new copy

MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

University of Maine

Orono, Maine

QUARTERLY REPORT

January-March, 1964

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NOT FOR PUBLICATION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.

Unit Personnel

Leader - Howard L. Mendall
Assistant Leaders - Malcolm W. Coulter(*)
Sanford D. Schemnitz(*)

University Representative - Albert D. Nutting, Director, School of Forestry

Collaborators(**) - Chester F. Banasiak, School of Forestry
Howard E. Spencer, Maine Dept. Inland Fisheries & Game
J. William Peppard, Maine Dept. Inland Fisheries & Game
Kenneth Anderson, Maine Dept. Inland Fisheries & Game
Alfred O. Gross, Professor Emeritus, Bowdoin College

Graduate Assistants - Jerry S. Choate
James F. Gore
Francis J. Gramlich
Graduate Student - Frank W. Ricker
Secretary - Maxine L. Horne

(*)Professors Coulter and Schemnitz serve half time on the Unit program and half time on the teaching staff of the School of Forestry.

(**)Collaborators change periodically. This list includes only those who are directly cooperating or assisting in current Unit studies.

Unit Coordinating Committee

Ronald T. Speers, Commissioner, Maine Dept. Inland Fisheries & Game
Albert D. Nutting, Director, School of Forestry
Howard L. Mendall, Unit Leader

MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

Quarterly Report

January-March, 1964

RESEARCH PROJECTS

FUR ANIMALS

Ecology 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

During the quarter an additional 117 specimens were processed. A detailed breakdown will not be presented until the next quarter since several specimens remain to be examined. One very noticeable characteristic among those handled to date has been the great quantities of fat, internal and external, generally present on specimens from southern Maine. These animals are from the most heavily settled region of the state - an area in which fisher have only recently become abundant. Few specimens from the northern, heavily timbered sections show such large quantities of fat.

About 2400 fisher were presented by trappers for stamping during the four-month open season. Almost half of these came from a comparatively small area in southern Maine and undoubtedly the catch there represents one of the highest harvests per square mile ever recorded for fisher. A more detailed comparison of this very interesting situation will be presented in the next report.

Observation of a captive female continues to yield data about behavior. This young animal has grown faster and larger than similar aged animals taken in the wild. Noticeable changes in activity and behavior were noted near the end of the quarter and are probably associated with the mating season. Some preliminary field work was begun in central Maine, but lack of snow hindered this during much of March.

Plans for next quarter:

1. Complete processing of carcasses on hand.
2. Establish a dermistid colony to clean skeletal material.
3. Begin laboratory analysis of digestive tracts.
4. Construct more adequate facilities for holding captive animals in the behavior studies.

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

Inactive during the quarter.

Plans for next quarter: The seasonal field studies will be resumed.

(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

Inactive during the quarter.

Plans for next quarter: Inactive.

(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

Consultant: Dr. A. O. Gross, Professor Emeritus of Ornithology, Bowdoin College

The literature review was continued during the quarter. The project outline was completed and sent for suggestions to several biologists who have had experience with eider ducks in other parts of the world. These

included Dr. V. C. Wynne-Edwards and Dr. H. Milne of Aberdeen, Scotland, and Dr. F. Graham Cooch of the Canadian Wildlife Service. The thesis adviser conferred in Brunswick with Dr. A. O. Gross, Professor Emeritus of Bowdoin College. Dr. Gross has done most of the earlier work on eider distribution in Maine. He kindly provided many field data and made numerous helpful suggestions.

Through the cooperation of the Regional Office, U. S. Bureau of Sport Fisheries and Wildlife, a 15-foot MFG fiberglass boat, trailer, and 35 H.P. motor was transferred to the Unit for this study.

During March a trip was made to Islesboro in Penobscot Bay to make arrangements for living quarters. Islesboro will serve as a base of operation for the field work.

In preparation for this project, Choate, as well as Schemnitz, Coulter and Mendall, took an 8-week evening course in boat safety and navigation given by the Coast Guard Auxiliary.

Plans for next quarter: To initiate the field studies.

WOODCOCK

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: Spring field work will begin during April.

RUFFED GROUSE

Ecology of the Ruffed Grouse in Maine

Objectives:
(1) To study population dynamics of harvested and unharvested grouse populations; and to compare mortality rates of resident non-migratory species (grouse) and migratory species (woodcock) on the same area.
(2) To determine cover preferences and use of forest clearings by adults and broods in spring and summer.
(3) To study the causes of juvenile mortality and measure the incidence of blood parasites.

Assignment: Sanford D. Schemnitz, Assistant Leader

Introduction:

This is a new project being initiated this spring, on a pilot basis. The objectives as stated above may be modified after the first season's results.

Despite the importance of the grouse as the leading Maine game bird in terms of annual harvest (average kill 1953-1962 - 166,000 [Gill, 1963]), relatively little current research has been conducted in Maine on this species. For example, little is known of the effects of current hunting regulations and land management practices on grouse harvest and population dynamics.

Previous Work and Present Outlook:

Grouse studies in Maine have been made by Jacobsen (1937) on census methods, by Howe (1950) on grouse aging, and Kittams (1943) and Brown (1944, 1946) on grouse food habits. Much of the life history and extensive management information has been based on the "New York Grouse Bible" by Bump, et al. (1947). In many instances the findings of this exhaustive treatise are not applicable to Maine due to climatic and vegetative differences. Many of the New York findings were derived from studies in central and southern New York in areas characterized mainly by hardwoods and mixed hardwood-softwood vegetation.

Opportunities for live trapping large numbers of ruffed grouse currently exist at the Moosehorn National Wildlife Refuge at Calais, Maine in cooperation with the U. S. Bureau of Sport Fisheries and Wildlife. During late summer of 1963 large numbers of ruffed grouse were taken in shorebird-type woodcock traps. Sharp (1963) has emphasized the necessity of small openings in the crown canopy as an essential component of grouse brood habitat. Numerous cuttings of various sizes and ages made for woodcock management exist on the Moosehorn Refuge. The utilization of these openings by grouse needs evaluation. Gullion and Marshall (1960) at Cloquet, Minnesota have suggested that refuges do not serve as a grouse reservoir for stocking adjacent heavily hunted covers. Banding of grouse at Moosehorn will provide a means of assessment of the extent of grouse movement away from a refuge in eastern Maine.

Procedures:

1. Grouse drumming log sites on study areas within the Moosehorn and Edmunds Unit of Moosehorn Refuge will be located. Drumming grouse will be live-trapped using mirror traps described by Tanner and Bowers (1948). A vegetative analyses will be made of the immediate area surrounding the drumming site. A densiometer will be used to measure crown canopy. Comparisons will be made with drumming log sites in Michigan (Palmer, 1963) and Minnesota (Gullion, King and Marshall, 1962). Annual drumming census counts similar to those described by Petraborg, et al. (1953) will be made along specified routes at the Moosehorn Refuge just prior to hardwood leaf development.

2. Grouse will be live-trapped in the summer using a modified shore-bird trap (Chambers and English, 1958) also employed to trap woodcock. All grouse trapped will be aged, sexed and banded, and the color phase indicated. Some of the birds will be color marked.

3. Slide samples of blood will be collected from all adults and from one chick of each brood trapped.

4. Various indices of grouse population density will be gathered throughout the year. Permanent King-type strip-census lines will be laid out to sample the study area in the later summer, post-hunting, and mid-winter.

During the quarter, revised project proposals were prepared based on detailed literature review. Consultation was made with Professor David O'Meara, Department of Animal Pathology, University of Maine, relative to techniques and equipment for grouse blood parasite studies. Six water soluble sample dyes: Methyle Blue A Extra conc.; Victoria Pure Blue BGO; Extra, Methyl Violet DXX crystals, Rhodamine B. Extra S; Victoria Green S Extra Conc.; and Magenta ABN Conc. from the General Aniline and Film Corporation, New York City, were tested on the plumage of live captive bobwhite quail for durability and brightness. To date the Victoria Green and Rhodamine B seem to be the most promising of the various dyes used.

Plans for next quarter:

1. Conduct spring counts of drumming males at the University Forest and the Moosehorn Wildlife Refuge.

2. Complete plans for studying live-trapped birds at Moosehorn Refuge in cooperation with Mr. Eldon Clark, Refuge Biologist.

3. Initiate the detailed field study in June.

BIG GAME

(a) A 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, Assistant Leader

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

The quarter was spent in orientation, the collection of data from the records of the major landowners, the plotting of these data on outline maps for comparison with registered kill figures; also accumulation of data on soil, geology, weather, or allied information not available from the landowners records.

The registered deer kill in the study area (22 townships centered around the Sysladobsis, and Machias Lakes complex) continued its decline in 1963. About one deer was killed for each four square miles of land area. Kill density in the perimeter townships surrounding the study area was almost one deer per mile.

During January, three trips were made to the area for orientation and to roughly estimate the number and location of deer wintering yards. Air reconnaissance in a warden aircraft showed only two areas with deer activity as evidenced by tracks. Several short surveys on foot through apparently excellent cover, and two hundred miles of auto search on secondary roads revealed very few deer tracks. Although the search was not intensive, weather and snow conditions were excellent, so the small number of sightings suggested a low deer population.

Contact with landowners: Data on timber harvest since 1920; extent, location and date of construction of roads and trails; camp leasing; location, date and size of forest fires were obtained from Standard Packaging Company, St. Regis Paper Company, and Georgia-Pacific Company. Personnel of these companies gave generously of time, information, and materials useful to the study.

Cutting data were plotted for each township by five-year period, under 4 density categories:

1. No cutting during the period.
2. Light cutting during the period, less than 10,000 cords.
3. Medium cutting, 10,000 to 25,000 cords.
4. Heavy cutting, more than 25,000 cords.

The fire history in acres burned per township was extracted from the Forest Commissioner's biennial reports, 1920 to 1948. Landowners' fire information furnished later history. No fires of less than ten acres were recorded. Most townships in the area had suffered fires on 500 or more acres during the period.

A preliminary examination of the cutting and fire history showed little correlation with the deer harvest.

Road and trail information gives only a part of the picture on access. The large lakes of the region open many areas to hunters. The total length of the road network was measured in each township; also the amount of area in each township that was more than a mile from a road or an accessible lake shore. Only those roads or trails that were passable to a pickup truck during hunting season were considered. The results were plotted on an outline map, with the accessibility expressed as the per cent of the land area more than one mile from a road or navigable water.

