Quarterly Report

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The natural history and ecology of the bearded seal (Erignathus barbatus) and the ringed seal (Phoca (Pusa) hispida)

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I. Task Objectives

1. Summarization and evaluation of existing literature and available unpublished data on reproduction, distribution, abundance, food habits and human dependence on bearded and ringed seals in the Bering, Chukchi and Beaufort Seas.

2. Acquisition of large amounts of specimen material required for an understanding of food habits in these two species.

3. Acquisition of additional data on productivity and growth rates.

4. Acquisition of baseline data on mortality and morbidity (including parasitology, diseases, predation and human harvest) of ringed and bearded seals.

5. Determination of population structure of bearded and ringed seals as indicated by composition of harvest taken by Eskimo subsistence hunters.

6. Initial assessment of regional differences in density and distribution of ringed and bearded seals in relation to geographic areas and, to a lesser extent, in relation to major habitat condition.

7. Acquisition of additional information on seasonal migrations.

II. Field and Laboratory Activities

A. Schedule

Date	Location	Purpose
July-September	Fairbanks	Analyses of seal specimens and data
July and August	Barrow	Collection of seal specimens
July	Shishmaref	Collection of seal specimens
July	Wainwright	Collection of seal specimens
August	USCGC Glacier	Collection of seal specimens
August	OSS Discoverer	Collection of seal specimens
August	Barter Island	Collection of seal specimens

B. Scientific Party

Name	Affiliation	Role
John J. Burns	ADF&G	Principal Investigator
Thomas J. Eley	ADF&G	Principal Investigator
David James	ADF&G	Technician
Glenn Seaman	ADF&G	Technician

C. Analytical Methods

From all specimens we endeavor to obtain weights, standard measurements, lower jaws, foreflipper claws, stomachs, reproductive tracts and intestines. We also obtained blubber, tissue, organ and blood samples as the situation permits.

The ages of seals are determined by examination of claw annuli (for animals six years and younger) and dentine or cementum annuli (for animals over six years of age). Growth rates are based on weight and standard measurements correlated with specimen age, sex and date and locality of collection. Species productivity and parasite burden are determined, respectively, through laboratory examinations of reproductive tracts and various organs and correlation of these data with age, sex, and date and locality of collection of each specimen.

Regional differences in seal density and distribution were assessed through aerial surveys following the methods of Burns and Harbo (1972).

Analytical methods are discussed in detail in our Annual Report for FY-1976.

D. Sample Localities

1. Barrow - At sea, within a 22 nautical mile radius of Point Barrow.

2. Wainwright - Specimens obtained from seals killed on sea ice and brought to the village for subsistence purposes. Most seals were killed within a 20 nautical mile radius of the village.

3. Shishmaref - Specimens obtained from seals killed on sea ice and brought to the village for subsistence purposes. Most seals were killed within a 20 nautical mile radius of the village.

4. Barter Island - At sea, within a 20 nautical mile radius of the village.

5. USCGC Glacier - Noon positions are given in Appendix 1.

6. OSS Discoverer - Noon positions are given in Appendix 2.

III-IV. Results and Preliminary Interpretation

A. Specimen Collections

During the July to September, 1976 quarter, our major efforts were devoted to field activities. One hundred and sixty-three ringed

seals and 99 bearded seals were obtained from villages, or collected by the Principal Investigators (Table 1). Measurements, jaws, claws, stomachs and reproductive tracks were obtained from most specimens. We also obtained blubber, tissue, organ and blood samples from many specimens. All of these and those obtained in previous years are being processed as rapidly as possible.

Table 1. Specimens obtained between July and September, 1976.

Location	Male	Female	Unknown	Total
Barrow				
Ringed seal	3	2	-	5
Bearded seal	1	-	-	1
Barter Island				
Ringed seal	-	2	1	3
Bearded seal	-	3	-	3
Wainwright				
Ringed seal	5	3	-	8
Bearded seal	8	12	1	21
Shishmaref				
Ringed Seal	59	84	1	144
Bearded seal	31	42	-	73
Glacier				
Ringed seal	1	-	-	1
Discoverer				
Ringed seal	-	2	-	2
Bearded seal	-	1	-	1

B. Parasitology and Pathology

A considerable amount of material for pathological and parasitological examination has been collected by this project. Within the limits of available time and funding, this material has been examined by ADF&G parasitologist Carol Nielsen. Her reports are included in their entirety as Appendix 4 of this report.

