killing 2 birds; they might have increased their bag by one had they cared to fill out with another species. Nevertheless, the data substantiated the impressions gathered while the season was in progress that this was a poorer season.

As is usual, hunting success varied widely by areas. This year it was highest in Merrymeeting Bay and lowest in the Penobscot Valley including the Penobscot Estuary. After opening day, inland gunners were especially hard hit by the weather. A long period of hot, dry weather prevailed during most of October, with temperatures often in the 60-80° range. Then, during the first half of November, precipitation reached near record amounts throughout all of Maine. By the time the second half of the season opened on the 22nd, most inland waterways were still at abnormally high water levels. Hunting opportunities that should have been excellent on the rivers were virtually non-existent. In a few localities the high water created flowages, that were used by ducks, which ordinarily would not have contained water. On the whole, however, inland hunting was poor after opening day.

Coastal gunning was generally good during the short period in November when the season was open. But December hunting conditions were very poor because of a sudden freeze on the 1st and 2nd. This marked the beginning of a prolonged cold spell that continued, with only a brief interval, until the season closed. Even on the coast the temperature dropped below zero on December 6. Hunting in the salt marshes came to an end long before the season closed, and many of the small bays and coves were too choked with ice for navigation in small boats. Hunting in eastern Maine was affected most seriously, but even in the western coastal areas, the hunters were considerably handicapped.

#### Crippling Loss

Crippling loss (birds "downed" but not retrieved) was 25 per cent. This is an improvement over the 29 per cent loss recorded for 1962.

#### Bag Composition

The kill by species of the birds examined is given in Table 1. The relative order of the 3 leading ducks (black duck, green-winged teal and goldeneye) has remained the same for 4 consecutive years, but the percentage of each declined somewhat from 1962. In the case of the black duck this would be logical with the general bag limit increased this year to 3, but with only 2 blacks permitted. It was previously mentioned that 14 per cent of all hunting parties had full limits, but only 2/3 of those birds could legally be blacks.

Percentage changes from 1962 were slight for most species. A marked decline was noted for the wood duck, however, and is believed directly related to lowered production of the breeding season. The blue-winged teal showed a slight increase in the kill but it had been expected there would be a substantial increase since the season opened 7 days earlier than in 1962.

The increased harvest of buffleheads resulted largely from late season coastal gunning. This duck, not highly regarded as a sport or table bird, is a fairly reliable indicator of the quality of coastal hunting. When black ducks and goldeneyes are "hard to get" in December, buffleheads show up more prominently in hunters' bags. This has been frequently observed during previous years.

### Age and Sex Ratios

The proportion of young birds in the kill generally reflects the success of the previous breeding season. Among northeastern ducks a ratio of two young to each adult shot is considered to be indicative of a healthy population. It must be cautioned here that, because of differences in migration patterns between young and adult birds, figures from one state may disagree with those from its neighboring states. To obtain an accurate picture of age ratios, therefore, figures from various parts of the flyway must be considered. Sex ratios of the kill may indicate different migration patterns between males and females, hunter selection of one sex over another, or, when considered over a broad geographical area, the actual proportion of males to females in the waterfowl population. Thus, Maine data alone must be considered with that from other states to be meaningful.

In Maine this year, the age was determined for 609 of the birds checked. The ratio for black ducks, as well as for all species combined, was 1.9 young for each adult shot. This is a slightly more favorable ratio than was the case a year ago.

Sex was determined for 611 of the birds. The ratio for all species was 117 males for every 100 females. Considering only black ducks the ratio was 127 males per 100 females. This is a slightly higher than average proportion of male blacks. It appears to be a biologically desirable ratio, since all waterfowl species have an apparent excess proportion of males in the population.

### Summary and Conclusions

1. During field studies, 750 hunter contacts were made and 896 birds were examined.
2. Hunting pressure on opening day and the second Saturday appeared slightly higher than a year ago. Thereafter, it was very low, attributable in part to adverse weather.
3. Individual hunter success averaged 1.95 ducks per man-day. Considering bag limit changes, this represents a decrease in hunter success from 1962 and is believed largely the result of unfavorable hunting weather.
4. The black duck, green-winged teal and goldeneye, in that order, predominated in the bag for the fourth consecutive year.
5. Crippling loss was lower than a year ago but, at 25 per cent, was still about at the long-term average.
6. Age and sex ratios of birds shot, particularly black ducks, were reasonably satisfactory from a biological standpoint.

Plans for next quarter: Inactive.