In assessing camp leases, the summer or family type camps were separated from the commercial, and known hunting type camps. While it is probable that some hunting is done from the family camps, information available indicates that it is negligible.

There was no significant correlation between accessibility, number of camps, and deer kill.

Other Sources of Information: An attempt to obtain snow depth history of the area was unsuccessful. The Maine Forest Service, Bangor Hydro Electric Company, and the U. S. Weather Bureau had no suitable records from within the area. The closest snow depth records that can be obtained are outside the area of low deer kill.

It was desirable to obtain soil information that might reflect the basic fertility of the area, but none was immediately available. Data obtained from Professor Trefethen of the Geology Department, University of Maine, indicated the study area was rather closely outlined by an almost homogeneous granite type intrusive body (porphyritic biotite/hornblende). This suggested a possible nutritionally deficient soil. Analysis of nutritive elements in browse might prove valuable.

Evaluation of Data: The data on all factors so far considered are often approximate and fragmentary. They vary in accuracy between different landowners from whom received, and even for different townships under the same ownership. Comparison with the kill figures (also subject to errors) was made in order to find an obvious gross correlation or trend. When data collection are completed, they will be analysed more closely with refined plotting and evaluating techniques.

Plans for next quarter:

1. To complete the collection of data from the remaining landowners, analyse the data more closely, and evaluate it statistically.

2. To extend the investigation of soil fertility and available nutrients as they are involved in deer production. This may involve browse sampling or small mammal collection for nutritional analysis.

(b) Influence of Known Populations of Deer Upon Forest Vegetation

Objectives: (1) To measure the influence of a known population of deer upon forest vegetation.
(2) To develop and test more adequate deer census methods than those currently available.

Assignment: Sanford D. Schemnitz, Assistant Leader

Consultants: Malcolm W. Coulter, Assistant Leader
Chester F. Banasiak, School of Forestry

Introduction:

This is a new project to be financed by a grant, just approved, from the McIntire-Stennis forestry research program. The project synopsis is as follows:

Following detailed vegetative and ecological studies on two forested offshore coastal islands, uninhabited by deer, sterilized deer will be introduced. Vegetation will be re-studied at intervals after known periods of deer browsing. Deer proof exclosures will serve as controls. The presence of a known number of animals on an isolated area will also permit

development and testing of census methods. Islands provide discrete ecological laboratories where many variables inherent in mainland studies can be controlled.

Work will be initiated this spring. Contacts with various cooperators will be made to learn of potentially suitable offshore islands currently unoccupied by deer to be used for this study. Aerial photographs and preliminary flight surveys will be made. Following these, field reconnaissance via boat will be made to select the study areas. Applicants for a graduate assistantship relating to one phase of this project are now being screened.

(c) Pilot Radio-Tracking Studies of White-tailed Deer

Objectives: To test the efficiency and accuracy of telemetry equipment on semi-tame deer within fenced enclosures on the University Forest.

Assignment: Sanford D. Schemnitz, Assistant Leader

Introduction:

This is a new study and is to be partly supported by a grant from the Coe Research Fund of the University of Maine. This work will supplement the study described in the foregoing project (b). The project statement is as follows:

One of the vexing problems of deer management is the daily seasonal and and yearly delineation of the movements and mobility of white-tailed deer. Individual deer in the wild, even if color-marked, are difficult to observe due to their natural wariness and the dense vegetation within their habitat.

Specific knowledge of the sphere of influence of a winter deer yard, a key component in the deer's northern range, is needed in order to help co-ordinate deer habitat management and forest management. How far does a deer move from summer to winter range? How far will deer move from their winter yard to seek food? Do they consistently return to the same yard each winter? Answers to these and other questions relating to behavior and mobility have a direct bearing on deer management. Perfection of a practical means of tracing deer movements would allow correlation of deer mobility and habitat usage with weather and vegetation data on specific study areas.

A major barrier to more intensive deer management is the lack of a reliable census method with a measurable limit of statistical error. Perfection of radio telemetry methods will be an aid in evaluating the accuracy of census methods to be tested on known densities of deer on coastal islands (see sub-project b).

During the quarter transmitter and receiver equipment was ordered from Markusen Electronic Specialties, Cloquet, Minnesota. A visit was made on January 18, 1964 to the deer radio-tracking project area at Kingston, Rhode Island, where J. J. Kupa, Department of Forestry, University of Rhode Island, is conducting similar deer tracking research. Much valuable insight on methods was derived from consultation with Mr. Kupa. A telemetry technical seminar session was attended at the North American Wildlife Conference on March 7, 1964, at Las Vegas, Nevada.

Plans for next quarter: Repair the fence at the 3-acre pen facilities on the University of Maine Forest where the experimental radio-tagged deer will be housed.

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

Following consultation with several biologists and statisticians at the University of Maine, an experimental design was selected that would apply to the current salt marsh ecology study. Many helpful suggestions were made by Dr. Marvin Meyer, Department of Zoology; Dr. Ivan McDaniel, Department of Entomology; and Dr. Altenberger, Director of the Computing and Data Processing Service.

The ditches of the Weskeag marsh are quite uniform as to depth, width, bottom, vegetation and amount of tidal influence; therefore, a randomized block experimental design was selected. Two water levels (eight and sixteen inches) have been chosen for the impoundments. These two levels, together with ditches with naturally flowing water, will represent the three treatments to be tested. Each treatment (eight and sixteen inches and natural flowing water) will be used three times in three different ditches. Each ditch will be randomly selected as to which treatment it will receive.

A thirty foot segment of each ditch will be used as the experimental area. Before any dikes are constructed, the ditch bottom will be staked at one foot intervals, starting from the point where the dike will be built to a point thirty feet upstream. Each stake will serve as a reference point and the square foot of water area immediately upstream to the stake will be designated as a plot. All sampling of *Ruppia*, snails, clams and *Gammarus* will be selected at random from these plots.

Field equipment was constructed or purchased during the quarter and the literature review was continued.

Plans for next quarter Continue literature review, take first series of samples, construct dikes and start series of water measurements (temperature, pH, salinity).

COOPERATION, EDUCATION WORK AND MISCELLANEOUS ACTIVITIES

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.

The Unit Leader and both Assistant Leaders participated in the annual State Game Warden training school held in Augusta. Coulter gave slightly more than one day of instruction while Mendall and Schemnitz taught for approximately a half-day each. The subjects on which lectures or laboratory demonstrations were given included: the program of the Maine Cooperative Wildlife Research Unit, predators and predation problems, identification of predation remains, identification of fur and skeletal material, and waterfowl identification. The school is conducted as part of the orientation of new wardens and also serves as a refresher course for a certain proportion each year of the older men. The Unit staff has participated in this annual school since its inception more than 25 years ago.

Mendall, Coulter, Schemnitz and Banasiak were in attendance at the Northeast Fish and Wildlife Conference at Hartford, Connecticut in January. Schemnitz presented a paper at the small game session, and Banasiak was chairman of the big game session.

Unit Leader Mendall and Assistant Leader Schemnitz attended the North American Wildlife Conference in Las Vegas, Nevada. Mendall also participated in the annual Unit meetings held prior to the Conference.

The Unit staff is to participate in the Maine Outdoor Recreation Survey, through a sub-contract with the Department of Agricultural Business and Economics of the Agricultural Experiment Station, which is conducting the survey. Coulter and Mendall are jointly in charge of the Unit's contribution to this project. During the quarter plans were drawn up for conducting the study.

Coulter and Mendall spent considerable time during the quarter participating in Wildlife Society activities - both the parent National Society and the Northeast Section. Mendall is a member of the editorial board of the Journal of Wildlife Management. He is also a member of the awards committee of the Northeast Section. Coulter was appointed as a member of a special committee of the Northeast Section to draw up specific awards criteria.

PUBLICATIONS

Schemnitz, Sanford D. 1964. Utilization of a coniferous roost by mourning doves in southcentral Pennsylvania. Paper presented at Northeast Wildlife Conference, Jan. 19-22, 1964, Hartford, Conn. 18 pp. (Mimeo.).

Respectfully submitted,

Howard L. Mendall

Howard L. Mendall, Leader
Maine Cooperative Wildlife
Research Unit

May 11, 1964

file copy

MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

University of Maine

Orono, Maine

QUARTERLY REPORT

April-June, 1964

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.

Unit Personnel

Leader - Howard L. Mendall
Assistant Leaders - Malcolm W. Coulter(*)
Sanford D. Schemnitz(*)

University Representative - Albert D. Nutting, Director, School of Forestry

Collaborators(**) - Chester F. Banasiak, School of Forestry
Howard E. Spencer, Maine Dept. Inland Fisheries & Game
J. William Peppard, Maine Dept. Inland Fisheries & Game
Kenneth Anderson, Maine Dept. Inland Fisheries & Game
Alfred O. Gross, Professor Emeritus, Bowdoin College
Wesley Jones, Moosehorn National Wildlife Refuge
Eldon Clark, Moosehorn National Wildlife Refuge
David O'Meara, Associate Professor of Animal Biology

Graduate Assistants - Jerry S. Choate
James F. Gore
Francis J. Gramlich
Graduate Students - John C. Baird
Frank W. Ricker
Secretary - Maxine L. Horne

(*)Professors Coulter and Schemnitz serve half time on the Unit program and half time on the teaching staff of the School of Forestry.

(**)Collaborators change periodically. This list includes only those who are directly cooperating or assisting in current Unit studies.

Unit Coordinating Committee

Ronald T. Speers, Commissioner, Maine Dept. Inland Fisheries & Game
Albert D. Nutting, Director, School of Forestry
Howard L. Mendall, Unit Leader

MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

Quarterly Report

April-June, 1964

RESEARCH PROJECTS

FUR ANIMALS

Ecology 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

The processing of accumulated carcasses continued and detailed study of digestive tracts was initiated late in the quarter with help from a student assistant. Because of Coulter's absence during the first part of the quarter, it has not been possible as yet to complete processing all the carcasses.

Tags from fisher trapped last winter were obtained and work was also started in tabulating information about the catch. Final summaries on the catch will be made as soon as new maps outlining warden divisions are received.

