COASTAL VERTEBRATES

A Brief Introduction
to the Birds, Mammals, Reptiles and Amphibians
of Outer Continental Shelf Planning Areas
and Adjacent Coastal Regions

A Draft Document

Prepared by Investigators and Students of

PROJECT OCS MAPS

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Cooperative Agreement No. 14-12-0001-30114

Federal OCS Oil and Gas Activities:
A Relative Comparison of Marine Productivity
Among the Outer Continental Shelf Planning Areas

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INTRODUCTION

The enormous diversity of coastal habitats in the Atlantic region supports a corresponding diversity of fauna and flora. The rocky northern coast is an important breeding ground for sea and shore birds and many species of waterfowl. Many of these birds reach the southern limit of their breeding range on the north Atlantic coastal islands. Aythyin ducks raft offshore in the winter, and large populations of eiders, Barrow Goldeneye, Harlequin Duck and scoters are found in the north Atlantic continental shelf waters in winter. Anserine and anatine waterfowl winter farther south on the Atlantic coast, in marshes and estuaries of MATL and SATL. Chesapeake Bay and Carolina Sound complexes support breeding of many species of puddle ducks, and Canada geese breed in coastal refuges. Furbearing mammals are found and exploited along the entire Atlantic coast, but United States fur production is dominated by Gulf coast harvests. Seals inhabit the northern Atlantic but not MATL or SATL. Cetaceans (including six endangered species of large whales) migrate along the continental shelf, summering and calving in the north and wintering in the south.

In the Gulf of Mexico coast region, production and diversity of vegetation is reflected in the high diversity an abundance of animals. Number of species of reptiles, mammals and birds is higher in the Gulf region than anywhere else in the United States. Populations of many waterfowlspecies depend on wintering grounds in the Gulf. An exception to the richness of vertebrate communities in the Gulf is the marine mammal fauna. In general, the Gulf is relatively poor in both nnumber of species and individual density. Within the Gulf region EGUL has low diversity but highest density. CGUL has the lowest density and diversity, while western areas of the Gulf have relatively high diversity but low individual density. Low abundance and diversity of marine mammals may reflect oligotrophic water column conditions and impoverished plankton.

Because Pacific coastal lands are not closely coupled to nearshore waters, few terrestrial vertebrates depend on coastal areas for population support, The sole exception is the insular species of fox found on the channel islands. Both southern (SCAL) and northern (NCAL and ORWA) portions of the region are important to populations of several species of pinnipeds. Cetaceans migrate along the entire Pacific coast, but SCAL waters are most critcal to several species which habitually forage in coastal areas. Seabirds breed in large numbers in SCAL, NCAL, and ORWA. By far the greatest avifaunal diversity is found in SCAL, and seasonal turnover is high. The ice free ORWA coast is important winter habitat for many species of birds which breed in the far north.

In the Alaska region, following the general trends of phytoplankton production and fin- and shellfish abundance, the highest densities of seabirds, shorebirds, waterfowl, and marine mammals are found in the Bering Sea, a wintering ground for Arctic animals, and summering ground for many temperate and boreal species. The Gulf of Alaska is only somewhat less outstanding in these respects, and is especially significant

for the bird and mammal migratory corridors which pass over and through its waters. While the Artic coast and shelf does not support the tremendous abundance of life found in other parts of the Alaskan marine environment, arctic habitats are essential to such species as the poilar bear and bowhead whale.

VERTEBRATES

NATL

MAMMALS

Terrestrial mammals of importance in NATL include gray and red fox, bobcat, raccoon, cottontail, whitetail deer and black bear. The latter two species are heavily hunted, and along with the moose (which is an inland species not abundant along the coast) comprise the most important game animals of the region.

Aquatic furbearers are beaver, mink, muskrat and otter. Muskrat is a frequent inhabitant of both fresh and salt marshes in the region, and the limited extent of the latter may account for the muskrat's relative scarcity (Beccasio et al. 1980). An interesting species, the sea mink (Mustela macrodon) once lived on rocky shores in NATL. It was hunted to extinction by 1860 (Hall and Kelson 1959).

Three species of pinnipeds: harbor seal (Phoca vitulina), hooded seal (Cystophora cristata), and gray seal (Halicoerus grypus) are found in NATL (Hall 1981). The hooded seal is not common in coastal waters south of Newfoundland (King 1983). The harbor seal breeds on coastal rocks and islands throughout NATL (Beccasio et al. 1980, King 1983), as does the less common gray seal, for which breeding records exist as far south as Muskeget Island, Massachusetts (Hall 1981).

BIRDS

Thirty-four species of seabirds are found in NATL. Of these, 11 species winter, 20 summer, and 3 are found throughout the year. Of 31 species of shorebirds and waders, 4 winter, 24 summer, and 3 occur year round. Thirty-four species of waterfowl use coastal or offshore areas of NATL, of which 19 species winter, 7 summer and 8 are found year round. Raptors through passerine comprise 163 species. Six species winter, 91 summer, and 66 are found all year (National Geographic Society 1983, Harrison 1983).

The northern portion of NATL along the Gulf of Maine is a rocky, fjord environment with many offshore islands that support a distinctly boreal avifauna. The common eider and harlequin duck breed in northern NATL, as do petrels, guillemots and razorbills (Beccasio et al. 1980). Matinicus Rock supports the only U. S. breeding population of common puffins. Other islands are currently being surveyed for restocking and/or attraction of new breeding groups (Steven Kress, Cornell University, personal communication).

South of the Gulf of Maine, from Elizabeth to Cape Cod, the coast is not as rough and rocky as further north. Shorebird nesting and migration concentration areas are found throughout,. although urbanization has reduced beach area available to breeding birds (Beccasio et al. 1980). Herring and black-backed gulls; cattle, great and snowy egrets; tricolored, little blue,

black-crowned night herons and glossy ibis breed at Parker River National Wildlife Refuge and on House Island,

VERTEBRATES

MATL

Mammals

Mammals of importance which inhabit upland areas include whitetail deer, eastern cottontail, gray squirrel, and eastern fox squirrel. The Delmarva form of fox squirrel is endangered, primarily by destruction of the old-growth loblolly pine habitat it requires (Flyger and Gates 1982). Common upland forbearers include raccoon, opossum, weasel, striped skunk, and gray and red fox.

Furbearing mammals in coastal areas of MATL are trapped commercially. Important. species are muskrat, river otter, mink, beaver, and the introduced nutria (Winner 1982).