C. Food Habits

See Quarterly Report of "Trophic relationships among ice inhabiting phocid seals" (RU #232).

D. Data Management

We have moved rapidly forward with data management throughout this quarter. Measurements, food habits and survey data for bearded and ringed seals have been submitted to NODC. Data from the remainder of the 1975 and 1976 specimens have been formated and await keypunching.

On recent seal surveys and other over-ice flights, several "terrestrial" mammals (wolverine, Arctic fox, wolf, caribou, moose and others) were observed on sea ice. Since ten-digit codes were not available for these animals we could only record them in the remarks spaces. However, for certain species we are obtaining enough sightings to begin computation of seasonal densities and other statistical tests with the aid of a computer. Therefore ten-digit species codes for all the mammal species of Alaska has been prepared (Appendix 3) by Mr. Eley and approved by Mauri Pelto and George Mueller. The ten-digit codes have now been sent to E.D.S. for final approval.

E. Reproduction and Growth

Analysis of reproduction and growth is critically dependent on accurate determination of the age of specimens. The sectioning, staining and mounting of seal teeth has been the full time job of one person for the past five months. Ages and reproductive condition are known for a portion of the ringed seal samples collected, an analysis of which is given below. Additional results will be reported on as age determination and reproductive analysis of the various samples are completed. Analysis of growth rates requires large samples. A sufficient number of measurements have been made, however age data is not yet available from enough individuals to allow meaningful analysis.

The epididymides of 213 male ringed seals (representing all age classes and collected during all months) have been examined for the presence of sperm. Active spermatogenesis has been detected in essentially all males seven years old and older which were collected during the months of March, April, May and June (Table 2). Six of 12 (50%) six year old males collected between March and May had abundant sperm in their epididymides. One five year old male taken in May had a trace of sperm in its epididymides. No geographic variation in spermatogenic activity has been detected thus far, however, our sample size from the Beaufort Sea is small.

The earliest date that sperm was found in male epididymides was mid-March and active spermatogenesis appears to continue until mid-June. Sperm remains on the epididymides of some males until mid-August. Most adult female ringed seals appear to ovulate in April and May therefore the males are physiologically capable of breeding well before and long after most females.

The reproductive tracts of 25 female ringed seals collected during 1976 have been examined and a tabulation of their reproductive status is presented in Table 3. A three year old female and a five year old female had ovulated for the first time but they apparently did not conceive. Five of six females six years old or older had ovulated but it could not be determined whether these females had conceived. A female 13+ years old had cysts on both uterine horns. The cysts caused complete obstruction of the uterine horns and both ovaries had begun to atrophy.

F. Sex and Age Structure of Harvest

Ringed seals comprise about 65 percent of the seal harvest by Eskimo hunters in Alaskan waters. The preponderance of ringed seals in the harvest does not necessarily reflect preference by the hunters, rather it indicates the ready availability of ringed seals. Ringed seals can be hunted whenever ice is present and a few animals are taken in ice-free waters.

The sex composition of ringed seals examined thus far is 426 males, 315 females and 18 sex unknown. This is a sex ratio of 1.4 males to 1 female. Grauvogel (unpubl. data) found a sex ratio of 1.3:1 in the ringed seal harvests of 1973 and 1974 in the northern Bering Sea and Bering Straits area. The predominance of males in the harvest may indicate the true sex ratio. More likely, however, the males may be more mobile due to searchs for females or to defense of a territory, therefore more likely to expose themselves to a hunter. Fedoseev (1965) found no sex selectivity by the Soviet commercial seal harvests.

The age composition of ringed seal populations can be determined only by sampling over a wide area and with a large sample size (Smith 1973; Fedoseev 1965). Sampling from a small area tends to give a biased age composition because of apparent age-specific movements. For example, in Alaska the harvest at Savoonga on St. Lawrence Island is comprised primarily of pups, one and two year old seals while the harvests at Wainwright and Barrow tend to include ringed seals of all ages. The age-sex composition of ringed seals obtained at Barrow, Wainwright and Cape Lisburne are presented in Tables 4, 5 and 6. A detailed analysis of sex-age composition will be covered in our next quarterly report.