Plans for next quarter:

1. Complete laboratory analysis of digestive tracts.
2. Complete facilities for captive animals.
3. Establish a dermisted colony for cleaning skeletal material.

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

The regular seasonal studies were continued throughout the spring. The annual production report was submitted to Washington, Boston and Augusta as of July 20. Although this covers a period somewhat longer than the current

quarter, it is reproduced at this time in the interest of continuity. The report is as follows:

This report summarizes the results, to date, of the 1964 waterfowl breeding studies in northern, eastern and central Maine. The writer received much assistance during these investigations from Graduate Assistant Frank Gramlich. Other members of the Unit staff who obtained data on breeding pair counts or brood checks were Assistant Leaders Malcolm Coulter and Sanford Schemnitz, Graduate Assistant Jay Gore, and Graduate Student Frank Ricker. Additional help on certain phases of the study was given by the following: Frank Haseltine of Pittsfield, Maine; John M. Dudley and John H. Dudley of Calais, Maine; Eldon Clark, Biologist of the Moosehorn National Wildlife Refuge; also Game Warden Lawrence Caron and Biologist J. William Peppard of the Maine Department of Inland Fisheries and Game.

This is the 26th consecutive year of these studies. Techniques were the same as in recent years and were described in detail in earlier reports. Coverage was essentially the same as in 1963.

Weather and General Breeding Conditions

The spring season was considerably advanced from a year ago, but, on the whole, was slightly later than the average. However, it was a season of extremes, and phenology was at first accelerated, then retarded. There was little snow cover at the time of the spring break-up (in marked contrast to 1963), and ice-clearing dates were close to the normal. These factors, together with above average temperatures and light precipitation during most of April and May, resulted in ideal water levels for early nesting. Yet by the end of May the growing season had slowed down considerably. June was cool and very dry and serious drought conditions existed. These have been partially alleviated by considerable precipitation thus far in July.

Waterfowl breeding chronology, advanced during the early part of the season, continued ahead of the average calendar for most species. Nesting dates for black ducks appeared, however, to show two peaks - one earlier than usual and one slightly later. Peaks for other species were generally from a week to 10 days ahead of the long-term average.

Breeding Populations

The initial breeding population is determined from 13 study areas. It has been explained in previous reports that these areas have proven to be fairly reliable indicators for northern, eastern and central Maine. This is especially true for the two most numerous species - the black duck and the ring-necked duck. Data for the other species have much less value in determining annual trends.

Results of these studies indicate that the breeding population at the beginning of the 1964 nesting season was at a "healthy" level for all species except the ring-necked duck. The important black duck showed an 18 per cent increase and is virtually back to its high levels of 1953, 1958 and 1962. This is especially gratifying in view of last year's situation when both a population decline and lower than average nesting success were noted.

The ring-necked duck decreased more in 1964 than it had increased a year ago. This followed the very heavy decline (34 per cent) of 1962. Thus, the population of ring-necks in the region covered is at its lowest level in 8 years.

Other breeding ducks on the study areas all appeared to be slightly increased in numbers from a year ago.

With all species, considerable variation was recorded between study areas and between regions. In general, populations were most favorable in eastern Maine and least favorable in central Maine.

Breeding pair counts or estimates are summarized as follows:

Species	Status in 1964
(Measured on census areas)	
Black Duck	18% increase
Wood Duck	6% increase
Ring-necked Duck	17% decrease
(Estimated)	
Blue-winged Teal	Slight increase
Green-winged Teal	Slight increase
Common Goldeneye	Slight increase

Nesting Success

A total of 34 nests were kept under observation until hatched or destroyed. These were divided as follows: Black duck - 17; ring-necked duck - 14; blue-winged teal - 2; hooded merganser - 1. This is too small a sample on which to base strong conclusions relative to nesting success. It does serve well to supplement other breeding data, especially observed ratios of breeding pairs to broods.

By mid-July all known nests had hatched or failed. Of the total, 20 (59 per cent) were successful. This is slightly lower than the long-term average, but is a substantial improvement over the 1963 percentage. Nesting success was slightly higher than in an average year for the ring-neck, and a little lower than average for the black duck.

For the second consecutive year there were no known nest losses from high water or flash floods. Also, for the second year in a row, mammalian predators were largely responsible for nest losses. This year the raccoon was identified most frequently as a predator in contrast to the red fox in 1963.

The Brood Season

As stated earlier in this report, breeding chronology was generally advanced in 1964. By way of contrast, a year ago 37 per cent of all recorded black duck hatchings occurred after June 20. This year the figure was only 14 per cent. With the later nesting ring-neck, 93 per cent of the hatch in 1963 took place after June 20 in comparison with 73 per cent in 1964.

Appreciably more broods were found this year than a year ago, with approximately comparable degree of coverage (77 in 1963, 124 in 1964). Class I brood sizes (downy stage) were generally a little lower this season, but the older young (Classes II and III) were similar or a little higher than in 1963. Brood sizes of ring-necked ducks were lower in all age classes. Table 1 summarizes brood data.

Rearing conditions have been quite similar to those of 1963. A progressively declining water table throughout June gave some concern that brood habitat might not be favorable for rearing, except in northern Maine where the drought was less severe. However, water levels have improved somewhat in July. With a large number of young already at or approaching flying age, it is expected that rearing success for the average brood will be at least as good as in 1963 and perhaps a little better.

Conclusions

1. Breeding populations of most species of waterfowl on Unit study areas were increased from those of 1963. The most noticeable increase was with the black duck. Only one species, the ring-necked duck, showed a decline in numbers. This duck is now at its lowest population level in 8 years.

2. Nesting success for both the black duck and ring-necked duck were higher than a year ago.

3. Breeding chronology for all species was advanced from 1963. It was similar to the long-term average for the black duck, but several days ahead of average for all other species.

4. Rearing conditions are at least as good as in 1963, but not as satisfactory as in most years.

5. With the exception of the ring-necked duck, it is expected that waterfowl production on the areas studied in 1964 will be substantially higher than in 1963.

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)

Inactive except for tabulation of data and manuscript preparation.

Table 1

Average Brood Sizes by Age Classes
(Complete counts only, as of July 20, 1964)

Species	Total Broods	Class I Broods	Class I Av. Size	Class II Broods	Class II Av. Size	Class III Broods	Class III Av. Size
Black Duck	48	16	6.8	18	6.6	14	5.4
Ring-necked Duck	32	22	7.6	7	5.9	3	5.7
Wood Duck	14	8	6.5	6	6.1	--	--
Common Goldeneye	14	7	7.6	7	4.3	--	--
Hooded Merganser	9	5	5.8	4	7.5	--	--
Blue-winged Teal	3	3	8.7	--	--	--	--
Green-winged Teal	2	--	--	2	7.0	--	--
Common Merganser	2	1	10.0	1	7.0	--	--
Totals	124	62	7.2	45	6.3	17	5.5

(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.

(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

Consultant: Dr. A. O. Gross, Professor Emeritus of Ornithology, Bowdoin College.

Most of April was spent acquiring equipment; also repairing and refinishing the boat to be used in the study. Field work was initiated April 10 when

a trip to the study area was made with Robert Rupp, Fisheries Biologist, Department of Inland Fisheries and Game. This trip served primarily for orientation as to the various islands of the study area. No nesting had begun, although there was much courtship and display evident.

Commencing with May 3, four days a week were spent on the area for the remainder of the month. Since then Choate has been stationed at Dark Harbor on Islesboro Island. This is near the nesting islands, and field work has been conducted daily when weather has permitted. Much assistance has been given in the field at various times by Unit Leader Mendall, Assistant Leaders Coulter and Schemnitz, and Graduate Assistants Gore and Gramlich.

Weather has been a deterring factor this spring. Long periods of high winds, as well as much fog, has limited the time spent in the field. Adverse weather is, of course, much more of a factor in coastal research than with inland studies.

Four islands have been chosen as major study areas. They are: Mouse Island, Goose Island, East Goose Rock, and Robinson Rock. Flat Island has served as a minor study area. All are in the Islesboro region.

Periodic nest searches were conducted on these islands. Attempts were made to survey each island at least once a week, although this was not always possible because of adverse weather. Each eider nest was given a number and marked with six inch wooden stakes. These stakes were replaced with longer (three feet) ones when the vegetation became so high that it became difficult to find the small stakes. Total gull nest counts were also made for each island except Flat. A few gull nests were marked for periodic observation.

The following data were recorded for each eider nest: date, time, observer, locality, number of eggs, amount of down, whether female was present or not, flushing distance of female, behavior of female, nesting cover, height of cover, concealment, and proximity of nests. Much more limited data were recorded for the sample of gull nests marked. Pictures were taken at periodic intervals of the vegetation to supplement height and density measurements.

A limited number of blind observations was made. The activities of nesting birds (eiders and gulls) were observed. Predatory activity of gulls on eider nests and on other gull nests was also noted. Unit Leader Mendall and Graduate Assistant Gramlich did much of this work. Some gull counts were also made from a blind to determine the ratio of black-backed to herring gulls in the population.

Fourteen female eiders were nest-trapped, banded, and color marked with the help of Assistant Leader Coulter. This is not a major part of the study, but was attempted as a pilot study which may prove useful in the future.

The first eider nests were found May 3. One nest was located on Goose Island and three on Mouse Island. The gulls apparently started nesting shortly before the eiders. Seven gull nests were found on Goose Island and 22 on Mouse Island, May 3.

The peak of eider nesting occurred around the last week in May. The maximum number of active nests counted for each island is as follows:

139 on Mouse Island, May 23 and 24
25 on East Goose Rock, May 23
55 on Robinson Rock, June 12 and 15
32 on Goose Island, June 4 and 5

Complete nest counts were not made on Flat Island because its larger size and dense growth of high shrubs made it difficult to find nests efficiently. The later nesting peaks for Goose Island and Robinson Rock are somewhat misleading. At the former it was impossible to make a careful count the last week in May because of adverse weather. The peak for Robinson Rock, likewise, is probably not as late as it appears. Fifty-three active nests were counted June 1. This is not significantly different from the June 12 and 15 count.

The first hatch was discovered on Flat Island May 16 when a brood of four was found still in the nest. This was an unusually early nest as the first hatches on the other islands were not recorded until about June 1. The hatching peak on the study area as a whole occurred the latter part of June. The maximum number of newly hatched nests counted for each island is as follows:

61 on Mouse Island, June 18, 19, 22, and 23
11 on East Goose Rock, June 18 and 19
20 on Robinson Rock, June 21 and 26
15 on Goose Island, June 12

A count was not made on Goose Island between June 12 and 25. If one had been made, the peak hatch probably would have occurred between those two dates.

