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WILDLIFE RESEARCH UNIT STUDIES

by

David R. Klein, Leader

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Project Progress Report
Federal Aid in Wildlife Restoration
Project W-17-4, Jobs 19.3R, 19.6R and 19.10R

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JOB PROGRESS REPORT (RESEARCH)

State: Alaska

Cooperators: Ronald Modafferi and David R. Klein

Project No.: W-17-4 Project Title: Research Unit Studies

Job No.: 19.3R Job Title: Effects of Nutritive Condition on Clutch Size of Female Rock Ptarmigan

Period Covered: July 1, 1971 to June 30, 1972

SUMMARY

In 1969, from April 19 to May 22, 103 female rock ptarmigan were collected from a 20-square-mile area. One hundred and five female rock ptarmigan were collected from this same area during April 19 to May 22 of 1970. During the same time period and from the same locality 108 female rock ptarmigan were collected in 1971. Autopsies yielded weights, measurements, organs and gut contents which will be analyzed in relation to the nutritional status of the birds in various reproductive stages within years and be compared along with the respective clutch size over three years.

Average clutch sizes and numbers of territorial males on the control area were the following: in 1968, 7.5 and 120; in 1969, 6.5 and 113; in 1970, 7.2 and 102; and in 1971, 6.3 and 92. In 1972 clutch size information was not recorded but the number of territorial males counted on the control area was 79, indicating a continued population decline.

Chemical analysis of food constituents, statistical treatment of data, and writing of preliminary drafts of several thesis chapters are currently being conducted.

OBJECTIVES

This study is proposed to test the following hypothesis on female rock ptarmigan: Nutritive condition of the female during a short period preceding egg laying effects clutch size.

An attempt will be made to quantify nutritive condition within years which will be compared over three years.

General

July and part of August were devoted to cleaning, measuring, drying and weighing leg bones (femur and tiobiorarsus) and backbones (synsacrum) of each of the 108 females collected in 1971.

For the remainder of August and September, dry weight and moisture content determinations were made on the two breast muscles (Pectoralis major and P. minor) from each female.

From October through December, dry weight, moisture content and total lipid determinations were made on hearts and livers from approximately 330 females collected over the three-year period.

During the months of January and February crop contents of females collected in 1971 were separated into constituent plant species and plant parts.

The majority of March was devoted to removing gut particles from ventriculus contents, separating the particles into various size categories with soil screens, and weighing each screen-separated fraction. The amount of berry seeds present in the remaining contents was then estimated visually and ranked on a scale of 1 to 5 (1=very few seeds, 5=mostly all seeds).

During April, parasite load (dry weight of tapeworms) was determined for each of the 108 females collected in 1971.

In early May, a field trip was made with Jerry McGowan, an Alaska Department of Fish and Game biologist, to the Department's ptarmigan study area at Eagle Creek to initiate a project designed to enumerate surplus territorial males. The investigator gained experience in counting territorial males and direct insight into methods employed. In addition, the investigator saw two areas on which the Department is presently conducting research and increased his knowledge of variations in breeding habitat used by ptarmigan.

After separating crop contents into constituent plant species and plant parts, it was found for some categories that the quantity was insufficient for the desired qualitative chemical analyses. Therefore, in late May, two trips were made to Eagle Summit to handpick samples of vegetation in quantities sufficient for qualitative analysis. This sampling method does not account for selection by birds but will give some insight into chemical composition of these minor dietary constituents.

During the remainder of time in May, weather data (temperature and relative humidity) representing all three field seasons were transferred from recording charts onto data sheets and then plotted geographically. Maximum, minimum and mean daily (average of values recorded for each hour within each day) values are depicted in each graph for each of the three field seasons.

Including and extending through June, all current data were transferred to computer sheets, rechecked for possible errors and key punched on computer cards. Some time was also spent writing preliminary drafts of several thesis chapters.

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JOB PROGRESS REPORT (RESEARCH)

State: Alaska

Cooperators: Wayman E. Walker and Peter C. Lent

Project No.: W-17-4 Project Title: Research Unit Studies

Job No.: 19.6R Job Title: Ecological Investigations of the Gyrfalcon in Alaska

Period Covered: July 1, 1971 to June 30, 1972

SUMMARY

In the summer of 1971 the number of gyrfalcons nesting on the Seward Peninsula was only 20 percent of the 1968-70 average. Mean hatching success was 1.91 per nest. Mean fledging was 1.00 for nests where young were successfully hatched and only 0.85 overall. The population showed a definite recovery in 1972.

