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**Marine Mammals
in Fisheries Ecosystem
in the Eastern Bering Sea and
in the Northeastern Pacific Ocean**

**Part 1. Inputs of marine mammal data
for ecosystem models PROBUB 80-1
and 80-2**

April 1980

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MARINE MAMMALS IN FISHERIES ECOSYSTEM
IN THE EASTERN BERING SEA AND IN THE
NORTHEASTERN PACIFIC OCEAN

Part 1. Inputs of marine mammal data for ecosystem
models PROBUB 80-1 and 80-2.

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1. PURPOSE AND NATURE OF THE SUMMARY

The purpose of this summary is to present quantitatively the inputs to the ecosystem simulation models. The computations in the PROBUB model have been done by subregions which are used as spatial units for presentation of inputs and the results. The subregions used are the fisheries management and statistical areas (see Figs. 1 and 2. Note: There is no subregion No. 10).

An attempt was made to use "plausible conservative" estimates of the marine mammal parameters, based on a many-sided evaluation of the numerous estimates available in the literature and comments received from the Marine Mammals Division of NWAFC. The overall error in these estimates is difficult to ascertain, as the actual true value is in most cases unknown.

2. ESTIMATES OF ABUNDANCE AND DISTRIBUTION OF MARINE MAMMALS IN THE EASTERN BERING SEA AND IN THE EASTERN NORTH PACIFIC

There are a variety of quite variable estimates available in literature on the abundance of different species in the North Pacific. Effort was given to obtaining a plausible conservative estimate disregarding often, but not always, exceptionally low and high values. Undoubtedly some estimates are too high and some too low. The estimates are summarized in Table 1; also given are summer and winter values.

In order to be able to run the very large model on the largest computers available in Seattle, the mammals had to be grouped into ecological groups. The main criterion for this grouping were the feeding habits and composition of food. The estimates of numbers of individual

mammals and/or mammal groups in different subregions were made on the basis of known seasonal migrations and the summer feeding and winter breeding grounds, and considering the feeding and migration habits of the mammals in respect to the coast and continental shelf (see Tables 3 to 25). It is assumed that the average of the mammal sum would be closer to plausible mean in large regions, such as the eastern Bering Sea, than the individual estimates by subregions.

It should be noted that error and bias in individual marine mammal data (abundance, food composition, weight, etc.) can be in any direction. Thus the error is minimized in summarizing the data (total by areas and/or by groups) into larger groups of species. Sharks are included with the marine mammals (see Table 25) as they are also apex predators like the mammals. Distribution of marine birds is described in another report in this series.

3. MEAN WEIGHTS OF MAMMALS AND THEIR FOOD REQUIREMENTS

An attempt was made to estimate a realistic mean weight of an average animal in the herd to be used in trophodynamic computations. However, the data available in literature for this purpose is meager for many species. In the case where two or more mammals were lumped together into an ecological group, the mean weight of the group was estimated considering the individual mean weights and the numerical strengths of individual species in the group. The estimated mean weights (Table 1, column 3) can be considered as conservative estimates. It is highly desirable that detailed computations of mean weight distributions of all marine mammals be made in the near future.

Most data on marine mammal food requirements originate from feeding experiments in aquaria, where animals are fed in captivity. The results of these experiments and a few other available food requirement data in literature, are also variable. Most reported values of food requirements by cetaceans are in the range of 4 to 6% body weight daily. These are relatively low values if we consider the rapid rate of growth of most whales. We have selected an average value of 5% BWD (body weight daily) as a plausible food requirement by cetaceans. The food requirement of pinnipeds (4 to 8% BWD) is relatively higher than those of whales. The food requirement data for species groups are given in Table 2.

The food requirements of pinnipeds are somewhat better known than those of whales because more of the former are kept in aquaria. Most commonly reported values are 4 to 8% BWD and more. (The range of reported values is 3 to 10% body weight daily.) We have selected 6% BWD as the plausible value. Based on the evaluation of data from various sources, food requirements of mammals are given in Table 2 in terms of body weight daily as used in the model

In the present (preliminary) computations, the food requirements were assumed to remain constant year around. This assumption is not correct in respect to all animals, especially those migrating to southern latitudes during the winter. This was compensated in the model by estimating the abundance of the widely migrating species to be somewhat lower on the wintering ground. Furthermore, several seal species are known not to eat during breeding season (ca 60 days). This fact was also compensated in the model by lowering slightly the number of seals present in breeding regions during breeding seasons.

4. MEAN FOOD COMPOSITION OF MARINE MAMMALS

There are very few quantitative data on marine mammal stomach content available in the literature which could be used without further evaluation to obtain mean composition of food for given mammal, season, and area. Most notes in the literature on marine mammal feeding are about organisms taken and the relative abundance of the species in the stomachs of individual mammals. The few quantitative notes available in literature indicate that the food items eaten vary in space and time--i.e. by availability of food items, and indicate also the "regime" (pelagic, demersal, coastal, offshore, etc.) from where the items are taken.

It could be assumed that if the quantitative composition of any given marine biota changes, there are accompanying changes in the composition of the food of mammals. However, the quantitative changes in mammal food items in the ecosystem cannot be expected to be linearly reflected in the changes in food composition of mammals, as most mammals are very mobile and can thus find and select the best feeding grounds with suitable food. There is also considerable specific food item preference in mammals, which varies from species to species, and specialization on given feeding regimes also dominates in most mammals. Thus qualitative notes on marine mammal food composition in the literature reflect the vulnerability of different species to given mammals and reflect also opportunistic feeding to a large extent, depending on the availability of food items in given locations and times.

The available literature on quantitative and qualitative aspects of marine mammal food composition were used to construct the mean composition of food of given species, considering also the availability and abundance of preferred species (see Tables 26 to 47). These tables also give somewhat different food compositions in shallow coastal regions than in offshore (deep) subregions where this division is warranted. Thus in the present model the composition of food of marine mammals is not changed in space and time due to lack of quantitative evidence, except between continental shelf and offshore areas.

5. SUMMARY NOTES ON THE SPECIES OF MARINE MAMMALS IN THE NORTH PACIFIC

The following brief notes on individual marine mammal species complement the data in Table 1. The notes present some additional information pertinent to ecosystem simulation in the eastern Bering Sea and along the North American coast.

Gray whale

Total N.E. Pacific stock 11,000 to 15,000. Minimum of 5,000 in the Bering Sea during the summer, mainly in the northern part. Main occurrence in Gulf of Alaska in April and May and in December and January. Feeding predominantly over the continental shelf, mainly on epibenthos, especially amphipods.

Right whale

N.E. Pacific stock estimated at 200. During the summer the population is found along the continental slope from British Columbia via Aleutians to

Anadyr Bay. During the winter the population is off Oregon and California. Food consists of copepods, euphausiids, shrimp, pelagic mollusks, and schooling fish.

Fin whale

N. Pacific stock ca 17,000. During the summer ca 5,000 are in the Bering Sea; during the winter some concentrations are found off Channel Islands.

Minke whale

Total N. Pacific stock unknown (ca 900 are caught annually in N.W. Pacific). During the summer the Bering Sea population is estimated to be about 3,000 (distribution reaches Chukchi Sea); during the winter, part of the population is off California. Gulf of Alaska is frequented from May to September.

Bowhead whale

Total Arctic population is estimated at 3,000. During the summer most of the population is in the Arctic. During the winter less than 2,500 are estimated to be in the Bering Sea off the ice edge. Food consists of small crustaceans (copepods, euphausiids, gammarids, amphipods, mysids) and small fish.

Blue whale

Total N.E. Pacific population is ca 1,700. Summer distribution along the continental slope from the Mexican border to the Aleutians. Gulf of Alaska frequented in June and July. Blue whale, as most other baleen whales, takes as food, besides zooplankton (copepods and mainly euphausiids), also small quantities of small pelagic fish and squids.

Sei whale

Total N. Pacific population 28,000. Does not enter Bering Sea, but is found in Gulf of Alaska and Aleutian coastal waters during the summer; winter spent further offshore. Feeds near the surface. Food consists of more small pelagic fish than in other baleen whales (anchovies, sauri, and jack mackerel).

Bryde's whale

Total N. Pacific population ca 25,000. Year around off California and further south although earlier whaling also took some off British Columbia. At present only rarely are any seen north of 35°N.

Giant bottlenose whale

Total N. Pacific population ca 10,000? Occurs from San Clemente Island to Bering Sea. Ca 2,000 during summer in Bering Sea (coastal). During early whaling, California catch peaked in July and October. Main food is fish and squids.

Bering Sea beaked whale

Total population estimate unknown. Small whale, coastal inhabitant from Oregon to north of Pribilof Islands. Feeds on squids and fish.

Sperm whale

Total N. Pacific population of exploitable age (size) in excess of 175,000, of which about 20,000 (mostly males) are in the Bering Sea during the summer. Frequents Gulf of Alaska also during summer months. The occurrence off northern California peaks in May and in September to November.

Humpback whale

N. Pacific population is estimated at 1,400, of which some are widely distributed during summer in the Bering Sea. Some concentrations are found off southern California during the winter. The Gulf of Alaska is frequented from April to September. Feeds mainly during the summer. Although humpback whale is a baleen whale, it feeds on nearly everything from euphausiids to salmon.

White whale (Belugha whale)

At least 60,000 in Arctic, may be as many as 200,000. At least 10,000 in the Bristol Bay and central and northern Bering Sea area; 500 in Cook Inlet year around. Eats everything but bulk of food consists of capelin, pollock, cod, herring, flounder, and salmon.