Multiple dates listed for a nest count indicate the count was made over a period of more than one day. Attempts were made to avoid keeping the birds off their nests for more than three hours per visit. As a result, it often took more than one day to make a complete count.

By the end of June there were only 13 active nests on Mouse Island, three on East Goose Rock, nine on Robinson Rock, and five on Goose Island.

Since gull nest counts were made after the nesting peak and the extent of renesting is unknown, only estimates of the breeding gull populations can be given. The estimated number of breeding pairs (including both herring and black-backed gulls) are:

125 on Mouse Island
50 on Goose Rock
110 on Robinson Rock
60 on Goose Island

Because of the 1963 outbreak of fowl cholera among both eiders and gulls (described in the latest issue of the Journal of Wildlife Management) on three of these islands, special attention was given this year to any evidence of a recurrence of this or any other disease. None at all was noted.

Plans for next quarter: To map each island to show cover types and nest locations; periodic checks of old nests to see if success or failure can be accurately determined over a period of weeks after abandonment; additional counts on the black-backed to herring gull ratios; plant collections and vegetative surveys on all islands; small mammal trapping on the nesting islands; and as many observations as possible of broods and brood behavior.

WOODCOCK

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

Because of insufficient manpower, the trapping and banding program, carried out for several years on the Greenbush study area, was not conducted this spring. The only woodcock work was related to the spring census on the regular sample areas maintained by the Unit. Virtually no change was recorded from populations of a year ago. Nesting peaks were somewhat advanced from average dates. Favorable weather prevailed throughout the breeding season and a good hatch was indicated.

Plans for next quarter: Inactive.

RUFFED GROUSE

Ecology of the Ruffed Grouse in Maine

Objectives:
(1) To study population dynamics of harvested and unharvested grouse populations; and to compare mortality rates of resident non-migratory species (grouse) and migratory species (woodcock) on the same area.
(2) To determine cover preferences and use of forest clearings by adults and broods in spring and summer.
(3) To study the causes of juvenile mortality and measure the incidence of blood parasites.

Assignment: Sanford D. Schemnitz, Assistant Leader

Consultants: Eldon Clark, Moosehorn National Wildlife Refuge
Wesley Jones, Moosehorn National Wildlife Refuge
David O'Meara, Associate Professor of Animal Biology

Several trips to Moosehorn Wildlife Refuge were made in late April and May to gather information on population levels of breeding male grouse. Early morning drumming census routes, consisting of 4 minute stops at 1 mile intervals, were run on the Baring and Edmunds Unit of the Moosehorn Refuge in Washington County. Several drumming logs and rocks were located. Two drumming grouse were live-trapped with mirror traps, banded, color marked, and released for further study.

A clutch of 10 grouse eggs from a nest adjacent to the Orono Campus were hatched in an incubator after the female had been killed by a raptor. Five of the grouse were alive and thriving at the end of the quarter. Weights, measurements, and notes on plumage development are being recorded at weekly intervals. Photographs have been taken against a gridded background to aid in aging live-trapped juvenile grouse and to more accurately age broods observed in the field. The five surviving young will be used to test the durability of various dyes as a marking technique.

Arrangements were completed with Refuge Biologist Clark and Student Assistant John Olson to record detailed information on sex, age, location of capture, etc., of all grouse captured at Moosehorn in shorebird type drift-traps during the summer woodcock banding program at the Refuge. This type of unbaited trap was used at Moosehorn to trap 212 ruffed grouse in 1963.

Several days were spent orienting and instructing Olson on grouse trapping procedure.

Plans for next quarter:

1. Each successful trapsite will be evaluated in detail in regard to vegetation, soil, slope, aspect and other site factors in order to characterize summer brood habitat of ruffed grouse at Moosehorn Refuge.
2. Selection will be made of a square mile tract for use as a census area by the King method.

BIG GAME

(a) A 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, Assistant Leader

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

Preliminary tabulation of data collected in the previous quarter was made. Additional data for the study area and surrounding towns were collected. Early and late spring surveys were made of several sections of the low-kill area, to obtain an estimate of deer population and usage. Preparations were made for the collection of soil, nutrient, and deer harvest data.

Additional road and trail information was obtained from landowners during the period and is being continued.

Studies of nutrition and soil aspects were begun. The limited records available of hind foot lengths and antler beam diameter of deer taken on the low-kill area and surrounding towns were examined. They showed no indication that malnutrition existed, and the measurements of deer from within the low-kill area compared favorably with those from the surrounding towns.

Available soil-type records were examined, and a discussion on area soils was held with the regional Soil Conservation Service personnel. Although the greater part of the study area has not yet been completely examined for soil types, enough typing has been done in the area and surrounding towns to give

its general composition. All evidence indicates that the soils within the area are as productive as those in the surrounding towns that have a higher deer kill. The occurrence of a mineral deficiency remains a possibility. A series of soil samples will be taken to test for cobalt and phosphorous content.

Game Division records of deer yards in the study area and surrounding towns were examined. The relative number and condition of yards as determined by game biologists seemed similar both inside and outside the study area. Some correlation seems to exist between estimated deer in winter yards and harvest the following season, but the number of samples is very small.

An early spring survey was made of a large deer yard on the perimeter of the study area and a smaller yard within the area. Although the deer had almost complete freedom of movement in the light snows of the past winter, evidence indicated that they had concentrated in their accustomed yarding areas until spring. A late spring survey was made over several townships. Representative cover types in each were examined closely for fresh deer sign. The animals appeared to be well distributed over the area. Browsing was evident on new growth in most cover types examined.

There is no apparent indication in preliminary analysis of correlation between deer kill and timber harvest, fire incidence, camp leases, or accessibility. The remaining land use factor--hunting pressure--remains to be evaluated. A determined effort will be made to sample a large number of deer hunters this fall.

The plan for interviewing long-time users of the area was continued. This phase of the study will be completed during the next quarter.

Plans for next quarter: Complete the collection of recorded historical data from landowners and other sources for the low-kill area and the towns on its perimeter; complete a cover-type comparison study between the low-kill area and surrounding towns with higher kill; collect soil samples from selected areas; begin analysis of collected data.

(b) Influence of Known Populations of Deer Upon Forest Vegetation

Objectives: (1) To measure the influence of a known population of deer upon forest vegetation.
(2) To develop and test more adequate deer census methods than those currently available.

Assignment: Sanford D. Schemnitz, Assistant Leader

Consultants: Malcolm W. Coulter, Assistant Leader
Chester F. Banasiak, School of Forestry

Two reconnaissance trips were made to locate potential coastal island study areas in the Boothbay Harbor and Southwest Harbor regions. Two islands - Little Duck and Outer Heron - were visited which are currently unoccupied by deer and possess a mixed forest growth of spruce and hardwoods. These islands will be investigated in more detail.

Excellent cooperation and assistance was provided by the coastal wardens and personnel of the Maine Department of Sea and Shore Fisheries.

Plans for next quarter: Continue the search for suitable coastal islands for this study.

(c) Pilot Radio-Tracking Studies of White-tailed Deer

Objectives: To test the efficiency and accuracy of telemetry equipment on semi-tame deer within fenced enclosures on the University Forest.

Assignment: Sanford D. Schemnitz, Assistant Leader

Equipment for this study has been ordered and is being built by Markusen Electronic Specialities for delivery in September, 1964. Mr. Kenneth LeMore, Department of Electrical Engineering, University of Maine, has agreed to assist in development, maintenance and repair of telemetry equipment on a consulting basis.

Progress has been made in cooperation with Director Nutting and Professor Coulter towards building an all-weather access road to the deer pens.

A field trip was made to Swan Island near Richmond to consult with Mr. D. K. Onion, Harvard University student, relative to equipment and techniques employed by Onion to track a female deer on Swan Island.

Plans for next quarter: To acquire several fawn deer from the State Game Farm of the Maine Department of Inland Fisheries and Game for use in this study. An antenna will be built to use with the portable receiver.

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 and Game

Major field work was begun during the quarter. Nine ditches are being used in the study. Their choice as controls or experimental ditches was determined by the completely randomized block experimental design, described

in the last quarterly report. Sampling comparisons will be made using Duncan's multiple range test.

All ditch bottoms were probed with a one inch diameter peat borer to determine the depth of the blue clay substratum. This was necessary because sheathing used for making the ditch plugs was to be driven into this clay to keep water from seeping under the plug. This has been a major problem in other salt marsh impoundment studies in Maine.

Pre-impoundment samples were taken during the first three days of May. A six inch diameter hinged core sampler has been devised for taking bottom samples. This unit is made from a heavy galvanized tin duct cut lengthwise and hinged so that samples may be removed carefully. The bottom of the duct has been cut at about a 40° angle to permit shearing the bottom of the sample with a spade and to facilitate removal from the ditch. The pipe with the core inside is lifted out of the ditch with the spade held over the bottom to prevent the core from slipping. The core sampler is then opened exposing the soil core. The top three inches of this extracted core is cut off and is placed in a small clam hod that has been lined with screening with a mesh of 14 lines per inch. The mud is washed from this sample and residue is preserved in 5% formalin solution. In the laboratory, the preserved samples were washed and screened (meshes 12 and 16 lines per inch), and the residue examined by floating small amounts in a white enamel tray.

Water analyses are being made for salinity, turbidity, pH, and temperature. Temperature and salinity (expressed in parts per thousand) are determined with a Gemware field salinity test kit. Hydrogen ion concentration (pH) is being determined by a Taylor Slide Colorimetric Comparator. A Jackson turbidimeter and a set of turbidity bottle standards made by the Department of Civil Engineering at the University of Maine, are being used to determine turbidity.

About 25 per cent of the bottom samples have been examined to date. Indications are that the ditches have moderate populations of snails, very few Macoma clams, and an abundance of widgeon grass seed. There is no active growth of widgeon grass in the ditches as yet.

A test plug installed last December has continued to hold 12 inches of water at low tide; therefore, a similar plug design has been used for all the experimental ditches this spring.