DDE residues in fat biopsies are highly variable, presumably reflecting dietary differences. PCB residue levels appear to be surprisingly high, both in gyrfalcon and their prey. No statistically significant egg shell thinning has occurred to date.

OBJECTIVES

To investigate the breeding biology and ecology of Alaskan gyrfalcons (*Falco rusticolis*), primarily the population of the Seward Peninsula.

To assess the chlorinated hydrocarbon pesticide contamination in the gyrfalcon and its important prey species.

RESULTS

Breeding Biology

The summer of 1971 was an unprecedentedly poor breeding season for gyrfalcons on the Seward Peninsula. Less than 20 percent of the previous "stable population" observed during 1968-1970 was found to be nesting. Although more non-breeding gyrfalcons were observed, these were not sufficient to account for the rest of the previous population.

Both hatching and fledging success were lower than in previous years. Mean hatching was 1.91 (n=11), while mean fledging was 1.00 (n=11) for those nests with successfully hatching young. Slightly less than 50 percent of the minimum number of possible eggs at 12 breeding sites were able to hatch and fledge. Mean fledging was only 0.85 (n=13) for all nesting attempts observed.

Six gyrfalcons were banded, including one adult female. Two adults banded in 1970 were retrapped and identified. These two adults were paired at the same cliff site in both 1970 and 1971.

Five pairs of gyrfalcons were found at nesting cliffs but not breeding. Seven lone birds were also identified, with at least four of these occupying a cliff site for a large part of the breeding season.

It is of extreme interest to the biology of this population whether 1972 will show a complete or partial recovery, or whether a similar "remnant" population will be observed.

Pesticide Analyses

Collections of material for pesticide residue analyses included biopsied synsacral fat from two breeding adult female gyrfalcons and five addled eggs. These samples were added to collections made in 1970 and analyses performed to assess contamination of several chlorinated hydrocarbons.

Analyses are completed for the majority of gyrfalcon samples. Some confirmatory tests are not yet completed and the remaining gyrfalcon prey items to be analyzed have been prepared for analysis but not quantified.

Table 1. DDE residues in some gyrfalcon prey items.

Species	Tissue	Number	Average, ppm (EF)
Common murres	WBH	3	1.26
Thick-billed murres	WBH	5	6.17
Spectacled eiders	WBH	3	0.49
King eiders	WBH	5	0.21
Whimbrels	WBH	2	1.20
Ptarmigan	WBH	2	0.53
Ptarmigan	Brains	12	0.01
Ptarmigan	Livers	6	0.11

Table 2. Thickness indices of gyrfalcon eggshells.

Sample	N	Mean	Range
Prepesticide (museum)	183	2.27	1.81-2.76
Prepesticide (Alaska)	25	2.26	----
Recent (1968-71 Seward Peninsula)	30	2.23	1.90-2.67

Table 3. DDE residues in gyrfalcons, ppm (EF).

Sample	N	$\bar{X}$	Range
Fat biopsies	12	75.82	0.72-286.59
Eggs	15	9.19-52.98	

Table 4. PCB residues in gyrfalcons, ppm (EF).

Sample	N	$\bar{X}$	Range
Fat biopsies	4	103.47	18.31-210.61
Eggs	8	121.47	49.18-200.78

Gyrfalcons are contaminated with several chlorinated pesticides. Mean residues of DDE are 75.82 ppm (EF) in biopsies and 24.52 ppm (EF) in eggs. In some cases, residue levels are fairly high and for biopsied fat especially, highly variable. This presumably reflects individual dietary differences as the range of pesticide contamination in gyrfalcon prey species is highly variable.

Recent gyrfalcon eggshells do not at present reflect any changes from prepesticide eggshells. No shell thinning, the cause of other raptorial species' decline, has been observed.

Surprisingly high levels of PCB have been found in gyrfalcons and their prey. There is considerably more PCB than DDE in gyrfalcon eggs, which is the reverse of the situation normally found in analyses of biological material. Further investigation of this phenomenon is planned, especially to determine which prey species are responsible for the observed levels of PCB.