MATL waters are within habitual range of at least seven species of cetaceans (University of Rhode Island 1981), but the region is more important as a migration route than as breeding or feeding grounds (Leatherwood and Reeves 1982. Reeves and Brownell 1982),

Birds

The MATL barrier islands are important habitats for wading bird rookeries, nesting grounds for colonies of gulls and terns, and stopovers for migrating shorebirds and raptors. Marshes, undeveloped shorelines, bays, rivers, and forests comprise valuable wildlife areas. The region lies on the Atlantic flyway, a major avian migration route used by large numbers of waterfowl, shorebirds, and land birds. Dabbling ducks, diving ducks, geese, and swans seasonally migrate through or over-winter in MATL coastal environments. The most widespread waterfowl species include the following:

dabbling ducks
- mallard *Anas platyrhynchos*
- American black duck *A. rubripes*

diving (sea) ducks
- lesser scaup *Athya affinis*
- redhead *A. americana*
- canvasbacks *A. valisineria*
- ring-necked duck *A. collaris*

geese
- Canada goose *Branta canadensis*
- brant *B. bernicla*
- snow/blue goose *Chen caerulescens*

swans
- tundra swan *Cygnus columbianus*

In general, waterfowl migration peaks during October and November. The Atlantic flyway is not as heavily utilized by shorebirds during spring migration (March - May). However, brants and snow geese follow the coast during their northward migration from winter concentrations in southern Pamlico Sound (Beccasio et al. 1980).

Shorebirds and wading birds form important breeding populations in major areas of the MATL. The most abundant breeding species are herring gull (Larus argentatus), common tern (Sterna hirundo), and least tern (S. antillarum). Beaches, marshes, mudflats, and areas of dredge spoil provide breeding areas for these species, and for plovers, oyster-catchers, and skimmers. Breeding populations of wading birds are conspicuousCarolina, represent the current northern limit of the expanding breeding range of the brown pelican. Wetlands extending south from Alligator River through North Carolina's sounds contain the northern breeding limit for the American alligator. However, these species are more common further south in the SATL OCS Planning Area. Similarly, although the right whale is considered endangered, it is sighted less frequently here than in ths are common nesters in
coastal and freshwater marshes.

VERTEBRATES

SATL

MAMMALS

Upland habitats in SATL support white tail deer, black bear, cottontails and gray and fox squirrels. Raccoon, opossum and bobcat are found throughout the region. Aquatic furbearers include mink, otter, muskrat and beaver. The introduced nutria is found at scattered localities in SATL (Winner 1982).

The Florida manatee is confined to southern Florida (now the Straits of Florida OCS Planning Area) in winter, but in warmer seasons it ranges northward in SATL to Georgia and even (rarely) further north.

The best available quantitative survey of marine mammals in SATL in one transect off central Florida in which identifications based on aerial surveys were compared with similar transects in the Gulf of Mexico (Fritts et al. 1983). Thirteen species of cetaceans were reported from this transect. Several species (Right Whale, Minke Whale, False Killer Whale and Short-finned Pilot Whale) are migrants through the region. Density of individuals is higher in SATL than in the Gulf of Mexico (Fritts et. al. 1983) but lower than that in the North Atlantic (Univ. of Rhode Island 1979).

Birds

Major migration routes for both water birds and passerine involve coastal areas of SATL. Both spring and fall warbler migrations Pass along the beaches and islands, and many other species favor coastal dune swales for nesting (D. Ludwig, unpublished data).

Colonial nesting shorebirds include herring, laughing and ring-billed gulls, comon, sandwich, gull-billed and royal terns, black skimmer, American oystercatcher and several species of plovers. These birds utilize remote and/or protected beaches for nest sites.

Wading birds nest in colonies, usually in hammocks or forest. patches near or over fresh or brackish water. Herons, egrets, and white and glossy ibis are colony nesters, as is the endangered wood stork,

Seabirds of the South Atlantic are poorly studied. Mr. Christopher Hainey, of the Department of Zoology, [University of Georgia, is currently attempting to catalog and census pelagic birds off the Georgia coast, but observations remain lagly unpublished and synthesis is not possible at this time. Overflight transects conducted in central Florida (Fritts et al. 1983) document 25 species of marine birds, with Shearwaters, petrels and pelicans comprising greater than 50 percent of the marine avifauna.

VERTEBRATES

EGUL

MAMMALS

Permanent transect overflights near Naples, FL, revealed 2644 individuals of at least six identifiable species of marine mammals. Diversity was relatively low, but abundance relatively high in comparison with similar surveys elsewhere in the Gulf of Mexico and the south Atlantic OCS Planning Areas. The most abundant species was the Atlantic bottlenose dolphin (Turciops truncates); striped and spotted dolphins were somewhat less common. A single sperm whale (Physeter catodon) sighting indicates the infrequent presence of this species off the Florida Gulf coast (Fritts et al. 1983.

Common and widespread species of terrestrial mammals in coastal EGUL include bobcat (rare and/or threatened elsewhere in the deep south), whitetail deer (Odocoileus virginianus), rabbits (3 spp.), squirrels (2 spp.), raccoon (Procyon lotor), opossum (Didelphis marsupialis), skunks (2 spp.), nutria (Myocastor COYPUS), and muskrat (Ondatra zibethicus). Florida black bear (Euarctos americanus) (threatened), Florida panther (Felis concolor), and the aquatic West Indian manatee (Trichechus manatus) also occur in peninsular Florida (Woolfenden 1983). These latter are considered under Endangered Species, below. Two aquatic mustelids, the mink (Mustela vison) and river otter (Lutra canadensis), are found in EGUL where they frequent coastal habitat. River otter is under status review by the U.S. Fish and Wildlife Service.

Three unique species of rodents inhabit coastal EGUL. The Choctawhatchee beach mouse (Peromyscus polionotus allophrys) is restricted to beach and dune habitats near Panama City, Florida. The Perdido Key beach mouse (P. p. trissylepsis) is found in similar habitats from Pensacola Bay west to Bon Secour Bay (Beccasio et al. 1982). The Florida mouse (P. floridanus) is found in dry sand pine and scrub habitats of peninsular Florida (Burt and Grossenheider 1976; Woolf enden 1983).

Many exotic animal species have established more or less tenuous populations in south Florida In EGUL, an interesting addition to the fauna is a small herd of sambar deer in St. Vincent National Wildlife Refuge, remnants of a privately hunted preserve population (Beccasio et al. 1982).

Birds

Bird species' numbers in the EGUL OCS Planning Area are as follows (Peterson 1980; Beccasio et al. 1982; Woolf enden 1983): breeding, 140 species; wintering, 235 species. The total is 257 species altogether, Ecological characteristics of coastal EGUL, including great habitat diversity, high Productivity, and favorable climate render the area important for avifauna alluring all seasons.