Bearded seals comprise about 20 percent of the retrieved kill of seals in the Bering and Chukchi Seas. As a result it is more difficult to obtain samples of adequate size for analysis of age and sex structure. In a sample of 73 bearded seals obtained at Shishmaref in June and July 1976, 42 (57.5%) were females and 31 (42.5%) males. At Wainwright, in July and August 1975, 30 bearded seals were taken. Of these, 18 (60%) were females and 12 (40%) were males. During July and August 1976, 20 bearded seals for which sex could be identified, were examined. Eight (40%) were males and 12 (60%) were females.

The predominance of female bearded seals in the retrieved harvest probably does not reflect the actual sex ratio in the population. Data summarized above indicates a ratio of 58.5 percent females:41.5 percent males. The sex ratio at birth is more nearly equal (Burns 1967). There is a significant change in the sex composition of the harvest which appears to be related to age of the seals. This is evident in three samples indicated above (Wainwright 1975 and 1976, and Shishmaref 1976). This combined sample consists of 72 females and 51 males (58.5% to 41.5%). The ratio in sub-adult animals in this sample (pups through four years old, N=56 for which age was determined) slightly biased toward males; 30 males:26 females. In animals older than four (N=61), the ratio was 19 males:42 females. (Editorial note: the age was determined for fewer animals than was the case with determination of sex. Therefore the different sample sizes.) It appears that physiological condition is an important factor in determining if a bearded seal sinks or floats after being shot in the water. Adult females are in better condition than adult males during the summer months. The retrieval success for adult females is probably much higher than it is for adult males.

Age composition of the samples referred to above (N=117) was as follows:

Age	Males	Females
pup	15	8
1	7	4
2	2	5
3	4	1
4	2	8
5	3	5
6	4	3
6+	12	34
	49	68

Data concerning the age and sex composition of all bearded seals sampled in 1975 and 1976 is currently being analyzed. Results of this analysis will be included in the next quarterly report.

G. Distribution, Density and Habitat

Several aerial surveys of ringed and bearded seals have been conducted in cooperation with RU #231 and RU #248. These include an extensive survey of the Bering Sea ice front in April, a survey of the shorefast ice of the Chukchi Sea and Kotzebue Sound in June and a survey of the shorefast ice of the Beaufort Sea in June. In addition, shipboard surveys and observations were made in the Bering Sea ice front in March and April, in the northern Bering Sea and Chukchi Sea in August and in the Beaufort Sea in August. All data has been computerized, and analysis and interpretation are now being done in conjunction with the above mentioned research units.

Some comments relative to the distribution and density of bearded seals, as determined from coastal hunting sites, are appropriate. Past records indicate that bearded seals winter mainly in the Bering Sea, moving north through Bering Strait as the ice recedes and disintegrates in spring and south as it advances and reforms in autumn. North of Bering Strait the winter distribution of bearded seals is restricted to those areas where winds and ocean currents keep the drifting ice relatively broken up. By comparison, relatively few bearded seals winter in the Chukchi Sea.

Harvest records directly reflect two factors; abundance and availability. However, they also can be used to indicate the timing of animal movements in the vicinity of hunting sites. Bearded seals are a preferred and actively hunted species and are taken by hunters whenever possible.

Harvest records from Point Hope indicate that few if any bearded seals were taken at that location during the months of March through May. Forty-seven seals were sampled from that period by Mr. Glenn Seaman and all were ringed seals.

Sampling records from Shishmaref are both interesting and informative. Shorefast ice persisted rather late near this village, during the summer of 1976. Although the hunters were active, they were restricted to landfast ice, or the lead just off shore of it, until 2 July. Our sample of seals examined in late June and on the first of July included 52 animals, of which all but one (a bearded seal) were ringed seals. The shore ice had broken up sufficiently to permit hunting by boat on July 2. On that date, 14 seals were examined, of which 8 were bearded seals. Thereafter, bearded seals were regularly taken until the intensive hunting ended, about July 12.

Records from Wainwright, for 1975 and 1976, indicate that in both years, bearded seals become numerous at that northern location during the second decade of July, and are present until the ice disappears from that area. Traditionally, bearded seals are most numerous during the last third of July.