Killer whale

North Pacific population is estimated at ca 3,000 or more, of which at least 800 are estimated to be year around in the Bering Sea and about 300 in Gulf of Alaska. Distribution from California to Bering Strait. Feeds mainly on larger fish (salmon, cod, rockfish), but also on smaller pinnipeds.

Goosebeak whale (Cuvier's whale)

Population small (500?), distributed from Oregon coast to S.E. Alaska and along Aleutian Islands. Feeds on fish and squids.

Pacific white-sided dolphin

North Pacific population unknown (10,000 estimated). Occurs in herds of several hundreds around continental slope from tip of Alaska Peninsula southward. Feeds on fish and squids.

Dalls porpoise

Population large, but unknown; 10 to 30 thousand taken annually by Japanese offshore fishery (accidental catch). Occurs year around from Mexican border to Bering Sea but mostly south of Aleutian Islands. Feeds on fish and squids (including capelin, hake, myctophids, mackerel, rockfish, herring, etc.).

Harbor porpoise

Total N. Pacific population ca 20,000 of which ca 5,000 year around in the Bering Sea. Occurs near shore from Strait of Juan de Fuca to Arctic. Feeds on fish.

Northern right whale dolphin

N. Pacific population about 40,000. Occurs in pods up to 2,000 individuals along the continental slope from Mexican border to British Columbia. Feeds on squids and pelagic fish.

Risso dolphin

Distributed from Strait of Juan de Fuca southward. Exclusive squid eater.

Common dolphin

Distributed from central California southward. Off California ca 40 animals per 100 km². Feeds on anchovy, other fish, and squids.

Bottlenose dolphin

In coastal areas in temperate waters from Vancouver Island to tip of California. Feeds on fish, squids, clams, and crabs.

Pilot whale (dolphin)

Occurs from Alaskan border southward in pods of several hundred; most abundant south of Point Conception. Feeds on squids and fish.

Sea otter

Population estimates give 18,000 off California and 100 to 120 thousand off Alaska. Feeds up to 20% BWD, taking mainly clams, sea urchins, and sluggish fish.

Northern fur seal

N. Pacific population estimates give up to 2 million seals. During the summer, Bering Sea population is estimated at 1.1 million of which 200,000 are in the Aleutian area. Gulf of Alaska population is highest from April to June. Undertakes extensive seasonal migration, although some population components remain at both geographic ends of the distribution range. The Bering Sea breeding population is nearly all at sea by the end of August and by October all are pelagic around the Aleutians and Gulf of Alaska. Feeds on abundantly available fish and squids; takes some salmon.

Stellar sea lion

N. Pacific population estimates range from 250 to 325 thousand. Migrates northward during the summer (up to the Pribilof Islands). Bering Sea population during the summer is estimated at 100,000. The resident Aleutian population is estimated at 60,000. Peak occurrences in Gulf of Alaska are in April, May and September. California population has decreased in the last decades. Opportunistic feeder on fishes, including salmon.

California sea lion

Population estimates range from 100,000 to 125,000, the most recent estimate being 90,000 of which half are in Mexico. Occurrence from Mexican border to Vancouver Island. Feeds on fish, including salmon.

Northern elephant seal

Population estimate 35,000 (recent estimate 60,000). Largest of the N. Pacific pinnipeds. Distributed from northern California to Alaskan border. Feeds on relatively deep-dwelling fish and also takes squids.

Harbor seal

Total N. Pacific population is estimated at a minimum of 750,000. Occurs from Mexican border to Arctic. Alaska population is estimated at 270,000; Washington 7,000; Oregon 5,000; and California 7,000. Year around resident. Feeds on everything, but main diet consists of fish.

Walrus

Winter population in the Bering Sea is ca 175,000; summer population 20,000. Feeds mainly on clams, but takes sluggish fish occasionally.

Bearded seal

Largest of the "ice seals" with a population in excess of 300,000, of which ca 50,000 remain in the northern part of the Bering Sea during the summer. Benthic feeder in water less than ca 150 m, taking also some fish.

Ribbon seal

Population 100,000, of which 60,000 remain in the Bering Sea during the summer. Distribution is pelagic off the ice, with main concentration between Anadyr Bay and St. Lawrence Island. Feeds on shrimp, crab, mysids, and mainly fish.

Spotted (or larga) seal

Population estimate is 200,000 to 250,000, of which 80,000 remain in the northern part of the Bering Sea during the summer. Distributed along ice edge more on eastern side of the Bering Sea and nearer to coast than other "ice seals". Feeds mainly on fish.

Ringed seal

Population estimates uncertain (highest estimate for Arctic is up to one million). Distributed during winter south to Pribilof Islands. Feeds on epibenthic crustaceans and fish.

Sharks (although not mammals, they are apex predators and are computed with mammals). The following sharks occur in the NE Pacific in any appreciable quantity.

Basking shark (Cetorhinus maximus) from Baja California to Gulf of Alaska. Only small numbers observed in Gulf of Alaska and in Bering Sea. Mean weight 500 kg. Mainly zooplankton feeder, but also takes small pelagic fish.

Salmon shark (Lamna ditropis). Occurs offshore in Gulf of Alaska and off U.S. coast. Total population estimated at 0.5 million; the estimates in areas of interest are 50,000(s)/10,000(w) in areas 1 to 9 and 30,000(y) in areas 11 to 16. Mean weight 120 kg. Feeds on fish (cottids, cod, pollock, hake, rockfish, and salmon).

Blue shark (Prionace glauca). Distributed along the U.S. coast up to Gulf of Alaska (none in the Bering Sea). Population estimates in areas of interest to the present models: 10,000(s)/1,000(w) and 15,000(y). Mean

weight 150 kg. Feeds on fish (sauri, pomfret, jack mackerel, salmon).

Spiny dogfish (Squalus acanthias) is included with fish as "cottids, elasmobranches, and other demersal fish".

6. SELECTED BIBLIOGRAPHY OF MARINE MAMMALS IN THE NE PACIFIC

Note: This is not a complete bibliography of marine mammals, but contains only selected, more pertinent references. A more complete annotated bibliography on marine mammals is: Severinghaus, N.C. 1979. Selected annotated references on marine mammals of Alaska. NWAFC Proc. Rpt. 79-15. 178 pp.^{1/}

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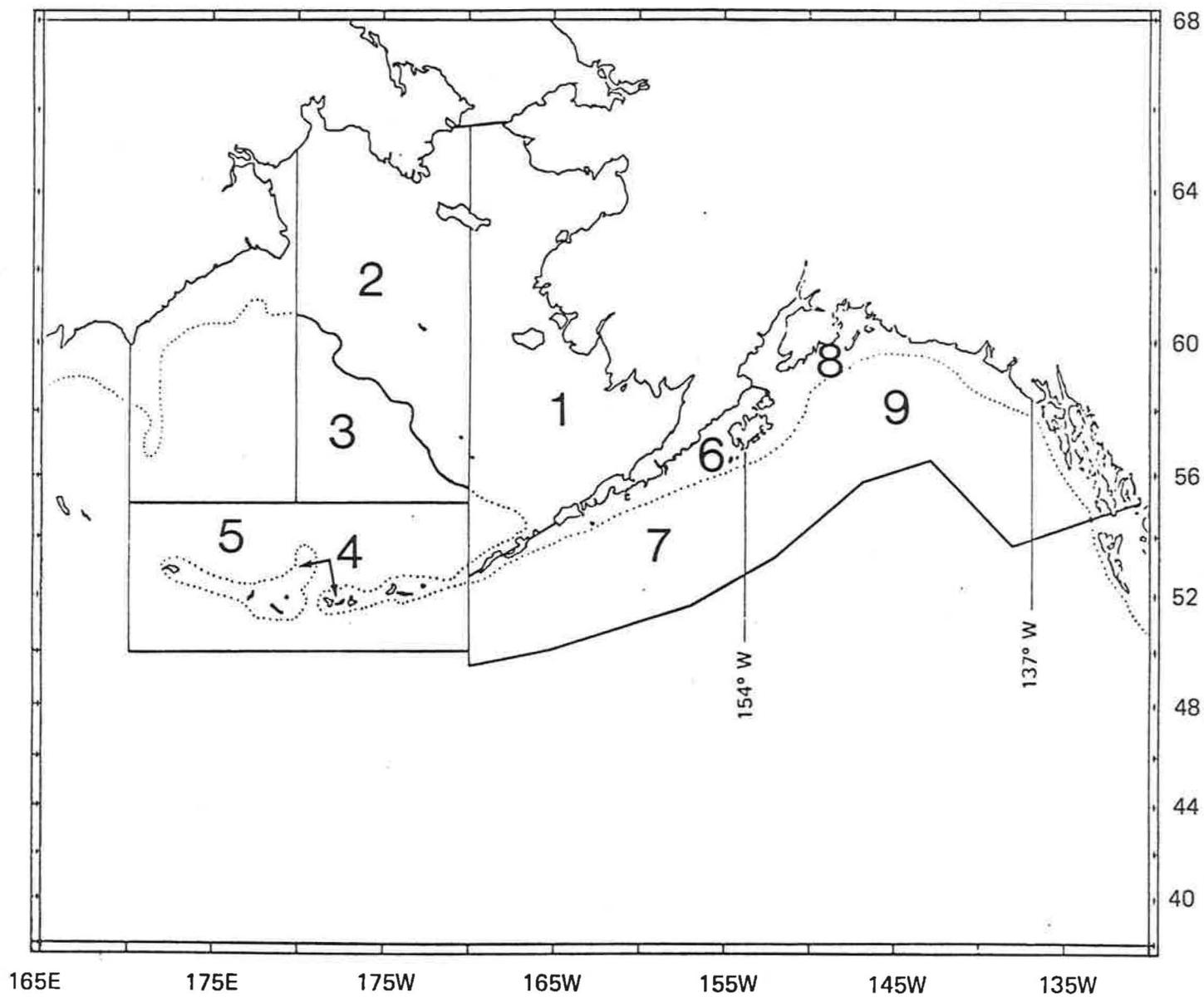