Ditch plugs were constructed of 1 x 5 inch rough hemlock sheathing of lengths that would permit driving it into firm clay substratum. Two walls of sheathing spaced twelve inches apart were driven across the ditch. The space was filled with blue clay taken from the ditch bottom downstream from the dike. A 1 x 12 inch board was placed over the space to prevent the clay from washing.

Five potholes, three with stands of widgeon grass and two lacking this plant, have been selected for water analysis comparisons with the experimental ditches. Although four weeks of sampling has been completed the amount of data collected is not enough to make valid comparisons.

Numbers of mosquito larvae and pupae collected by surface dipping at randomly selected collecting stations is considered to be an indicator of

mosquito production in the sampled area. A 500 ml. aluminum water dipper, attached to a five foot wooden staff is being used. Six potholes and all ditches are being sampled. Ten dips are taken in each pothole or ditch. Sampling has been conducted twice, once in early June and once in late June. No mosquito larvae were found in any of the ditches or in either of two large (20-30 feet across) potholes which contain moderate populations of mummichogs. Moderate numbers were found in the four medium and small sized potholes.

A series of photographs were made to illustrate the various aspects of the study. Several theses (transferred from other schools) as well as reprinted articles and other literature were reviewed.

Plans for next quarter: Complete examination of pre-impoundment bottom samples; obtain an early fall series of bottom samples; continue water analyses; and complete the review of literature.

COOPERATION, EDUCATIONAL WORK AND MISCELLANEOUS ACTIVITIES

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.

Unit personnel participated in the Wildlife and Forestry sessions of the University of Maine's annual Farm and Home Week, March 30-April 2. Schemnitz was Chairman of the Wildlife Management program. He also lectured at the High School Science Forum.

Mendall participated in the Region 5 workshop held at the Patuxent Research Center, Laurel, Maryland, April 7-9.

Schemnitz participated in the University's High School Science Day program. He also lectured on radio-telemetry studies of deer at the Bangor-Brewer Radio Club.

Respectfully submitted,

Howard L. Mendall

Howard L. Mendall, Leader
Maine Cooperative Wildlife
Research Unit

August 10, 1964

file copy

MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

University of Maine

Orono, Maine

QUARTERLY REPORT

July-September, 1964

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.

Unit Personnel

Leader - Howard L. Mendall
Assistant Leaders - Malcolm W. Coulter(*)
Sanford D. Schemnitz(*)

University Representative - Albert D. Nutting, Director, School of Forestry

Collaborators(**) - Chester F. Banasiak, School of Forestry
John Gill, Maine Dept. Inland Fisheries & Game
J. William Peppard, Maine Dept. Inland Fisheries & Game
Kenneth Anderson, Maine Dept. Inland Fisheries & Game
Alfred O. Gross, Professor Emeritus, Bowdoin College
Wesley Jones, Moosehorn National Wildlife Refuge
Eldon Clark, Moosehorn National Wildlife Refuge
David O'Meara, Associate Professor of Animal Biology

Graduate Assistants - John C. Baird
Jerry S. Choate
James F. Gore
Francis J. Gramlich

Secretary - Maxine L. Horne

(*)Professors Coulter and Schemnitz serve half time on the Unit program and half time on the teaching staff of the School of Forestry.

(**)Collaborators change periodically. This list includes only those who are directly cooperating or assisting in current Unit studies.

Unit Coordinating Committee

Ronald T. Speers, Commissioner, Maine Dept. Inland Fisheries & Game
Albert D. Nutting, Director, School of Forestry
Howard L. Mendall, Unit Leader

MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

Quarterly Report

July-September, 1964

RESEARCH PROJECTS

FUR ANIMALS

Ecology 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

During the quarter, all carcasses on hand were processed. Digestive tracts, reproductive organs, parasites and skulls were preserved for further study. A total of 156 digestive tracts were examined. Much of this work was conducted by Peter Allen, a 1964 wildlife graduate, employed by the Unit during the summer.

A pen for captive animals to be used for study of behavior was completed and a dermestid colony was established to assist in cleaning skulls. In addition, distribution of the 1963-64 catch by trappers was tabulated.

Most of the digestive tracts examined were from animals taken in the southern half of Maine. A marked decrease in the frequency of birds and squirrels was noted in these specimens as compared to those previously examined from northern Maine. The incidence of porcupines and hares was similar, but southern Maine specimens showed somewhat higher use of mice and deer as food. As has been the case in the northern forest regions, fisher in the farmland environments return often to deer carcasses to feed during the winter. Trappers take advantage of this behavior--one trapper reported locating 18 deer carcasses by following fisher tracks. He trapped fisher at many of these places. Many of the deer are believed to be the result of crippling losses during the hunting season. No evidence of fisher killing deer during the winter has been found.

More than half the 1963-64 legal take was made in the southern third of the state. The catch per unit of area over part of this region averaged 1 fisher per 2 square miles. This is a much higher harvest than has been recorded for northern semi-wilderness areas and is believed due to the high densities of fisher in the new range, combined with the trapper accessibility to all portions of southern Maine. By contrast, the catch for one 3500 square mile block of northern forest area was approximately 1 fisher per 62 square miles. Although fisher have invaded southern Maine only within the past 8-10 years, they have built up to unusual densities in an environment that, until recently, has not been considered suitable for the species.

Plans for next quarter:

1. Continue preparing skulls with aid of dermestid colony.
2. Begin examination of parasites.
3. Arrange for small collection of carcasses from specific areas, primarily to determine incidence of porcupine among fisher in places where high numbers of fisher have existed for at least 5 and 10 year periods.

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

The annual breeding ground studies were completed during the quarter. There are no appreciable changes from the conclusions reported in detail in the last quarterly report. Water levels continued to decline throughout August and September. No adverse effects of this were noted on the season's production. However, an earlier than average departure of birds from many inland breeding areas was noted. This may have been due, in part, to less favorable water levels. This was especially evident in eastern Maine and in adjacent portions of New Brunswick.

Plans for next quarter: Inactive except for limited population data that will be procured 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)

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

Inactive during the quarter.

Plans for next quarter: Field bag check studies, on a reduced scale from previous years, will be conducted by the Unit staff.

(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, Leader

Consultant: Dr. A. O. Gross, Professor Emeritus of Ornithology, Bowdoin College.

Nest counts were continued into July to obtain all possible information on late breeding efforts. The nesting season was essentially over by the second week of the month. However, the last known hatch occurred July 27 when one young hatched from a clutch of three eggs.

Most brood observations were made in July. Much difficulty was encountered in this phase of the study. After leaving the nesting islands, the females and young dispersed over much of the bay making them difficult to locate. Thus, fewer data on broods and brood behavior were obtained than had been hoped.

Once the young eiders were in the water there appeared to be very little predation by gulls. There were only three instances of attempted predation noted. Two of these were caused by the observers separating the young from the adults. Only one attack of the three was successful and it was one of those caused by human disturbance. In two of the cases predation was attempted by black-backed gulls. In the one successful attempt both black-backed and herring gulls attacked the young eiders, but it was a black-backed gull that successfully captured the young.

Counts of the ratios of black-backed gulls to herring gulls were continued. It appears that this ratio varies considerably between islands. Robinson Rock has the smallest proportion of black-backed gulls while Mouse and Goose Islands have a much greater proportion. Since an estimate was made of the total gull population for each island, the herring and black-backed gull populations can be calculated from these ratios. An attempt will be made to determine if there is any relationship between the number of black-backed gulls on an island and the amount of nest predation on that island.

Maps were made of all four islands. Stakes were placed at various points on the perimeter of the vegetation and around each vegetation type. The points were then located using a plane table and alidade. The map was drawn by sketching in lines connecting the points. Then the approximate location of each nest was marked on the map. These maps will be used to determine nesting densities for each island for the various vegetation types.

Sample plots were taken in the major vegetation types to determine density and relationship to nest density. However, the greatest nest concentrations appear to be in areas where two vegetative types meet. This "edge effect" probably overshadows any effects of vegetation density.

Each species of plant present on the islands was collected and preserved for future identification. Thirteen mouse traps baited with peanut butter were set on Mouse Island for about three weeks and on Goose Island for about two weeks. No small mammals were caught and it is believed that there are few if any mammals living on these islands.

No fowl cholera or other disease among the eiders was noted during the quarter.

Field work was terminated September first. Activities since then have consisted primarily of preparing and organizing data for analysis by use of punch cards and an electronic computer.

Plans for next quarter: To continue preparation of the data for analysis by electronic computer; to identify the plants collected on the study area; and to continue the literature review.

WOODCOCK

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.

RUFFED GROUSE

Ecology of the Ruffed Grouse in Maine

Objectives: (1) To study population dynamics of harvested and unharvested grouse populations; and to compare mortality rates of resident non-migratory species (grouse) and migratory species (woodcock) on the same area.
(2) To determine cover preferences and use of forest clearings by adults and broods in spring and summer.
(3) To study the causes of juvenile mortality and measure the incidence of blood parasites.

Assignment: Sanford D. Schemnitz, Assistant Leader

Consultants: Eldon Clark, Moosehorn National Wildlife Refuge
Wesley Jones, Moosehorn National Wildlife Refuge
David O'Meara, Associate Professor of Animal Biology

Grouse trapping on the Moosehorn Refuge was carried out under the direction of student assistant Olson. Trapping success (Table 1) was somewhat lower than expected, particularly on the Baring (northern) Unit of the Refuge. Traps were operated at Baring from July 8, 1964 until September 11, 1964 and

33 ruffed grouse were taken. In contrast, 64 grouse were captured at the Edmunds Unit using fewer traps during the same period. No 1963 grouse recoveries were made in 1964 at Baring. One grouse, an adult female banded in 1963, was taken this summer at Edmunds. In 1963, 186 grouse were captured on both Units in contrast to 97 birds in 1964 (a 48 percent decrease). However, the current summer total of 69 recaptures greatly exceeded the 26 grouse recaptured in 1963. The peak period of trapping success in 1964 was the second week of July.

Table 1. Ruffed Grouse Trapped at Moosehorn Refuge - Summer, 1964

Unit	No. of Traps in Operation	Adults	Imm.	Adults Recaptured	Immatures Recaptured	Total Captures
Edmunds	76	9	55	3	38	105
Baring	106	7	26	1	27	61
Grand Total	182	16	81	4	65	166

Grouse brood counts followed the pattern of relatively low trapping success. The average brood size at Moosehorn Refuge was 2.7 young per female with a range of 1-5 young although this was based on only 6 observations of complete broods. Incomplete brood counts averaged 3.8 for 13 broods (range 3-5).