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JOB PROGRESS REPORT (RESEARCH)

State: Alaska

Cooperators: Douglas Schamel and Peter C. Lent

Project No.: W-17-4 Project Title: Research Unit Studies

Job No.: 19.10R Job Title: The Reproductive Biology of the Common Eider (*Somateria mollissima* L.) on the Beaufort Sea Coast

Period Covered: July 1, 1971 to June 30, 1972

SUMMARY

Common eiders (*Somateria mollissima* L.) were observed at Egg Island on the Beaufort Sea Coast from July 7 to August 12, 1971, and again starting in June, 1972.

All nesting eiders were incubating when observations began in 1971. Thirteen pairs of common eiders were observed nesting on Egg Island in 1972. Eight of these started nesting between June 18 and 30. Twelve glaucous gull nests were also located on Egg Island in 1971.

Preliminary descriptions of nesting behavior of this species are provided.

OBJECTIVES

To gain an understanding of the reproductive biology, including phenology, mating behavior, factors influencing nest site selection, clutch size, nesting behavior, nest predation, post-nesting activity and other social and interspecific interactions of the common eider duck on the Beaufort Sea coast of Alaska.

General

A base camp for avifaunal studies was established in May by the U. S. Fish and Wildlife Service at Point McIntyre, Alaska. This camp is located on the Beaufort Sea coast, a few miles west of Prudhoe Bay. A chain of islands extends from Point McIntyre westward to Oliktok. These islands are the nesting grounds of glaucous gulls (*Larus hyperboreus*) and common eiders (*Somateria mollissima*).

The investigator arrived at the Point McIntyre camp on July 7. He was accompanied by Dr. James C. Bartonek, a U. S. Fish and Wildlife Service research biologist. A preliminary investigation of the islands in the vicinity led to the location of 17 nesting common eiders on Egg Island, a small gravel islet a mile or two north of the base camp. This was the densest population of these birds that was located. Accordingly, a small temporary observation blind was erected on this island. Observations were made using binoculars and a spotting scope. Field work terminated on August 12, 1971.

On May 20, 1972, Schamel and field assistant Prescott again established a field camp in a small wannigan on Egg Island. Field work was still in progress here on June 30, at the end of the reporting period.

RESULTS

Observations of nesting female common eiders began on July 9, 1971; all nesting eiders were well into incubation. Assuming a 28-day incubation period, it is believed that nest initiation occurred during the first week in June. During incubation, no duck was observed to voluntarily leave its nest at any time. Vocalizations were rarely produced. Preening and down-arranging activities were fairly common. These motions did not appear to be ritualized, however.

Nesting birds typically held their heads in a "rest position," a compact "s." However, when approached by the investigator this position of the head was changed. The neck was fully extended and held at an angle such that the bird's head was only an inch or two off the ground. This position was held by the bird, silently and motionless, until the investigator approached too close. The eider then lifted its head and either flushed immediately or showed a definite "approach-avoidance" reaction - trying to escape from the intruder but simultaneously trying to remain at the nest. The "critical distance" at which eiders flushed

varied not only from bird to bird but also with the technique of approaching the nest and the duration of incubation. In general, the longer the bird had been incubating, the more closely it could be approached.

Only one of the 17 nesting eiders performed an "injured" display when approached by the observer. This consisted of the female flopping about in the shallow water near the nest, thus supposedly feigning a broken wing. The display lasted for about 20 seconds then the duck headed for deeper water. The performance occurred while this bird's young were pipping. The first successful nests were terminated on July 15, 1971. The last nest terminated successfully on July 26.

Non-nesting female common eiders were observed on the island for the entire period of field work. During this time, these birds were observed to construct and rearrange deserted nests. These ducks were far more active and vocal than the nesters. They were frequently found in groups of 20 or 30 in the immediate vicinity of nesting birds. There they would nibble at pebbles, sticks and clumps of sandbeach sandwort (*Honckenya peploides*). A particularly favorite pastime involved stripping the bark from driftwood. Almost all their activity was periodically interrupted by vocalizations. Sometimes they would vocalize while pecking and nibbling at some object. More often, however, they would pause in their activity, extend their necks skyward and cackle a series of hoarse notes. Infrequently, two birds would have a misunderstanding. While facing one another, they would cackle for about 10 to 15 seconds before sparring with their bills for 2 to 3 seconds. No meaningful (wounding) blows were ever seen to have been delivered. The "loser" always retreated a foot or two.