Figure 1.--Computation areas for PROBUB 80-1 in the eastern Bering Sea and western Gulf of Alaska

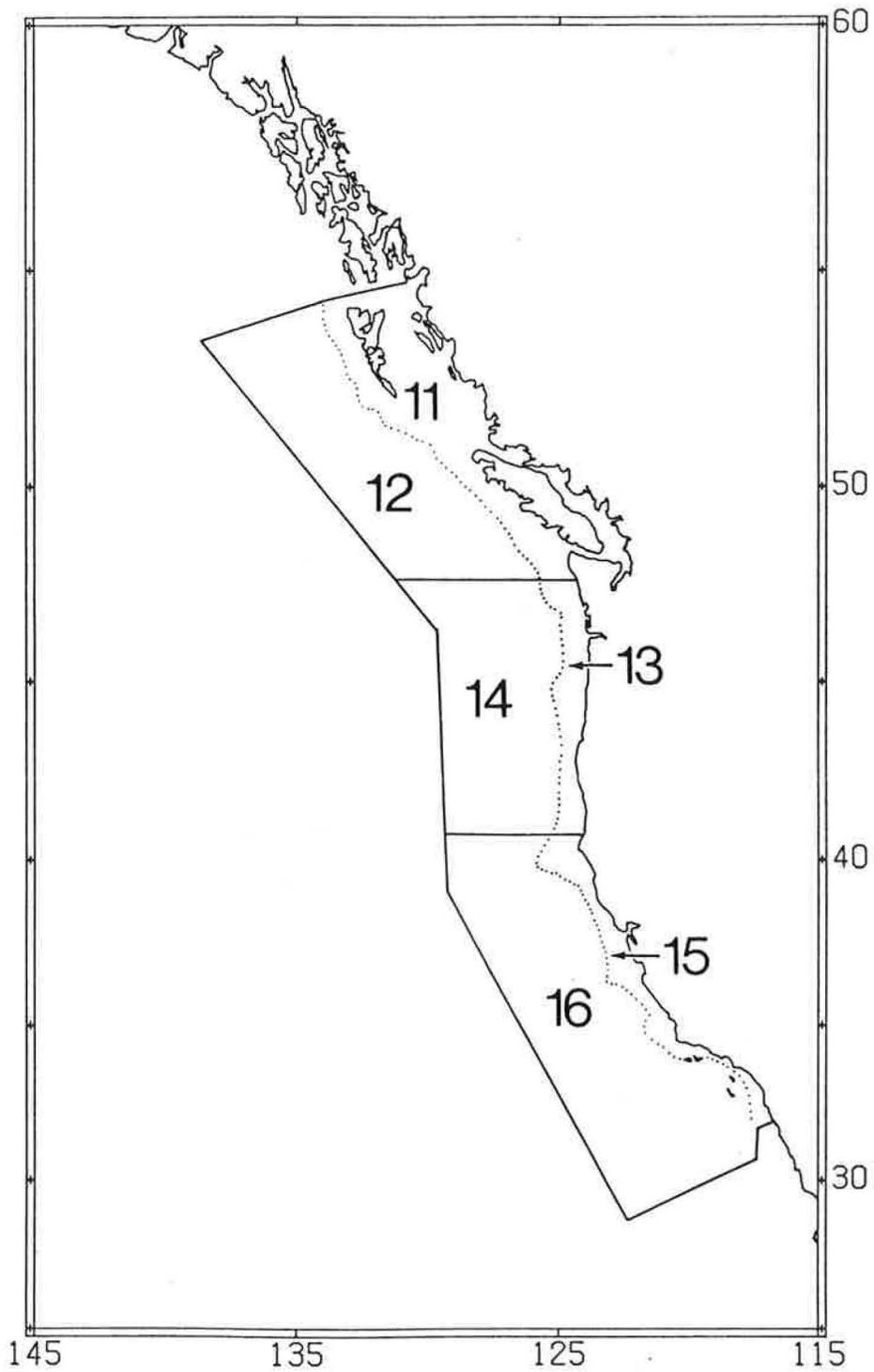


Figure 2.--Computation areas for the PROBUB 2 in the eastern Gulf of Alaska and off the west coast of N. America.

Table 1.--Marine mammals in the eastern Bering Sea, Gulf of Alaska and west coast of North America

Rank no.	Name	Latin name	Grp. wt.	Avg. wt.	Est. no. in N. Pacific	Maximum and minimum numbers and months Areas 1 to 9	Maximum and minimum numbers and months Areas 11 to 16
<u>Baleen whales</u>							
1	{ Gray whale	Eschrichtius robustus	31	{ 30t	11,000(E)	8,000(7)- -	4,100(1)- 1,150(7)
	{ Right whale	Balaena glacialis		{ 50	(200)?	50(8)- -	50(12)- -
2	{ Fin whale	Balaenoptera physalus	36	{ 50	17,000	4,000(8)- -	1,300(12)- 1,000(7)
	{ Minke whale	Balaenoptera acutorstrata		{ 9	?	3,000(8)- -	800(12)- -
3	Bowhead whale	Balaena mysticetus		35	3,000	2,500(3)- 200(8)	- -
4	{ Blue whale	Balaenoptera musculus	45	{ 75	1,700	Aleut. 500	800(12)- 200(7)
	{ Sei whale	Balaenoptera borealis		{ 30	28,000	Alaska 1,500(8)	1,500
5	Bryde's whale	Balaenoptera edeni (brydei)		30	25,000	-	500(7)- 100(2)**
<u>"Sperm whales" ***</u>							
6	{ Giant bottlenose whale	Berardius bairdi	8	{ 10	10,000 ?	2,000(8)- -	1,000(2)- 500(8)
	{ Bering Sea beaked whale	Mesoplodon steinegeri		{ 2.5	?	600(8)- -	200(2)- 100(8)
7	Sperm whale	Physeter catodon		32	200,000	20,000(8)- -	10,000(11)- 6,000(8)
<u>"Toothed whales" ***</u>							
8	Humpback whale ****	Megaptera novaengliae		25	1,400	200(6)- -	200(2)- 50(6)
9	Beluga (white) whale	Delphinapterus leucas		2.0	60,000(A)	10,000	- -
10	{ Killer whale	Orcinus orca	8	{ 10	3,000 ?	900	600
	{ Goosebeak (or Cuyier's) whale	Ziphius cavirostris		{ 3	500 ?	200	200
<u>Porpoises and Dolphins</u>							
11	{ Pacific white-sided dolphin	Lagenorhynchus obliiquidens	120	{ 60kg	10,000(E) ?	3,000(8)- -	4,000
	{ Dall's porpoise	Phocoenoides dalli		{ 140	500,000	30,000(8)- 10,000(3)	10,000
12	Harbour porpoise	Phocoena phocoena (vomarina)		80	20,000	5,000(8)- 4,000(3)	500
	{ Northern right whale dolphin	Lissodelphis borealis		{ 70	40,000	-	20,000
	{ Risso's dolphin	Grampus griseus		{ 100	?	-	2,000
13	{ Common dolphin	Delphinus delphinus	85	{ 55	?	-	4,000
	{ Bottlenose dolphin	Tursiops truncatus		{ 100	?	-	2,000
	{ Pilot whale	Globicephala macrorhyncha (scammoni)		{ 200	500 ?	-	1,000
14	Sea otter	Enhydra lutris		35	120,000	100,000	18,000
<u>Pinnipeds, group 1</u>							
15	Northern fur seal	Callorhinus ursinus		45	1,400,000(E)	1,100,000(7)-200,000(3)	800,000(1)- 150,000(7)
16	Steller (northern) sea lion	Eumetopias jubatus		350	275,000	100,000(8)- 55,000(3)	60,000(3)- 15,000(7)
17	California sea lion	Zalophus californianus		100	110,000	-	50,000(7)- 35,000(2)
18	Northern elephant seal	Mirounga angustirostris		900	35,000	-	20,000
19	Harbour seal	Phoca vitulina (Richardi)		50	750,000 ?	270,000	19,000
<u>Pinnipeds, group 2</u> (<u>"ice seals"</u>)							
20	Walrus	Odobenus rosmarus		800	175,000	175,000(3)- 20,000(8)	-
21	Bearded seal	Erignathus barbatus		200	300,000	250,000(3)- 50,000(8)	-
22	{ Ribbon seal	Phoca fasciata	56	{ 70	100,000	100,000(3)- 60,000(8)	-
	{ Larga (spotted) seal	Phoca vitulina largha		{ 55	250,000	220,000(3)- 30,000(8)	-
	{ Ringed seal	Phoca hispida		{ 60	up to 1 mil.	200,000(3)- 20,000(8)	-
23	Sharks			100	?	50,000(8)- 10,000(3)	40,000

* - Estimated Arctic population.

