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WILDLIFE RESEARCH UNIT STUDIES

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Volume VI
Annual Project Segment Report
Federal Aid in Wildlife Restoration
Project W-6-R-6, Work Plan L

The subject matter contained within these reports is often fragmentary in nature and the findings may not be conclusive; consequently, permission to publish the contents is withheld pending permission of the Department of Fish and Game.

(Printed August 1965)

WORK PLAN SEGMENT REPORT
FEDERAL AID IN WILDLIFE RESTORATION

STATE: Alaska

PROJECT: W-6-R-6 TITLE: Alaska Wildlife Investigations

WORK PLAN: L TITLE: Wildlife Research Unit Studies

JOB NO.: 1 TITLE: Growth and Development of Waterfowl

PERIOD COVERED: July 1, 1964 - June 30, 1965

ABSTRACT

The rates of growth of body parts of Canvasbacks, Mallards and Lesser Scaups appear to be similar in northern and southern areas. Observations and measurements indicate that: 1) the sequence of feather emergence; 2) the time between the emergence of the first body feathers and the emergence of the primaries; and, 3) the rate of growth of individual feathers are constant for all individuals of a species in a given area and at a given time of the year. There was little difference in the rates of growth of the primaries for northern and southern birds of both Mallards and Canvasbacks. Although no significant differences were found in rates of plumage development between northern and southern birds of the same species, the late nesting season of 1964 resulted in the development of birds in the Tetlin Lake area under light conditions similar to those in the South Dakota and Manitoba study areas. Normal nesting would result in development of birds in the Tetlin Lakes area under conditions of considerably longer day length than is the case further south.

OBJECTIVES

To determine growth rates and sequence of plumage development of ducklings, and evaluate production of waterfowl.

TECHNIQUES

A number of investigators have suggested that ducklings in the Subarctic and Arctic have a faster rate of plumage development than those at lower latitudes. If this were true, age determination techniques based on stages of plumage development which were determined at lower latitudes would need modification in order to be useful in the northern areas. This study was undertaken to determine the rates of plumage development of ducklings in interior Alaska and compare these rates with those of birds at lower latitudes. The study was conducted during the summers of 1963 and 1964 in the area immediately east of Tetlin Lake, Alaska.

Nests were located by systematically searching the area with most of the effort concentrated in the sedge borders of the ponds.

In 1963, the eggs were injected with dye to color the ducklings and the known-age broods were allowed to hatch and go through their pre-flight development under completely natural conditions. Poor hatching success due to nest predators and mobility of broods limited the amount of data that was collected. Those broods which were followed throughout most of their plumage development were classified as to stage of plumage development using Gollop and Marshall's (1954, Miss. Flyway Council Tech. Sect.) classification system as often as possible.

In 1964, eggs were collected from nests and hatched artificially in an oil-operated incubator. Ducklings were color marked by egg injection and were tagged with numbered web tags. The ducklings were then placed on a 2.7 acre holding pond. Daily plumage classifications of the ducklings and weekly measurements of weight, culmen length, tarsus length, length of the 9th primary, 6th secondary, longest tertial, longest scapular and middle rectrix were taken. In addition to the classification of the stage of plumage development, visual observations of the sequence and time of emergence of certain feathers were made each day. Mortality of the ducklings on the holding pond was heavy, but complete information was gained from small numbers of Mallards, Canvasbacks and Lesser Scaups. Plumage classifications were made on Buffleheads but no measurements were taken.

FINDINGS

Body weight and the length of the tarsus do not appear to increase during the first three or four days after hatching. The culmen increases in length from the day of hatching. The weight of Canvasbacks leveled off after the 60th day, just before flight was attained. Mallards and Lesser Scaups did not demonstrate this leveling-off, however, no measurements were taken after the birds attained flight. The plateau in the weight curve at the time the flight feathers begin to develop which has been found by other investigators, particularly in hatchery-reared birds, did not occur in any of the individuals studied at Tetlin. The rates of growth of the body parts appear to be similar in both northern and southern areas.

Feather Growth

There was little individual variation in the rates of feather growth, however, the age at which the feathers emerged varied by as much as three weeks. Most individuals were within a week of each other. No satisfactory data on the feather growth of birds at lower latitudes have been located. A rough comparison can be made with Dzubin's (1959, Jour. Wildl. Mgmt., 23 (3): 279-290) data on the Canvasback in Manitoba. There do not appear to be any great differences between northern and southern birds of this species.