Twenty-four species of marine birds were identified from a permanent overflight, transect near Naples, Florida. Terns accounted for 67% of individuals

identified, gulls 19%, and pelecaniformes 9%. Audubon's shearwater (Puffinus iherminieri), Cory's shearwater (P. diomedea), greater shearwater (P. gravis), and Wilson's storm-petrel (Oceanites oceanicus) occurred in low numbers, Unexpectedly, high numbers of common loons (Gavia immer) and magnificent frigatebirds (Fregata magnificent) were encountered. Abundances of loons, frigatebirds, and pelicans (Pelecanus spp.) may be related to abundance of schooling fish, and occurrence of terns, noddys (Anous stolidus), and frigatebirds is probably due to proximity of breeding grounds in the Florida Keys.

Bald eagle (Haliaeetus leucocephalus), peregrine falcon (Falco peregrinus), white pelican (Pelecanus erythrorhynchos), American oyster-catcher (Haematopus palliatus), and many waterfowl winter in estuaries and wetlands of EGUL. The Planning Area is particularly important for wintering American coots (Fulica Americana), and bald eagles have been known to breed (Beccasio et al. 1982).

Among the interesting and/or important species that breed in EGUL are the red-cockaded woodpecker (Dendrocopas borealis), brown pelican (Pelecanus occident. alis), short-tailed hawk (Buteo brachyurus), Cuban shown plover (Charadrius alexandrines subsp.), white-crowned pigeon (Columba leucocephala), magnificent frigatebird, mottled duck (Arias fulvigula), black-bellied whistling duck (Dendrocygna autumnalis), fulvous whistling duck (D. bicolor), and wood duck (Aix sponsa). The Cape Sable seaside sparrow (Ammospiza mirabilis) is close to extinction in its last remaining habitat in the northwest corner of Everglades National Park.

Breeding colonies of birds are found throughout EGUL. Important examples include Collier Seminole State Park (with approximately 6000 pairs of wood stork, Mycteria Americana), Pine Island (6-12 pairs of bald eagles), and Cedar Keys National Wildlife Refuge (up to 200,000 birds, with 60,000 white ibises) (Beccasio et al. 1982).

VERTEBRATES

CGUL

MAMMALS

Diversity and abundance of marine mammals in the CGUL OCS Planning Area is low compared with other regions of the Gulf Coast. Extensive overflight surveying of a permanent transect near Shell Keys National Wildlife Refuge off Marsh Island, Louisiana (Fritts et al. 1983) revealed only six species of marine mammals, The bottlenose dolphin (Turciops truncatus) accounted for 79% of all individuals, with the remainder consisting of sperm whale (Physeter catodon), short-finned pilot whale (Globicephala macrorhynchus), spotted dolphin (Stenella spp.), striped dolphin (S. coerleoalba), and unidentified dolphins. The total number of individual marine mammals sighted was less than 50% of the number recorded for similar sampling effort on each of two transects off the Florida coast. Low percentage (27%) of deep (>100m) water in the transect. area may account for the low abundances and diversity of marine mammals (Fritts et al. 1983). Some sightings of the West Indian manatee (Trichechu manatus) have been reported in the Mississippi delta (Beccasio et al. 1982),

Widespread species of terrestrial mammals utilizing coastal habitat in CGUL include bobcat (Lynx rufus), whitetail deer (Odocoileus virginianus), mink (Mustela vison), river otter (Lutra canadensis), nutria (Myocastor COYPUS), muskrat (Ondatra zibethicus), swamp rabbit (Sylvilagus aquatics), marsh rabbit (S. palustris), opossum (Didelphis marsupials), raccoon (Procyon lotor), and skunk (Mephitis mephitis). 'l'he black bear (Euarctos americanus) is threatened in Mississippi, and is found in CGUL, as is the red wolf (Canis niger). The Florida panther (Felis concolor) may occur in this region, but recent sightings are unconfirmed. For further information, see "Endangered Speciesj" below.

Wetlands near the mouth of the Mississippi River support a small population (150-200 individuals) of the unique "marsh" race of the whitetail deer. Louisiana has for many years been the nation's leading producer of wild fur (Beccasio et al. 1982).

Birds

Coastal areas of the CGUL OCS Planning Area are within the winter range of 196 bird species and within the summer and/or breeding range of 126 species (Peterson 1980). Twenty-five species of marine birds were identified from a permanent overflight transect.. The same number of species, but far fewer individuals, were reported from similar transects in other areas of the Gulf Coast. Large numbers of individual oceanic birds may be related to high productivity of coastal waters within the region (Fritts et al. 1983),

Coastal marshes of CGUL are important winter concentration areas for waterfowl. White ibis and other shorebirds breed at various sites along the coast, and migrating birds of several orders utilize coastal habitats in both spring and autumn (Beccasio et al 1982). Species commonly represented in major breeding colonies in the region are listed in 'l'able 1.

Among endangered bird species, the bald eagle (Haliaeetus leucocephalus), brown pelican (Pelecanus occidentals), red-cockaded woodpecker (Picoides borealis), and Mississippi race of sandhill crane (Grus canadensis) all breed locally in CGUL. The peregrine falcon (Falco peregrinus) and white pelican (Pelecanus erythrorhynchos) are migrants and winter residents.

Bird species commonly represented in breeding colonies within the CGUL OCS Planning Area are the brown pelican, Pelecanus occidentals, laughing gull, Larus atricilla, Forster's tern, Sterna forsteri, least tern, S. albifrons, black skimmer, Rhynchops niger, great blue heron, Ardea herodias, Louisiana (tricolor) heron, Hydranassa tricolor, great egret, Casmerodius albus, American oystercatcher, Haematopus palliatus, ~~white ibis, Eudocimus albus~~.

VERTEBRATES

WGUL

MAMMALS

Diversity of marine mammals as estimated on a permanent overflight transect off Padre Island was second highest (at least ten species) of four Gulf and south Atlantic survey areas. However, the Padre Island transect had low numbers of individuals in comparison with eastern Gulf transects. Bottlenose dolphin (Turciops truncates), sperm whale (Physeter catodon), and Stenella SPP. were the most frequently sighted. other species recorded were unidentified Mesoplodon and beaked whale, pygmy killer whale (Feresa attenuata), short-finned pilot whale (Globicephals macrorhynchus), Risso's dolphin (Grampus griseus), spotted dolphin (St. enella plagiodon, S. frontalis, S. dubia), and striped dolphin (S. coeruleoalba).

The sperm whale was recorded more frequently and in greater numbers than expected, and Risso's dolphin has not previously been reported for the western Gulf of Mexico. Presence of pelagic species in this area is attributed to the narrow continental shelf allowing marine mammals deep water in proximity to the coast (Fritts et al. 1981).