** - Rare occurrence north of 35°N.

*** - The groups "sperm whales" and "toothed whales" signify groupings by feeding habits.

**** - Humpback whale, although a baleen whale, has been included in the "toothed whale" group because of its rather extensive fish diet.

Table 2.--Food requirements of marine mammals.

Mammal group	Food requirement (% BWD) <u>1/</u>
Baleen whales	5
Sperm whales	5
Toothed whales	5
Dolphins and porpoises	5
Sea otter	12
Seals, group 1	6
Seals, group 2	6
Sharks	2

1/ Body weight daily

Table 3.--Monthly distribution

1. Gray and right whales

Month	Subregions															
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	
Jan.	200	0	200	100	100	800	1,300	450	600	50	250	400	400	1,000	2,000	
Feb.	0	0	20	20	20	100	200	50	100	50	250	400	400	1,000	2,000	
Mar.	0	0	20	20	20	100	100	50	100	50	250	400	400	1,000	2,000	
Apr.	0	0	100	100	100	700	1,200	600	600	50	250	250	250	700	700	
May	800	400	500	300	300	800	1,300	300	300	50	150	150	150	500	500	
Jun.	2,000	1,500	800	450	450	200	400	200	200	20	100	150	100	400	400	
Jul.	3,000	3,000	1,000	500	500	100	50	100	50	20	100	150	100	400	400	
Aug.	3,000	3,000	1,000	500	500	100	50	100	50	20	100	150	100	400	400	
Sep.	2,500	2,000	1,000	500	1,000	100	50	100	50	20	100	150	100	400	400	
Oct.	1,800	1,100	1,000	300	500	400	600	200	100	30	100	200	200	600	800	
Nov.	1,000	500	700	200	300	550	800	300	300	50	130	250	250	600	1,200	
Dec.	400	0	400	150	200	700	1,200	500	500	50	150	300	300	800	1,700	

Table 4.--Monthly distribution

2. Fin and minke whales

Month	Subregions															
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	
Jan.	0	0	0	0	0	0	0	0	10	0	20	200	900	500	1,200	
Feb.	0	0	0	0	0	0	0	0	10	0	20	200	900	500	1,200	
Mar.	0	0	0	0	0	0	0	0	10	0	20	150	750	400	1,000	
Apr.	50	0	50	80	100	10	10	10	30	0	30	100	600	300	800	
May	150	50	400	250	600	30	60	40	60	0	40	100	500	200	600	
Jun.	300	150	2,000	400	2,000	50	100	50	90	0	20	100	400	100	500	
Jul.	500	200	3,000	400	2,500	50	100	50	100	0	20	50	400	100	500	
Aug.	500	200	3,000	400	2,500	50	100	50	100	0	20	50	400	100	500	
Sep.	300	200	2,000	400	2,500	60	100	50	100	0	30	50	550	100	500	
Oct.	100	80	1,000	200	1,200	40	70	40	70	0	40	100	650	250	700	
Nov.	20	10	200	100	300	10	30	10	40	0	20	150	750	400	1,000	
Dec.	0	0	0	0	0	0	0	0	10	0	20	200	900	500	1,200	

Table 5.--Monthly distribution

3. Bowhead whale

Month	Subregions															
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	
Jan.	1,400	1,000	50	0	0	0	0	0	0	0	0	0	0	0	0	
Feb.	1,500	700	100	50	50	0	0	0	0	0	0	0	0	0	0	
Mar.	1,600	500	200	100	100	0	0	0	0	0	0	0	0	0	0	
Apr.	1,600	600	150	50	50	0	0	0	0	0	0	0	0	0	0	
May	400	700	50	0	0	0	0	0	0	0	0	0	0	0	0	
Jun.	200	450	0	0	0	0	0	0	0	0	0	0	0	0	0	
Jul.	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	
Aug.	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	
Sep.	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	
Oct.	400	500	0	0	0	0	0	0	0	0	0	0	0	0	0	
Nov.	900	700	50	0	0	0	0	0	0	0	0	0	0	0	0	
Dec.	1,400	850	50	0	0	0	0	0	0	0	0	0	0	0	0	

Table 6.--Monthly distribution

4. Blue and sei whales

Month	Subregions															
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	
Jan.	0	0	0	0	0	0	0	0	0	0	0	0	0	50	150	
Feb.	0	0	0	0	0	0	0	0	0	0	0	0	0	50	150	
Mar.	0	0	0	0	0	0	0	0	0	0	0	0	0	50	150	
Apr.	0	0	0	100	200	20	50	10	150	5	50	50	150	80	350	
May	0	0	0	200	400	40	150	30	250	5	250	100	500	100	600	
Jun.	0	0	0	350	900	50	250	50	350	10	400	150	700	150	800	
Jul.	0	0	0	350	900	50	250	50	350	10	400	150	700	150	800	
Aug.	0	0	0	350	900	50	250	50	350	10	400	150	700	150	800	
Sep.	0	0	0	200	600	50	250	50	300	5	400	150	700	150	800	
Oct.	0	0	0	100	300	20	100	30	200	5	250	100	450	100	450	
Nov.	0	0	0	50	100	10	50	10	100	5	100	50	200	80	250	
Dec.	0	0	0	0	0	0	0	0	0	0	0	0	0	50	150	

Table 7.--Monthly distribution

5. Bryde's whale

Month	Subregions															
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	
Jan.	0	0	0	0	0	0	0	0	0	0	0	0	5	0	100	
Feb.	0	0	0	0	0	0	0	0	0	0	0	0	5	0	150	
Mar.	0	0	0	0	0	0	0	0	0	0	0	0	10	10	150	
Apr.	0	0	0	0	0	0	0	0	0	0	0	0	30	20	150	
May	0	0	0	0	0	0	0	0	0	0	0	0	60	30	200	
Jun.	0	0	0	0	0	0	0	0	0	0	10	10	80	40	300	
Jul.	0	0	0	0	0	0	0	0	0	0	20	30	100	50	400	
Aug.	0	0	0	0	0	0	0	0	0	0	20	30	100	50	400	
Sep.	0	0	0	0	0	0	0	0	0	0	10	20	80	40	300	
Oct.	0	0	0	0	0	0	0	0	0	0	0	10	60	30	300	
Nov.	0	0	0	0	0	0	0	0	0	0	0	0	10	20	150	
Dec.	0	0	0	0	0	0	0	0	0	0	0	0	5	0	100	

Table 8.--Monthly distribution

6. Giant bottlenose and beaked whales

Month	Subregions															
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	
Jan.	0	0	0	0	0	0	0	0	0	50	250	50	300	50	350	
Feb.	0	0	0	0	0	0	0	0	0	50	300	50	350	50	400	
Mar.	0	0	0	0	0	0	0	0	0	50	250	50	260	50	300	
Apr.	0	0	50	100	150	50	50	50	50	50	200	50	220	50	250	
May	50	50	200	150	250	80	150	80	150	50	180	50	180	50	200	
Jun.	200	100	300	200	400	80	200	80	200	50	150	50	150	50	150	
Jul.	300	200	500	300	500	100	300	100	300	50	150	50	150	50	150	
Aug.	300	200	500	300	500	100	300	100	300	50	150	50	150	50	150	
Sep.	300	200	500	300	500	100	300	100	300	50	150	50	150	50	150	
Oct.	150	100	300	200	400	80	200	80	200	50	180	50	180	50	200	
Nov.	50	50	100	100	200	50	100	50	100	50	200	50	200	50	250	
Dec.	0	0	0	0	0	0	0	0	0	50	200	50	250	50	350	

Table 9.--Monthly distribution

7. Sperm whale

Month	Subregions															
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	
Jan.	0	0	0	0	0	0	0	0	0	20	200	80	2,000	1,000	5,000	
Feb.	0	0	0	0	0	0	0	0	0	20	200	80	2,000	1,000	5,000	
Mar.	0	0	0	0	0	0	0	0	0	20	200	100	2,000	800	5,000	
Apr.	0	0	300	100	1,000	0	0	0	0	50	250	100	2,000	800	6,000	
May	200	0	2,000	300	3,500	100	500	50	250	50	250	100	2,500	1,000	6,100	
Jun.	300	200	4,000	400	6,000	150	1,500	100	800	50	250	100	2,000	800	4,500	
Jul.	500	500	6,500	500	7,600	200	2,500	200	1,500	50	250	100	1,500	1,000	3,100	
Aug.	500	500	6,500	500	7,600	200	2,500	200	1,500	50	250	100	1,500	1,000	3,100	
Sep.	500	500	6,500	500	7,600	200	2,500	200	1,500	50	250	100	1,500	1,000	4,500	
Oct.	300	200	4,000	300	5,500	150	1,500	100	1,000	50	250	100	2,000	800	6,000	
Nov.	100	0	1,500	100	2,000	50	400	50	600	50	250	100	2,500	1,000	6,100	
Dec.	0	0	0	0	0	0	0	0	0	20	200	80	2,000	1,000	6,000	

Table 10.--Monthly distribution

8. Humpback whale

Month	Subregions															
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	
Jan.	0	0	0	0	0	0	0	0	0	5	5	5	10	10	120	
Feb.	0	0	0	0	0	0	0	0	0	5	5	10	10	10	130	
Mar.	0	0	0	0	0	0	0	0	0	5	20	10	30	15	90	
Apr.	5	0	5	5	20	10	50	10	50	5	35	15	35	17	60	
May	10	10	30	10	50	8	30	8	30	5	30	5	30	15	30	
Jun.	10	20	50	20	50	5	10	5	10	5	30	5	30	15	30	
Jul.	10	20	50	20	50	5	10	5	10	5	30	5	30	15	30	
Aug.	10	20	50	20	50	8	30	8	10	5	30	5	30	15	30	
Sep.	10	20	50	20	50	10	50	10	50	5	30	5	30	15	30	
Oct.	5	10	30	10	20	8	30	8	30	5	10	15	40	17	60	
Nov.	0	0	10	5	10	2	10	2	10	5	5	10	10	20	90	
Dec.	0	0	0	0	0	0	0	0	0	5	5	5	5	20	120	

