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MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

University of Maine

Orono, Maine

QUARTERLY REPORT

January-March, 1965

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NOT FOR PUBLICATION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  
J. Franklin Witter, Head, Dept. of Animal Pathology  
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

January-March, 1965

RESEARCH PROJECTSFUR ANIMALSEcology and Behavior of the Fisher

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

Assignment: Malcolm W. Coulter, Assistant Leader

Data on 3 litters of fisher were obtained during the quarter and 7 of the 9 young examined. One litter of 3 whelped on March 2 and is being held in captivity with the adult. The young were doing well at the end of the month and should provide valuable data on growth, development and behavior.

Some time was devoted to study of populations and food habits in a study area near Freedom and Troy in south-central Maine. Most of the field work was conducted by Graduate Assistant Gore and other students. Several kills and scats were collected together with data on use of various cover types by fisher.

Plans for next quarter: Obtain data on growth, development and behavior of the young being kept in captivity.

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 during the quarter.

Plans for next quarter: Spring field work will be initiated during April.

(b) Renesting and Homing Study

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

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

Inactive during the quarter.

Plans for next quarter: Work will be resumed on preparation of the manuscript of the project completion report and publication.

(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, Leader

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

Nesting data gathered last summer were recorded on Morley tabulating cards. The various categories and combinations thereof were sorted and tallied using an IBM electronic sorter. Calculation of total acreages for each island and the acreage of each cover type was completed. A preliminary analysis of the 1964 data was made and writing of the thesis was begun.

The following is a summary of the 1964 nesting season. It is emphasized that the data analysis is not complete and certain statistical tests must still be applied to determine the significance of the data.

There were 569 nesting attempts by eiders on the study area. The total number of nests on each island were as follows:

<u>Island</u>	<u>Number of Nests</u>
Mouse Island	274
Robinson Rock	136
Goose Island	91
East Goose Rock	68

The first eider nests were initiated the week of April 19 and the last nest was begun between July 5 and 11. Nesting activity reached a peak between May 17 and 23. First hatches occurred the last week in May, excepting an earlier hatch on Flat Island May 15. This island is not considered part of the study area. The nest was probably initiated about April 11. The last clutch hatched the first week in August.

Cow parsnip (Heracleum) was the cover type most important to production and also appeared to be preferred over the other types for location of nest sites. Forty-three percent of the nests occurred in cow parsnip which comprised 13 percent of the total vegetated area. When preference is based on nest densities in a given cover type, nightshade (Solanum), -with 29 nests/1000 sq. ft. seems to be selected over cow parsnip at 17 nests/1000 sq. ft. However, nightshade made up only 0.73 percent of the vegetated area and contained but 4 percent of the nests. Thus, although nightshade has the greatest number of nests per unit of area, it is apparent that cow parsnip is the most important vegetative type for eiders nesting on these islands.

Time of nest initiation was correlated with cover type chosen to see if preferences changed during the season or if birds selected other sites when high initial densities of nests were located in cow parsnip. No definite trends were found.

Density of nests within the habitat available for nesting for the entire study area was 4.77 nests/1000 sq. ft. or 208 nests/acre. The densities for each island are given in the following list:

<u>Island</u>	<u>Nests/1000 sq. ft.</u>	<u>Nests/acre</u>
Mouse Island	4.79	208
Robinson Rock	3.83	167
Goose Island	4.98	217
East Goose Rock	8.94	389

There was no apparent correlation between the amount of cow parsnip and the total density of nests on the islands. East Goose Rock, with highest nesting density, had a smaller percentage of cow parsnip than any of the other islands. (Robinson Rock is excluded from this comparison as this plant does not occur there.) Thus, density seems to be dependent on factors other than the amount of preferred vegetation present on an island.

While studying the location of eider nests it was noticed that many of them were near the boundary of a cover type. This suggests that "edge effect" tends to result in increased nest densities. The amount of edge per unit of area will be calculated for each island to determine if such a relationship actually exists.

Average clutch size based on 346 sets of eggs was 3.81 with a range of one to eight eggs per nest. More than three-fourths of the sets consisted of three to five eggs. Clutch size for the first half of the season was 3.87 eggs as opposed to 3.56 eggs for the second half.

The percentage of nests hatching on the entire area was 39.03 while 38.60 percent of all the eggs hatched. A breakdown of success by islands is as follows:

<u>Island</u>	<u>Percent of nests hatched</u>	<u>Percent of eggs hatched</u>
Mouse Island	46.56	42.86
Robinson Rock	27.97	29.47
Goose Island	36.05	38.75
East Goose Rock	34.38	38.42

Total production was 713 young with 1.25 young hatched per nesting attempt--a very low degree of production.

Several factors which might influence nest predation were examined. Cover type had a definite effect. Nests in cow parsnip had the highest success (47.75 percent) while those located in bed rock areas had the lowest (25.00 percent). This is probably a direct result of the great amount of concealment provided by cow parsnip and the sparse cover of bed rock sites. Success was also compared with concealment which was placed in four categories: poor, fair, good, and excellent. Minimum and maximum concealment was based respectively on the poorest and best class recorded for a nest throughout the entire period when the nest was occupied by a female. Normally, most early nests were in the category of minimum concealment. Success as related to these classes was as listed:

<u>Minimum concealment</u>	<u>No. of nests</u>	<u>Percent of nests hatched</u>
Poor	213	39.91
Fair	24	58.33
Good	13	38.46
Excellent	18	27.78
<u>Maximum concealment</u>		
Poor	186	37.10
Fair	47	38.30
Good	38	60.53
Excellent	96	63.54

If there is a relationship between hatching success and concealment, one would expect the highest percent of hatching in those nests with excellent minimum concealment. This is obviously not the case. However, the sample size for minimum concealment is inadequate. If it were larger, a pattern of success similar to the maximum concealment data might be evident.

Considering only nests with complete clutches, those containing five or more eggs were more likely to hatch (72.15 percent) than nests containing four or fewer eggs (57.50 percent).

Partial predation occurred in 13.43 percent of the nests. However, hatching success in these nests was about the same as that in all nests. Thus, loss of one or two eggs to a predator does not necessarily indicate a return visit to the nest by the same predator, as sometimes noted with other waterfowl.

Plans for next quarter: Complete analysis of data; continue writing preliminary sections of the thesis; make preparations for the second season's studies; and initiate spring field work.

## 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: The seasonal study will be conducted as usual this spring.

## 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

Inactive during the quarter.

Plans for next quarter: Drumming grouse census studies will be made along the 1964 routes at both units of the Moosehorn National Wildlife Refuge. Vegetation on each drumming site located will be recorded and typed; drumming grouse will be trapped and banded with the aid of mirror traps.

#### 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

The winter deer yard surveys were carried out insofar as weather conditions permitted. The aerial survey revealed a number of sightings in accessible portions of the study area. Ground surveys were begun and were completed in part. However, this phase of the study was much less productive than anticipated because of the unusually open winter with relatively little accumulation of snow. Deer fed freely in open hardwoods and no "yarding" was noted.

Data previously collected were analyzed. A multiple regression formula was chosen, with registered deer kill as the dependent variable, and the 16 factors of timber harvest, burns, cover-type, and accessibility equated to it as independent variables. Professor Russell Altenberger, Computer and Data Processing Center, and Dr. Harold Young, School of Forestry, were very helpful.

Each town was treated as an observation. Complete data were available for 12 towns within the low kill area and for 9 of the adjacent towns.

Independent Variable	Description	Unit of Measure
X <sub>1</sub>	Timber harvest 1920 - 1929	Cords per sq. mi.
X <sub>2</sub>	Timber harvest 1930 - 1939	Cords per sq. mi.
X <sub>3</sub>	Timber harvest 1940 - 1949	Cords per sq. mi.
X <sub>4</sub>	Timber harvest 1950 - 1959	Cords per sq. mi.
X <sub>5</sub>	Timber harvest 1920 - 1959	Cords per sq. mi.
X <sub>6</sub>	Burns 1920 - 1929	Acres per sq. mi.
X <sub>7</sub>	Burns 1930 - 1939	Acres per sq. mi.
X <sub>8</sub>	Burns 1940 - 1949	Acres per sq. mi.
X <sub>9</sub>	Total Burns	Acres per sq. mi.
X <sub>10</sub>	Percent of spruce-fir	Percent
X <sub>11</sub>	Percent of spruce-fir-hardwoods	Percent
X <sub>12</sub>	Percent of hardwood-spruce-fir	Percent
X <sub>13</sub>	Interspersion of cover type	Change in 12 mi. transect
X <sub>14</sub>	Accessibility	Computed Index
X <sub>15</sub>	Number of private camps	Actual Count
X <sub>16</sub>	Number of commercial sporting camps	Actual Count

A preliminary analysis showed that none of the variables studied were directly related to the low deer kills. The final regression is being processed at the Computer Center and detailed results will soon be available.