Table 1  
 1963 Waterfowl Bag Checks  
 Species Composition (Exclusive of Sea Ducks)

Species	No. of birds checked	Per cent	Per cent change from 1962
Black Duck	394	44.0	-3.0
Green-winged Teal	133	14.8	-1.5
Goldeneye	102	11.4	-1.2
Wood Duck	42	4.7	-3.7
Ring-necked Duck	34	3.8	-0.2
Blue-winged Teal	31	3.5	+2.4
Bufflehead	28	3.1	+2.7
Mallard	26	2.9	+0.3
Hooded Merganser	20	2.2	+0.1
Greater Scaup	17	1.9	+1.7
Pintail	10	1.1	+0.7
Canada Goose	6	0.7	+0.3
American Widgeon	5	0.6	+0.5
Mergansers (Common & Red-breasted)	5	0.6	-1.0
Ruddy Duck	4	0.5	+0.4
American Coot	3	0.3	-1.4
Barrow's Goldeneye	2	0.2	+0.1
Lesser Scaup	1	0.1	-0.3
Gadwall	1	0.1	----
Misc. (Unidentified)*	32	3.6	----
Total	896	100.1	

\*Includes birds plucked and dressed when examined.

(d) Breeding Biology of the Common Eider in Penobscot Bay, Maine

Objectives: To determine breeding success, and factors influencing productivity, within selected eider colonies on the Maine coast.

Assignment: Jerry S. Choate, Graduate Assistant

Thesis Adviser: H. L. Mendall

Introduction:

This is a new study with field work to be started this spring. The common eider breeds in appreciable numbers on the Maine coast. Yet there is no available information as to its nesting and rearing success or its specific habitat needs in this region. Therefore, productivity and related factors in the breeding biology of the eider will be studied on certain islands in Penobscot Bay. The major objectives are to devise ways for measuring annual production, to determine nesting densities and hatching success, and to determine the factors governing production.

The principal method of study will be by direct observation with the use of blinds and spotting scopes. Thus, the birds will be disturbed as little as possible to increase the reliability of the observations.

An attempt will be made to census the potential breeding population within the overall study area. Production estimates can then be based on number of young produced per breeding bird. Each island will be divided into units according to nesting density. In this way it will be possible to determine topographic, vegetative and other differences which may be correlated with nesting density and hatching success. Physical factors such as exposure to weather, the type of nest, and amount of cover will be considered along with relationships to other animals.

Renesting data may be obtained by removing the eggs from nests on which females have been live-trapped, banded, and color-marked. Observation of renesting due to natural destruction can also provide data.

The incidence of mortality of the young will be estimated through observation of average brood sizes throughout the breeding season. However, since it is known that eiders often combine broods for mutual protection, the change in the number of young per female can be used as a criterion to determine mortality.

By estimating the number of nesting attempts and hatching success, as well as mortality of the young, it is hoped that an accurate estimate of total production for each island can be made along with a determination of the factors affecting this production.

Plans for next quarter: To prepare a project outline and to complete plans for the spring work.

WOODCOCKWoodcock Population Studies

Objectives: To conduct annual censuses and to obtain related ecological data on the Unit's permanent census routes in Maine.

Assignment: Howard L. Mendall, Leader

Inactive during the quarter.

Plans for next quarter: Inactive.

BIG GAMEA Study of the Causes for the Declining Deer Harvests in Eastern Maine

Objectives: (1) To determine the causes of the low deer kill in a block of 20 townships in northern Hancock County and adjacent portions of Washington County.  
(2) To formulate management recommendations for improvement.

Assignment: Francis J. Gramlich, Graduate Assistant

Thesis Adviser: S. D. Schemnitz

Consultants: Chester F. Banasiak, School of Forestry  
J. William Peppard, Regional Biologist, Dept. Inland Fisheries and Game

Introduction: This is a new study financed by State Pittman-Robertson funds.

There has been a noticeable decline in the deer harvest in northern Hancock County and adjacent portions of Washington County. A block of 20 wildland towns, covering an area of over 700 square miles, has been producing harvest densities about one-third those of surrounding towns. Most of the towns involved reached harvest peaks about 1940, and the kill has declined in comparison with adjacent towns since that time.

Investigation will involve compilation of descriptive information for the area. General information will include recent historic (since 1920) accounts of land use as: cutting practices and forest products harvested; fire occurrence; descriptions of forest cover types; relative accessibility of the area, including amount and type of road building; number and type of camp leases; hunting pressure and hunter success; deer population trends; geological and soil factors. Ten timber companies own most of the land. Much information has already been obtained from the files of one of these, and similar cooperation is anticipated from the others.

Aerial and ground surveys will be made to locate deer wintering areas and to obtain an estimate of deer population density. From an analysis of the general information, representative towns within the low kill area will be selected for more intensive studies and comparison with other areas.

The objective of the investigation is to identify the factors contributing to the low deer harvest, and, if possible, to formulate management recommendations for improvement.

During the quarter preliminary study plans were completed. A meeting was held with representatives of the Dead River Company, a major landowner in the area concerned. Through the interest and cooperation of this company, land-use data have been obtained from nine townships within the study area. This material includes: volume of logs and pulpwood harvested, dates and extent of forest fires, timber cruise data, history of access roads, and information on camp leases. It is expected that similar data will be obtained from the other major landowners.