Table 11.--Monthly distribution

9. Beluga whale

Month	Subregions															
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	
Jan.	2,000	1,500	3,500	800	1,000	50	20	450	0	0	0	0	0	0	0	
Feb.	2,000	1,000	4,000	800	1,000	50	20	400	0	0	0	0	0	0	0	
Mar.	2,000	900	4,000	800	1,100	50	20	400	0	0	0	0	0	0	0	
Apr.	2,000	900	4,000	800	1,100	50	20	450	0	0	0	0	0	0	0	
May	2,700	2,200	2,600	700	700	50	20	500	0	0	0	0	0	0	0	
Jun.	3,000	2,900	2,000	600	300	50	20	500	0	0	0	0	0	0	0	
Jul.	3,000	2,900	2,000	600	300	50	20	500	0	0	0	0	0	0	0	
Aug.	3,000	2,900	2,000	600	300	50	20	500	0	0	0	0	0	0	0	
Sep.	3,000	2,900	2,000	600	300	50	20	500	0	0	0	0	0	0	0	
Oct.	2,900	2,500	2,500	600	300	50	20	500	0	0	0	0	0	0	0	
Nov.	2,700	2,200	2,600	700	600	50	20	500	0	0	0	0	0	0	0	
Dec.	2,500	2,000	2,900	700	700	50	20	500	0	0	0	0	0	0	0	

Table 12.--Monthly distribution

10. Killer and goosebeak whales

Month	Subregions															
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	
Jan.	150	100	180	150	110	80	100	100	140	140	170	130	180	80	100	
Feb.	100	50	190	150	200	80	100	100	140	140	170	130	180	80	100	
Mar.	100	50	190	150	200	80	100	100	140	140	170	130	180	80	100	
Apr.	150	50	140	150	200	80	100	100	100	140	170	130	180	80	100	
May	150	150	100	150	140	80	100	100	140	140	170	130	180	80	100	
Jun.	170	170	100	150	100	80	100	100	140	140	170	130	180	80	100	
Jul.	170	170	100	150	100	80	100	100	140	140	170	130	180	80	100	
Aug.	170	170	100	150	100	80	100	100	140	140	170	130	180	80	100	
Sep.	170	170	100	150	100	80	100	100	140	140	170	130	180	80	100	
Oct.	170	170	100	150	100	80	100	100	140	140	170	130	180	80	100	
Nov.	170	170	100	150	100	80	100	100	140	140	170	130	180	80	100	
Dec.	170	150	120	150	100	80	100	100	140	140	170	130	180	80	100	

Table 13.--Monthly distribution

11. Whiteside and Dall's porpoises

Month	Subregions															
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	
Jan.	0	0	2,000	1,000	3,000	500	2,000	500	3,000	500	2,000	500	3,000	1,000	4,000	
Feb.	0	0	1,000	1,000	3,000	500	2,000	500	3,000	500	2,000	500	3,000	1,000	4,000	
Mar.	0	0	1,000	1,000	3,000	500	2,000	500	3,000	500	2,000	500	3,000	1,000	4,000	
Apr.	0	0	2,000	1,500	4,000	750	3,500	600	4,500	600	2,500	750	3,000	1,000	4,000	
May	500	500	3,500	2,000	6,000	850	5,000	800	6,000	800	3,000	1,000	3,000	1,000	4,000	
Jun.	750	750	5,000	2,000	8,000	1,000	6,000	1,000	8,000	1,000	4,000	1,000	3,000	1,000	4,000	
Jul.	1,000	1,000	5,000	2,000	8,000	1,000	6,000	1,000	8,000	1,000	4,000	1,000	3,000	1,000	4,000	
Aug.	1,000	1,000	5,000	2,000	8,000	1,000	6,000	1,000	8,000	1,000	4,000	1,000	3,000	1,000	4,000	
Sep.	1,000	1,000	5,000	2,000	8,000	1,000	6,000	1,000	8,000	1,000	4,000	1,000	3,000	1,000	4,000	
Oct.	750	750	4,000	2,000	6,000	800	4,000	900	7,000	900	3,000	1,000	3,000	1,000	4,000	
Nov.	500	500	3,000	1,500	5,000	700	3,000	700	5,500	700	2,500	800	3,000	1,000	4,000	
Dec.	0	0	2,500	1,000	4,000	600	2,000	600	4,500	600	2,000	650	3,000	1,000	4,000	

Table 14.--Monthly distribution

12. Harbor porpoise

Month	Subregions															
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	
Jan.	1,200	400	100	900	100	600	80	600	80	250	50	150	50	0	0	
Feb.	1,300	200	100	1,000	100	600	80	600	80	250	50	150	50	0	0	
Mar.	1,300	200	100	1,000	100	600	80	600	80	250	50	150	50	0	0	
Apr.	1,300	600	110	1,000	100	600	80	600	70	250	50	150	50	0	0	
May	1,200	800	120	900	100	700	80	600	60	250	50	150	50	0	0	
Jun.	1,200	1,000	150	800	100	800	80	600	60	250	50	150	50	0	0	
Jul.	1,200	1,200	150	80	110	800	80	600	60	250	50	150	50	0	0	
Aug.	1,200	1,200	150	800	110	800	80	600	60	250	50	150	50	0	0	
Sep.	1,200	1,200	150	800	110	800	80	600	60	250	50	150	50	0	0	
Oct.	1,200	1,000	150	800	100	800	80	600	60	250	50	150	50	0	0	
Nov.	1,200	800	120	800	100	800	80	600	60	250	50	150	50	0	0	
Dec.	1,200	600	100	900	100	700	80	600	70	250	50	150	50	0	0	

Table 15.--Monthly distribution

13. Right whale dolphin; Risso's, common, bottlenose, and pilot dolphins

Month	Subregions															
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	
Jan.	0	0	0	0	0	0	0	0	0	200	2,000	600	8,000	2,200	16,000	
Feb.	0	0	0	0	0	0	0	0	0	200	2,000	600	8,000	2,200	16,000	
Mar.	0	0	0	0	0	0	0	0	0	200	2,000	600	8,000	2,200	16,000	
Apr.	0	0	0	0	0	0	0	0	0	200	2,000	600	8,000	2,200	16,000	
May	0	0	0	0	0	0	0	0	0	200	2,000	600	8,000	2,200	16,000	
Jun.	0	0	0	0	0	0	0	0	0	200	2,000	600	8,000	2,200	16,000	
Jul.	0	0	0	0	0	0	0	0	0	200	2,000	600	8,000	2,200	16,000	
Aug.	0	0	0	0	0	0	0	0	0	200	2,000	600	8,000	2,200	16,000	
Sep.	0	0	0	0	0	0	0	0	0	200	2,000	600	8,000	2,200	16,000	
Oct.	0	0	0	0	0	0	0	0	0	200	2,000	600	8,000	2,200	16,000	
Nov.	0	0	0	0	0	0	0	0	0	200	2,000	600	8,000	2,200	16,000	
Dec.	0	0	0	0	0	0	0	0	0	200	2,000	600	8,000	2,200	16,000	

Table 16.—Monthly distribution

14. Sea otter

Month	Subregions															
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	
Jan.	10,000	2,000	0	43,000	0	30,000	0	15,000	0	3,000	0	0	0	15,000	0	
Feb.	10,000	2,000	0	43,000	0	30,000	0	15,000	0	3,000	0	0	0	15,000	0	
Mar.	10,000	2,000	0	43,000	0	30,000	0	15,000	0	3,000	0	0	0	15,000	0	
Apr.	10,000	2,000	0	43,000	0	30,000	0	15,000	0	3,000	0	0	0	15,000	0	
May	10,000	2,000	0	43,000	0	30,000	0	15,000	0	3,000	0	0	0	15,000	0	
Jun.	10,000	2,000	0	43,000	0	30,000	0	15,000	0	3,000	0	0	0	15,000	0	
Jul.	10,000	2,000	0	43,000	0	30,000	0	15,000	0	3,000	0	0	0	15,000	0	
Aug.	10,000	2,000	0	43,000	0	30,000	0	15,000	0	3,000	0	0	0	15,000	0	
Sep.	10,000	2,000	0	43,000	0	30,000	0	15,000	0	3,000	0	0	0	15,000	0	
Oct.	10,000	2,000	0	43,000	0	30,000	0	15,000	0	3,000	0	0	0	15,000	0	
Nov.	10,000	2,000	0	43,000	0	30,000	0	15,000	0	3,000	0	0	0	15,000	0	
Dec.	10,000	2,000	0	43,000	0	30,000	0	15,000	0	3,000	0	0	0	15,000	0	