Because of overlapping measurements of birds of different ages, none of the body parts or feathers measured are good enough criteria for determining the age of ducklings more precisely than is possible with Gollop and Marshall's (1954, Miss. Flyway Tech. Sect.) plumage classification system.

The rates of plumage development as determined by Gollop and Marshall's system are given for birds at Tetlin and for those at lower latitudes in Table 1. Individuals of the same species in the same area may attain flight at different ages. This variation occurs at the time when the first body feathers emerge. Individual Canvasbacks spent from 18 to 33 days in Class I. However, all individuals went through Classes II and III at about the same rate regardless of the age at which they first entered Class 11. Observations and measurements indicate that: 1) the sequence of feather emergence; 2) the time between the emergence of the first body feathers and the emergence; of the primaries (and probably all other feathers); and, 3) the rate of growth of individual feathers are constant for all individuals of a species in a given area and at a given time of year.

Table 1. Average Age Span (in days) for Each Plumage Subclass at Tetlin, Alaska and in the Northern United States and Southern Canada.

Species	Area	IA	IB	IC	IIA	IIB	IIC	III	Flying
Mallard	Tetlin	1-6	7-11	12-26	27-32	33-37	38-41	42-62	61-64
	South Dakota[1]	1-6	7-12	13-18	19-25	26-35	36-45	46-55	52-60
Canvasback	Tetlin	1-9	10-17	18-30	31-39	40-45	46-55	56-66	62-71
	Manitoba[2]	1-9	10-18	16-25	26-32	33-42	43-53	54-65	56-68
Lesser Scaup	Tetlin	1-6	7-12	13-20	21-30	31-35	36-47	48-56	53-61
	South Dakota[1]	1-6	7-13	14-20	21-28	29-33	34-42	43-50	47+
Bufflehead	Tetlin	1-6	7-12	13-19	20-24	25-28	29-34	35-45	45+
	Washington[3]	1-12	13-19	19-26	27-36	37-47	48-53	54-63	64+

1. Gollop and Marshall (1954).

2. Dzubin (1959).

3. Crouch (pers. comm.) includes one individual taken from the Tetlin study area.

While there was little difference in the ages at which the birds studied at Tetlin and those studied at lower latitudes attained flight, there were differences in the rates of feathering of the body. The rate of body feathering as determined by the length of time spent in Class 11 was 27 days for South Dakota Mallards and only 15 days for Tetlin Mallards. Manitoba Canvasbacks went through Class 11 in 28 days while those at Tetlin went through this class in 25 days. Lesser Scaups, on the other hand, feathered slower at Tetlin, requiring 27 days to go through Class 11 while those in South Dakota required 22 days. These differences between northern and southern birds appear to be a result of different rates of feather growth. The sequence of emergence of feathers and the time between the emergence of any two feathers appears to be relatively constant for all individuals of a species at both northern and southern latitudes. The rate of body feather growth, however was faster in northern Mallards than among those in the northern U. S. The rate of body feather growth appears to be only slightly faster in northern Canvasbacks than among those in southern Canada. Northern Lesser Scaups appear to have a slower rate of body feather growth than among those in the northern U. S.

The relative rates of growth of the primaries can be compared by measuring the lengths of time between the emergence of the primaries through their sheaths and the period when the bird first attains flight. This time averaged 19 days for Tetlin Mallards and 20 days for South Dakota birds. Tetlin Canvasbacks required 19 days to go through this period while Manitoba Canvasbacks required 20 days. It appears that there is little difference in the rates of growth of the primaries for northern and southern birds of either of these species. No information has been located on the age at which primaries break their sheaths among South Dakota Lesser Scaups. In the case of the Mallard, there is an apparent contradiction here. The information indicates that the body feathers of this species grow faster in northern birds than in southern birds while the primaries grow at about the same rate for both groups of birds. Actually, when one considers the probable causes of differences in rates of feather growth, this situation is to be expected.