V. Problems and Recommendations

None.

VI. Funds Expended (estimated)

100. Salaries and Wages	$83,000.00
200. Travel	7,522.45
300. Contractual	5,592.17
400. Commodities	4,778.00
500. Equipment	5,351.32
	$106,243.94

Table 2. Seasonal variation in sperm presence in the epididymides of male ringed seals seven years old and older.

Month	Number Examined	Sperm Presence		
		Abundant (Number)	Trace (Number)	None (Number)
January	3	-	-	3
February	1	-	-	1
March	9	9	-	-
April	15	15	-	-
May	24	23	-	1
June	30	20	4	6
July	5	-	1	4
August	5	-	2	3
September	1	-	-	1
October	2	-	-	2
November	11	-	-	11
December	12	-	-	12

Table 3. Reproductive status of 25 female ringed seals collected during 1976.

Number	Claw Age	Month of Collection	Pregnant Yes-No	Status	Comments
BP-15-76	Pup	July	No	Nulliparous	No follicular activity
SHP-63-76	Pup	June	No	Nulliparous	No follicular activity
SHP-118-76	Pup	July	No	Nulliparous	No follicular activity
SHP-126-76	Pup	July	No	Nulliparous	No follicular activity
SHP-179-76	Pup	July	No	Nulliparous	No follicular activity
SHP-180-76	Pup	July	No	Nulliparous	No follicular activity
SHP-187-76	Pup	July	No	Nulliparous	No follicular activity
SHP-192-76	Pup	July	No	Nulliparous	No follicular activity
SHP-194-76	Pup	July	No	Nulliparous	No follicular activity
SHP-201-76	Pup	July	No	Nulliparous	No follicular activity
SHP-218-76	Pup	July	No	Nulliparous	No follicular activity
SHP-224-76	Pup	July	No	Nulliparous	No follicular activity
SHP-236-76	Pup	July	No	Nulliparous	No follicular activity
SHP-265-76	Pup	July	No	Nulliparous	No follicular activity
SHP-134-76	1	July	No	Nulliparous	No follicular activity
SHP-58-76	3	June	No	Nulliparous	No follicular activity
PHP-41-76	3	May	No	Nulliparous	Ovulated apparently for first time
PHP-40-76	4	May	No	Nulliparous	No follicular activity
SHP-103-76	5	July	No	Nulliparous	Ovulated apparently for first time, degenerate corpus luteum
SHP-190-76	6	July	Unknown	Nulliparous	No corpus albicantia, one corpus luteum
SHP-202-76	7+	July	Unknown	Primiparous	One corpus albicantia, one corpus luteum
BP-7-76	7+	July	Unknown	Multiparous	Two corpus/albicantia, one corpus luteum
SHP-144-76	8	July	Unknown	Multiparous	Two corpora albicantia, one corpus luteum
BP-12-76	11	August	Unknown	Multiparous	Two corpora albicantia, one corpus luteum
NP-1-76	13+	January	No	Multiparous	Uterine cysts sealed both horns of uterus. Ovaries atrophying

Table 4. Sex and ages of ringed seals collected at Barrow, Alaska.

Age	1975 Male	1975 Female	1975 Unknown	1976 Male	1976 Female	1976 Unknown
Pup	–	1	–	2	1	–
1	–	–	–	–	–	–
2	–	–	–	–	–	–
3	1	–	–	–	1	–
4	1	–	–	–	–	1
5	–	–	–	1	–	–
6	1	–	–	1	–	–
6+	–	–	–	–	–	–
7	–	–	–	–	–	–
7+	2	–	–	–	1	–
8	–	–	–	4	–	–
8+	3	–	–	–	–	–
9	–	–	–	–	–	–
9+	–	1	–	–	–	–
10	–	–	–	–	–	–
10+	–	–	–	–	–	–
11	–	–	–	–	1	–
11+	–	–	–	–	–	–
Unknown	–	1	–	2	–	1
Total	8	3	0	10	4	2

Table 5. Sex and ages of ringed seals collected at Wainwright, Alaska.