Table 17.--Monthly distribution

15. Fur seal (in thousands)

Month	Subregions															
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	
Jan.	15	10	20	40	15	30	30	30	30	60	90	100	200	150	200	
Feb.	15	5	20	40	15	25	25	25	30	50	70	80	250	170	220	
Mar.	10	5	20	40	15	25	30	25	30	50	70	80	250	170	220	
Apr.	15	5	30	45	20	50	70	40	60	50	60	60	200	150	150	
May	45	30	30	50	30	50	70	40	60	50	40	60	100	100	100	
Jun.	180	180	40	50	30	50	70	40	60	50	30	50	50	50	50	
Jul.	350	400	50	100	200	50	40	50	40	50	30	30	10	10	10	
Aug.	400	350	50	100	150	40	50	50	50	50	30	20	10	7	3	
Sep.	300	300	100	120	180	40	70	40	70	50	30	30	10	7	6	
Oct.	100	100	250	150	200	40	70	40	70	50	60	70	40	20	50	
Nov.	50	50	200	60	50	30	50	30	50	50	80	80	100	100	100	
Dec.	35	25	100	40	20	30	40	30	40	60	90	100	200	150	200	

Table 18.--Monthly distribution

16. Steller sea lions (in thousands)

Month	Subregions															
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	
Jan.	2	1	10	15	12	2	3	2	3	5	10	8	12	7	8	
Feb.	2	1	10	15	12	2	3	2	3	6	10	8	12	7	8	
Mar.	2	1	10	15	12	2	3	2	3	7	10	8	12	7	8	
Apr.	6	4	12	14	14	6	5	7	5	10	15	8	12	7	8	
May	9	5	15	13	16	9	7	11	7	8	10	6	8	5	6	
Jun.	10	5	15	12	16	10	8	13	8	6	6	3	3	3	2	
Jul.	10	5	15	10	16	10	10	15	10	5	3	3	1	2	1	
Aug.	10	5	15	10	16	10	10	15	10	5	3	3	1	2	1	
Sep.	10	5	15	10	16	10	10	15	10	5	5	4	6	4	3	
Oct.	10	5	15	12	17	10	7	10	8	5	7	6	8	6	5	
Nov.	7	4	15	14	14	6	5	7	5	5	8	8	10	7	7	
Dec.	2	1	10	15	12	2	3	2	3	5	10	8	12	7	8	

Table 19.--Monthly distribution

17. California sea lions (in thousands)

Month	Subregions														
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16
Jan.	0	0	0	0	0	0	0	0	0	1	3	6	5	15	15
Feb.	0	0	0	0	0	0	0	0	0	1	3	6	5	15	15
Mar.	0	0	0	0	0	0	0	0	0	1	3	6	5	15	15
Apr.	0	0	0	0	0	0	0	0	0	2	4	8	8	15	18
May	0	0	0	0	0	0	0	0	0	2	4	10	10	15	20
Jun.	0	0	0	0	0	0	0	0	0	3	5	10	10	15	20
Jul.	0	0	0	0	0	0	0	0	0	3	5	10	10	15	20
Aug.	0	0	0	0	0	0	0	0	0	3	5	10	10	15	20
Sep.	0	0	0	0	0	0	0	0	0	3	5	10	10	15	20
Oct.	0	0	0	0	0	0	0	0	0	2	4	10	8	15	20
Nov.	0	0	0	0	0	0	0	0	0	1	3	8	5	15	18
Dec.	0	0	0	0	0	0	0	0	0	1	3	6	5	15	15

Table 20.--Monthly distribution

18. Elephant seal

Month	Subregions															
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	
Jan.	0	0	0	0	0	0	0	0	0	1,500	2,500	2,800	3,800	4,200	5,200	
Feb.	0	0	0	0	0	0	0	0	0	1,500	2,500	2,800	3,800	4,200	5,200	
Mar.	0	0	0	0	0	0	0	0	0	1,500	2,500	2,800	3,800	4,200	5,200	
Apr.	0	0	0	0	0	0	0	0	0	1,500	2,500	2,800	3,800	4,200	5,200	
May	0	0	0	0	0	0	0	0	0	1,500	2,500	2,800	3,800	4,200	5,200	
Jun.	0	0	0	0	0	0	0	0	0	1,500	2,500	2,800	3,800	4,200	5,200	
Jul.	0	0	0	0	0	0	0	0	0	1,500	2,500	2,800	3,800	4,200	5,200	
Aug.	0	0	0	0	0	0	0	0	0	1,500	2,500	2,800	3,800	4,200	5,200	
Sep.	0	0	0	0	0	0	0	0	0	1,500	2,500	2,800	3,800	4,200	5,200	
Oct.	0	0	0	0	0	0	0	0	0	1,500	2,500	2,800	3,800	4,200	5,200	
Nov.	0	0	0	0	0	0	0	0	0	1,500	2,500	2,800	3,800	4,200	5,200	
Dec.	0	0	0	0	0	0	0	0	0	1,500	2,500	2,800	3,800	4,200	5,200	

Table 21.--Monthly distribution

19. Harbor seals (in thousands)

Month	Subregions														
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16
Jan.	20	30	0	45	0	45	0	50	0	50	0	13	0	7	0
Feb.	20	30	0	45	0	45	0	50	0	50	0	13	0	7	0
Mar.	20	30	0	45	0	45	0	50	0	50	0	13	0	7	0
Apr.	20	30	0	45	0	45	0	50	0	50	0	13	0	7	0
May	20	30	0	45	0	45	0	50	0	50	0	13	0	7	0
Jun.	20	30	0	45	0	45	0	50	0	50	0	13	0	7	0
Jul.	20	30	0	45	0	45	0	50	0	50	0	13	0	7	0
Aug.	20	30	0	45	0	45	0	50	0	50	0	13	0	7	0
Sep.	20	30	0	45	0	45	0	50	0	50	0	13	0	7	0
Oct.	20	30	0	45	0	45	0	50	0	50	0	13	0	7	0
Nov.	20	30	0	45	0	45	0	50	0	50	0	13	0	7	0
Dec.	20	30	0	45	0	45	0	50	0	50	0	13	0	7	0

Table 22.--Monthly distribution

20. Walrus

Month	Subregions															
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	
Jan.	85,000	45,000	10,000	25,000	10,000	0	0	0	0	0	0	0	0	0	0	
Feb.	85,000	45,000	10,000	25,000	10,000	0	0	0	0	0	0	0	0	0	0	
Mar.	85,000	45,000	10,000	25,000	10,000	0	0	0	0	0	0	0	0	0	0	
Apr.	85,000	45,000	10,000	25,000	10,000	0	0	0	0	0	0	0	0	0	0	
May	20,000	15,000	3,000	5,000	3,000	0	0	0	0	0	0	0	0	0	0	
Jun.	10,300	8,400	500	500	300	0	0	0	0	0	0	0	0	0	0	
Jul.	10,300	8,400	500	500	300	0	0	0	0	0	0	0	0	0	0	
Aug.	10,300	8,400	500	500	300	0	0	0	0	0	0	0	0	0	0	
Sep.	10,300	8,400	500	500	300	0	0	0	0	0	0	0	0	0	0	
Oct.	20,000	15,000	3,000	2,000	3,000	0	0	0	0	0	0	0	0	0	0	
Nov.	30,000	25,000	6,000	8,000	6,000	0	0	0	0	0	0	0	0	0	0	
Dec.	50,000	38,000	8,000	16,000	8,000	0	0	0	0	0	0	0	0	0	0	

Table 23.--Monthly distribution

21. Bearded seals (in thousands)

Month	Subregions															
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	
Jan.	120	65	5	10	6	0	0	0	0	0	0	0	0	0	0	
Feb.	130	80	6	18	6	0	0	0	0	0	0	0	0	0	0	
Mar.	135	85	5	20	5	0	0	0	0	0	0	0	0	0	0	
Apr.	100	70	4	15	4	0	0	0	0	0	0	0	0	0	0	
May	80	50	3	10	3	0	0	0	0	0	0	0	0	0	0	
Jun.	40	30	1	6	2	0	0	0	0	0	0	0	0	0	0	
Jul.	20	22	1	5	2	0	0	0	0	0	0	0	0	0	0	
Aug.	20	22	1	5	2	0	0	0	0	0	0	0	0	0	0	
Sep.	20	22	1	5	2	0	0	0	0	0	0	0	0	0	0	
Oct.	30	50	3	5	3	0	0	0	0	0	0	0	0	0	0	
Nov.	60	60	4	6	4	0	0	0	0	0	0	0	0	0	0	
Dec.	100	65	5	8	6	0	0	0	0	0	0	0	0	0	0	

Table 24.--Monthly distribution

22. Ice seals (in thousands)

Month	Subregions															
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	
Jan.	120	170	50	35	350	0	0	0	0	0	0	0	0	0	0	
Feb.	150	170	60	35	40	0	0	0	0	0	0	0	0	0	0	
Mar.	190	170	70	40	50	0	0	0	0	0	0	0	0	0	0	
Apr.	190	170	70	40	50	0	0	0	0	0	0	0	0	0	0	
May	90	100	45	30	30	0	0	0	0	0	0	0	0	0	0	
Jun.	45	50	20	20	20	0	0	0	0	0	0	0	0	0	0	
Jul.	20	30	10	20	10	0	0	0	0	0	0	0	0	0	0	
Aug.	20	30	10	20	10	0	0	0	0	0	0	0	0	0	0	
Sep.	20	30	10	20	10	0	0	0	0	0	0	0	0	0	0	
Oct.	40	50	20	30	20	0	0	0	0	0	0	0	0	0	0	
Nov.	70	100	30	30	25	0	0	0	0	0	0	0	0	0	0	
Dec.	90	150	40	35	30	0	0	0	0	0	0	0	0	0	0	