A vegetation survey was made at successful grouse trapsites in order to describe summer grouse habitat. Blood parasite samples were collected by student assistant Olson from a number of the trapped ruffed grouse.

Several observations of colored wing-tagged and dyed grouse provided information, along with recaptures, on summer brood movements. Immature grouse trapped at the Edmunds Unit averaged 2-3 weeks younger in age than those at Baring approximately 20 miles northwest. A review of weather records will be made in an attempt to explain this difference in grouse hatching dates.

Plans for next quarter: Tabulate and analyze the 1964 summer data collected at Moosehorn Refuge.

BIG GAME

(a) A 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, Assistant Leader

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

During the quarter a forest cover-type survey was initiated. Much use was made of the aerial photo studies made by the U. S. Forest Service, results of which have been plotted on U.S.G.S. topographic sheets at a scale of 1:62,500. Although the original survey was quite general and was seldom concerned with acreages less than 200, it was considered sufficient to give a broad picture of the study area.

The forest cover of the low-kill area and surrounding towns consists mainly of three major groupings: (See Table 1)

(1) Type 18 - Spruce-fir composition: red spruce and balsam fir making up 75 percent or more of the stand.
(2) Type 20 - Spruce-fir-hardwood composition: spruce and fir being 50-74 percent of the stand in mixture with hardwoods.
(3) Type 21 - Hardwood-spruce-fir composition: spruce and fir being 25-49 percent of the stand, in mixture with hardwoods.

The area of each cover type by township was measured using the dot grid system. A survey was designed to evaluate the accuracy of the mapped cover type and to determine the availability and utilization of browse available in each cover type, and to compare the browse available in the low-kill area with that available in the perimeter townships outside the low-kill area.

Table 1. Area of Major Cover Types (Acres)

Area	Type 18	Type 20	Type 21	Not Forested	Total
Low-kill area	143,424	131,166	171,324	14,580	460,494
Perimeter	163,098	245,790	97,722	55,512	562,122

One hundred and fifty circular, .01 acre plots were measured in a stratified random sample of the area--25 plots in each of the 3 forested cover types within the low-kill area, and the same number outside the area in the perimeter townships. All stems of browse species bearing living twigs between 1 foot and 5.5 feet above the ground level were counted. Each stem was examined for evidence of deer browsing. The plot was searched for deer fecal pellet groups, and the forest stand on each plot was described.

Data collected on each plot included the number of stems and species of browse present, number and species of browsed stems, deer fecal pellet groups observed, dominant tree species, height of stand and estimated crown closure of canopy.

Collection of historical data pertinent to the study was continued. Information on timber harvest, road and trail building, and camp leases was obtained from the Penobscot Development Company. Similar information was requested from International Paper Company, G. Pierce Webber, and Prentiss and Carlisle, the last large landowners of the area that have not already furnished data. Each has promised to make the information available for the study. Information pertaining to roads, trails, and cover types was solicited from the J. W. Sewall Company, of Old Town, from the State Tax Office, and from the Maine Forest Service, at Augusta.

Samples of a known cobalt deficient soil, and one of proven adequacy for ruminants (cattle) were obtained from two University of Maine pastures at Orono. These will be used to ascertain the discrimination effectiveness of cobalt sampling procedures, and to obtain an index of soil cobalt content.

Soil samples were collected from a forested area of each township in the low-kill and the perimeter areas. These will be analyzed for phosphorous and cobalt content.

Plans for next quarter:

1. Conduct a hunting pressure survey of the area to determine trends in number of hunters, hunter distribution, and hunting habits during the past period of high harvest and the decline.

2. Collect available information on deer carcasses--weights and measurements; also biological samples, such as reproductive tracts, and possibly rumen samples.

3. Sample winter deer yards in the area and its perimeter.

4. Tabulate and analyze all collected data.

(b) Influence of Known Populations of Deer Upon Forest Vegetation

Objectives: (1) To measure the influence of a known population of deer upon forest vegetation.
(2) To develop and test more adequate deer census methods than those currently available.

Assignment: Sanford D. Schemnitz, Assistant Leader

Consultants: Malcolm W. Coulter, Assistant Leader
Chester F. Banasiak, School of Forestry

Additional reconnaissance trips were made to locate coastal island study areas. Two suitable sites, Outer Heron Island, Boothbay Harbor, and Great Spruce Head Island, Penobscot Bay seem to have adequate vegetation, size, and a lack of deer occupation essential for this study. Tentative approval from the owners of Outer Heron Island has been received.

The cooperation and assistance of personnel of the Maine Department of Sea and Shore Fisheries has been excellent in assisting in this study.

Plans for next quarter: Make final selection of a study island and prepare a work plan.

(c) Pilot Radio-Tracking Studies of White-tailed Deer

Objectives: To test the efficiency and accuracy of telemetry equipment on semi-tame deer within fenced enclosures on the University Forest.

Assignment: Sanford D. Schemnitz, Assistant Leader

During the quarter equipment needed for this study was obtained and plans completed for the initial trials.

Plans for next quarter: Deer that will be acquired from the Maine Department of Inland Fisheries and Game in connection with sub-project (b) will be used on the radio-tracking study until they are released on study islands next summer. Radio transmitters will be attached to the deer and tested.

(d) The Ecology of the Deer Population on Isle Au Haut, Maine

Assignment: John C. Baird, Graduate Assistant

[A new project]

As part of the over-all research program on deer and their influence on forest vegetation, this study was initiated during the past quarter. It will be financed by McIntire-Stennis research funds and will provide a background for future work in this program (see also sub-project b). At present this study is in the initial stages of development, and the precise objectives are still being formulated.

Isle au Haut consists of approximately 4,700 acres, 2,800 of which are in Acadia National Park. It is the largest island in a complex of outer islands in Penobscot and Jericho bays. It is located about 5 miles south of Stonington, and has the advantage of being relatively isolated. The vegetation consists primarily of a spruce-fir forest, typical of the environmental conditions found on coastal islands in Maine. Severe over-browsing, extensive utilization of "starvation food" species, such as white spruce and alder, and a high density of deer combine to present a unique opportunity to evaluate some aspects of deer ecology.

During the past quarter three trips to the study area were made. Road access, cover types, topography, habitat conditions, and deer abundance were noted during a general reconnaissance of the island. Personnel at Acadia National Park are cooperating in developing plans for this study. A general vegetative cover map is being prepared from aerial photographs.

Plans for next quarter: To prepare detailed project and work outlines; to initiate sampling methods and census techniques for deer and for habitat evaluation; and to begin the habitat evaluation.

SALT MARSH ECOLOGY

Effects of Small Salt Marsh Impoundments Upon Ruppia and Macroinvertebrates

Objectives: (1) To determine the effects of plugged ditches upon 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, Assistant Leader

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

Field work was conducted on an intensive basis throughout the summer. Examination of pre-impoundment bottom samples was completed, and a post-impoundment series was taken. Weekly observations and water analyses were continued. Mosquito larva sampling was completed.

Pre-impoundment samples have not as yet been statistically analyzed. The post-impoundment samples were taken September 9th and 10th, approximately 4-1/2 months after the initial samples. Laboratory examination of these is now in progress. The method of taking the samples and the laboratory examination are the same as described in the April-June quarterly report.

Widgeon grass seed was collected and will be used in greenhouse and field germination tests. The seeds are being preserved in salt water (13 o/oo) at a temperature of 33°F.

More complete details of the sampling results and analyses will be given in the next quarterly report.

Plans for next quarter: Start greenhouse germination tests; sample *Gammarus*; determine utilization of impoundments by waterfowl and collect a sample of these for stomach analysis; begin preliminary writing of the thesis.

COOPERATION, EDUCATIONAL WORK AND MISCELLANEOUS ACTIVITIES

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. The Unit secretary maintains the bird banding files for the State Game Division, all such records being kept in the Unit office. She spent much time during the quarter in processing banding schedules and recovery records.

Schemnitz was among 40 participants, selected from 140 applicants, in the 6-week animal behavior summer institute at Michigan State College. This was sponsored by the National Science Foundation.

Mendall participated in the annual meeting of the Maine Waterfowl Council in Augusta on August 22. He conferred in Fredericton, New Brunswick on September 29 with wildlife officials of the University of New Brunswick and the Fish and Wildlife Branch of the Department of Lands and Mines.

About 2200 feet of all-weather access road to the Unit wildlife pens has been graveled and 4 culverts have been installed. This much needed work has been accomplished in connection with the McIntire-Stennis project, but the permanent improvement resulting will increase the accessibility and usefulness of the 5 deer pens, 1-1/2 acres each, for training and research. This work was planned by Coulter, with assistance by Roger Taylor, Supervisor of the University Forest, and by Schemnitz.

PUBLICATIONS

Extension Service Bulletin #475 "Common Small Mammals of Maine - Their Life Histories and Control" was revised for another printing. Assistant Leader Coulter is co-author of this publication with Clarence Faulkner, U.S. Bureau of Sport Fisheries and Wildlife. Demand for this bulletin since it was first printed in June 1959 has averaged 1,000 copies a year.

Respectfully submitted,

Howard L. Mendall

Howard L. Mendall, Leader
Maine Cooperative Wildlife
Research Unit

November 2, 1964

File copy

MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

University of Maine

Orono, Maine

QUARTERLY REPORT

October- December, 1964

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.

Unit Personnel

Leader - Howard L. Mendall
Assistant Leaders - Malcolm W. Coulter(*)
Sanford D. Schemnitz(*)

University Representative - Albert D. Nutting, Director, School of Forestry

Collaborators(**) - Chester F. Banasiak, School of Forestry
John Gill, Maine Dept. Inland Fisheries & Game
J. William Peppard, Maine Dept. Inland Fisheries & Game
Kenneth Anderson, Maine Dept. Inland Fisheries & Game
Howard E. Spencer, Maine Dept. Inland Fisheries & Game
Alfred O. Gross, Professor Emeritus, Bowdoin College
Wesley Jones, Moosehorn National Wildlife Refuge
Eldon Clark, Moosehorn National Wildlife Refuge
David O'Meara, Associate Professor of Animal Biology
Paul N. Carpenter, Agronomist, Agr. Experiment Station
Harold Hubler, Superintendent, Acadia National Park

Graduate Assistants - John C. Baird
Jerry S. Choate
James F. Gore
Francis J. Gramlich

Secretary - Maxine L. Horne

(*) Professors Coulter and Schemnitz serve half time on the Unit program and half time on the teaching staff of the School of Forestry.