Causes of different rates of feather growth:

Latitudinal variation in day length has been suggested as being the cause of different rates of plumage development. There does appear to be a direct correlation between the length of daylight and the rate of feather growth. There was an average of about 15 1/4 hours of daylight in South Dakota at the time of major body feather growth of the Mallards in that area. At the time of major body feather growth of Mallards at Tetlin there were over 18 hours of daylight. However, at

the time of growth of the primaries, there was an average of 15 hours in South Dakota and 15 1/2 hours at Tetlin. In the case of Canvasbacks, there were about 15 hours of daylight in Manitoba and 15 1/2 hours at Tetlin during their respective times of major body feather growth. There were about 14 1/2 hours of daylight in both areas during the time the average Canvasback's primaries were growing. Lesser Scaups feathered under an average of 14 1/4 hours of daylight in South Dakota and 13 hours at Tetlin. There were only 12 1/4 hours of daylight during the time of growth of Lesser Scaups primaries at Tetlin and probably about 14 hours in South Dakota.

If early nesting species exhibit a faster rate of feather growth in the North than in the South and late nesting species a slower rate in the North than in the South, then it seems likely that early hatching individuals would exhibit faster rates of feather growth than late hatching individuals of the same species in the same area. The individuals of each species studied at Tetlin hatch at about the same time so no comparison can be made. However, Hochbaum (1944, Wildl. Mgmt. Inst.) mentions that in Manitoba early broods have slightly faster rates of plumage development than late broods of the same species. If daylight is a controlling factor, then one would expect the differences to be even greater in the North where the length of daylight varies more.

Because the spring of 1964 was late, the Mallards studied at Tetlin hatched later than the earliest members of this species do in a normal year. The Canvasbacks studied hatched at about the average time and the Lesser Scaups studied hatched very late. Therefore, the plumage development information for the Mallard and Lesser Scaup presented in Table 1 is probably not representative of the average individuals of these species at Tetlin.

Lillie and Wang (1940, Proc, Nation. Acad. Sci. USA, 26(1):67-87) demonstrated a nocturnal reduction in the growth rates of certain feathers on Brown Leghorn Capons. Veselovsky (1951, Sylvia, 12:1-19) has shown a similar reduction of feather growth at night in wild ducks. Lillie and Wang attribute this reduction to the normal diurnal lowering of the rate of metabolism which normally occurs between 6 and 9 PM. By reversing the times of light and dark, the daily growth curve could be reversed, indicating that the coming of darkness induced th lowering of the rate of metabolism and hence the feather growth rate. In nocturnal species, this depression occurs during the day suggesting that the depression is due to differences in behavior rather than the direct effect of light.

It is possible that longer periods of daylight reduce the length of the period of lower metabolism and that this shortens the period of slow feather growth.

Studies of the effects of daylight on feeding behavior and the quantity and quality of food consumed, coupled with frequent measurements of feathers, should provide considerable information on this subject. Such a study would probably have to be done under hatchery conditions. If so, a greater knowledge of the effects of hatchery conditions on certain species is necessary.

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WORK PLAN SEGMENT REPORT
FEDERAL AID IN WILDLIFE RESTORATION

STATE: Alaska

PROJECT: W-6-R-6 TITLE: Alaska Wildlife Investigations

WORK PLAN: L TITLE: Wildlife Research Unit Studies

JOB NO: 2 TITLE: Population Ecology of the Harbor Seal

PERIOD COVERED: July 1, 1964 - June 30, 1965

ABSTRACT

Observation of behavior on seal herds of mixed sex and age made at Tugidak Island indicated that during haul-out behavior was directed toward maintaining a spacially stable resting group. Variations in this general pattern of behavior occurred during the pupping and breeding periods with females becoming strongly defensive of their new pups and males assuming a dominant aggressiveness towards females and subordinate males during the mating period.

Corpora lutea of seals in late pregnancy are larger than those of seals in other stages of the reproductive cycle and regress in size during lactation. A corpus albicans is formed five to six weeks after parturition. Normally a single ovum is shed. Breeding fights may be a stimulus to ovulation. Corpora albicantia may persist up to five years. About 50 per cent of the females mature at three years of age and 50 per cent at four years. Males appear to mature at six years. The oldest specimens collected were a 28 year old female and a 25 year old male. Implantation of embryos apparently occur from late August through mid-September.

Aging of seals was accomplished up to four years by examination of the pattern of dentine formation. Beyond four years of age the number of cementum layers in the sectioned tooth was taken as the age of a given seal.

The largest number of seals observed hauled out in Aialik Bay was nearly 500 and a similar number may have occupied Harris Bay. On Tugidak Island the population ranged from about 4,000 in early May to an estimated 10,000 at the height of pupping in mid-June, and down to 5,000 to 6,000 in July, after the pupping season.