The West Indian manatee (Trichechus manatus has been sighted from Galveston Bay and further south (Shew et al. 1981b), and is a "casual visitor" at the mouth of the Rio Grande River (Beccasio et al. 1.982). The Texas coast manatees may be remnants of northern Gulf populations.

Common species of terrestrial mammals widespread in coastal habitats of the WGUL OCS Planning Area include bobcat (Lynx rufus), whitetail deer (Odocoileus virginianus), gray fox (Urocyon cinereoargenteus), nutria (Myocastor coypus), coyote (Canis latrans), raccoon (Procyon lotor), badger (Taxidea taxus), coati-mundi (Nasua narica), mink (Mustela vison), river otter (Lutra canadensis), and peccary (Pecari tajacu). Of particular interest are the badger, coati, and peccary which are found only on this section of the U.S. coast (Beccasio et al. 1982). In addition to the above, game and fur-hearing species include fox squirrel (Sciurus niger), gray squirrel (Sciurus carolinensis), beaver (Castor canadensis), muskrat (Odonatra zibethicus, in the northern section of WGUL), and marsh rabbit (Sylvilagus palustris) (Shew et al. 1981 b).

The last. remaining wild populations of red wolf (Lupus niger) ranged over northern counties in coastal WGUL, but may now be extinct. The jaguarundi (Felis yagouroundi cacomitli), jaguar (F'. onca), cougar (F'. concolor), and ocelot. (F. pardalis) are all endangered, and all depend on increasingly rare thicket. /matte habitat on the south Texas coastal plain (Shew et al. 1981b).

Birds

Marshes and estuaries in WGUL support concentrations of wintering waterfowl that are among the largest in the country (Beccasio et al. 1982). The region is a traditional wintering ground for mallards (Anas platyrhynchos),

gadwall (A. strepera), and blue-winged teal (A. discors), and nearly 78% of the world population of redhead ducks (Aythya americana) winters in Laguna Madre (Beccasio et al. 1982).

Over 40 species of marine birds were identified from a permanent. overflight transect, but numbers of individuals were low in comparison with other Gulf Coast surveys. Gulls and terns accounted for about 91% of individual birds sighted, and phalaropes (family Phalaropodidae), jaegers (Stercorarius spp.), black skimmer (Rynchops niger), six pelicaniform species, and two species of shearwater were also reported (Fritts et al. 1981).

Masked ducks (Oxyura dominica) and mottled ducks (Anas fulvigula) breed in marshes of the Texas Coast (Peterson 1980, Beccasio et al. 1982). Resident wading birds include the white ibis (Eudocimus albus, endangered in Texas), reddish egret (Dichromanassa rufescens), white-faced ibis (Plegadis chihi), and roseate spoonbill (Ajaia ajaia).

Aransas National Wildlife Refuge supports the largest species list (about 350 spp.) of any unit in the National Wildlife Refuge system (Beccasio et al. 1982). The Refuge was established in 1937 to protect the whooping crane (Grus Americana), and is now the wintering ground for a great, percentage of extant individuals (Shew et al. 1981b). Wood storks (Mycteria americana) and Attewater's greater prairie chicken (Tympanuchus cupido) also are reported from the Refuge (Beccasio et al. 1982). The latter species is reported from various sites on the Texas coastal plain as well (Beccasio et al. 1982).

The winter bird fauna of the Texas coast is extremely diverse, as northern migrants mingle with non-migrating residents.

VERTEBRATES

SCAL

MAMMALS

More than 30 species of marine mammals breed, feed or migrate through the Southern California Planning Area. About 40% of the known total population} of California sea lions and northern elephant. seals breed in the channel islands. Total population of pinnipeds in the planning area is estimated to exceed 75,000 (LeBoef et al. 1976).

The only common mysticete whale in southern California is the California Gray Whale (Eschrichtius gibbosus), which migrate through southern California on annual passage between feeding areas in the Bering Sea and calving grounds in Scammon Lagoon, Baja California, Mexico (Reeves and Brownell 1982).

Other cetac eans occuring in southern (California include the mysticetes Baleana glacialis, Balaenoptera acutorostrata, B. borealis, B. musculus, B. physalus and Megapt era noveanglive (Dailey 1974, Chapman & Feldhamer 1982) and fifteen odontocete species: Delphinus delphis, Globicephala macrorhyncha, Lagenorhynchus obliquidens, Lissodelphis borealis, Orcinus orca, Phocoena phocoena, Phocoenoides dalli, Stenella caeruleoalba, S. graffmanii, Tursiops gilli, Kogia breviceps, Pseudora crassidens, Physeter catodon, Mesoplodon carlihubbsi, and Ziphius cavirostris (Dailey 1974).

The sea otter, Enhydra lutris was once a common and important inhabitant of coastal California. It was recently extinct. in southern areas of the state, arid probably does not now occur there in meaningful numbers (Kenyon 1982).

Conspicuous and important terrestrial mammals of the southern California coast include tile mule deer, gray fox, bobcat, cougar, black bear and wild boar. Coyot es are abudant and pestiferous in urban and suburban areas where development has forced other mammalian species from favored habitats (Bekoff, 1982). The wild boar is an important game animal of chaparral habitats, particularly on the channel islands. The insular gray fox (latin name) is a unique inhabitant of several of the channel islands.

Birds

A total of 326 bird species inhabit the Southern California Planning Area. Among seabirds, nineteen species winter, at least twelve species summer, and sixteen species are year round residents. Of all other species combined, 60 winter, 30 summer and 189 inhabit SCAL year round (National Geographic Society, 1983). The channel islands support thirteen unique endemic forms, including one each of' California quail, Allen's hummingbird, western flycatcher, horned lark, scrub joy, Bewick's wren, loggerhead shrike, orange-crowned

warbler, house finch, rufous-sided towhee, rufous-crowned sparrow, sage sparrow and song sparrow.

Waters offshore of San Diego Bay and Santa Barbara support winter concentrations of waterfowl and seabirds. South of San Diego Bay along the coast and near the Coronado Islands are found some of the few nesting locations for black skimmers, elegant terns, least terns and Caspian terns,

VERTEBRATES

CCAL

MAMMALS

CCAL is not as important to pinniped populations as are regions further north or south. The California sea lion is found in CCAL, but the Channel Islands of SCAL support most of the population, The Steller Sea Lion also occurs in CCAL waters, but the center of breeding distribution is north of the Canadian border. The harbor seal is the only pinniped which occurs in CCAL in numbers significant to its overall population (Morejohn 1977).

Approximately 22 species of cetaceans have been observed in CCAL. Grey whales migrate in coastal waters, and Blue, sei and humpback whales are occasionally sighted offshore. Dolphins (Turciops and Delphinus) and pilot whales (Globicephalus) are year-round residents.