The t test for unpaired replicates was used to compare data between the low kill and the surrounding area. The registered kill was the only variable with a highly significant difference.

The first drafts of several sections of the thesis were prepared.

Plans for next quarter: Complete writing of thesis.

#### (b) Influences 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  
 J. Franklin Witter, Dept. of Animal Pathology

Five deer (3 male and 2 females) are currently in the wildlife pens. These deer were provided by the Game Division, Maine Department of Inland Fisheries and Game, with the assistance of biologists Sidney Howe and Dana Holmes.

On March 18, a 70 pound "button" buck male was vasectomized by Dr. J. Franklin Witter assisted by 4 students. This deer recuperated well from the anesthesia (sodium nembutal; 12 cc. intravenous injection) and from the operation. There were no visible after effects.

A field trip was taken to Matinicus and Criehaven Islands which are approximately 23 miles by boat offshore from Rockland. Criehaven, a 365 acre island, appeared to be suitable for the objectives of this study, having a good variety of hardwood vegetation along with spruce for shelter. Several of the local residents expressed interest in having deer introduced on the island. Additional investigations of this and other islands will be made.

Plans for next quarter: Acquire additional deer as needed. Vasectomize the two remaining 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

Assistant: Thomas Allen, Undergraduate Wildlife Science Student

Transmitters built by Markusen Electronics were attached to two female fawn deer on January 28 and February 3, 1965. These instruments are transistorized and powered with two Burgess mercury 502 R batteries connected in series to provide 2.7 volts. Each transmitter is attached to a leather neck collar with a total apparatus weight of 230 grams. The transmitters operate at frequencies of 151.070 and 151.085 megacycles and the required FCC license has been obtained. Successful directional reception and a meter deflection was observed at a distance of 1-1/2 miles with a hand-held antenna. The transmitters functioned adequately at 0° - 15°F. An additional mast type antenna 20 feet in height has been constructed and will be tested.

It was noted that the leather collar caused considerable chafing and loss of hair on the deer's neck. Current plans are to glue strips of fur to the collar to provide a buffer and cushion and thereby alleviate this problem.

Preliminary tests were made of the drug Tranimul provided by Hoffman-LaRoche Company, New Jersey, used successfully in Louisiana to immobilize wild deer when mixed in a grain bait. The pills were pulverized and inserted in several apples. Although one of the semi-tame penned female fawns readily accepted and fed upon untreated apples, she refused, after one or two bites, to consume the drug treated apple. Apparently the taste of the drug repelled this deer. Further tests will be made using other baits to determine its feasibility as a means of capturing deer.

Plans for next quarter: Continue testing present equipment; also other types of transmitter batteries and solar cells attached to transmitters as a power source.

(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

Deer drives were conducted on February 6th and 7th and on March 20th and 21st on several sections of the island. Approximately 30 students and staff members of the University participated in these drives. A vehicle, walkie-talkie radios, and personnel assistance provided by Acadia National Park contributed greatly to the success of these weekends. A total of 11 drives were conducted on 8 sections of the island. These areas comprise approximately 790 acres of the total 6600 acres of the island. The following table summarizes the results of the drives.

	Date of Drive	Acres	No. Deer Tallied	Deer/Acre
Area 1	Feb. 6	200	21	1/9.5
	Mar. 20	200	11	1/18
Area 2	Feb. 7	25	1	1/25
	March 20	25	0	-----
Area 3	Feb. 7	30	2	1/15
	March 20	30	2	1/15
Area 4	Feb. 7	130	15	1/8.7
Area 5	Feb. 6	50	3	1/16
Area 6	March 20	20	3	1/7
Area 7	March 21	280	14	1/20
Area 8	March 21	55	0	-----
<b>Totals</b>		<b>1045</b>	<b>72</b>	<b>1/14.5</b>

The calculated total of 14.5 acres/deer substantiates earlier indications of a high density of deer. However, additional drives and data from other census methods must be conducted in order to more accurately project population estimates.

Two aerial reconnaissance flights were made on February 6 and on March 5. Direct observations of deer and deer activities were limited due to the density of the coniferous cover. These flights were very helpful, however, in determining cover types, aspects of topography, and in delimiting the best possible areas for conducting deer drives. Biologist J. William Peppard and Pilot Andrew Stinson of the Maine Department of Inland Fisheries and Game were very cooperative in this aspect of the study.

Samples of red spruce, white spruce, alder, cedar, kelp, rockweed and "old man's beard" were collected. Professor Plummer of the Maine Agriculture Experiment Station was very helpful in arranging for a nutritional analysis of these samples.

The vegetation on the island may be broadly classified into the following cover-types:

<u>Cover-Type</u>	<u>Acres</u>	<u>Percent of Total Area</u>
Spruce	5160	78.0
Mixed hardwoods	470	7.0
Mixed softwoods	380	6.5
Cedar	130	2.0
Pitch Pine	100	1.5
Cedar-Softwood	100	1.5
Open	<u>240</u>	<u>3.5</u>
	6580	100.0

The establishment and marking of 7 strip census lines, totaling 18.8 miles, is nearly completed. These lines are oriented in an east-west direction and traverse the island at 1/2 mile intervals throughout its length. The percent of the total length of line within each cover-type corresponds to the percent of the total area which that particular cover-type occupies. Along each line centers for vegetative sample plots have been established at 165 foot intervals.

Plans for next quarter: One weekend of deer drives will be conducted, vegetative sampling will be initiated, strip census lines will be cruised, and a search for dead deer is scheduled during the next quarter.

#### 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 suborder Gammaridea.
- (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

Additional amphipod and snail samples were obtained from the study area in February. The snails, preserved in 70% alcohol, were sent to Dr. Joseph P. E. Morrison of the U. S. National Museum for identification. He reported the most abundant species as Hydrobia salsa (Pilsbry) 1905. Apparently, this collection represents the northernmost record for the species.

Dr. Paul Haefner, Assistant Leader of the Cooperative Fisheries Unit, identified the amphipods as belonging to the Genus Orchestia.

Plans were made for spring germination and growth studies with widgeon grass. It is believed that seeds from ditches and seeds from potholes have different viability rates. Seeds will be collected from study ditches and potholes (containing stands of widgeon grass) as soon as the ice has cleared. Seeds are to be tested both in the field and in the laboratory.

A draft of the preliminary sections of the thesis was written.

Plans for next quarter: Begin germination and growth studies, obtain another series of invertebrate bottom samples, and continue writing portions of the thesis.

### 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.

Coulter and Schemnitz attended the Northeastern Fish and Wildlife Conference at Harrisburg, Pennsylvania in January. Coulter was elected Vice-chairman of the Northeast Section of the Wildlife Society. Schemnitz presented a paper at the upland game session. He is also co-chairman of the sub-committee on teaching of the Northeast Section. The charter for a University of Maine student chapter of the Society was presented at the meetings.

Mendall attended the annual Unit Coordination Meeting held March 5 and 6 in Washington, D. C. He also attended the North American Wildlife and Natural Resources Conference March 7-10. Other personnel in attendance were Coulter and Schemnitz; also Assistant Professor Banasiak of the School of Forestry, and Graduate Assistant Gore.

Unit personnel participated in the forestry and wildlife programs of the University of Maine's annual Farm and Home Week activities. Coulter served as chairman of the wildlife program.

Unit personnel are participating in the annual training school for state game wardens. The school, formerly held in Augusta, has been re-organized and enlarged and is now located at the University of Maine. It extends for 10 weeks with the following courses given by University staff members: game biology, fish biology, plant identification, mapping and compass work, report writing, and public speaking. In addition, Fish and Game personnel are in charge of instruction in law enforcement procedures, presentation of evidence and first aid.

The organization of the new school was under the direction of Director A. D. Nutting of the University's School of Forestry and Deputy Commissioner George Bucknam of the Department of Inland Fisheries and Game. Many of the details of curriculum scheduling were handled by Coulter, who is also conducting the course in game biology. Schemnitz is teaching the course in

plant identification. Mendall is also participating in the school through occasional guest lectures.

Two undergraduates were assigned to the Unit under the new work study program of the Economic Opportunity Act. These men have been assisting with several phases of work including preparation of specimens, tabulation of data and field studies with graduate students.

#### PUBLICATIONS

Olson, David P.

1964. The use of aerial photographs in studies of marsh vegetation. Bull. 13, Tech. Series, Maine Agric. Expt. Sta., Univ. of Maine, Orono. 62 pp.

Schemnitz, Sanford D.

1965. Some responses of bobwhite quail to severe winter weather in southern Pennsylvania. Trans. Northeastern Wildlife Conference, Harrisburg, Pa. 16 pp. (Mimeo).