Age	1975			1976		
	Male	Female	Unknown	Male	Female	Unknown
Pup	3	3	–	–	–	–
1	–	1	–	–	–	–
2	–	1	–	–	–	–
3	1	–	–	–	1	–
4	–	–	–	2	–	–
5	1	1	–	–	–	–
6	1	3	–	–	–	–
6+	–	–	–	–	–	–
7	3	1	–	1	1	–
7+	–	–	–	–	1	–
8	–	–	–	–	–	–
8+	1	1	–	1	–	–
9	–	–	–	–	–	–
9+	3	–	–	1	–	–
10	–	–	–	–	–	–
10+	3	1	–	–	–	–
11						
11+						
Total	16	12	–	5	3	–

Table 6. Sex and ages of ringed seals killed by polar bears at Cape Lisburne, Alaska, March-April 1976.

Age	Male	Female	Unknown
Pup	–	–	–
1	–	–	–
2	–	–	–
3	1	–	–
4	–	–	–
5	–	–	–
6	1	–	–
6+	–	–	–
7	1	–	–
7+	–	–	–
8	1	–	–
8+	1	–	–
9	1	–	–
9+	1	–	–
10	1	–	–
10+	2	–	–
11	1	–	–
11+	1	–	–
Unknown	–	–	8
Total	12	–	8

VII. Literature Cited.

Burns, J. J. 1967. The Pacific bearded seal. Alaska Department of Fish and Game, Juneau. 66pp.

_____ and S. J. Harbo, Jr. 1972. An aerial census of ringed seals, northern coast of Alaska. Arctic 25:279-290.

Fedoseev, G. A. 1965. Age and sex composition of the kill of the ringed seal (Phoca hispida ochotensis Pall.) as an index of the age structure of the population. Morskie Mlekopitayuschie, Akad. Nauk SSSR, 105-112. Fish. Res. Bd. Can. Trans. Ser. No. 799.

Smith, T. G. 1973. Population dynamics of the ringed seal in the Canadian eastern Arctic. Fish. Res. Bd. Can. Bull. 181:55pp.

APPENDIX 1

APPROXIMATE NOON LOCATIONS OF USCGC *GLACIER*

DATE	LOCATION	
17 August 1976	71°31'N	156°03'W
18 August 1976	71°34'N	155°34'W
19 August 1976	71°34'N	154°42'W
20 August 1976	71°11'N	153°09'W
21 August 1976	70°59'N	149°47'W
22 August 1976	70°40'N	148°26'W
23 August 1976	70°36'N	148°13'W
24 August 1976	70°36'N	148°16'W
25 August 1976	70°37'N	148°13'W
26 August 1976	70°40'N	147°43'W
27 August 1976	70°48'N	149°04'W
28 August 1976	71°07'N	151°01'W
29 August 1976	71°43'N	151°46'W
30 August 1976	71°25'N	152°25'W
31 August 1976	71°18'N	152°32'W
1 September 1976	71°13'N	153°18'W
2 September 1976	71°28'N	154°39'W
3 September 1976	71°34'N	156°02'W

APPENDIX 2

APPROXIMATE NOON LOCATIONS OF R/V *DISCOVERER*

DATE	LOCATION	
19 August 1976	68°08'N	162°00'W
20 August 1976	64°24'N	166°05'W
21 August 1976	64°48'N	167°12'W
22 August 1976	66°25'N	166°25'W
23 August 1976	66°35'N	163°00'W
24 August 1976	69°20'N	170°00'W
25 August 1976	68°50'N	170°55'W
26 August 1976	72°00'N	166°30'W
27 August 1976	72°00'N	166°30'W
28 August 1976	72°00'N	166°30'W
29 August 1976	66°25'N	168°05'W
30 August 1976	63°53'N	171°45'W
31 August 1976	63°00'N	168°40'W
1 September 1976	57°11'N	171°30'W
2 September 1976	52°22'N	176°40'W