Terrestrial mammals of importance in CCAL include mule deer, gray fox, bobcat, mountain lion, raccoon and black bear, Aquatic forbearers are relatively sparse on the coast, and trapping is not an important activity.

Birds

Avifauna of CCAL comprises approximately 227 species. Of sixteen sea birds commonly found in shelf waters, thirteen winter and three are found year-round. Of 29 shorebirds and waders, 21 winter and eight are found year-round, Of 31 waterfowl species, 26 are found in winter and five live in the area year-round. Raptors through passerine comprise 151 species, of which 51 summer. 21 winter and 79 are found vear-round (data summarized from large-scale distribution maps in Robbins et al. 1966).

Tidal marshes are of particular interest, for they support a variety of wading birds, waterfowl and passerine, as well as the California clapper rail and California black rail, species of special concern.

NCAL Coastal Habitats

VERTEBRATES

NCAL

MAMMALS

The southern subspecies of the sea otter ranges north through Humboldt Bay, and the northern subspecies has been introduced to the Oregon coast from the Aleutian population and may range into NCAL (Beccasio et al. 1981, Jones and Stokes 1981a,b).

Four species of pinnipeds are found in NCAL: the elephant seal, Steller's sea lion, California's sea lion and harbor seal. Haulout sites are found througout the coast, and breeding occurs in specific colony areas.

More than 22 species of cetaceans are found in northern California coastal waters (BLM 1982b). Gray whales migrate through the NCAL area twice a year, and blue, sei and humpback whales utilize offshore waters (BLM 1982b).

Coastal NCAL is not important to survival of any terrestrial mammal species. Important mammals of the area include mule deer, black bear, gray fox, bobcat., cougar and raccoon.

BIRDS

More than 40% of total California seabird production occurs in NCAL. The area is particularly important for breeding of Fork-Tailed Storm Petrel, Learch's Storm Petrel, Common Murre, Marbled Murrelet, Rinoceros Aublet and Tufted Puffin. (Sowls et al, 1980),

Twenty-nine species of waterfowl winter in NCAL (Robbins et al. 1966), but the low proportion of estuarine area reduces the importance of the coastal region as critical habitat. Many sea ducks raft offshore, but major wintering grounds are further north.

VERTEBRATES

ORWA

MAMMALS

At least. 30 species of marine mammals, including seven endangered whales (see Endangered Species), are known to occur in waters of the ORWA OCS Planning Area (Table 1). Distribution, abundance, and life history data are scant for this region, especially for cetaceans, Several of the toothed whales and porpoises listed in Table 1 are known only from strandings or a few sightings.

Northern Sea otters are not abundant on the Oregon and Washington coasts, although the predominance of rocky shores with extensive kelp beds and rich benthic populations offers much apparently good habitat. Transplants of Aleutian sea otters to Oregon and Washington during the late 1960's and early 1970 had mixed success (Kenyon 1978). Southern sea otters, a threatened subspecies, have been observed as far north as Quillayute Needles NWR (MAP 75; USFWS 1981).

Harbor seals haul out on sandspits, coastal rocks and low tidelands in ORWA for resting, pupping and nursing. They are common in estuaries, and have been observed as far as 290km inland on the Columbia River. The Washington population in 1977 was 5500 individuals; at least as many can be presumed to inhabit the Oregon coast.. Harbor seals PUP in May on the Washington coast, and from June to September in Puget Sound (Newley 1978; King 1983).

Steller sea lions haul out. and breed on rocky oceanic shores, especially islands, and feed in coastal and shelf waters. Somewhat out-of-date estimates placed the Oregon and Washington population at 650-1000, and 400-500 individuals respectively (Kenyon and Rice 1961). California sea lions do not breed north of the Farallon Islands (see NCAL), but males range as far north as Vancouver Island (Canada) from August to May (Mate 1978).

Northern fur seals are entirely pelagic except during the summer breeding season, when they are confined to a few islands in the Bering Sea. Wintering concentrations of tens to hundreds of fur seals have been observed along the continental slope off Oregon and Washington (Fiscus 1978).

Northern elephant seals feed on pelagic fish and squid in deep water offshore from ORWA and are found along the Washington coast from April through June. Elephant seals, like fur seal, are pelagic, and range widely at sea for months at a time. The northernmost. breeding colony is on the Farallon Islands in northern California (Delong 1978; Condit and LeBoeuf 1984).

No numerical estimates have been found for any of the sixteen species on non-endangered cetaceans which occur in ORWA. Species that are common or at least occasionally abundant include minke whales, killer whales, Dall and harbor

porpoises, and Risso's dolphin. Deeper offshore water may provide important habitat for beaked whales and other cetaceans, but there are no data from which to estimate their abundance,

Birds

Rocky cliffs and sea islands along the Oregon and Washington coasts are important nesting sites for nearly one million colonial seabirds, Leach's storm-petrels (Oceanodroma leucorhoa) and common murres (Aria aalge) have the largest breeding populations on the Oregon coast with 535,000 and 123,700 individuals respectively. Seabirds with much smaller breeding populations in Oregon include Cassin's auklet (Ptychoramphus aleuticus), tufted puffin (Lunda cirrhata), gulls and cormorants (USFWS 1980).

Copalis, Quillayute Needles, and Flattery Rock National Wildlife Refuses in Washington protect island nesting habitat for 150,000 seabirds, including petrels, auklets, murres, gulls, cormorants, guillemots, and oystercatchers. Seasonal migrations of pelagic birds increase the Washington populations to more than one million individuals (USFWS 1980).

Total seabird abundance in the ORWA OCS Planning Area probably approximates two million birds.

River mouths, estuaries, tidalflats and marshes in the ORWA coastal zone provide plentiful habitat for both migrant and resident waterfowl, shorebirds, and wading birds. The Pacific Northwest is an important wintering area for migratory waterfowl which summer and nest in arctic and sub-arctic habitats,

Table 6. Marine mammals in the ORWA OCS Planning Area.