Table 25.--Monthly distribution

23. Sharks (in thousands)

Month	Subregions															
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	
Jan.	0.5	0.3	1.2	2	3	0.5	1	0.5	1	4	6	15	15	15	15	
Feb.	0.5	0.3	1.2	2	3	0.5	1	0.5	1	4	6	15	15	15	15	
Mar.	0.5	0.3	1.2	2	3	0.5	1	0.5	1	4	6	15	15	15	15	
Apr.	0.7	0.5	2	2.5	4	1	2	1	2	4	6	15	15	15	15	
May	2.2	3	2.3	3	5	2.5	3	2.5	3	4	6	15	15	15	15	
Jun.	3	5	2.8	3.5	7	4	5	4	5	4	6	15	15	15	15	
Jul.	4	7	3	4	8	5	7	5	7	4	6	15	15	15	15	
Aug.	4	7	3	4	8	5	7	5	7	4	6	15	15	15	15	
Sep.	4	7	3	4	8	5	7	5	7	4	6	15	15	15	15	
Oct.	2.8	5	2	3	7	4	5	4	5	4	6	15	15	15	15	
Nov.	1.5	2	1.8	2.5	5	2	3	2	3	4	6	15	15	15	15	
Dec.	0.5	0.3	1.2	2	3	0.5	1	0.5	1	4	6	15	15	15	15	

Table 26.--Mean food composition

1. Gray and white whales

Rank no. (food)	Species/group of species	Areas 1 to 9		Areas 11 to 16	
		Shallow	Deep	Shallow	Deep
26	Euphausids	45	50	47	51
23	Epifauna	25	8	19	8
20	Shrimp	5	6	2	3
25	Copepods	12	16	16	18
15	Capelin	2	2	1	1
14	Herring/other Clupeoids	1	1	2	3
12	Pollock	5.1	8.1	-	-
4	Hake	-	-	6	6
18	Squid	3	15	4	15
13	Rockfish	1.1	1.1	2	2
16	Atka mackerel/mackerel	1.2	1.2	1	1
3	Sauri, lanternfishes, myctophids	-	2.1	-	-

Table 27.--Mean food composition

2. Fin and minke whales

Rank no. (food)	Species/group of species	Areas 1 to 9		Areas 11 to 16	
		Shallow	Deep	Shallow	Deep
26	Euphausids	68	68	65	65
25	Copepods	25	25	25	25
18	Squids	3	3	4	4
15	Capelin	1	1	1	1
14	Herring	1.5	1.5	2.0	2.0
12	Pollock	1	1	-	-
4	Hake	-	-	1	1
3	Sauri, myctophids	0.5	0.5	2	2

Table 28.--Mean food composition

3. Bowhead whale

Rank no. (food)	Species/group of species	Areas 1 to 9		Areas 11 to 16	
		Shallow	Deep	Shallow	Deep
25	Copepods	36	40	-	-
23	Epibenthos (mysids)	31	25	-	-
26	Euphausids	10	16.5	-	-
20	Shrimp	4	2	-	-
19	Crab	2.5	0.5	-	-
15	Capelin/sand lance	4	2	-	-
12	Pollock	5.5	7	-	-
14	Herring	3	1	-	-
18	Squid	1.5	6	-	-
10	Cod/polar cod	2.5	-	-	-

Note: Small quantities of fish taken consists of juveniles (mostly schooling).

Table 29.--Mean food composition

4. Blue and sei whales
5. Bryde's whale

Rank no. (food)	Species/group of species	Areas 1 to 9		Areas 11 to 16	
		Shallow	Deep	Shallow	Deep
26	Euphausids	64	61	63	62.5
25	Copepods	20	25	18.5	18
18	Squid	7.5	9.5	9	12
3	Saury, myctophids	2.5	3	3	3.4
12	Pollock	2	0.5	-	-
14	Herring	0.5	0.5	1.0	0.8
4	Hake	-	-	2	1.5
13	Rockfish	0.5	-	1.0	0.8
16	Atka mackerel	0.5	0.5	1.0	1.0
23	Epifauna	2.5	-	1.5	-

Note: These whales are known to feed also on small quantities of small schooling fish (mostly larvae and juveniles).

Table 30.--Mean food composition

6. Giant bottlenose and beaked whales

Rank no. (food)	Species/group of species	Areas 1 to 9		Areas 11 to 16	
		Shallow	Deep	Shallow	Deep
18	Squid	20	25	20	23
12	Pollock	23	25	-	-
4	Hake	-	-	18	25
7	Yellowfin sole	3.5	.2	-	-
6	Flathead sole	1.0	.2	1.0	.5
5	Halibut	0.5	.2	-	-
8	Other flatfish	3.5	.4	2.0	.5
11	Sablefish	1.1	1.5	0.9	1.0
15	Capelin	7	8	3	3
16	Mackerel	6	18	10	15
14	Herring	5	5.2	9	11
17	Salmon	0.4	0.3	0.1	0.1
10	Cod	3	3	1	1
9	Cottids	14	5	17	6
13	Rockfish	4	6	5	7
23	Epifauna	8	2	8	2
3	Saury	-	-	5	5

Table 31.--Mean food composition

7. Sperm whale

Rank no. (food)	Species/group of species	Areas 1 to 9		Areas 11 to 16	
		Shallow	Deep	Shallow	Deep
18	Squid	77	78	83	78
12	Pollock	4	6	-	-
15	Capelin	2	1	1	1
14	Herring	2	1	3	5
13	Rockfish	2.3	1.3	2.3	1.3
16	Mackerel	3	2	3	2
26	Euphausids	7.5	9.5	3	2
23	Epifauna	2	1	1	0.5
3	Saury	-	-	3	5
4	Hake	-	-	1	5
17	Salmon (and tuna)	0.2	0.2	(0.1)	(0.1)

Note: According to Russian whale scientists, sperm whale occasionally take salmon and tuna. Furthermore, the sperm whale diet in the Bering Sea and Gulf of Alaska consists more of fish and euphausids than further south in the open ocean.

Table 32.--Mean food composition

8. Humpback whale

Rank no. (food)	Species/group of species	Areas 1 to 9		Areas 11 to 16	
		Shallow	Deep	Shallow	Deep
14	Herring/anchovy	3	2	6	3
26	Euphausids	20	16.5	12	16
17	Salmon	3.5	3.5	1.5	1.5
12	Pollock	25	15	-	-
4	Hake	-	-	20	15
13	Rockfish	5.0	6.5	5.0	6.5
10	Cod	3	3.5	3	3.5
15	Capelin	10.5	12.5	8.5	9.5
16	Mackerel	6.5	4.5	7	5
18	Squid	12	32.5	18	22
23	Epifauna	6	1	4	1
8	Other flatfishes	2.5	1	3	1
7	Yellowfin sole	2.5	1	-	-
5	Halibut	0.5	0.5	-	-
3	Saury, myctophids	-	-	12.0	17.0

Note: Although the humpback whale is a baleen whale, it is reported to feed on everything in the marine pelagic biota, specially on small and juvenile schooling fish.

Table 33.--Mean food composition

9. Beluga whale

Rank no. (food)	Species/group of species	Areas 1 to 9		Areas 11 to 16	
		Shallow	Deep	Shallow	Deep
12	Pollock	31	34	-	-
4	Hake	-	-	-	-
11	Sablefish	2	4	-	-
10	Cod	4	4	-	-
14	Herring	6	6	-	-
15	Capelin	10.5	10.5	-	-
9	Cottids	13	6	-	-
17	Salmon	3.5	3.5	-	-
3	Saury	-	0.5	-	-
7	Yellowfin sole	4	0.1	-	-
6	Flathead sole	2	0.1	-	-
5	Halibut	2	0.2	-	-
8	Other flatfish	4	0.2	-	-
13	Rockfish	2	4	-	-
18	Squid	10	23	-	-
16	Mackerel	6	4	-	-

Table 34.--Mean food composition

10. Killer and goosebeak whales

Rank no. (food)	Species/group of species	Areas 1 to 9		Areas 11 to 16	
		Shallow	Deep	Shallow	Deep
12	Pollock	33.5	32	-	-
4	Hake	-	-	28	30
11	Sablefish	3	4	4	4
10	Cod	5	5	4	4
14	Herring	3	3	5	4
15	Capelin	6	8	4	4
9	Cottids	6	3	5	2
17	Salmon	2.5	2.5	2	2
3	Saury	-	-	1	3
7	Yellowfin sole	2	0.1	-	-
6	Flathead sole	2	0.1	-	-
5	Halibut	1	0.5	-	-
8	Other flatfish	2	0.3	3	0.5
13	Rockfish	3	5	5	5
18	Squid	8	10	8	10
16	Mackerel	3	5	7	9
	Mammals and birds	20	21.5	24	22.5

Note: Killer whales prey also on small marine mammals and even on marine birds.