APPENDIX 3

TEN-DIGIT SPECIES CODE TO THE MAMMALS OF ALASKA

89	MAMMALIA	
8911	Mysticeti	
891101	Eschrichtiidae	
89110101	Eschrictius	
8911010101	Eschrictius robustus	Grey whale
891102	Balaenopteridae	
89110201	Balaenoptera	
8911020101	Balaenoptera acutorostrata	Minke whale
8911020102	Balaenoptera borealis	Sei whale
8911020103	Balaenoptera physalus	Fin whale
8911020104	Balaenoptera musculus	Blue whale
89110202	Megaptera	
8911020201	Megaptera noraeangliae	Humpback whale
891103	Balaenidae	
89110301	Balaena	
8911030101	Balaena glacialis	Right whale
8911030102	Balaena mysticetus	Bowhead whale
8912	Odontoceti	
891201	Delphinidae	
89120101	Stenella	
8912010101	Stenella caeruleoalba	Striped Dolphin
89120102	Lagenorhynchus	
8912010201	Lagenorhynchus obliquidens	Pacific white-sided dolphin
89120103	Lissodelphis	
8912010301	Lissodelphis borealis	Northern right whale dolphin
89120104	Grampus	
8912010401	Grampus griseus	Gray grampus or Risso's dolphin
89120105	Pseudorca	
8912010501	Pseudorca crassidens	False killer whale
89120106	Globicephala	
8912010601	Globicephala sieboldi	Pilot whale
89120107	Orcinus	
8912010701	Orcinus orca	Killer whale
89120108	Phocoena	
8912010801	Phocoena phocoena	Harbor porpoise
89120109	Phocoenoides	
8912010901	Phocoenoides dalli	Dall's porpoise
891202	Monodontidae	
89120201	Delphinapterus	
8912020101	Delphinapterus leucas	Belukha
89120202	Monodon	
8912020201	Monodon monoceras	Narwhal
891203	Physeteridae	
89120301	Physeter	
8912030101	Physeter catodon	Sperm whale
891204	Ziphiidae	
89120401	Berardius	
8912040101	Berardius bairdi	Giant bottlenose whale

89120402	Ziphius	
8912040201	Ziphius cavirostris	Cuvier's beaked whale
89120403	Mesoplodon	
8912040301	Mesoplodon carlhubbsi	Hubb's beaked whale
8912040302	Mesoplodon stejnergeri	Stejnerger's beaked whale
8913	Carnivora	
891301	Ursidae	
89130101	Ursus	
8913010101	Ursus maritimus	Polar Bear
8913010102	Ursus arctos	Grizzly and Brown Bear
8913010103	Ursus americanus	Black bear
891302	Mustelidae	
89130201	Enhydra	
8913020101	Enhydra lutris	Sea otter
89130202	Lontra	
8913020201	Lontra canadensis	River otter
8913203	Gulo	
8913020301	Gulo gulo	Wolverine
89130204	Mustela	
8913020401	Mustela vison	Mink
8913020402	Mustela nivalis	
8913020403	Mustela erminea	Ermine
89130205	Martes	
8913020501	Martes americana	Marten
8913020502	Martes pennanti	Fisher
89130206	Mephitis	
8913020601	Mephitis mephitis	Striped skunk
891303	Otariidae	
89130301	Zalophus	
8913030101	Zalophus californianus	California sea lion
89130302	Eumetopias	
8913030201	Eumetopias jubatus	Northern or Stellers sea lion
89130303	Callorhinus	
89130301	Callorhinus ursinus	Northern fur seal
891304	Odobenidae	
89130401	Odobenus	
8913040101	Odobenus rosmarus	Walrus
891305	Phocidae	
89130501	Phoca	
8913050101	Phoca largha	Spotted seal
8913050102	Phoca vitulina richardii	Harbor seal
8913050103	Phoca hispida	Ringed seal
8913050104	Phoca fasciata	Ribbon seal
8913050105	Phoca groenlandica	Harp seal
89130502	Erignathus	
8913050201	Erignathus barbatus	Bearded seal
89130503	Cystophora	
8913050301	Cystophora cristata	Hooded seal
89130504	Mirounga	
8913050401	Mirounga angustirostris	Northern elephant seal
891306	Procyonidae	
89130601	Procyon	
8913060101	Procyon lotor	Raccoon
891307	Felidae	
89130701	Lynx	
8913070101	Lynx lynx	Lynx