Respectfully submitted,



Howard L. Mendall, Leader  
Maine Cooperative Wildlife  
Research Unit

April 5, 1965

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- 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

Data were gathered about growth and behavior of a litter of 3 fisher whelped in captivity during March. One of the young died at 33 days of age; the remaining 2 grew and developed rapidly during the quarter.

An analysis of the 1964-65 catch was made. The total take, 1,039 animals, was slightly less than half that for the previous season. About 25 percent of the harvest occurred in York County in extreme southern Maine. Comparatively few animals were taken in the northern highland region of the state.

A 4-month open season, November to February inclusive, was in effect during 1964-65. However, almost half the total take was made in November.

Plans for next quarter: Continued observation and experimentation with captive fisher.

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

The seasonal breeding ground studies were carried out during the quarter. The annual status report was prepared by Mendall as of July 20. Although this covers some work beyond the April-June quarter, the report is given in full at this time in the interest of project continuity. It is as follows:

This report summarizes the results to date, of the 1965 waterfowl breeding studies in northern, eastern and central Maine. Most of the work was carried out by the writer, but some assistance was given on breeding pair counts by Graduate Assistants Gore and Gramlich and by John M. Dudley of Calais, Maine.

This is the 27th consecutive year of these studies. Techniques were the same as in recent years and have been described in detail in earlier reports. However, the coverage was considerably reduced this year because of staff man-power limitations; also since much of the writer's time was devoted to the Unit's new coastal studies. Data are not comparable, therefore, with those of previous years except for initial populations based on breeding pair counts. The 1965 nest samples, as well as brood records obtained thus far, are very limited and hence are not included at this time.

#### Weather and General Breeding Conditions

The early part of the spring season as related to waterfowl was retarded both from 1964 and from the long-term average. Because of very warm weather during late winter, ice-clearing was at normal or even slightly earlier dates. By contrast, during late March and the first half of April a nearly static weather pattern prevailed: below average temperatures, practically no precipitation and almost constant north and northwest winds. This combination both delayed and prolonged early migration. Consequently black ducks, wood ducks and goldeneyes nested at later than average dates. The normally late breeding teal and ring-necked ducks, however, were not so affected and were actually ahead of their usual time-table.

The precipitation deficiency, widespread this year throughout the northeast, steadily became more acute throughout May and June and continued with only temporary periods of showers to mid-July. Only extreme northern Maine has escaped the full effects of the drought. On many breeding marshes, the declining water levels have resulted in poor rearing conditions.

#### Breeding Populations

The initial breeding population ordinarily 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.

This year breeding pair counts were obtained from only 9 areas, but the most representative of the original 13 were utilized. Thus, it is believed that the value of the data is not impaired even though the coverage was curtailed.

Results of these studies are summarized as follows:

<u>Species</u>	<u>Status in 1965</u>
----------------	-----------------------

(Measured on census areas)

Ring-necked Duck	19% increase
Wood Duck	No change
Black Duck	9% decrease

(Estimated)

Green-winged Teal	No change
Common Goldeneye	No change
Blue-winged Teal	Slight decrease

It may be seen that there were only minor changes in most species. Although slight declines appeared likely for both the black duck and blue-winged teal, these were offset by a moderate increase in the ring-necked duck. This is gratifying because the ring-neck had decreased sharply in 1962 and showed a further decline last year.

#### Nesting and Rearing Success

As previously stated, it was not possible to obtain an adequate sample of nests or broods to make specific comparisons with data from previous years. From general impressions, however, it would appear that nesting success was about average, but that brood rearing conditions were below optimum, due to a retarded chronology for early nesting species and low water levels on many inland marshes. Although supporting data are lacking, it may be assumed that overall production has not been as good as in 1964. In view of this possibility, it is the opinion of the writer that this fall's waterfowl season in Maine should not open as early as the 1964 date. A delay of even a few days would seem biologically justified this year, because it would afford greater protection to the state's potential breeding stock for 1966.

#### Conclusions

1. Breeding populations for most species of waterfowl on Unit study areas showed no changes or slight decreases from those of 1964. The only exception was the ring-necked duck where a moderate increase was recorded.
2. Nesting chronology of the black duck, wood duck and goldeneye was retarded, both from last year and from the long-term average. Chronology of the ring-necked duck and the two teal was similar to that of 1964, being advanced from the average.
3. Brood rearing conditions have been below optimum over much of the state because of a prolonged drought with greatly lowered water levels.

Plans for next quarter: To conclude the season's field 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)

Considerable progress was made on preparation of the manuscript.

Plans for next quarter: To continue work on the 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

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, Leader

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

NOTE: Data summarized cover more than the current April-June period. They are included at this time to permit a seasonal review of the eider project.

Field work was initiated April 16. Two to four days a week were spent on the study area until June 1; thereafter, full time was devoted to the project. The weather this season has been much more favorable than a year ago for field work and allowed more time to be spent on the nesting islands. Much assistance was given in the field at various times by Unit Leader Mendall, Assistant Leader Coulter, State Fisheries Biologist Robert Rupp and by the following undergraduates at the University of Maine: Stephen Clark, Gary Diffen, Richard Ferren, and Paul Schaefer.

The methods used and data recorded were essentially the same as in 1964. However, Robinson Rock was excluded from the major study area and was replaced by Flat Island. This enabled a study of nesting success on an area with vegetation which was much different from that found on the other islands. Also, Robinson Rock was to be used as a banding site and it was felt the nest success data would not be comparable with that of other islands. An additional change in techniques involved Goose Island, which was visited three times a week instead of the usual once a week. The objective was to determine effects of human disturbance on nesting success. In 1964 East Goose Rock had about the same success as Goose Island and thus, East Goose Rock served as a control area and was visited once a week.

On June 4th and 5th, 17 female eiders were nest-trapped and banded on Robinson Rock. This was done to further investigate methods of trapping large numbers of birds on the nesting islands. Coulter, Rupp, Clark, and Choate took part in this phase.

Nineteen albumen samples were collected from eider eggs. These will be sent, by request, to Dr. H. Milne in Scotland for use in his studies on genetics of eiders.

Length, diameter, and volume of known species of gull eggs were measured in an effort to find a method of distinguishing black-backed and herring gull eggs in the field where the two species nest on the same island.

The first eider nest was found on Mouse Island April 24. As last year, the gulls started nesting shortly before the eiders. Ten gull nests were found April 24 on Mouse Island.

Nest initiation by eiders reached a peak between May 17 and 23. Twenty-two percent of all nests on the study area were begun during this week. This compared closely with last year's dates, even though the chronology of the beginning of the 1965 nesting season was retarded by at least a week from 1964. The nesting peak and total nests found for each island is as follows:

<u>Island</u>	<u>Total Nests Found</u>	<u>Nesting Peak</u>
Mouse Island	231	May 24 to 30
Goose Island	115	May 17 to 23
East Goose Rock	52	May 17 to 23
Flat Island	63	April 26 to May 2
	<u>461</u>	

Nesting success was much higher on Flat Island than on the others. Since many more initial nesting attempts were successful there were presumably fewer renests. Thus the height of nesting there came about three weeks earlier than for the other islands. Nesting success varied considerably by islands. Exact percentages have not been determined as yet, but will probably range from approximately 75 percent at Flat Island to about 25-30 percent for Mouse Island and Goose Island.

The hatching peak for the entire area occurred during the second half of June. Breakdown by islands is as follows:

Mouse Island	June 21 to 27
Goose Island	June 14 to 20
East Goose Rock	June 14 to 20
Flat Island	May 31 to June 6

Of the 14 female eiders banded in 1964, two were recovered. Both were nesting on the island on which they had been banded. Other banded birds were seen but the band could not be read.

Again this year attention was given to any evidence of disease. One dead male eider was found on Mouse Island May 9. Autopsy by the Department of Animal Pathology at the University of Maine revealed that the bird died as the result of a severe infestation of Acanthocephalid worms. There was no other evidence of disease on the study area.

Plans for next quarter: Analyze the data for the 1965 season and continue writing the thesis.

\*\*\*\*\*

In addition to the thesis investigation just summarized, a comparative study was initiated in mid-May by Mendall, near Rockland in the Mussel Ridge Channel of Penobscot Bay, some 12 miles southwest of Choate's study area. A similar complex of breeding islands exists and the overall eider population is approximately the same. However, habitat conditions and human disturbance factors are considerably different; hence, a comparative study was deemed very desirable.