KEY: P = permanent resident, M = seasonal migrants, E = endangered
T = threatened, C = coastal habitat, O = offshore habitat

Common name	Scientific name	Status	Primary habitat	Estimated number
Southern sea otter	Enhydra lutris	T] P	C	Few
Northern sea otter	Enhydra lutris	P	C	10s-100s
Harbor seal	Rhoea vitulina	P	C	>10,000 (5500 in Washington)
Steller sea lion	Enmetopias jubataP		C, O	1050-1500
California 5ea lion	Zalophus californianus	M	C, O	1000 S-1 CI, OOOS (males)
Northern fur seal	Callorhinus ursinus	M	O	1005
Northern elephant seal	Mirounga angustisostr	M	C, O	loos
Gray whale	Eschrictius robustus	E, M	C	17,000
Minke whale	Balaenoptera acutorostite	P	C) O	?
Fin whale	B. physalus	E] M	O	Few
Sei whale	B. boreal is	E, M	O	?
Blue whale	B. musculus	E, M	O} C	10II5
Humpback whale	Megaptera novaeangliae	E, M	O, C	1005
Pacific right whale	Eubalaena glacialis	E, M	O	10s-1005
Sperm whale	W macrocephalus	E, M	O	1000s
Pygmy sperm whale	Kagia breviceps	M	O	Few

Table 6 (continued)

KEY: P = permanent resident, M = seasonal migrants, E = endangered
T = threatened, C = coastal habitat, O = offshore habitat

Common name	Scientific name	Status	Primary Habitat	Estimated number
Bering Sea (Steinegers) beaked whale	Mesoplodon steinegeri	M	O	Present
Goose-beaked (Caviers) whale	Ziphuis cavirstrio	M	O	Present
Giant bottle-nosed (Bairds) whale	Berarduis bairdi	M	O	Present
Archbeak whale	Mesoplodon carlhubbsi	M	O	Present
Short-finned pilot whale	Globicephala macrorynchus	-		Present
Killer whale	Orcinus orca	P	C, O	Common
False killer whale	Pseudorca crassidens	-		Rare
Harbor porpoise	Phocoena phocoena	P	C	
Dall porpoise	Phocoenoides dalli	P	C, O	Common
Pacific white-sided dolphin	Lagenorynchus obliquidens	M	O	Present
Northern whale dolphin	Lissodelphis borealis	M	O, C	Present
Common dolphin	Delphinus delphis	P	C	Uncommon
Risso's dolphin	Grampus griseus	M	O, C	Abundant at times
Striped dolphin	Stenella coeruleoalba	-		Rare

VERTEBRATES

GOAK

Marine Mammals

At least 23 species of marine mammals occur in the coastal and offshore waters of GOAK, either as permanent residents, seasonal migrants, or occasional visitors (Table 1). Seven of these species are endangered whales, which are considered under "Endangered Species" below.

The offshore waters are a major migration corridor for northern fur seals (Callorhinus ursinus); a large concentration winters off Baranof Island in southeastern Alaska. Although most Alaskan fur seals summer and breed in the Pribilof Islands in the Bering Sea, some are present in GOAK year-round. Fur seals feed from 16-160km offshore along the shelf break, and most of their existence is pelagic (Gusey 1979a; MMS 1984a). From 1962-1971 an average of 59,192 fur seals were harvested annually in the Pribilofs (Scheffer 1972); more recently, harvests have averaged about 3 x 103 seals per year, thought to be less than the maximum sustainable yield (MMS 1982a), As fur seal harvests have been controlled by management practices for many years, these data probably reflect annual production by the population of 1.0-1,3 million seals breeding in the Pribilofs (MMS 1984a). The number of fur seals that use GOAK for migration and wintering is not known, but a significant amount of the annual production by this population must depend upon food resources from the offshore waters of this OCS Planning Area.

Steller sea lion (Eumetopias jubata) rookeries and hauling grounds are distributed on rocky shores and islands throughout GOAK (ADFG 1984a; MMS 1984a). Sea lion habitat is generally restricted to shallow oceanic coastal waters, although some individuals enter bays and rivers, especially in winter (Gusey 1979a). Over 135,000 Steller sea lions inhabit the GOAK region, producing an estimated 27,500 pups annually (MMS 1984).

Harbor seals (Phoca vitulina) inhabit the coastal zone, including inshore and protected waters, over much of GOAK (ADFG 1984a). Hauling and pupping occur on rocks, sand bars, beaches, and glacial ice, but they are restricted to gently sloping shores (Gusey 1979a). Population estimates are not available for GOAK as a unit; however, based on estimates for all of Alaska, for the western Gulf of Alaska (Scheffer 1972; Gusey 1979a), and for the very concentrated population of Icy 13ay (Calkins et al. 1975), certainly more than 10,000 harbor seals inhabit. this OCS Planning Area. The harbor seal is a productive species; Alaskan harvest and bounty statistics from 1964-1970 show an annual average harvest of 23,000 animals (Scheffer 1972) with no apparent reduction in population size (Calkins et al. 1975).

The Pacific walrus (Odobenus rosmarus) apparently has been extending its range south and east from the Bering Sea into the Gulf of Alaska. Walrus have

been reported from Prince William Sound and Icy Bay in GOAK (Gusey 1979a; MMS 1984a).

Approximately one-third of the total Alaskan population of 105,000-135,000 sea otters (Enhydra lutris), or about 35,000-47,000 individuals, inhabit the Gulf of Alaska region. In GOAK, the highest concentrations are found in Prince William Sound and along the outer island coasts of southeastern Alaska (MMS 1984a). Sea otters prefer coastal oceanic waters and are partial to rock outcrops and kelp beds. Their range and numbers have been expanding in Alaska since about. 1912, when protective regulations ended exploitive harvesting (Scheffer 1972).

Eleven species of non-endangered cetaceans (whales and porpoises) are either permanent residents, seasonal migrants, or rare visitors in GOAK (Table 1). The Minke whale, killer whale, Dall porpoise, harbor porpoise, and the Pacific white-sided dolphin are considered permanently or seasonally abundant in GOAK (Gusey 1979a; MMS 1984a), although Scheffer (1972) listed the white-sided dolphin as rare in this area. A small number of beluga whales are thought to reside in Yakutat Bay, and belugas have been observed near Montague Island (MMS 1984a). Several other species of small whales and porpoises have been observed only rarely in GOAK; probably none of these are residents or regular migrants. Distributional maps for non-endangered cetaceans may be found in Gusey (1979a), BLM 1981a, MMS (1984a), and ADFG (1984a).

Several species of terrestrial mammals depend, mostly seasonally, on coastal habitats and food resources in GOAK. These include the brown (or grizzly) bear (Ursus sp.), beaver (Castor canadensis), muskrat (Ondatra zibethecus), arctic fox (Alopex lagopus), river otter (Lutra canadensis), and Odocoileus hemionus, the Sitka black-tailed deer (Gusey 1979a).

Marine Birds

More than two million seabirds nest in colonies along the GOAK coast (Sowls et al. 1978; MMS 1984a). In addition, during spring migrations there are as many as 48 million seabirds present in GOAK offshore waters (BLM 1981a). Major seabird colonies are listed in Table 2 and their locations plotted on the various coastal MAPS.