Table 35.--Mean food composition

11. Whiteside and Dall's porpoises

Rank no. (food)	Species/group of species	Areas 1 to 9		Areas 11 to 16	
		Shallow	Deep	Shallow	Deep
12	Pollock	25	25	-	-
4	Hake	-	-	25	20
11	Sablefish	4	6	3	4
10	Cod	6	6	2	2
14	Herring, sardine, etc.	10	8	12	10
15	Capelin, myctophids	8	10	6	9
9	Cottids	1	0.5	12	6
17	Salmon (also tuna)	2	4.3	2	4
3	Saury	-	-	5	8
7	Yellowfin sole	0.5	0.2	-	-
6	Flathead sole	0.5	0.1	0.5	0.2
5	Halibut	0.2	0.2	-	-
8	Other flatfish	0.5	0.2	0.5	0.2
13	Rockfish	3	6	6	8
18	Squid	29.3	26.5	14	19.6
16	Mackerel	4	5	6	7
19	Crab	-	-	2	1
23	Epifauna	6	2	4	1

Table 36.--Mean food composition

12. Harbor porpoise

Rank no. (food)	Species/group of species	Areas 1 to 9		Areas 11 to 16	
		Shallow	Deep	Shallow	Deep
12	Pollock	28.5	26	-	-
4	Hake	-	-	22	23
11	Sablefish	-	-	-	-
10	Cod	6	12	4	6
14	Herring	8	4	12	12
15	Capelin	10	14	8	8
9	Cottids	22	15	13	9
17	Salmon	3.5	3.5	1	1
3	Saury	-	-	2	5
7	Yellowfin sole	2	0.5	-	-
6	Flathead sole	1.5	0.5	-	-
5	Halibut	0.5	0.5	-	-
8	Other flatfish	3	1	8	3
13	Rockfish	3	3	8	6
18	Squid	0.01	10	6	16
16	Mackerel	4	8	8	8
23	Epifauna	6	1.5	7	2
19	Crab	2	0.5	1	1

Table 37.--Mean food composition

13. Right whale dolphin; Risso, common, bottlenose, and pilot dolphins

Rank no. (food)	Species/group of species	Areas 1 to 9		Areas 11 to 16	
		Shallow	Deep	Shallow	Deep
12	Pollock	-	-	-	-
4	Hake	-	-	20	12
10	Cod	-	-	-	-
14	Herring, sardines	-	-	10	10
15	Capelin, yctophids	-	-	10	10
9	Cottids	-	-	5	-
17	Salmon	-	-	-	-
3	Saury	-	-	5	15
7	Yellowfin sole	-	-	-	-
6	Flathead sole	-	-	-	-
5	Halibut	-	-	-	-
8	Other flatfish	-	-	-	-
13	Rockfish	-	-	3	3
18	Squid	-	-	42	45
16	Mackerel	-	-	5	5

Table 38.--Mean food composition

14. Sea otter

Rank no. (food)	Species/group of species	Areas 1 to 9		Areas 11 to 16	
		Shallow	Deep	Shallow	Deep
12	Pollock	15	-	-	-
4	Hake	-	-	8	-
10	Cod	2	-	-	-
14	Herring	5	-	7	-
15	Capelin	5	-	5	-
9	Cottids	20	-	15	-
7	Yellowfin sole	2	-	-	-
6	Flathead sole	2	-	-	-
8	Other flatfish	2	-	2	-
16	Mackerel	2	-	3	-
23	Epifauna	37	-	50	-
22	Infauna	3	-	5	-
19	Crab	5	-	5	-

Table 39.--Mean food composition

15. Fur seal

Rank no. (food)	Species/group of species	Areas 1 to 9		Areas 11 to 16	
		Shallow	Deep	Shallow	Deep
12	Pollock	47	40	-	-
4	Hake	-	-	30	30
10	Cod	1	1	-	-
14	Herring	8	10	15	18
15	Capelin	20	16	22.5	18
9	Cottids	8	4	10	2
17	Salmon	2.5	2.5	2.5	2.5
3	Saury	-	-	-	5
7	Yellowfin sole	0.5	0.01	-	-
6	Flathead sole	0.3	0.01	-	-
8	Other flatfish	0.2	0.01	-	-
13	Rockfish	2.5	2.5	2	-
18	Squid	3	15	8	14.5
16	Mackerel	7	9	10	10

Table 40.--Mean food composition

16. Steller sea lion

Rank no. (food)	Species/group of species	Areas 1 to 9		Areas 11 to 16	
		Shallow	Deep	Shallow	Deep
12	Pollock	39	48	-	-
4	Hake	-	-	37	39
11	Sablefish	1	1	1	1
10	Cod	4	4	4	4
14	Herring	6	3	7	4
15	Capelin	8	5	8	4
9	Cottids	7	5	6	4
17	Salmon	4	4	3	3
3	Saury, myctophids	-	-	4	8
7	Yellowfin sole	4	1	-	-
6	Flathead sole	3	1	1	0.5
5	Halibut	1	0.5	-	-
8	Other flatfish	6	1.5	6	1.5
13	Rockfish	8	8	8	8
18	Squid	5	12	7	15
16	Mackerel, Atka mackerel	4	6	8	8

Table 41.--Mean food composition

17. California sea lion

Rank no. (food)	Species/group of species	Areas 1 to 9		Areas 11 to 16	
		Shallow	Deep	Shallow	Deep
4	Hake	-	-	25	29
11	Sablefish	-	-	1	1
10	Cod	-	-	2	2
14	Herring, anchovy	-	-	19	16
9	Cottids	-	-	6	4
17	Salmon	-	-	3	3
3	Saury	-	-	4	8
6	Flathead sole	-	-	1	0.5
8	Other flatfish	-	-	6	1.5
13	Rockfish	-	-	8	8
18	Squid	-	-	17	19
16	Mackerel	-	-	8	8

Table 42.--Mean food composition

18. Elephant seal

Rank no. (food)	Species/group of species	Areas 1 to 9		Areas 11 to 16	
		Shallow	Deep	Shallow	Deep
4	Hake	-	-	22	25
11	Sablefish	-	-	3	3
10	Cod	-	-	1	1
14	Herring	-	-	5	1
9	Cottids	-	-	16	15
17	Salmon	-	-	4	4
3	Saury	-	-	5	8
6	Flathead sole	-	-	1	0.01
8	Other flatfish	-	-	3	0.01
13	Rockfish	-	-	17	17
18	Squid	-	-	15	21
16	Mackerel	-	-	8	5

Table 43.--Mean food composition

19. Harbor seal

Rank no. (food)	Species/group of species	Areas 1 to 9		Areas 11 to 16	
		Shallow	Deep	Shallow	Deep
12	Pollock	30	44	-	-
4	Hake	-	-	31	46
10	Cod	8	5	4	2
14	Herring	7	4	9	5
15	Capelin	10	8	8	6
9	Cottids	13	6	15	6
17	Salmon	3	4	2	2
7	Yellowfin sole	1	0.5	-	-
6	Flathead sole	1	0.5	1	0.5
5	Halibut	1	0.5	-	-
8	Other flatfish	1	0.5	1	0.5
13	Rockfish	4	3	6	6
18	Squid	8	18	10	20
16	Mackerel	5	3	7	4
23	Epifauna	6	1	4	1
19	Crab	2	1	2	1

Table 44.--Mean food composition

20. Walrus

Rank no. (food)	Species/group of species	Areas 1 to 9		Areas 11 to 16	
		Shallow	Deep	Shallow	Deep
23	Epifauna	68	10	-	-
22	Infauna	4	2	-	-
21	Predatory benthos	10	12	-	-
10	Cod	3	20	-	-
12	Pollock	4	30	-	-
7	Yellowfin sole	1	3	-	-
6	Flathead sole	2	2	-	-
5	Halibut	1	3	-	-
8	Other flatfish	2	8	-	-
9	Cottids and other demersal	5	10	-	-

Note: Although >80% of walrus food consists of benthos, it is known to also take small quantities of fish.

Table 45.--Mean food composition

21. Bearded seal

Rank no. (food)	Species/group of species	Areas 1 to 9		Areas 11 to 16	
		Shallow	Deep	Shallow	Deep
23	Epifauna	33	22	-	-
22	Infauna	6	2	-	-
21	Predatory benthos	25	18	-	-
19	Crab	2	4	-	-
20	Shrimp	4	8	-	-
10	Cod	6	8	-	-
12	Pollock	10	16	-	-
9	Cottids and others	8	9	-	-
15	Capelin	3	6	-	-
7	Yellowfin sole	1	1	-	-
6	Flathead sole	1	1	-	-
8	Other flatfish	1	1	-	-
14	Herring	1	4	-	-

Table 46.--Mean food composition

22. Ice seals

Rank no. (food)	Species/group of species	Areas 1 to 9		Areas 11 to 16	
		Shallow	Deep	Shallow	Deep
23	Epifauna	33	28	-	-
22	Infauna	5	2	-	-
26	Euphausids	13	20	-	-
19	Crab	2	1	-	-
20	Shrimp	2	2	-	-
9	Cottids	10	8	-	-
10	Cod	10	8	-	-
12	Pollock	14	20	-	-
17	Salmon	2	2	-	-
15	Capelin	6	5	-	-
14	Herring	2	3	-	-
8	Other flatfish	1	1	-	-

Table 47.--Mean food composition

23. Sharks

Rank no. (food)	Species/group of species	Areas 1 to 9		Areas 11 to 16	
		Shallow	Deep	Shallow	Deep
12	Pollock	25	29	-	-
4	Hake	-	-	25	26
11	Sablefish	2	2	2	2
10	Cod	6	6	5	5
14	Herring	4	2	8	6
15	Capelin	10	12	10	10
9	Cottids	12	9	9	7
17	Salmon	5	4	3	2
3	Saury	-	-	3	7
7	Yellowfin sole	5	2	-	-
6	Flathead sole	4	1.5	5	2.5
5	Halibut	3	1.5	-	-
8	Other flatfish	5	3	6	4
13	Rockfish	8	10	10	8
18	Squid	5	12	7	14
16	Mackerel	6	6	7	6.5