A total of 437 nests was located, marked and visited periodically. All but 6 of these were on four islands. Although the season's data have been only partly analyzed as yet, some of the more interesting tabulations are as follows:

<u>Island</u>	<u>Pop. Estimate (No. of Pairs)</u>	<u>No. Nests Marked</u>	<u>Hatching Success (Percent)</u>
Tommy's Island	35-40	30	68
Garden Island	120	161	63
Seal Island	25	25	50
Fisherman's Island	225-250	183	27

The wide range in hatching success follows the general pattern of Choate's four study islands at Islesboro (75% to 25%), although with not quite such extremes. Any statistical correlations between cover types, nesting dates and hatching success have not yet been determined. It is very likely that the high success on Tommy's and Garden islands is largely the result of dense nesting cover of raspberry; also to a minimum of human disturbance.

The poor production on Fisherman's Island is attributed to a combination of factors: a flock of sheep pastured there; a large resident gull population in which black-backed gulls predominated; explorations by amateur bird watchers (one party alone kept eiders off their nests for nearly 4 hours);

picnicking parties, and curious fishermen. Obviously, some nest losses were unavoidably caused by study operations although all possible precautions, based on prior experience, were taken to minimize disturbances. Finally, a gull-banding project was being conducted there, presumably by a private conservation agency, the activities of which had an additional adverse effect on the eiders.

The Fisherman's Island situation is unfortunate in that this constitutes one of the largest known eider colonies on the Maine coast. The island is privately owned by a local resident who is very much interested in the welfare of all sea birds. During discussions with him, he voluntarily agreed to refuse permission for any further pasturing of sheep; and to discourage insofar as he can, unauthorized landings on the island during the critical nesting period. Also, it is hoped that if any gull banding is contemplated for 1966 the work can be coordinated with the eider studies and thus reduce the amount of travel over the island.

Hatching peaks for the four islands as a whole occurred during the first week of June, somewhat earlier than was found at Islesboro. Earliest recorded hatch was on May 21 at Garden Island, while the latest, at Fisherman's Island, did not take place until the last of July--approximately July 28.

It is noteworthy that overall nesting success from both the Islesboro and Rockland areas was higher than that recorded in 1964 at Islesboro. On three of the nesting islands it exceeded 60 percent.

\*\*\*\*\*

In addition to the eider studies by Choate and Mendall, a day's reconnaissance was made by Coulter and U.S. Game Management Agent Owen Seelye in the North Haven region of East Penobscot Bay. Several nesting islands, not previously known to have breeding eiders, were recorded.

The interest and assistance by both the Central and Regional offices of the U.S. Bureau of Sport Fisheries and Wildlife in the Unit's eider duck studies has been greatly appreciated. Without this extra support the work could not have been carried out. The boat, motor and trailer used last year at Islesboro was provided by the Boston office, as well as the trailer for the expansion this year at Rockland. Messrs. Crawford, Palas and Tice have been most cooperative. The 1965 replacement of Choate's motor was obtained from a Central office allotment to the Unit. The 35 H.P. motor used in the Rockland work was purchased at very nominal cost through a special agreement with the manufacturer, arranged by the Wildlife Management Institute; in this connection, Vice President C. R. Gutermuth and Field Representative William Allen were very helpful.

## 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

Woodcock census studies on the Unit's six study areas in northeastern Maine were conducted. Schemnitz covered the Greenbush route and Mendall checked the others. A 13 percent increase was recorded in the number of singing males in comparison with 1964.

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

Drumming grouse census studies were conducted in May along the same routes as surveyed in 1964 at the Moosehorn National Wildlife Refuge. The 1965 census counts were identical with those of 1964. Intensive search revealed the location of 13 active drumming sites. All 1964 sites were active again this spring.

Four male grouse were trapped and banded with conventional mirror traps. Two of these captures were at drumming sites where grouse were caught in 1964. One of the 1965 captures on May 13 was a return of a bird taken originally May 12, 1964. Detailed site analysis was recorded for each drumming locale.

In contrast to results of Michigan and Minnesota studies, use of large rocks, some as large as 6 feet in diameter, as drumming sites far exceeded instances of logs being used. Also denser upland coniferous cover was used by drumming grouse than was recorded in the Lake States studies.

A similar grouse courtship study was undertaken on the 1700-acre University forest at Orono with the assistance of Paul Nickerson, a senior wildlife student. Ten active drumming sites were located, and 3 male grouse were mirror-trapped.

Plans for next quarter: Conduct ruffed grouse trapping as in 1964 with shorebird-type drift traps at the Moosehorn Refuge with assistance of several summer assistants. Addition of 50 traps on two new lines will be made.

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 the thesis was completed and Gramlich satisfactorily passed the oral examination for the M.S. degree. He has accepted employment with the U.S. Bureau of Sport Fisheries and Wildlife as Refuge Manager of the Sudbury National Wildlife Refuge in Massachusetts.

The summary of the thesis is as follows:

A block of 21 townships in eastern Maine, yielding consistently lower annual harvests than the surrounding region, was studied to investigate factors related to the low deer kill. Period of the study was from December 1963 to May 1964.

The immediate perimeter, a 28-township strip bordering the low-kill area, was selected for use in comparing factors thought to be related to the deer harvests. This section, while resembling the low-kill area, was necessarily greater in geographical extent and varied more in biological, topographical, and cultural (land-use) factors. But essentially, it was typical of the larger forest border zone, in which the entire study area is located.

Data were collected from public and private records for the period 1920 to 1964 on various environmental and land-use factors. A field study was made of forest cover types and deer utilization relationships, land-use, and hunter-oriented factors. Items of primary concern were timber harvest, forest fires, accessibility, and remoteness, deer welfare factors, composition of forest cover types, hunting pressure, and hunter related factors. A planned deer yard survey was restricted to limited observations by two unusually open winters.

The quantitative data were analyzed by multiple regression with the 1620 computer to ascertain interrelationships and correlation with deer harvests.

The factors investigated accounted for only a portion of the variation in deer harvests. The conclusions resulting from this study are:

1. The only highly significant factor was that of remoteness which accounted for a sizeable part of the variation within the low-kill area. Remoteness was inversely correlated to deer harvest in the entire study area, but only to a significant degree within the low-kill area.

2. Recent fires were significantly correlated to the deer harvest, but the variation accounted for was very small, and applied only to the perimeter area.

3. Timber harvests were not found to be correlated with deer harvests. The annual cut for the past 45 years has averaged only 0.1 cord per acre per year, and the effect of this light cut has been obscured by other factors. Timber harvest is increasing and should become a significant factor in deer welfare in the near future.

4. There were real differences between the low-kill area and the region surrounding it in human population, accessibility, forest cover-types, deer harvests, and probably, but not statistically proven, hunting pressure. In all these factors, the low-kill area is comparable to the more remote areas of the state with similar land-use and biological factors--the so-called forest interior region.

5. While not measured in this study, deer populations and individual hunting success did not appear to vary greatly with the surrounding region.

6. The deer harvests of the entire area have declined drastically since 1950. The most logical explanation, supported by data collected in this study, is that due to changes in the stages of maturity of forest stands, brought about by insect and disease attack, forest fires, and to a minor degree by cutting, the deer population of the area increased to a level beyond the carrying capacity of the range. The young forest stands grew out of reach of deer and the reduced food supply contributed to winter mortality and lowered fawn production which reduced the herds to their present lower numbers in keeping with the food supply. The hunting pressure in the area has remained relatively stable, and the reduced deer population is reflected in the harvest figures.

NOTE: This is a completed project.

(b) Influences 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  
 J. Franklin Witter, Dept. of Animal Pathology

Inactive during the quarter.

Plans for next quarter: Undertake intensive vegetative survey of study islands prior to deer release.

(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

Assistant: Thomas Allen, Undergraduate Wildlife Science student

A 20 foot mast-type antenna built by Cush-Craft Company, Manchester, N.H. was tested on May 28, 1965 and allowed good directional reception at a maximum distance of 4.2 miles.

Both transmitter-equipped does gave birth to fawns bringing the total of the captive herd to 6 deer (2 bucks, 2 adult does, 1 female fawn, 1 fawn, sex unknown).

Two vasectomy operations were attempted. One was successful with rapid recovery from the drug. The other operation was lethal to a "button-buck" fawn. The cause of death apparently was the interaction effect of Tranvel (a tranquilizer) and nembutal, causing a violent convulsion and severe internal hemorrhaging.

Plans for next quarter: Inactive.

(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  
Harold E. Young, School of Forestry

Plans for the sampling design and the technique to be used in measuring the vegetation were completed. Dr. Harold Young, School of Forestry, provided a great deal of assistance in this regard. Preliminary plots were measured to determine the time required and the feasibility of using the sampling method.

Plots centers will be located on seven lines which have been marked across the island at half mile intervals. Sampling points for each cover type will be chosen randomly but limited on any one line to assure distribution throughout the island. It is anticipated that a minimum of twenty plots in each cover type should be measured to provide an adequate sample.