Nesting eiders rarely acknowledged the presence of the non-nesters. Only when a non-nester nibbled at the nest bowl or at some object very near the nest would a nesting eider show any response. At these times, the nesting bird would peck in the direction of the intruder. It is thought that the nester occasionally vocalized during these skirmishes.

Following the departure of the nesting eiders from the island, each nest was measured and marked by the investigator. It was quickly discovered, however, that the non-nesting females were disturbing the old nests. They were frequently deepened and vegetation, sticks and feathers were subsequently added. The wooden nest markers were often uprooted and sometimes added to the rearranged nest. When old nest bowls were discovered by non-nesting females, they would sit either in the bowl or very close to it. If any down was located near the nest, it would be pulled towards and under the bird. Sticks, feathers, gravel and anything else that could be easily reached was scraped into the forming nest. Often, however, a bit of material was out of reach. In such a case, the eider would crawl along on her breast until the object was reached. It was then scraped under her. Invariably, another object was seen several more feet away. Non-nesting females often traveled for many yards alternating crawling and scraping. Such nesting simulation did not usually last for more than an hour at any one location.

Only two or three male common eiders were seen on Egg Island. They usually accompanied the groups of non-nesting females.

On one occasion, July 9, a courtship display was observed. The male sat facing the female. He stretched his head straight up, then towards the female and finally back to the "normal" position. This type of display alternated with a similar one in which the male would stand up as the neck was raised. Occasionally, the male would stand, give two quick wing flaps and then sit down again. The female responded to the neck jerks of the male by stretching her neck either upwards or to one side. She frequently moved from one location to another. In all cases, the male soon followed her. Sometimes, another female eider would approach the pair, cackling as she neared the pair. It is thought that this action was "intended" to attract the attention of the male. However, the attention of the male eider was not distracted. It is thought that this courtship display was accompanied by vocalizations by both ducks. Later that day, the typical "ah-oo" coo of the male common eider was periodically heard.

While only one eider nest is known to have suffered predation from glaucous gulls, it is suspected that at least five additional nests were partly or wholly destroyed by these birds.

Few jaegers were seen near the island. Those that did approach were soon chased away by glaucous gulls or Arctic terns. Since the Beaufort Sea ice pack was contiguous with the north side of the island until mid-July, there was a possibility of Arctic fox predation. However, there was no evidence that such predation had occurred during this nesting season. According to Dr. Bartonek, Arctic foxes destroyed common eider nests on Cross Island, a small islet about 20 miles northeast of the study area. Human presence on Egg Island is thought to have increased the predatory success of glaucous gulls. When eider nests were examined for clutch size or pipping young, the glaucous gulls invariably returned to the island before the eiders. Although the eggs were nearly always covered over with down, it is thought that the unnatural absence of the female eider gave the gulls an increased opportunity to steal the eggs. It was also discovered that if a female eider was followed by a duckling when she flushed, the nest was permanently abandoned. The female led the duckling to the water and did not return to the nest. This also increased the predation of eggs.

Other nesting birds were noted on Egg Island. Twelve glaucous gull nests were located. The first pipping was noted on July 9 and all eggs are believed to have hatched by July 16. The chicks remained in their nests, or in the immediate vicinity of their nests, for several days before roaming freely over the island. These chicks did not seem to fear human presence, for they made no effort to hide while mapping procedures were conducted close to them. Two dead fledgling gulls were found on the island, one on July 24 and the other on August 1. The cause of their deaths was not determined. About 10 Arctic terns nested on the study island. A single chick was found on July 9. By July 14, all nesting had terminated. One black brant nest was found on the island. The first young was noted on July 14. By July 16, the brant family had departed.

In 1972, break-up did not commence until June 1, when the Kuparuk River began to overflow. The season's first pair of common eiders were seen flying over the island on June 2. Although no common eiders were observed walking on the island until June 18, at least one nest had been initiated by June 20. Of the 13 common eiders that nested on the island, at least eight birds were nesting prior to June 30.

In an effort to detect any circadian rhythms displayed by the eiders and other birds, we operated on rotating eight-hour shifts. Before the eiders arrived on the island, bird numbers and activities were recorded for the island area, including sections of both Gwydyr Bay and the Beaufort Sea. This information was collected on data sheets and will be transferred to IBM cards for summation and analysis. With the arrival of the eiders, our main emphasis was centered on the island, where we recorded the activities and movements of all birds utilizing the island. Part of the activities was captured on 35mm color slides and 16mm black and white movie film.

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