(**)Collaborators change periodically. This list includes only those who are directly cooperating or assisting in current Unit studies.

Unit Coordinating Committee

Ronald T. Speers, Commissioner, Maine Dept. Inland Fisheries & Game
Albert D. Nutting, Director, School of Forestry
Howard L. Mendall, Unit Leader

MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

Quarterly Report

October-December, 1964

RESEARCH PROJECTS

FUR ANIMALS

Ecology 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

Inactive during the quarter.

Plans for next quarter: To continue preparation of skulls, aided by dermestids, and to begin examination of parasites.

WATERFOWL

(a) Waterfowl Distribution and Breeding Ecology

Objectives: To obtain data on factors influencing distribution and migration of waterfowl in Maine; and to determine population densities of the important breeding species, especially the black duck and ring-necked duck, under varying habitat conditions.

Assignment: Howard L. Mendall, Leader

Inactive except for gathering of migration data in conjunction with 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 during the quarter.

Plans for next quarter: To resume tabulation of data and preparation of manuscript.

(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 17th consecutive season personnel of the Maine Cooperative Wildlife Research Unit and the State Game Division cooperated in field bag checks of waterfowl hunters. State personnel were under the direction of Howard E. Spencer. Additional assistance was given by Robert Rupp, Fisheries Biologist of the Maine Department of Inland Fisheries and Game. Data from these field studies supplement the statistically designed samples from federal and state postal surveys. In addition, the personal contacts with hunters have an important public relations value.

A split season, evenly divided, was in effect on ducks with open dates of October 3-24 and November 20-December 12. This was the earliest opening date since 1952. The bag limit was 3 birds as in 1963, but without the restriction of 2 black ducks that prevailed a year ago. The season for geese was October 3-November 18 and November 20-December 12.

Because of man-power and budget limitations, the bag check effort was considerably curtailed this fall. Field work was largely concentrated during the early part of the season. Therefore, the 1964 data are not directly comparable with those of previous years, except as related to opening days. Nevertheless, enough information was obtained from the primary hunting areas of the state to formulate a general appraisal of the season as a whole.

Fall Populations

It was the concensus of biologists and wardens that most species showed a continuation of the relatively high populations of recent autumns, but with very marked geographical variation. Early season concentrations of birds appeared to be more extensive in the coastal belt, in Merrymeeting Bay and in a few scattered inland areas of southern Maine than a year ago. But these were offset by decreases in northern, eastern and central Maine. This was especially noticeable in eastern Maine and adjacent marshes of southern New Brunswick. It is believed that unfavorable water levels associated with the summer drought was an important factor in the early departure of ducks from inland breeding marshes. This was pointed out in the last quarterly report. An added influence was the unusually early date at which young of the year reached maturity.

Late-season populations in coastal waters were generally good, but likewise showed more regional variation than is often the case. Coincident

with extensive December icing of salt marshes and mud flats, there was an apparent east to west movement. Decreased numbers of black ducks and goldeneyes were reported in Cobbscook and Penobscot bays, but with increased numbers in Casco Bay.

Hunter Success

Because of lessened bag check effort, especially after the second Saturday, direct comparisons with 1963 as to hunter success cannot be made for the entire season. Opening day success, however, was somewhat lower for nearly all regions of the state, including Merrymeeting Bay; and was especially so in eastern Maine.

Hunting success during the late season on the coast appeared to be higher than in 1963 for the few gunners who were able to get out. Severe weather conditions prevailed from the first day of December to the end of the season. Extensive shoreline icing, together with much snow, sleet and freezing rain either prevented or discouraged all but a minority of hunters from going afield. This was the second consecutive year that hunting during the December portion of the season has been seriously curtailed by winter-like conditions.

Species Composition

A number of changes in the kinds of ducks harvested on opening day was apparent this year. Increases in teal were recorded, which would be expected with the season opening earlier. Open season differences of only a few days are usually reflected in changes in teal harvest, especially the blue-wing. An increase in the proportion of black ducks also occurred, but not as great as might have been expected with the bag limit on blacks raised from 2 to 3.

Principal declines were in the mallard and in the various diving ducks, chiefly the ring-neck.

Canada goose hunting in 1964 was very good, not only on opening day but throughout much of the season. Geese arrived early, in good numbers, and remained late. In addition to their regular concentration in Merrymeeting Bay, they were more numerous than usual in the interior of the state.

Crippling Loss

The number of birds reported as shot but not retrieved was 25 percent, the same figure as obtained in 1963.

Age and Sex Ratios

The proportion of young birds in the harvest was 1:2.2 adults for all species and 1:2.3 for the black duck. These ratios are slightly better than a year ago. They are believed to reflect the improved production from the northeastern breeding grounds in 1964.

Sex ratios for the black duck, as well as for all species combined, were approximately 120 males per 100 females, a relatively "normal" proportion.

Plans for next quarter: Inactive.

(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, Leader

Consultant: Dr. A. O. Gross, Professor Emeritus of Ornithology, Bowdoin College.

During the quarter all nesting data were prepared for analysis by use of punch cards and an IBM electronic computer. There were 569 nesting attempts on the four study islands and the data for each nest were put in 27 categories. The computer will greatly speed up analysis of such a vast amount of data.

The original maps of each island were traced to produce suitable work maps. Total areas of each island and each cover type are being determined by using dot grid paper (25 dots per square inch). Some areas have been computed, but this phase is not yet complete.

Plans for next quarter: Complete computation of areas for each island and cover type; analyse the nesting data; make preparations for the spring field work; and begin writing preliminary sections of the thesis.

WOODCOCK

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.

RUFFED GROUSE

Ecology of the Ruffed Grouse in Maine

Objectives: (1) To study population dynamics of harvested and unharvested grouse populations; and to compare mortality rates of resident non-migratory species (grouse) and migratory species (woodcock) on the same area.

(2) To determine cover preferences and use of forest clearings by adults and broods in spring and summer.
(3) To study the causes of juvenile mortality and measure the incidence of blood parasites.

Assignment: Sanford D. Schemnitz, Assistant Leader

Consultants: Eldon Clark, Moosehorn National Wildlife Refuge
Wesley Jones, Moosehorn National Wildlife Refuge
David O'Meara, Associate Professor of Animal Biology

During the quarter field data obtained during the summer were tabulated. Also one field trip to the Moosehorn Refuge was made in October.

No distinctive pattern was observed in the catch of grouse in relation to the dominant vegetation of the trapsite (Tables 1 and 2). The success of trapsites in different vegetation types was nearly the same as the distribution of the trapsites within the vegetation types.

Table 1. Vegetation and grouse trapping success, Moosehorn National Wildlife Refuge, Baring Unit, Summer, 1964.

Type	Number of Trapsites	Percent of Total	Number of trapsites where grouse were caught	Percent of total
Alder	71	67.0	18	69.3
Mixed hardwood-softwood trees	20	18.8	2	7.7
Birch-aspen	9	8.5	3	11.5
Conifer	6	5.7	3	11.5
	106	100.0	26	100.0

Table 2. Vegetation and grouse trapping success, Moosehorn National Wildlife Refuge, Edmunds Unit, Summer, 1964

Type	Number of Trapsites	Percent of Total	Number of trapsites where grouse were caught	Percent of total
Alder	49	64.5	24	75.1
Mixed hardwood-softwood trees	18	23.7	5	15.6
Birch-aspen	4	5.2	1	3.1
Conifer	5	6.6	2	6.2
	76	100.0	32	100.0

During the October field trip to the Refuge, three ruffed grouse were observed defending drumming logs that had been occupied the previous spring.

Plans for next quarter: Inactive.

BIG GAME

(a) A 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, Assistant Leader

Consultants: Chester F. Banasiak, School of Forestry
J. William Peppard, Regional Biologist, Dept. Inland Fisheries and Game
John Gill, Game Biologist, Dept. Inland Fisheries and Game
Paul N. Carpenter, Agronomist, Agr. Experiment Station

A hunting pressure survey was conducted on the low-kill area and also on comparison areas. Deer hunter interviews were conducted in the field with 350 hunters interviewed. Cobalt trace element sampling procedure was investigated. Data from summer browse survey were tabulated.

Hunting Pressure Survey. This survey was designed to sample the density and distribution of hunters using the study area. The first Saturday of the open season in this hunting zone - November 7, 1964 - was selected as the indicator of high hunting pressure. To sample at a period of maximum hunter stability, the hours between 7 and 9:30 a.m. were selected for the survey. Graduate students and staff members assisted.

Eight 20-mile segments of road were randomly selected for the sample. One cooperator was assigned to survey each segment of road in a vehicle. Each sample-taker started the survey at a designed end of his route at exactly 7 o'clock. He tallied each vehicle observed parked along his route, and also any vehicles visible at intersections and turnouts from his road segment. It was, of course, necessary to make a decision as to whether the vehicle was being used for hunting. Vehicles were recorded by distance from the starting point, as indicated by speedometer reading. The survey was completed when each cooperator had completed 20 miles of travel along the designated route. A state warden aircraft with an observer made simultaneous aerial checks of the same routes. There seemed to be excellent correlation between numbers of vehicles reported from the ground and air, except for two routes through inhabited areas. There, the plane reported significantly more vehicles. This was presumed due to identification difficulties in congested areas, and to the time differential between air and ground checks.

A total of 160 miles of road were checked with the following results:

	In Low-kill Areas	Outside Areas
Vehicles reported by ground survey	50	40
Vehicles reported by air survey	59	51

Hunters per vehicle counted during that day averaged 2.1.

Hunter density for an assumed high pressure day, for the area one mile on each side of the road, was thus computed to be:

Within low-kill area - .52 hunters per square mile.

Outside the area - .65 hunters per square mile.