891308	Canidae	
89130801	Canis	
8913080101	Canis lupus	Wolf
8913080102	Canis lupus	Coyote
89130802	Alopex	
8913080201	Alopex lagopus	Arctic fox
89130803	Vulpes	
8913080301	Vulpes vulpes	Red fox
8914	Artiodactyla	
891401	Cervidae	
89140101	Cervus	
8914010101	Cervus elaphus	Elk or Wapiti
89140102	Odocoileus	
8914010201	Odocoileus hemionus	Black-tail deer
89140103	Rangifer	
8914010301	Rangifer tarandus	Caribou
89140104	Alces	
8914010401	Alces alces	Moose
891402	Bovidae	
89140201	Bison	
8914020101	Bison bison	Bison
89140202	Ovibos	
8914020201	Ovibos moschatus	Muskox
89140203	Ovis	
8914020301	Ovis dalli	Dall sheep
89140204	Oreamnos	
8914020401	Oreamnos americanus	Mountain goat
8915	Insectivora	
891501	Soricidae	
89150101	Sorex	
8915010101	Sorex cinereus	Masked shrew
8915010102	Sorex pribilofensis	Pribilof shrew
8915010103	Sorex jacksoni	St. Lawrence Island shrew
8915010104	Sorex vagrans	Vagrant shrew
8915010105	Sorex palustris	Water shrew
8915010106	Sorex alaskanus	Glacier Bay water shrew
8915010107	Sorex arcticus	Arctic shrew
89150102	Microsorex	
8915010201	Microsorex hoyi	Pygmy shrew
8916	Chiroptera	
891601	Vespertilionidae	
89160101	Myotis	
8916010101	Myotis lucifugus	Little brown bat
8916010102	Myotis keenii	Keen's myotis
8916010103	Myotis volans	Long-legged myotis
8916010104	Myotis californicus	California myotis
8917	Lagomorpha	
891701	Ochotonidae	
89170101	Ochotona	
8917010101	Ochotona collaris	Collared pika
891702	Leporidae	
89170201	Lepus	
8917020101	Lepus americanus	Snowshoe hare
8917020102	Lepus timidus	Northern or tundra hare

8918	Rodentia	
891801	Sciuridae	
89180101	Marmota	
8918010101	Marmota monax	Woodchuck
8918010102	Marmota broweri	Alaska marmot
8918010103	Marmota caligata	Hoary marmot
89180102	Eutamias	
8918010201	Eutamias minimus	Least chipmunk
89180103	Spermophilus	
8918010301	Spermophilus parryii	Arctic ground squirrel
89180104	Tamiasciurus	
8919010401	Tamiasciurus hudsonicus	Red squirrel
89180105	Glaucomys	
8918010501	Glaucomys sabrinus	Northern flying squirrel
891802	Castoridae	
89180201	Castor	
8918020101	Castor canadensis	Beaver
891803	Cricetidae	
89180301	Peromyscus	
8918030101	Peromyscus maniculatus	Deer mouse
8918030102	Permyscus sitkensis	Sitka mouse
89190302	Clethrionomys	
8919030201	Clethrionomys rutilus	Northern red-backed mouse
8918030202	Clethrionomys gapperi	Gapper's red-backed mouse
89180303	Microtus	
8918030301	Microtus pennsylvanicus	Meadow vole
8918030302	Microtus oeconomus	Tundra vole
8918030303	Microtus longicandus	Long-tailed vole
8918030304	Microtus coronarius	Coronation Island vole
8918030305	Microtus xanthognathus	Yellow-cheeked vole
8918030306	Microtus gregalis	Singing vole
8918030307	Microtus abbreviatus	Insular vole
89180304	Ondatra	
8918030401	Ondatra zibethicus	Muskrat
89180305	Lemmus	
8918030501	Lemmus sibiricus	Brown lemming
8918030502	Lemmus nigripes	Black-footed lemming
89180306	Synatomys	
8918030601	Synatomys borealis	Northern bog lemming
89180307	Dicrostonyx	
8918030701	Dicrostonyx torquatus	Collared lemming
891804	Muridae	
89180401	Rattus	
8918040101	Rattus rattus	Black or roof rat
8918040102	Rattus norvegicus	Norway rat
89180402	Mus	
8918040201	Mus musculus	House mouse
891805	Zapodidae	
89180501	Zapus	
8918050101	Zapus hudsonicus	Meadow jumping mouse
8918050102	Zapus princeps	Western jumping mouse
891806	Erethizontidae	
89180601	Erethizon	
8918060101	Erethizon dorsatum	Porcupine