OBJECTIVES

To determine factors of the population ecology of the harbor seal, including breeding biology, productivity, and population sex and age composition.

TECHNIQUES

Seals were collected by hunting alone or with commercial hunters. Specimens were collected in Aialik Bay and Harris Bay west of Seward in the summer and fall of 1963, and on Tugidak Island south of Kodiak Island in 1964. Observations of behavior were made almost exclusively on Tugidak Island. Data routinely collected included measurements of total weight, total length, combined hind flipper span, blubber thickness, and observations on molt, pelage color, reproductive status, and stomach contents. Female reproductive tracts were examined in the field. Gonads of both sexes were collected, preserved in AFA, and examined later in the laboratory to determine the reproductive status of the individual. The lower right canine tooth was routinely collected and preserved in Loess' solution. Cross-sections and longitudinal sections about 0102 mm thick were obtained from the tooth by cutting it with a diamond-toothed rotary power saw and grinding the section by hand between two find carborundum stones. The tooth sections were examined with a dissecting microscope and a compound microscope using 15x and 150x magnification. The age of the seal was determined by evaluating the dentine and cementum layers found in the tooth section, along with a consideration of the seal's total length, and the diameter of the lumen at the root of the tooth.

FINDINGS

Behavior

Harbor seal behavior was observed in the pre-pupping, pupping, nursing, and mating phases of the annual reproductive cycle. The responses of the seals to their physical and biotic environment which were observed in the pre-pupping period were found to be basic to harbor seal behavior, and were altered by the special circumstances characterizing later phases of the reproductive cycle, and by hunting.

Timing and duration of haul-out on Tugidak Island were found to depend primarily upon tide and wind conditions as they affected availability of the beach. The presence of seals already on the beach was an important stimulus to general haul-out. Once ashore, seals were reluctant to return to the sea until the beach was awash or some danger was imminent. Certain areas of beach were preferred as haul-out sites, but as the pupping season reached its peak and the seal

population on the west beach of Tugidak Island rose from about 2500 to about 7500, the seals became less selective in their choice of haul-out areas.

The results of sex ratio counts of the hauled out herds were unsatisfactory due to the difficulty of distinguishing between the sexes, but it was apparent that the herds were of mixed age and sex.

Mild intraspecific aggressiveness was common among hauled-out seals and was directed toward maintaining a spacially stable resting group. Agression was place-conditioned as opposed to territorial, as Bartholomew and Collins (1961) noted in the northern elephant seal cow, and consisted of foreflipper waving or scratching, and short, rapid butts with the head which were often open-mouthed and accompanied by a growl. Males and females use similar expressions of aggressiveness in the non-breeding season.

A consistent pattern of dominance relationships was not observed in the hauled-out herd, but normally a larger seal was able to move about more freely in the herd or to more easily discourage the movements of nearby seals.

Pupping began on Tugidak Island by at least May 5, reached a maximum by June 11, and ended by about June 25. Most pups born during the first two weeks of May were deserted by the mother, but as the pupping season progressed the incidence of desertion declined. By June, desertion was uncommon under natural conditions. Desertion normally resulted in the pup's death from starvation, although some evidence suggested that on rare occasions deserted or orphaned pups may either be adopted or learn to feed on marine organisms precociously. The normal incidence of desertion probably has little effect on the population, but field observations suggested that intensive hunting may contribute to an abnormally high desertion rate and may cause significant mortality in addition to the commercial kill.

Mothers were very attentive toward pups, and never left them under normal circumstances. Except for cows with pups, behavior was little different during the pupping and nursing periods.

The mating period was characterized by the increased aggressiveness of mature males which might be directed toward other males or toward females. After approaching a female, the male would charge, and grab the cow by the back of the head, neck, or shoulders, and a vigorous fight would follow. Such fights were not observed to result in copulation but this was attributed to the females' not having reached estrus. Aggressiveness between males was of the same form but was of brief duration and milder intensity than the encounters between males and females.

Copulation was only observed to occur in the water. The duration of copulation is unknown, but it is known to be over ten to fifteen minutes.

The Reproductive Cycle

The duration of puping was mentioned above. Parturition requires about thirty seconds and the pup may be born head first or tail first. If the pup is not deserted at birth, it is almost constantly protected by its mother from sea gulls and hostility of other seals, probably until it is weaned at three to four weeks of age. Cows with pups are normally aggressive toward other seals, particularly pups.