The Bitterlich point sampling method, utilizing the wedge prism, will be used to establish the general tree character of the vegetation. Four quarter mile-acre plots will be located on compass bearings fifteen feet from the sampling point. The purpose of these subplots is to determine the amount of available browse and the degree of utilization of tree species. Diameters of all tree species will be measured six inches above the ground and classified according to species. All twigs will be tallied in species categories and recorded as unbrowsed, deer browsed, hare browsed or unknown browsed. The pounds per acre of browse available will be determined by the Shafer twig count method utilizing samples of browsing diameters and twig weights. Four additional subplots (1.98 sq. ft.) will be established to measure the amount of food on abundant shrub species such as Gaylussacia baccata, Kalmia angustifolia, Aronia arbutifolia, and Spiraea latifolia. Twigs one foot above the ground will be clipped to a maximum of six inches from the tip, sorted by species and weighed to the nearest gram. The degree of browsing on each species will be estimated to the nearest ten percent.

Three strip census counts were conducted along 18 1/2 miles of flagged line. Each observer was assigned approximately four miles of line. Direct distances to observe deer were measured in addition to the perpendicular distance to the line. Due to the daily activity patterns of deer and the time required to walk the lines, each man will have about two miles of line on future counts.

Plans for next quarter: Several strip census counts will be conducted and vegetative sampling plots will be measured.

#### 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 suborder Gammaridea.
- (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 work on the thesis was completed and it is now being typed in final draft. Gore is scheduled to take the oral examination for the M.S. degree in August. He has accepted employment with the U. S. Bureau of Sport Fisheries and Wildlife in South Dakota as a Federal Game Management Agent.

A summary of the thesis will be given in the next Unit Quarterly Report.

COOPERATION, EDUCATIONAL WORK AND MISCELLANEOUS ACTIVITIES

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

Coulter and Schemnitz completed their teaching in connection with the State Game Warden School. This was described in detail in the last Unit Quarterly Report. Plans are already being made to continue this expanded training school in 1966.

In April Mendall participated in a two-day woodcock management conference at the Moosehorn Refuge with personnel from the Regional Office and Migratory Bird Population Station. He also participated in the public meeting held at the Visitor Center dealing with Refuge policies and problems.

Effective July 1, Coulter was promoted from Associate Professor to Professor of Wildlife Management. He was also assigned to the School of Forestry building committee. A new forestry-wildlife building was authorized by the State Legislature, and is scheduled for occupancy in the fall of 1967.

Mendall has accepted a request by Dr. Thomas Baskett, new Editor of the Journal of Wildlife Management, to continue as a member of the Editorial Board. He served in this capacity under the previous editorships of both Dr. Kirkpatrick and Dr. Scott.

Schemnitz lectured to the Explorer Scouts on careers in wildlife management. He also assisted James Garvin, University Visual Aids Specialist, in presenting a TV program in connection with the University Centennial activities. Subjects of the program were the radio-equipped deer at the wildlife pens.

THESES AND PUBLICATIONS

Gramlich, Francis J. 1965. A study of factors related to low deer harvests in a portion of eastern Maine. (Unpublished) M.S. Thesis, Univ. of Maine, Orono. 106 pp.

A series of articles were carried in 20 weekly newspapers throughout the state based on Extension Bulletin #425, Big Game and Fur-Bearing Animals of Maine, authored by Coulter.

Respectfully submitted,

*Howard L. Mendall*<sup>H</sup>

Howard L. Mendall, Leader  
Maine Cooperative Wildlife  
Research Unit

August 12, 1965

File copy

MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

University of Maine

Orono, Maine

QUARTERLY REPORT

July-September, 1965

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.

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Unit Personnel

Leader - Howard L. Mendall

Assistant Leaders - Malcolm W. Coulter(\*)  
Sanford D. Schemnitz(\*)

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

Collaborators(\*\*) - 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  
J. Franklin Witter, Head, Dept. of Animal Pathology  
Harold Hubler, Superintendent, Acadia National Park

Graduate Assistants - John C. Baird  
Jerry S. Choate  
James F. Gore  
Charles H. Lobdell  
F. Loy McLaughlin  
Vaughn D. Rasar  
Larry J. Roop

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

4

MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

Quarterly Report

July-September, 1965

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 except for observations of captive animals and work on a joint manuscript with P. L. Wright of the Montana Unit on growth and reproduction of Maine fishers.

Plans for next quarter: Begin preparation of a comprehensive report.

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

The season's field studies were terminated in August. There were no essential changes from the conclusions as to production trends which were presented in the last quarterly report. Below optimum brood rearing conditions continued throughout the summer, as a consequence of drought. Data indicate that, at best, 1965 was a mediocre breeding season in much of Maine.

Plans for next quarter: Inactive except for limited data on fall populations which will be gathered in connection with 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)

Work on the manuscript was continued.

Plans for next quarter: It is hoped to complete the first draft of the 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

Inactive during the quarter.

Plans for next quarter: A limited amount of field work will be carried out, primarily on areas where there is a good back-log of data from previous years.

(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.

The quarter was devoted to analysis of data and writing the thesis.

Plans for next quarter: To complete the thesis.

WOODCOCKWoodcock Population Studies

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

Assignment: Howard L. Mendall, Leader

Inactive during the quarter.

Plans for next quarter: Inactive.

RUFFED GROUSEEcology 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

For the second consecutive summer an intensive effort was made to live trap ruffed grouse in conjunction with the woodcock trapping program of the Moosehorn Refuge. In addition to the seven regular full-time summer students, another student was hired and financed by Economic Opportunity Act funds administered by the University of Maine. The additional help at the Baring Unit of the Refuge was used to run 3 additional traplines totaling 50 traps. This resulted in a total of 156 traps and 9 traplines.

The procedures used during 1965 were generally similar to 1964, with sex, age, and location of grouse recorded. Blood smears were made to measure the incidence of parasitism. One innovation in 1965 was the use of a color leg banding scheme using colored Scotch brand plastic tape over aluminum leg bands. This technique was similar to that described by Gullion (1965, J. Wildl. Mgmt., 29:114-116). Two bands were placed on each leg. One colored band in the lower right position was used to indicate the particular trapline where the grouse was captured.

In addition to standard trapping, one of the students at the Edmunds unit was successful in capturing one adult male, three adult females, and six young with a long handled dip net.

For the second consecutive year, the grouse population at both units remained at a relatively low density. One consistent pattern in each year was the continued summer drought. Trapping success per trap night as shown in Table 1 was lower in 1965 than in 1964.

At Baring, returns totaled 2 of 33 (6.0 percent). Four of the 64 (6.2 percent) grouse banded in 1964 were recaptured at the Edmunds unit.

Ten of the Baring birds (2 adults and 8 immatures) were sent to Francis Dunn, Regional Biologist, Maine Department of Inland Fisheries and Game. This was in cooperation with Dunn's trapping project in northern Maine.

Table 1. Comparison of 1964 and 1965 Trapping Success at Moosehorn Refuge

Unit	No. of Traps in operation	Adults	Immatures	Total
1964 Edmunds	76	9	55	64
1965 Edmunds	76	11*	31**	42
1964 Baring	106	7	26	33
1965 Baring	156	11	46	57

\* Includes 4 caught with a hand net.

\*\* Includes 6 caught with a hand net.

For the first time during the Moosehorn studies, a few spruce grouse (Canachietes canadensis) were caught. An adult female and 6 young were trapped and color marked at Edmunds.

A unique occurrence was an observation of moulting, presumably caused by fear, that involved instantaneous shedding of the tail feathers by an adult female. This was observed during routine handling and removal of the bird from a trap for banding. N. H. Hoglund in his paper "Fright Moulting in Tetraonids" - 1964 Veltrevey, 2(8):418-425 described similar behavior by European grouse. Hoglund added that feather heaps found in grouse nests or territories are not necessarily proof that the bird was taken by a predator.

Plans for next quarter: Tabulate and analyze in detail the 1965 data collected at Moosehorn Refuge.

#### BIG GAME

##### (a) Ecological Relationships of White-tailed Deer and Vegetation at Acadia National Park

Assignment: M. W. Coulter and S. D. Schemnitz, Assistant Leaders  
F. Loy McLaughlin, Graduate Assistant

NOTE: This is a new project, financed by a two-year contract between the National Park Service and the School of Forestry. Principal investigators are Coulter and Schemnitz, but certain phases of the investigation will be assigned to Graduate Assistant McLaughlin.

Abstract of the proposed research is stated in the contract as follows:

Emphasis will be placed upon design and execution of a stratified, random browse survey, based upon a forest type map, essential to serve as a basic framework for current and future assessment of deer vegetative

relationships and deer population status at Acadia National Park.

Stated objectives are:

1. To develop a sound statistical design for study of the influence of the deer herd upon vegetation.
2. To measure the influence of the current deer herd upon vegetation.
3. To assist Park personnel in exploring and developing ways to census deer, study deer movements and the possible development of opportunities for people to see deer readily.