Deer kill figures for all years since records have been kept were obtained from the Department of Inland Fisheries and Game. These have been tabulated and prepared in graph form.

In addition to cooperation from personnel of the Dead River Company, Professor Banasiak of the School of Forestry and State Game Biologist J. William Peppard provided much assistance.

#### Plans for next quarter:

1. To obtain land-use records, similar to those of the Dead River Company, from the remaining major landowners.
2. To conduct ground and aerial surveys to ascertain cover types, general browse conditions, and to locate deer wintering areas.
3. To examine geological and soil data available for the area.

#### SALT MARSH ECOLOGY

##### Effects of Small Salt Marsh Impoundments upon *Ruppia* and Macroinvertebrates

- Objectives:
1. To determine the effects of plugged ditches upon the growth and production of widgeon grass (*Ruppia maritima*); and on populations of Baltic clams (*Macoma baltica*), several species of small snails, and amphipods of the Genus *Gammarus*.
  2. To determine the effect of plugged ditches in relation to mosquito reproduction.

Assignment: James F. Gore, Graduate Assistant

Thesis Adviser: M. W. Coulter

Consultant: Kenneth Anderson, Regional Biologist, Dept. Inland Fisheries & Game

#### Introduction:

This is a new study initiated this fall. It is financed by Pittman-Robertson funds as part of the State's investigation of salt marsh ecology.

During the past 250 years, Maine and other states along the Atlantic coast have lost many acres of salt marshes through drainage for mosquito control, production of salt marsh hay or other farming uses, and for industrial development. Consequently, marsh wildlife has decreased markedly. Waterfowl in particular have been influenced by destruction of these marshes.

One aspect of salt marsh ecology is being investigated as a graduate thesis. The principal study area is the Weskeag River marsh near Rockland in Knox County. This marsh was drained by small ditches many years ago to facilitate the harvesting of salt marsh hay. During the present study, a series of ditches will be plugged with wooden dikes to retain various levels of brackish water, while other ditches will be left in their natural condition as controls. Plugging ditches at various levels will result in differences in water temperatures, salinity and nutrient exchange.

The study will test the influence of various levels of brackish water upon the population of widgeon grass (*Ruppia maritima*), Baltic clams (*Macoma balthica*), and various species of small snails and amphipods of the genus *Gammarus*; all of which constitute important duck foods. A carefully designed sampling plan will be used to permit statistical testing of the significance of population changes that may occur.

During the quarter 10 field trips were made to the study area. Existing ditches and potholes were examined and samples of both plant and invertebrate organisms obtained. Various portions of the marsh were photographed to show details of topography and to supplement more general studies made a year ago by former Graduate Assistant Day.

Seven drainage ditches have been selected for experimental study. Selection was based on uniformity of depth, width, bottom, vegetation and amount of tidal influence. Ditch plugs will be inserted in these next spring. As a preliminary step one wooden plug was constructed in December in a ditch to serve as a guide to construction of the test plugs. The purpose of this was to observe its ability to withstand tidal pressure, frost-heaving and icing.

Several local residents have been helpful in providing information as to history, drainage and waterfowl use of the marsh. Waldo Tyler, of South Thomaston, has been particularly helpful in this respect and has also offered the use of personal equipment for the study. The project consultant, Game Biologist Kenneth Anderson, has likewise provided much assistance in planning details of investigation.

Plans for next quarter: To continue literature review, to prepare an experimental design for the study, and to become familiar with techniques for processing samples.

#### COOPERATION, EDUCATION WORK AND MISCELLANEOUS ACTIVITIES

Dr. Lee Yeager, in charge of Cooperative Wildlife Research Units, of the Washington office, spent 5 days during late November at the Maine Unit. The first day was devoted to meetings and to student and staff conferences. A luncheon for Dr. Yeager was attended by Dean of Graduate Study Eggert, Dean of Agriculture Libby, and by several University and State officials closely

connected with the Unit program, including Commissioner Speers and Deputy Commissioner Bucknam of the Department of Inland Fisheries and Game. During the afternoon a meeting of the Unit Coordinating Committee was held. The remainder of Dr. Yeager's visit was spent in the field observing habitat conditions, especially as related to white-tailed deer and waterfowl.

Unit personnel continued to furnish technical assistance to the Game Division of the Department of Inland Fisheries and Game, to several University departments, and to the general public.

On October 30, Schemnitz addressed a meeting of the Bangor Senior Citizens. On December 16 Mendall participated in a meeting in Augusta of the Maine Waterfowl Council.

Coulter and Schemnitz devoted much time during December to detailed preparation of several research project resumes and outlines submitted as part of the School of Forestry's requests for grants through the new McIntire-Stennis program.

Respectfully submitted,



Howard L. Mendall, Leader  
Maine Cooperative Wildlife  
Research Unit

February 25, 1964