The corpora lutea of seals in late pregnancy are larger than those of seals in other stages of the reproductive cycle, and regress in size during lactation. By the time of ovulation, five to six weeks after parturition, a corpus albicans is formed (Harrison, 1960). Ovulation normally does not occur in the ovary containing a recent corpus luteum, but evidence of conception was found. Normally, a single ovum is shed.

In the few specimens collected, which had been in breeding fights with males, ovulation was imminent but had not occurred; breeding fights may be stimulus to ovulation. It is likely that most females have ovulated by the end of July, but numerous sperm were found in the epididymes of males collected in August. Few or no sperm were found in the epididymes of males collected in October, and the testes weight of mature seals averaged less than half that of testes collected from late May through August.

Corpora albicantia may persist up to five years, but in seals up to twenty years of age the corpora albicantia rarely persist over two years, and therefore do not provide a complete record of past reproductive performance of cows in most age groups. The data suggest that about 50 percent of the females mature when three years old, and about 50 percent mature when four years old.

The sample of males was inadequate, but the data indicate that males are normally mature when six years old, and may become mature at five years of age. The oldest specimens collected were a 28 year old female, and a twenty five year old male. Both were in breeding condition, indicating that the potential period of reproduction may exceed twenty years.

Embryos collected in late October were estimated to range from six to ten weeks old on the basis of their development as compared to the age of human embryos in similar developmental stages. If these estimates are correct, implantation occurred from late August through mid-September.

Field observations suggested that the majority of pups were weaned by July 12. If ten weeks elapsed before implantation, implantation would be expected to occur most frequently in late September. While the data is not conclusive, a reasonable generalization seems to be that implantation may occur from the last of August through the last of September.

Gestation

The peak of pupping was considered to occur about June 11, on the basis of the field observations and total counts of hauled out herds. By comparing the proportionate development of the embryos collected and the actual and proportionate time remaining until parturition, the total length of gestation was calculated to be 271 days, but variations from this figure would be expected.

Age determination

The permanent dentition normally erupts a few days after birth. The canine tooth at birth is a curved, hollow cone 17 to 20 mm long. As the seal grows older, the lumen of the tooth is filled by dentine. In sections examined under the microscope with transmitted light, a pattern of alternating dark and light dentinal increments may be observed. Dentine and cementum layers were best observed in cross-sections taken just above the end of the fetal dentine. By comparing the pattern of dentine deposition and the size of the pulp cavity opening at the root of the teeth, from newborn pups and progressively older seals, it was possible to determine the annual pattern of dentine deposition for seals up to two years, when the lumen was closed at the root by cementum accretion. In older seals it appeared that the pattern of dentine deposited in the second year was essentially duplicated in the third and fourth years of life. Thereafter, smaller successive increments of very translucent dentine were deposited which probably were annual in nature, but which became increasingly irregular and difficult to count as the lumen of the tooth was filled with dentine. I concluded that on the basis of the pattern of dentine deposition, the age of seals could be determined up to four years.

Mansfield and Fisher (1960) found that the cementum layers on the canine tooth of a known-age harbor seal were annual deposits. Cementum deposition begins at five and a half to six months of age with a thin band of cement between the end of the fetal dentine and the end of the root of the tooth. By one year of age, additional cement has been deposited from above the end of the fetal dentine, to and around the dentine at the end of the root. The first year's cementum frequently appears as two layers, but this effect seems to diminish with age. Apparently, only single layers are deposited in later years.

The number of cementum layers found on teeth examined in this study correspond to the age of the seal as determined by dentine, deposition, up to four years of age. Additional cementum layers found on the teeth of older seals were assumed to be annual deposits, on the basis of Mansfield and Fisher's results. Thus the number of cementum layers found on the tooth was taken as the age of a given seal.

Growth

The average weight of pups increases from 26 lbs. at birth to 43 lbs. at weaning. At about six months of age the males averaged 56 lbs. in weight, while the females averaged 47 lbs. Males appear to maintain a slight advantage in size throughout life although there may be overlap between the sexes. Pregnant females may outweigh adult males. The heaviest male collected weighed 232 lbs., while the haviest female was pregnant and weighed 240 lbs. The distribution of weights appeared to approach asymptotically a figure of 200 lbs. for males and 150 lbs. for females.

Food Habits

Food was found in four stomachs and consisted of fish in one stomach, small fish and octopi beaks in one stomach, octupus in a third stomach, and shrimp, not identified at present, in a fourth stomach. For comprehensive information on food habits, the reader should see Sheffer and Sperry (1931), Imler and Sarber (1947), and Spalding (1964).