During the quarter, Coulter and Schemnitz conferred at length with Park Service officials, examining file data and in planning the project. During September McLaughlin visited Acadia Park and became acquainted with the area and with Park operations. He obtained aerial photos in preparation for type-mapping.

Plans for next quarter: To initiate field work.

(b) Influences 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  
J. Franklin Witter, Dept. of Animal Pathology

Eight days were spent on Outer Heron Island near Boothbay Harbor by Schemnitz and a field assistant. Twenty-four tree plots were tallied in the main vegetation types using the Bitterlich variable plot method. In addition, 4 quarter-acre plots of secondary vegetation were measured at each tree plot location. Permanent photo plots have been marked and photos were taken to show conditions prior to release of deer. Repeated photos will be made in future years to record changes in the vegetation caused by the browsing activities of the deer to be released on this island. Ten browse sample of trees and shrubs (spruce, birch, maple, mountain ash, etc.) were collected for nutrient analysis by the Biochemistry Department, Maine Agricultural Experiment Station.

Thurlow Farmer, Captain of the "Guardian," patrol boat of the Maine Department of Sea and Shore Fisheries, was very helpful and cooperative in providing transportation to and from the island.

Plans for next quarter: Permanent fenced exclosures will be erected on Outer Heron Island. Two deer will be released on Outer Heron Island after the conclusion of the 1965 hunting season.

(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

Assistant: Thomas Allen, Undergraduate Wildlife Science student

During the past year existing telemetry transmitters and receivers built by Markusen Electronics have been tested on local penned deer and have functioned well. However, one major deterrent to practical field use of this equipment is the relatively short life of the mercury batteries (six months maximum). A combination of solar cells and nickel cadmium batteries have been installed on leather collars. Clear plexiglass has been used to protect the fragile solar cells from mechanical damage when the collar is mounted on the deer's neck.

An additional grant of \$600 was received from the University of Maine Coe Research Fund to continue this research.

An experimental expandible leather collar utilizing metal springs has been constructed to be used on adult male deer to allow neck expansion during the rut.

Plans for next quarter: Test the efficiency of the solar battery recharge circuit using a Weston Model 756 illumination meter to determine the minimum amount of light required for recharge, and for charge duration. Attach expandable collar to penned male deer for testing during the fall rutting season.

(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  
Harold E. Young, School of Forestry

NOTE: This report covers more than the July-September quarter as a summary of work accomplished during the spring and summer field season is presented.

Seven lines that had been marked across the island during the winter were utilized to conduct strip census counts. These lines comprise a total of 18.1 miles and range in length from 1.96 to 2.97 miles.

Preliminary computations, using King's strip census method, indicate a herd of approximately 260 deer.

Additional census counts will be conducted in October and November and therefore any final analysis of the data is not available at this time. Population estimates will be calculated utilizing King's, Hayne's, Webb's and Kelker's strip census methods. These results will be interpreted with regard to behavioral factors pertaining to this specific situation.

Evening roadside spotlighting counts were conducted during the summer. This information has provided an insight on the distribution, sex ratio and, to a limited extent, the fawn-doe ratio of the herd.

The evaluation of the existing habitat conditions through measurements of sample plots constituted the major portion of the field work. A detailed outline of the techniques utilized was presented in the spring quarterly report. Work was initiated on sample plot measurements in late May and was completed in early September. A total of 140 overstory plots, 560 quarter-milacre plots, and 560 - 1.98 sq. ft. subplots were measured. A minimum of 2½ hours were required for one man to measure an average plot.

Browse samples of 13 species were collected on August 9 to be analyzed for their nutritive content.

Plans for next quarter: Strip census counts will be made in October and November. Data obtained on habitat measurements will be analyzed. Thesis writing 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 suborder Gammaridea.
- (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 the final draft of the thesis was prepared, Gore took his oral examination, and was awarded the M.S. degree at the August Commencement. He is now employed with the U. S. Bureau of Sport Fisheries and Wildlife as a Game Management Agent in South Dakota.

The summary and conclusions of the thesis are as follows:

The ecology of salt marsh drainage ditches was studied from the fall of 1963 through the spring of 1965. The objectives were to determine the effects of plugged ditches upon reproduction and growth of widgeon grass; to determine the influence of holding water in ditches upon populations and/or biomass of Macoma clams, certain small gastropods and amphipods; and to study the effect of plugged ditches upon mosquito production. The results of this study may be of assistance in making recommendations for the management of drained salt marshes. The following conclusions resulted from the study, after one growing season.

1. Eight-inch impoundments resulted in an increase in the number of snails.
2. Biomass of snails increased in both control and impounded ditches.
3. Impounding ditches did not initiate widgeon grass growth. This is due in part to the presence of unviable seeds. Other factors probably also influence the establishment of widgeon grass in ditches.
4. Widgeon grass seeds of proven viability will germinate and produce seedlings in ditch environments. However, it is not known whether these seedlings will develop into mature plants.
5. Ditch impoundments did not create new locations suitable for salt marsh mosquito breeding primarily because these areas also supported populations of mummichogs.
6. Soil properties did not vary to any marked degree between control and impounded ditches.
7. Water properties, except turbidity, did not vary to any marked degree between control and impounded ditches. Eight-inch impoundments had slightly less turbidity during the summer than did control or 16-inch impounded ditches.
8. Food habits analyses of 16 ducks revealed that all of the waterfowl food organisms studied were commonly utilized on the Weskeag marsh.
9. The simple design of the ditch plugs, used in the study, was sturdy enough to impound water up to 16 inches deep. The cost of the materials for making the plugs was low, and the plug construction was relatively easy.

NOTE: This report completes the first segment of the project. The salt marsh study will be continued for two years with the second phase assigned to Graduate Assistant Rasar.

#### COOPERATIONAL, EDUCATIONAL WORK AND MISCELLANEOUS ACTIVITIES

Unit personnel continued to furnish technical assistance to the State Department of Inland Fisheries and Game, to several University departments and to the general public. Coulter spent considerable time in conferring with State and University personnel on Game Division matters and in project planning for new P-R financed assistantships, and the National Park study. The Unit Secretary, Miss Horne, continued to supervise the processing of Game Division banding schedules and recoveries. This involves considerable time annually, especially during the summer banding program.

During September, Schemnitz participated in a meeting at the University of Connecticut in Storrs, of northeastern biologists conducting research on the white-tailed deer. He also attended a meeting in New York City of the Northeastern Marketing Division of Agricultural Experiment Stations. This was a project-planning conference in connection with a regional outdoor recreation study.

Mendall participated in the annual August meeting of the Maine Waterfowl Council held in Augusta. During the last of September and first of October he conferred in Fredericton, New Brunswick with wildlife personnel of the University of New Brunswick and the Provincial Fish and Wildlife Branch.

Mendall was appointed a member of the woodcock research and management committee which was established in March at the North American Wildlife Conference. This is part of an overall management planning study of migratory game birds, exclusive of waterfowl, which is being coordinated by Leonard Foote of the Wildlife Management Institute. The woodcock committee, under the chairmanship of Stephen Liscinsky of the Pennsylvania Game Commission, is to render a preliminary report of recommendations in January. Mendall has prepared a section of this report dealing with research needs as related to hunting.

#### PERSONNEL CHANGES

During July, Banasiak resigned as Assistant Professor of Wildlife Management and as P-R Deer Research Project Leader. He has accepted an offer to enter private employment. The Unit staff has long enjoyed the cooperative relationships with Banasiak and wish him well in his new position.

Four new graduate assistants are on the Unit staff this fall. Brief statements as to their backgrounds and project assignments are as follows:

Charles Lobdell, a wildlife graduate of the University of Idaho, has been assigned to the outdoor recreation project--a School of Forestry contract which is part of a regional forest-wildlife study.

F. Loy McLaughlin is a wildlife graduate of Virginia Polytechnic Institute. He is studying the ecology of the white-tailed deer at Acadia National Park. Provisions for this assistantship are included in a research contract with the National Park Service (see sub-project (a), Big Game).

Vaughn Rasar, a wildlife graduate of Oklahoma State University, has been assigned to the State Pittman-Robertson project on salt marsh ecology. This is a follow-up study to that completed last spring by former graduate assistant James Gore.

Larry Roop, a wildlife graduate of Purdue University, will study white-tailed deer populations, and influencing factors, in eastern Maine. This is a State Pittman-Robertson project. It will be conducted, in part, along lines of the two-year study recently completed by former graduate assistant Francis Gramlich.

NOTE: Project statements and objectives for the studies of Lobdell, Rasar and Roop will be given in the next Unit quarterly report.

THESES AND PUBLICATIONS

Gore, James F. 1965. Effects of small salt marsh impoundments upon Ruppia and macroinvertebrates. (Unpublished) M. S. Thesis, Univ. of Maine, Orono. 111 pp.