Hunter Interviews. Deer hunters within the low-kill area and those hunting in perimeter towns adjacent to that area were interviewed in the field to determine their hunting habits and experiences in the region. About 350 hunters were contacted during the open season, with the following results:

	Low-kill Area	Outside Area
Resident to non-resident ratio	2:3	1:1
Number of years hunted in area	15.5 years	13.5 years
Days hunted each season	9.8 days	7.2 days
Average age	47.2 years	42.3 years
Percent hunted from private camps	60%	50%
Percent hunted from commercial camps	38%	48%
Percent hunted from bases outside area	33%	16%

Hunters were almost unanimous in believing that deer numbers had declined noticeably during their experience with the area. They were of the opinion that the number of hunters had remained relatively unchanged during this period. Almost all hunters thought that deer were more plentiful this year than last. The harvested deer that were examined appeared to be in excellent condition.

Soil Trace Elements. Following several preliminary tests in the University soils laboratory, the plan to sample the study area for cobalt deficiency was abandoned. It appeared that the standard methods of spectroscopic analysis would be of little value in determination of trace element deficiencies that might affect deer nutrition.

Browse Survey. Results of the summer browse survey on 150 sample plots were tabulated. Variance was too great for the sample size to yield highly significant comparisons. Minor differences were noted, but generally, the amount of browse available and utilized was quite similar by cover type for samples inside and outside the low-kill area. Preferred species of both softwood and hardwood browse were available in limited amounts in all cover types. The available browse and the deer populations of the sampled areas seemed to be well balanced.

Plans for next quarter: Conduct winter yard surveys, complete analysis of all data, and begin writing thesis.

(b) Influence of Known Populations of Deer Upon Forest Vegetation

Objectives: (1) To measure the influence of a known population of deer upon forest vegetation.
(2) To develop and test more adequate deer census methods than those currently available.

Assignment: Sanford D. Schemnitz, Assistant Leader

Consultants: Malcolm W. Coulter, Assistant Leader
Chester F. Banasiak, School of Forestry

Inactive during the quarter except for literature review.

Plans for next quarter: Obtain deer from State Game Farm; vasectomize the males.

(c) Pilot Radio-Tracking Studies of White-tailed Deer

Objectives: To test the efficiency and accuracy of telemetry equipment on semi-tame deer within fenced enclosures on the University Forest.

Assignment: Sanford D. Schemnitz, Assistant Leader

A receiver and 4 transmitters attached to leather deer collars were received from Markusen Electronic Specialities Company, Cloquet, Minnesota. A plywood carrying case with strap for the receiver was built. Slots were constructed in the receiver case to enable hand warmers to be inserted, along with insulation. The hand warmers will increase the meter response efficiency at near zero temperatures.

Two male fawn deer were released November 3, 1964 in the campus deer pens. These deer were furnished by the Maine Department of Inland Fisheries and Game with the assistance of game biologists Sidney Howe and Dana Holmes. They will be used in this study prior to release next summer in connection with sub-project (b).

Plans for next quarter: Attach transmitters to penned deer and test telemetry equipment.

(d) The Ecology of the Deer Population on Isle au Haut, Maine

Objectives: (1) To determine the number of deer on Isle au Haut.
(2) To evaluate the existing habitat conditions and measure the influence of the deer upon their environment.
(3) To determine the carrying capacity for this particular habitat with regard to adequate forest regeneration.

Assignment: John C. Baird, Graduate Assistant

Thesis Adviser: S. D. Schemnitz, Assistant Leader

Consultants: J. William Peppard, Regional Biologist, Dept. Inland Fisheries and Game
Harold Hubler, Superintendent, Acadia National Park

During the quarter detailed project and work outlines were prepared. Arrangements were completed with personnel of Acadia National Park for their cooperation on this study. A review of the literature was continued to become familiar with vegetative sampling techniques, strip census methods, and other aspects of the study.

A cover-type map of the island was prepared utilizing aerial photographs. These were checked through ground observations. General notations on feeding habits, habitat preferences, and other aspects of deer activity were recorded. These observations and the cover-type map will provide a basis for selecting and establishing deer drive areas, strip census lines, and vegetative sampling plots.

Several areas were selected and marked with plastic "flagging" for deer drives. J. William Peppard, state regional biologist, has been very helpful in arranging for an aerial census to coincide with the drives. Food, housing, and travel arrangements were finalized in order to provide accommodations for thirty students who are to participate in these weekend drives.

Plans for next quarter: Strip census lines will be established and cruised, deer drives will be conducted on specified areas, and plant sampling will be initiated.

SALT MARSH ECOLOGY

Effects of Small Salt Marsh Impoundments upon Ruppia and Macroinvertebrates

Objectives: (1) To determine the effects of plugged ditches upon 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, Assistant Leader

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

During the quarter data collected on invertebrates, widgeon grass, mosquito production, waterfowl food habits and algae were analysed. Preliminary portions of the thesis were written. Several trips to the study area were made.

The examination of post-impoundment bottom samples was finished. The "T" test was used to determine whether significant changes in invertebrate numbers and biomass had occurred during one growing season. Biomass was determined by weighing oven-dried specimens. Bottom samples yielded too few Macoma clams for any comparisons. Data from the ditches with similar treatment were combined.

There was no significant change in the number of snails in control ditches; however, there was a highly significant increase in biomass. This probably indicates only natural growth of snails during the summer. A highly significant increase in both numbers and biomass was recorded for snails in the eight-inch impoundments. There was a highly significant decrease in the number of snails in the 16-inch impoundments. The biomass of these snails was also less but not significantly so. This seems to reflect that even though the number of snails was significantly lower, their growth rate was such that no significant weight change was recorded.

All study ditches were examined for signs of widgeon grass production. No growths were found. However, it is known from the invertebrate bottom samples that widgeon grass seed does occur in the ditches.

A greenhouse germination test was conducted to test viability of seeds collected from ditches and seeds collected from a pothole which had an excellent stand of widgeon grass. Seventy seeds were from ditches while 75 seeds were from the pothole. The test lasted 24 days. No seed germinated from the ditch collections, while 10.7 percent of the seeds from the pothole germinated in 8 to 11 days. Further germination tests, both in the greenhouse and in the marsh, are planned for the coming spring.

Mosquito sampling data indicate that drainage ditches, either plugged or natural, are unsuitable places for mosquito larval development. Three hatches of salt marsh mosquitoes occurred during the summer. Sampling was done during two of these brood periods. The only larvae encountered were those taken while sampling two small shallow potholes near the edge of the marsh. The most influential limiting factor appeared to be the presence of predaceous mummichogs (Fundulus heteroclitus).

Dr. Charles Richards, University of Maine botanist, examined algae samples that were collected during the summer. These contained algae of six genera. Species of Enteromorpha were most common. Algae of this genus

is commonly found in floating masses in potholes and other somewhat protected places in salt marshes during the summer. On several occasions this algae was found on the study area floating at the surface of the 16-inch impoundments, especially along the ditch margins where it became entangled with overhanging vegetation. This condition was not observed in control or eight-inch impounded ditches. The shading of the ditch bottoms by algae may become a limiting factor in widgeon grass production.

Cladophora, a genus found to limit widgeon grass production in impoundment studies in other states, was identified in only one sample. Apparently this genus is not common at the Weskeag marsh.

It appears that algae presents greater problems in the 16-inch impoundments. In neither the eight-inch impoundments nor the controls did algae mat the surface or present other difficulties.

It was planned that Gammarus samples would be taken during the fall or early winter when they would normally be abundant in the ditches. Weekly inspections during the fall revealed few Gammarus. Unusually cold temperatures in early December froze all ditches and most of the Weskeag River. To date the ditches have remained frozen thereby prohibiting sampling. It is now anticipated that sampling will be conducted at time of ice-out.

Stomachs from 16 ducks shot during the fall were analysed. Widgeon grass seed was the third most important vegetative food, while snails and Gammarus were the most important animal foods.

An interesting sidelight to the study has been the common occurrence of lead shot in the bottoms of study ditches. Several bottom samples, six inches in diameter by four inches deep, have yielded as many as 8 to 12 shot. This was very surprising since this particular marsh is lightly gunned. Also the narrow ditches provide a very small surface area for the pellets to fall upon when considered in relation to the total marsh surface.

Plans for next quarter: Continue writing of preliminary portions of the thesis, and make preparations for the spring field work.

COOPERATION, EDUCATIONAL WORK AND MISCELLANEOUS ACTIVITIES

Unit personnel continued to furnish technical assistance to the State Game Division, to several University departments, and to the general public. The Unit secretary devoted considerable time to processing banding schedules and recovery records for the Game Division.

Mendall participated in the annual research conference of the Bureau of Sport Fisheries and Wildlife at the Patuxent Research Center, Laurel, Maryland, October 6-8.

The regular winter meeting of the Unit Coordinating Committee was held in Orono on December 28. Present from the State Department of Inland Fisheries and Game were Commissioner Speers, Deputy Commissioner Bucknam, Game Division Chief Hodgdon, Assistant Game Division Chief Powell and Warden Division Chief Marsh. Representing the Unit and University were

Director of the School of Forestry Nutting, Unit Leader Mendall and Assistant Unit Leader Coulter. Among various matters discussed, was the proposal of Commissioner Speers to expand the annual game warden training school held each winter in Augusta. Under the new plan the school will be at the University of Maine and will run for 10 weeks.

Schemnitz represented the Wildlife Society at a meeting of the newly formed Animal Behavior Society in Montreal, Quebec, December 26-29.

The Unit staff is participating in the Maine Outdoor Recreation Survey, through a sub-contract with the Department of Agricultural Business and Economics of the Agricultural Experiment Station, which is conducting the survey. Coulter and Mendall are jointly preparing material on wildlife resources.

PUBLICATIONS

Krafft, Arne. 1964. Management of moose in a Norwegian forest. MEDDELELSER FRA STATENS VILTUNDERSØKELSER (Papers of the Norwegian State Game Research Institute), 2. Seri, Nr. 16 A.s KAARE GRYTTING NORWAY. 61 pp. [NOTE: This is a revised version of Krafft's thesis which constituted part of his Master's degree program at the University of Maine.]

Mendall, Howard L., and Harvey K. Nelson. 1964. Adventuresome Waterfowl. In WATERFOWL TOMORROW, pp. 305-311. U. S. Dept. Interior, Govt. Printing Office, Washington. 770 pp.

Respectfully submitted,

Howard L. Mendall

Howard L. Mendall, Leader
Maine Cooperative Wildlife
Research Unit

February 18, 1965