Predation

Attacks of glaucous-winged gulls on pups was the only form of predation upon harbor seals observed in this study. Killer whales were seen in Aialik and Harris Bays, but no predation by the whales was observed. At Tugidak Island, bald egales ate placentas and carcasses,

but were never observed to attack live pups, even when the pups were deserted and feeble. Glaucous-winged gulls attempted to eat the placenta even before it was detached from the female. The gulls would also peck at the umbilical cord of pups whenever possible. Deserted pups were often found with one or both eyes damaged, and this was most likely the result of attacks by the gulls. Attended pups are normally well protected from attacks by gulls or other seals.

Population

The numbers of seals in Alaskan waters has not been estimated. An aerial photographic census of harbor seals in selected areas in the Gulf of Alaska and the Aleutian Islands was conducted during 1956 and 1957 (Mathisen and Lopp, 1963), but the authors do not consider that their data represent a comprehensive survey of the harbor seal population. Imler and Sarver (1947) estimated that about 6,000 harbor seals occupied the Copper River Delta area, at least during the time of culachon and salmon spawning runs.

On a census conducted by boat in southeastern Alaska, Imler and Sarber (1947) observed seals at a density of about .5 seal per mile. Spalding (1964) estimated that seals were distributed along the British Columbia coast at a density of about one seal per mile in the late winter, when dispersion was maximal.

In this study, the largest number of seals observed hauled out in Aialik Bay was nearly 500. A similar number may have occupied Harris Bay. On Tugidak Island, the population ranged from about 4,000 in early May to an estimated 10,000 at the height of pupping in mid-June, and down to 5,000 to 6,000 in July, after the pupping season.

Mathisen and Lopp's (1963) data, which are most complete for Tugidak Island and the adjacent shore of Sitkinak Island, tend to confirm these estimates. Thus, a major movement of seals to and from Tugidak Island in response to the pupping season is suggested by the data.

Sex-ratio counts of the hauled-out herd were unsatisfactory because of the difficulty in distinguishing between males and females unless the external genitalia were in view. The number of adult cows in breeding condition was estimated by summing the numbers of pregnant females, attended pups, and deserted pups counted on a given date. The percentage of the total seals counted, which the adult females in breeding condition represented, was then calculated. The percentage of adult breeding females increased from three percent in early May to 35 percent on June 7. On June 13, just after the peak of pupping, the proportion had dropped to 24 percent, although more seals were on the island.

The calculated percentage of adult females in breeding condition is conservative, but it is probably of the correct order of magnitude.

The sex ratio of all pups examined up to the age of weaning was 76 males to 82 females, which was not significantly different from a 50:50 sex ratio at the .99 confidence level. The cumulative sex ratio at age five and a half months was 98 males to 99 females. Hunting during 1963 was not known to be selective with respect to sex, and among all the seal collected which were one year old or older, the sex ratio was 27 males to 23 females, which was not significantly different from a 50:50 ratio at the .99 confidence level. The age distribution of collections in 1963 is biased because pups and immature seals are less wary and therefore more readily taken.

The total harvest of seals on Tugidak Island was approximately 5,500, of which about 4,000 were pups. Few pups were observed in July, after both pupping and the major hunting effort had ended. I felt that nearly the entire pup crop had been harvested for hides or bounty or both. Mathisen and Lopp (1963) counted 13,383 seals on Tugidak and Sitkinak in September 1957, about 4,000 more than they had found in June. If the difference represents the annual increment, it agrees closely with my estimate of the pup crop and the harvest of pups in 1964. In September 1956, however, they counted 16,776 seals on the Trinity Islands.

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WORK PLAN SEGMENT REPORT
FEDERAL AID IN WILDLIFE RESTORATION

STATE: Alaska

PROJECT: W-6-R-6 TITLE: Alaska Wildlife Investigations

WORK PLAN: L TITLE: Wildlife Research Unit Studies

JOB NO.: 6 TITLE: Ecology of the Black Bear in Interior Alaska

PERIOD COVERED: July 1, 1964 - June 30, 1965

ABSTRACT

Arrangements have been made to obtain specimen material from black bears killed by hunters and from those killed as nuisance animals. Material has been collected from a total of 24 bears and processing of specimen material has been initiated. Vegetation plots have been located in alpine and forested areas to aid in the determination of berry production in areas utilized by black bears. Initial vegetation analysis within the plots has been completed.