Respectfully submitted,

*Howard L. Mendall*

Howard L. Mendall, Leader  
Maine Cooperative Wildlife  
Research Unit

November 10, 1965

File Copy

MAINE COOPERATIVE WILDLIFE RESEARCH UNIT

University of Maine

Orono, Maine

QUARTERLY REPORT

October-December, 1965

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.

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Unit Personnel

Leader - Howard L. Mendall

Assistant Leaders - Malcolm W. Coulter(\*)  
Sanford D. Schemnitz(\*)

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

Collaborators(\*\*) - 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  
J. Franklin Witter, Head, Dept. of Animal Pathology  
Thomas J. Corcoran, School of Forestry  
Harold E. Young, School of Forestry  
Harold Hubler, Superintendent, Acadia National Park  
Roy W. Stamey, Park Ranger, Acadia National Park

Graduate Assistants - John C. Baird  
Jerry S. Choate  
Charles H. Lobdell  
F. Loy McLaughlin  
Vaughn D. Rasar  
Larry J. Roop

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, 1965

RESEARCH PROJECTSFUR ANIMALSEcology and Behavior of the Fisher

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

Assignment: Malcolm W. Coulter, Assistant Leader

Considerable time was devoted during the quarter to preparation of a comprehensive report on this project. This will also be used as a doctoral dissertation at Syracuse University.

Plans for next quarter: To continue manuscript preparation.

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 limited data on fall migration procured in connection 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)

A preliminary draft of the manuscript was completed.

Plans for next quarter: Manuscript revision and preparation of illustrative material.

(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

Bag-check studies by Unit personnel were largely confined to opening and closing days of the two split season. Field observations were conducted intermittently, however, throughout the fall, and other data were supplied by State Game Division biologists. General conclusions as to the hunting season are as follows:

1. It was the best goose season in many years.
2. Duck hunting was rather mediocre. After opening day it ranged from poor in the interior of northern and eastern Maine to only fair, at best, elsewhere.
3. Lower hunting success on ducks was attributed largely to unfavorable weather.
4. Hunting pressure, after opening day, was unusually light. It is believed that the kill, except for geese, was substantially reduced from a year ago.

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.

Data analysis was completed and considerable progress was made in writing the thesis.

Plans for next quarter: To complete the thesis.

WOODCOCKWoodcock Population Studies

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

Assignment: Howard L. Mendall, Leader

Inactive during the quarter.

Plans for next quarter: Inactive.

RUFFED GROUSEEcology 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, Refuge Biologist  
Wesley Jones, Refuge Manager

Grouse banding data for 1963 and 1964 were coded for IBM analysis. This was carried out in cooperation with Eldon Clark, Refuge Biologist.

Drumming sites at the Moosehorn National Wildlife Refuge were visited several times during the quarter. Nine of 13 spring sites were actively occupied during the autumn of 1965.

Plans for next quarter:

1. Finish the coding of grouse banding records.
2. Complete the analysis and interpretation of 1965 summer field data.

BIG GAME(a) Ecological Relationships of White-tailed Deer and Vegetation at Acadia National Park

Assignment: M. W. Coulter and S. D. Schemnitz, Assistant Leaders  
F. Loy McLaughlin, Graduate Assistant

Consultants: Harold E. Young, School of Forestry  
Paul G. Favour, Chief Naturalist, Acadia National Park  
Roy W. Stamey, Park Ranger, Acadia National Park

- Objectives: (1) To develop a sound statistical design for study of the influence of the deer herd upon the vegetation.
- (2) To measure the influence of the current deer herd upon vegetation.
- (3) To assist Park personnel in exploring and developing methods to census deer, and to study deer movements; also to develop ways for deer to be readily seen by the public.

N O T E: As pointed out in the July-September, 1965 quarterly report, one phase of this contract research is being conducted as a thesis study by Graduate Assistant McLaughlin. Dr. Schemnitz is thesis adviser. The following is a progress report of McLaughlin's study:

A forest type map of Acadia National Park, which is in the final stages of completion, was constructed with the aid of aerial photographs, supplemented by numerous ground checks. A geological survey map (scale 1:24,000) of Mount Desert Island was used as a base map. Forest types were determined from the aerial photographs with a stereoscope and transferred to the base map with a sketchmaster. Tree heights were differentiated with an Abrams height-finder. The minimum mapping unit is ten acres except for clearly defined important stands which are mapped to three acres. The type map will be used to help develop a statistically sound browse survey.

Assistance was given to Park personnel in their herd reduction program by helping with deer drives and collection of data. During November, 52 deer were killed on the Park. The following data or specimen material was collected:

- (1) date and location on the island
- (2) age and sex
- (3) dressed weight
- (4) hind foot length (inches)
- (5) antler beam diameter (mm.)
- (6) doe reproductive tracts
- (7) rumen samples
- (8) kidneys

Twenty reproductive tracts were collected with the aid of Park personnel, and stored in 10 percent formalin for future analysis.

The reduction program was discontinued during December, resumed in January, and will continue until the end of February. Approximately 80 of the 120 deer scheduled to be removed from the Park for the 1965-66 season have been killed up to date (January 14, 1966).

Plans for next quarter: A browse survey design will be constructed following pre-sampling of the vegetation. Trial runs will precede an intensive survey. Depending upon phenology, the survey will be conducted during March, April, and May.

Observations of winter feeding activities will be made in deer concentration areas. A re-examination of 110 permanent vegetative plots established by Park personnel in 1945 will also be conducted. In addition, the vegetation in five fenced enclosures will be studied to compare changes in stand succession with areas where deer are free to browse. Data collected during the reduction program will be analysed.

(b) Influences 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  
 J. Franklin Witter, Department of Animal Pathology

Five days were spent at Outer Heron Island, with the assistance of graduate assistants Roop, Baird and Rasar, erecting four modified Krefting-type deer exclosures (40 feet square by eight feet high).

Personnel of the Bureau of Commercial Fisheries, Boothbay Harbor, especially fisheries biologist Stanley Chenoweth and Capt. Brown, were of much assistance in providing transportation to and from the island.

Plans for next quarter: Release two deer at Outer Heron Island.

(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

Assistant: Thomas Allen, Undergraduate Wildlife Science student

The solar-powered transmitter has been perfected and attached to one of the penned deer. The pen is vegetated with a dense stand of spruce and fir. This dense crown canopy is similar to forest conditions in a natural winter deer yard. It will provide an ideal situation to assess if enough light will penetrate the foliage to activate the solar cell and keep the nickel-cadmium batteries charged in the transmitter. This is a serious problem during periods of prolonged cloudy days and short winter days.

Plans for next quarter: Periodically test solar transmitter attached to penned deer.

(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  
 Harold E. Young, School of Forestry

Seven strip census counts were made during the weekends of September 24-26 and October 23-24. A total of 16 separate counts, comprising 255 miles of line, have now been conducted.

Field work has been completed. Analysis of data and preparation of the thesis have been started.

Plans for next quarter: To complete preparation of the thesis.

(e) Ecology of White-tailed Deer in a Low Harvest Area of Eastern Maine

- Objectives: (1) To determine the causes of the low deer kill in a block of 21 townships in Hancock and Washington counties.  
 (2) To relate these findings to area management suggestions.

Assignment: Larry J. Roop, Graduate Assistant

Thesis Adviser: Sanford D. Schemnitz, Assistant Leader

Consultants: J. William Peppard, Regional Biologist, Dept. Inland Fisheries and Game  
 John Gill, Game Biologist, Dept. Inland Fisheries and Game  
 Harold Young, School of Forestry

This new project is a continuation of a study completed last year by Graduate Assistant Francis J. Gramlich (summarized in the April-June quarterly report). The block of 21 wildland townships continued, in 1965, to produce a deer harvest much less than that of surrounding areas. Specific information on the total kill will not be available until registration station data are tallied, but an attempt to obtain extensive information on the deer from these areas produced a sample of only 29 animals from the 21 towns of the low-kill area as opposed to 129 deer from 30 towns in the perimeter.