Shore, marsh, and wading birds concentrate in wetland areas, especially the Copper and Bering River deltas, where more than 20 million birds are present in spring; orca Inlet, with from 450,000 (MMS 1984a) to 10 million (Gusey 1979a) birds in April and May; and the salt marshes and estuaries of the Yakutat Forelands. These wetland areas are also primary habitat for migratory waterfowl, especially geese, swains, and dabbling ducks.

The only large raptor breeding in GOAK, except for a very few peregrine falcons (Falco peregrinus), is the bald eagle (Haliaeetus leucocephalus). Some

1000-1500 eagles use the coastal habitats, including beaches, wetlands, and sea cliffs.

Maps of bird distributions, densities, and migration routes in GOAK may be found in Sowls et al. (1978), Gusey (1979a), Arneson (1980), BLM (1981a), Gould et al. (1982), and MMS (1984a). The various coastal MAPS will summarize some of this information. Gusey (1979a) provides ecological and life history data for much of the GOAK avifauna.

Table 1. Marine mammals in the GOAK OCS Planning Area (adapted from BLM 1975; Gusey 1979a; and MMS 1984a).
KEY: P = permanent resident; M = seasonal migrant; E = endangered species; C = coastal habitat; O = offshore habitat

Common name	Scientific name	Status	Primary Habitat
Sea otter	Enhydra lutra	P	C
Steller sea lion	Eumetopias jubata	P	C
Northern fur seal	Callorhinus ursinus	M	O
Harbor seal	Phoca vitulina	P	C
Walrus	Odobenus rosmarus	P(?), rare	C
Gray whale	Eschrichtius robustus	E, M	O, C
Minke whale	Balaenoptera acutorostrata	P	C
Fin whale	B. physalus	E, M	O
Sei whale	B. borealis	E, M	O
Blue whale	B. musculus	E, M	O
Humpback whale	Megaptera novae angliae	E, M	O
Pacific right whale	Eubalaena glacialis	E, M	O
Sperm whale	Physeter macrocephalus	E, M	O
Beluga whale	Delphinapterus leucas	P	C
Killer whale	Orcinus orca	P	C
Bering Sea beaked whale	Mesoplodon steinegeri	M, rare	O
Goose-beaked whale	Ziphius cavirostris	M, rare	O
Giant bottle-nosed whale	Berardius bairdi	M, rare	O
Short-finned pilot whale	Globicephala macrorhynchus	M, rare	O
Harbor porpoise	Phocoena phocoena	P	C
Dall porpoise	Phocoenoides dalli	P	C, O
Pacific white-sided dolphin	Lagenorhyncus obliquidens	M	O
Northern right whale dolphin	Lissodelphis borealis	M, rare	

Table 2. Major seabird colonies (>5000 individuals) in GOAK OCS Planning Area (Sowls et al. 1978).

	Location	Map #	Total seabirds	Chief species
Forrester Island NWR	54°47'N 133°33'W	80	1,107,224	storm petrels auklets murrelets puffins
St. Lazaria Island	56°N 135°43'W	80	49,986	storm petrels puffins
Middleton Island	59°25'N 146°20'W	96	167,936	kittiwakes murres puffins cormorants
Cape St. Elias	59°48'N 144°32'W	92	8,912	puffins murres
Wingham Island	60°00'N 144°22'W	92	19,576	kittiwakes murres
Martin Island	60°11'N 144°22'W	92	20,276	kittiwakes murres puffins
Porpoise Rocks	60°24'N 1146°45'W	96	5,744	kittiwakes murres puffins
Boswell Rocks	60°24'N 1LL'10'W	96	8,200	kittiwakes
Egg Island	60°22'N 145°50'W	96	11,020	gulls
Wooded Islands	59°53'N 147°25'W	96	17,135	puffins storm petrels kittiwakes

VERTEBRATES

KODIAK

MARINE MAMMALS

Twenty-three species of marine mammals occur in the coastal and offshore waters of KODK, either as permanent residents, seasonal migrants, or occasional visitors. Seven of these are endangered whales (see 'Endangered Species' below).

The major migration corridor for 1.0.1,3 million northern fur seals (Callorhinus ursinus) crosses the Portlock and Albatross banks east and south of Kodiak Island [MMS 1984a (Graphic 3)]. The fur seals (about 75% of the total world population) breed in the Pribilof Islands in the Bering Sea, where an average of 59,200 fur seals were harvested annually from 1962-1971 (Scheffer 1972). Recent harvests have averaged approximately 30,000 seals, but this is less than the maximum sustainable yield (MMS 1982a), Offshore waters of KODK are an important feeding area for fur seals, some of which may enter Shelikof Strait (BLM 1981a).

Steller sea lion (Eumetopias jubata) rookeries and hauling grounds are distributed on rocky shores and islands throughout KODK [ADFG 1984a; MMS 1984a (Graphic 3)]. The largest rookeries are locater? on Sugarloaf Island, Marmot Island, Chirikof Island, and the Semidi Islands. Approximately 40,000 sea lions inhabit the greater Kodiak area, defined by Scheffer (1972) as roughly equivalent to the KODK OCS Planning Area; Bailey (1976) reported 9100 sea lions in the Barren Islands alone. From population and pup production estimates for the entire Gulf of Alaska (MMS 1984a), it can be calculated that more than 8000 sea lion PUPS are produced in KODK annually.

Inshore and protected waters of KODK support large numbers of harbor seals (Phoca vitulina), and haulouts are widely distributed through the Planning Area ([BLM 1981a (Graphic 11)]. Scheffer (1972) estimated that 21,663 harbor seals inhabit the Kodiak region, with the largest populations on the Trinity Islands. The concentration of more than 1.3,000 seals on Tugidak Island is probably the largest in Alaska [BLM 1981a (Graphic 11)].

There are a few records of walrus (Odobenus rosmarus) from the Kodiak Island vicinity (Scheffer 1972). This species may be expanding its range from the Bering Sea into the Gulf of Alaska (MMS 1984a).

The many kelp beds in coastal waters of KODK provide excellent habitat for sea otters (Enhydra lutris). High concentrations of otters occur on and around Shuyak and Afognak Islands and at several locations along the Alaska Peninsula (Gusey 1979a). From population estimates and sighting records for various portions of KODK [Scheffer 1972; Bailey 1976; Gusey 1979a; BLM 1981a (Graphic 11)1, it appears that there are 6,000-10,000 sea otters in the region covered by this OCS Planning Area.