OBJECTIVES

1. To investigate and develcp a suitable aging technique.

2. To establish population structure and welfare.

3. Te determine basic food habits in relation to food abundance.

TECHNIQUES

The field work for this project was initiated in June 1964. The black bear is an elusive animals, and it quickly became evident that it would be difficult for a man working alone to gather enough data in two years to make a meaningful study. Consequently, much of the early work was devoted to enlisting the aid and interest of other people. A number of people have been contacted (from taxidermists to roadhouse proprietors) who are ready and willing to alert me to any possibility of obtaining a specimen. Many other people, including several pilots, are providing me with good observation data.

FINDINGS

Population Structure

Information for this phase of the study is being obtained through harvest and specimen collection data, and observations. Most specimens are being obtained from hunters, some are being taken as "nuisance" animals by private landowners, and a few are being collected by the investigator.

Materials collected from each specimen whenever possible include skull (teeth to used in age determination), reproductive tracts, long bones, pelves, and tissue for parasite examination (mainly diaphragm and liver). Weights and measurements are taken whenever possible.

Through June 1, 1965, material from 24 bears has been collected.

Aerial and ground observations indicate litter size to be 1.44 (for nine observations) in the 1964 bear season.

Food Habits

Food items in stomachs are recorded according to incidence of occurrence and volume. Also, an attempt is being made to identify berries. Materials from intestines and scats are being listed according to incidence of occurrence and ocular estimate of volume.

Other work being done in conjunction with the food habits aspect of the project includes plant collection and berry production analysis. Plots have been set up in conjunction with the latter.

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WORK PLAN SEGMENT REPORT
FEDERAL AID IN WILDLIFE RESTORATION

STATE: Alaska

PROJECT: W-6-R-6 TITLE: Alaska Wildlife Investigations

WORK PLAN: L TITLE: Wildlife Research Unit Studies

JOB NO.: 7 TITLE: The Caribou Warble Fly: Parasite-host Interrelationships

PERIOD COVERED: July 1, 1964 - June 30, 1965

ABSTRACT

Two Caribou were examined and 157 warble fly larvae were found in one and 324 in the other. Larvae from two penned female caribou were picked off the ground soon after they had left the host. Over a 25 day period (May 24 - June 17) 272 larvae were collected and subjected to four controlled temperature experiments. Formation of a puparium and adult emergence occurred faster at a higher temperature, but survival rates have not been determined. Attempts to obtain eggs from adults have failed.

OBJECTIVES

To investigate the relationships of the caribou warble fly, Oedemagena tarandi, to its host species in terms of the population structure, physiological status and range interrelationships of the host.

TECHNIQUES

Findings

Available literature was to be received to compile information on the life history and ecology of the warble fly. Caribou from selected herds were to be sampled to determine the incidence of parasitism by warbles and pertinent data recorded. Ecological factors were to be considered in relationship to the warble fly abundance and occurrence.

Two caribou were examined for warble fly larvae infestation. A total of 157 larvae was found in one caribou while the other had 324. The larvae were of various sizes in each of these caribou. The largest larvae were dissected from the cysts and an attempt was made to stimulate pupation in 37°C and 5°C. None of the larvae survived longer than seven days in 37°C, however, five larvae survived 16 days in 5°C. After 16 days, all of the larvae had died and none formed a puparium during the experiment.

The larvae from two penned female caribou have been collected and used in controlled temperature experiments. Larvae were picked up off the ground soon after they had dropped from the host. Dropping of warble fly larvae took place over a period of 25 days, beginning on May 24 and terminating on June 17. A total of 272 larvae were collected. Four controlled temperature chambers running 5°C, 10°C, 20°C and 25°C are being used to determine length of the pupal stage, emergence dates and percent survival. Formation of a puparium and adult emergence occurs faster in a higher temperature. Larvae placed in 5°C and 10°C have not formed a puparium, but at 20°C, pupation occurred in three days and two days in 25°C. Earliest adult emergence dates took place in 15 days in 25°C and 22 days in 20°C. Since emergence occurs over a period of seceral days, survival rates have determined.

Attempts to obtain eggs from the adult flys have failed to date. Caribou hair has been placed in a cage with the adults but no eggs have been found.

Adult warble fly longevity has ranged from two to eight days.

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