Regional Biologist J. William Peppard, Unit graduate students, and undergraduates assisted in taking data and measurements of deer registered at game check stations proximal to the study area. The information taken from these animals was: (1) date killed, (2) township where killed, (3) age to nearest year, (4) sex, (5) antler beam diameter, (6) main beam length, (7) number of points, (8) hind foot length, and (9) field dressed weight. In addition the number of lactating does handled was recorded. The sample from the low-kill area is small, but noticeable differences in age distribution are evident in the table that follows:

## Low-kill Area:

Age (Years)	$\frac{1}{2}$	$1\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{2}$	$5\frac{1}{2}+$	Sex Ratio
No. Deer	5	7	10	5	0	2	18 males
% Total	17.2	25.1	35.4	17.2	0	6.9	11 females

## Perimeter Area:

Age (Years)	$\frac{1}{2}$	$1\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{2}$	$5\frac{1}{2}+$	Sex Ratio
No. Deer	34	41	17	13	10	14	81 males
% Total	26.3	31.7	13.1	10.0	7.7	10.8	48 females

A five year (1960-64) state biologist's sample from this area, as reported in Gramlich's thesis, showed a slightly higher fawn:doe ratio of 1.05 for the low-kill area than the 0.97 fawns per doe of the perimeter. The results of the 1965 season tend to exaggerate this trend as is shown below:

Area	No. of Fawns	No. of Does	Fawn:doe ( $1\frac{1}{2}$ year+)
Low-kill	5	9	1.8
Perimeter	34	33	0.97
Total	39	42	1.1

The physical measurements, age composition, and reproduction of the deer within the two areas will need to be analysed statistically to determine if significant differences occur. It will be assumed that any gross differences in the range will be reflected in the physical attributes of the deer.

A hunting pressure index was obtained by access strip sampling during the hunting season. Two Saturdays (November 4 and 25) were selected to sample 71 five-mile sections of access road. These roads were mainly dirt logging roads owned and maintained by private pulpwood companies. The number of hunter vehicles, type of vehicle, and the state of the vehicle license were recorded. Unit staff and graduate students made these checks simultaneously, beginning at 7:00 a.m. of the designated days. It is of significance that there was a difference of approximately one hunter vehicle per five-mile segment between the two areas on each date. Also, there was a drop of about one vehicle per unit per area during the second sampling, but this is the result of an overall, unpredicted drop in hunter numbers which began about November 25.

Each year the Maine Department of Inland Fisheries and Game randomly selects licensed hunters to receive a questionnaire from which is determined average time spent hunting and hunting success. During this fall's field work, stamped, addressed card questionnaires, designed to get information similar to the statewide survey, were put on hunter vehicles or given to hunters at camps, in the field, and at registration stations. This questionnaire should supplement data from the study area so that comparisons can be made with the State's annual survey to be obtained later. Only 88 of 400 or 22 percent of the cards were returned. This low return was expected because of the lack of personal contact with many of the recipients.

Plans for next quarter: Further analysis of data from the deer kill and access strip sampling will be undertaken and statistical tests will be applied. Data from past years on hunter success will be tabulated for the study area, and this year's hunter survey will be used as a supplement to state questionnaire data from this area. A deer yard study will be initiated; it is planned that ten yards will be checked this winter and another ten yards the following winter. An aerial flight to locate deer concentration areas will precede browse sampling and appraisal of the yards.

#### SAIT MARSH ECOLOGY

##### Factors Affecting the Production of *Ruppia* and Macroinvertebrates in a Salt Marsh

- Objectives:
- (1) To determine factors which affect the production of widgeon grass, *Ruppia maritima*.
  - (2) To further investigate the effects of plugged ditches upon production of *Ruppia* and on populations of macroinvertebrates.
  - (3) To further investigate the effects of plugged ditches on mosquito reproduction.

Assignment: Vaughn Rasar, Graduate Assistant

Thesis Adviser: M. W. Coulter, Assistant Leader

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

This is a new project. In many respects it is a continued study on salt marsh ecology which was initiated by former Graduate Assistant James Gore in the fall of 1963. Gore's study was summarized in the July-September quarterly report. The project is financed by Pittman-Robertson funds as a part of the State's investigations of salt marsh ecology.

The Weskeag River marsh near Rockland in Knox County serves as the principal study area. Main objectives are to obtain additional information on factors which affect the production of *Ruppia* and populations of macroinvertebrates, both important waterfowl foods.

The study is designed to incorporate both field and laboratory tests and replication will be used in all cases where possible. A determination of factors affecting production of *Ruppia* will include germination tests of seed in soil from potholes containing *Ruppia* growth and from potholes lacking this

growth. Additional germination tests will be conducted as to the effects of mulching and scarification of seeds. Mulching tests will be carried out in the field in both pothole and ditch environment. Scarification tests will be limited to the laboratory.

When the Weskeag marsh study was initiated two years ago, the emphasis was placed on testing the effects of various depths of impounded salt water in ditches on populations of macroinvertebrates and Ruppia growth. Since most short-term ecological studies are often inconclusive, this phase of the project is being continued. Sampling of snails at designated points within eight inch, sixteen inch and control ditches, and also a determination of the changes in numbers and biomass of the snails, is the main objective of this phase.

During the fall quarter, sampling of snails and soil within the experimental ditches was completed. Approximately one-third of 54 snail samples have been sorted in the laboratory and all of the soil samples have been analyzed for soluble salts and pH by the University Soil Testing Service. Widgeon grass seeds from ditch and pothole environments were collected and stored in salt water in preparation for the winter germination tests.

Plans for next quarter: To continue literature review, complete sorting of snails and widgeon grass seed and complete the study outline. Germination tests will be initiated.

#### OUTDOOR RECREATION

##### Socio-Economic Characteristics of Maine Sportsmen

- Objectives:
- (1) To identify and analyse those social, psychological, and economic variables which motivate sportsmen to hunt and fish.
  - (2) To identify and analyse the reactions of the consumer to rules and regulations, administration and policy, and the opportunities for sport in Maine.
  - (3) To identify and analyse the expenditures incurred by sportsmen in pursuit of hunting and/or fishing.
  - (4) To compare the above information for Maine to the northeastern states in general.

Assignment: Charles H. Lobdell, Graduate Assistant

Thesis Adviser: M. W. Coulter, Assistant Leader

Consultants: Thomas J. Corcoran, Forest Economist, School of Forestry  
 Sanford D. Schemnitz, Assistant Leader  
 John Gill, Game Biologist, Maine Dept. Inland Fisheries & Game

This is a new project and was initiated during the quarter. It is one phase of a northeast regional study which is under contract by the Agricultural Experiment Stations through provisions of the Hatch Act. The Maine phase is being conducted through the School of Forestry. Participating states are Vermont, Pennsylvania, West Virginia, Massachusetts, and Maine. Each state is represented by a local leader on the regional committee. The various local leaders represent the fields of agricultural and forest economics, sociology, and wildlife biology.

Data will be obtained by use of mail questionnaires. There will be one questionnaire for the regional study and one that will apply to Maine only.

Activities during the quarter included the following: (1) the regional questionnaire was subjected to critical review and accepted after the fourth revision; (2) the regional committee met in New York City; (3) the survey designed specifically for Maine was proposed for consideration; (4) a partial bibliography on the economic, sociological, and psychological factors affecting participation in hunting and fishing was completed; and (5) a series of hypotheses to be tested were formulated.

The New York conference of the regional committee was for the specific purpose of final revision and acceptance of the questionnaire. Lobdell and Schemnitz attended from Maine. Methods and deadlines for the study were drawn and approved.

A series of hypotheses were formulated as related to specific questions in both surveys. In general, participation in hunting and fishing is predictable from the social, economic, and psychological characteristics of the participants. These relationships will be tested in a population of license holders in Maine, 16 years or older, classified by sex, age, family income, size of place of residence, education, occupation, and amount of experience afield.

#### Plans for next quarter:

1. A pre-test of the regional and Maine questionnaires will be conducted.
2. Methods of data analysis will be developed.
3. 2500 names from Maine hunting and fishing license stubs for 1965 will be drawn.
4. Final versions and cover letters for both questionnaires will be printed and prepared for an April 1, 1966 mailing.

#### COOPERATIONAL, EDUCATIONAL WORK AND MISCELLANEOUS ACTIVITIES

Unit personnel continued to furnish technical assistance to the State Department of Inland Fisheries and Game, to several University departments and to the general public. Coulter spent considerable time conferring with State and University personnel on Game Division matters, and in making plans for the State Game Warden training school which will begin in January. In general, the program of this 10-week session will be similar to that of last year (see January-March, 1965 quarterly report).

Unit Leader Mendall attended the annual meeting of the Atlantic Section, Canadian Society of Wildlife and Fisheries Biologists, November 26 and 27. This was held at Acadia University, Wolfville, Nova Scotia. He presented a paper entitled "Some Behavior Traits of the Ring-necked Duck as Related to Management."

PUBLICATIONS

Coulter, Malcolm

1965. Black bear: like no other in Maine. The Maine Alumnus, 47(1):13.

Mendall, Howard L.

1965. Some Behavior traits of the ring-necked duck as related to management. Proceedings Annual Meeting, Atlantic Section, Canadian Society Wildlife and Fisheries Biologists. Wolfville, Nova Scotia.

Respectfully submitted,



Howard L. Mendall, Leader  
Maine Cooperative Wildlife  
Research Unit

January 31, 1966