Eleven species of non-endangered cetaceans are either permanent residents, seasonal migrants, or rare visitors in KODK. Common species in KODK waters include the minke whale (Balaenoptera acutorostrata), killer whale (Orcinus orca), Dal] porpoise (Phocoenoides dalli), harbor porpoise (Phocoena phocoena), and perhaps Pacific white-sided dolphin (Lagenorhynchus obliquidens). The last species has been sighted in large groups in Gulf of Alaska waters (Gusey 1979a) but was listed as rare in the area by Scheffer (1972). Beluga whales (Delphinapterus leucas) are uncommon in KODK, but they have been seen occasionally in Shelikof Strait and the bays of the Kodiak Archipelago [BLM 1981a (Graphic 12)]. Beaked whales (three species), pilot whales (Globicephala macrochynchus), and right whale dolphins (Lissodelphis borealis) are rarely seen in KODK, but they may feed on offshore banks and Continental Slope waters in the Planning Area [Scheffer 1972; Gusey 1979a; BLM 1981a (Graphic 12)].

Several species of terrestrial mammals depend, mostly seasonally, on coastal habitats and food resources in KODK. These include the brown (or grizzly) bear (Ursinus sp.), river otter (Lutra canadensis), black bear (Ursus Americana), red fox (Vulpes fulva), arctic fox (Alopex lagopus), wolf (Canis lupus}, coyote (Canis latrans), mink (Must.ells vison), wolverine Gulo luscus), moose (Alces alces), and the Sitka black-tailed deer (Odocoileus hemionius). Kodiak Island brown bears are unique for their large size: they are of considerable commercial importance as a big-game species. Coastal areas of the Alaska Peninsula arc important foraging areas for both brown bears and moose.

Marine Birds

Approximately 2,8 million seabirds nest in colonies in the KODK OCS Planning Area (Sowls et al. 1978). T h e largest of these colonies are on the Barren Islands (more than 500,000 breeding birds; Bailey 1976) and the Semidi Islands NWR (1.7 million birds; Sowls et al. 1978). Estimated seabird densities in the nearshore waters surrounding Kodiak Island are 2.3 million birds in summer and 1.5 million in winter; ice-free bays and fjords of the Kodiak Archipelago "., .may be critical for . . . common murres (Aria aalge) and crested auklets (Aethia cristatella) during severe winters,... " (Forsell et al. 1981). Shipboard and aerial surveys have shown high densities of pelagic birds (primarily Shearwaters) on the banks to the east and south of Kodiak Island, especially on the Portlock Bank (Gould et al. 1982), Table 12.

KODK is less important to waterfowl than most other areas of the Alaska Geographic Region. Nevertheless, at least 200,000 ducks, geese, and swans winter on Kodiak Island (BLM 1975b).

Because of a general lack of survey effort, there are few data available on bird density and distribution on the southern Alaska Peninsula.

Bald eagles (Haliaeetus leucocephalus) are common in KODK, and more than 200 pairs may nest along the shores of Kodiak Island NWR (BLM 1981a). Peregrine falcons (peregrinus) also nest in the Kodiak Archipelago and on the Barren Islands (BLM 1981a).

Table 12. Large seabird colonies in the KODK OCS Planning Area (from Sowls et al. 1978).

Location and approximate coordinates		MAP #	Principal species	total population
Semidi Islands (? colonies with)5000 birds)	55 °58'-56°15'N 156°45'W	109	murres northern fulmar puffins kittiwakes auklets	1)727)075
Ugaiushak Island	56°48'N 156 °53'W	109	puffins kittiwakes	56,346
Unnamed Islands	56°50'N 156°59'W	109	puffins pigeon guillemot	101400
Central Island	56°51'N 156°54'W	109	puffins	23,052
Kittiwake Island	56°56'N 156°45'W	109	black-legged kittiwake	5950
Flat Island	56°52'N 152°46 'W	104	tufted puffin black-legged kittiwake	311075
Cathedral Island	57°07'N 153°09'W	104	tufted puffin black-legged kittiwake	171013
Ladder Island	57 °18'N 152°55'W	104	tufted puffin arctic tern	8470
W. Boulder Bay	57°17'N 152°46 'W	104	black-legged kittiwake tufted puffin	411578
Gull Point	57°22'N 152 °36'W	104	tufted puffin	6127
Chinook Island and Rocks	57°38'N 152°09'W	104	black-legged kittiwake tufted puffin	171343

continued. ,

Table 12. Large seabird colonies in the KODK OCS Planning Area (from Sowls et al. 1978).

Location and approximate coordinates		MAP #	Principal species	total population
N. Noisey Island	57°55'N 153°35'W	104	tufted puffin glaucous-winged gull	21]740
S. Noisey Island	57 °54'N 153 °35'W	104	glaucous-winged gull tufted puffin	7456
Whale Island	57°56 'N 152°48'W	104	black-legged kittiwake	61?9
The Triplets	57°59'N 152°28'W	104	tufted puffin common murre	62,482
Ermine Point Island	57°17'N 52 °54'W	104	black-legged kittiwake tufted puffin	6801
Oil Triangle	57°38'N 55 °40'W	110	murres	80,000
N, Point Puale Bay	57 °46'N 155°37'W	110	murres tufted puffin	10,740
Cape Unalishagvak	57°33'N 155°44'W	110	murres black-legged kittiwake	6110
Poltava Island	57 °01'N 156°29'W	110	puffins glaucous-winged gull	8500
David Island	57°03'N 156°30'W	110	puffins glaucous-winged gull cormorants	181000
Sugar loaf Island	58°53'N 152 °03'W	105	tufted puffins glaucous-winged gull	111?47
W. Amatuli island	58 °55'N 152 °03'W	105	tufted puffin glaucous-winged gull horned puffin	98,050

continued ...

Table 12. Large seabird colonies in the KODK OCS Planning Area (from Sowls et al. 1978).

Location and approximate coordinates		MAP #	Principal species	total population
E. Amatuli Island	58°54'N 152 °00'W	105	fork-tailed storm petrel tufted puffin common murre black-legged kittiwake horned puffin	4801134
Nerd island	58°57'N 152 °10'W	105	common murre black-legged kittiwake tufted puffin	55,573

VERTEBRATES

CKIN

MAMMALS

Steller sea lions (Eumetopias jubata) are common in the southern portion of CKIN and along the entire outer coast of the Kenai Peninsula (AGAACL "1981; ADFG 1984a; MMS 1984a). Rookeries and haul-out areas are mainly confined to the oceanic shores of the Kenai Peninsula [MMS 1984a (Graphic 3)], but Kamishak Bay is an important feeding ground (AGAACL 1981).

Harbor seal (Phoca vitulina) haul-outs are scattered throughout Cook Inlet proper (ADFG 1984a; MMS 1984a) as well as in protected waters along the Kenai Peninsula, in Blying Sound, and western Prince William Sound. Augustine Island is a major pupping ground for this species [MMS 1984a (Graphic 3)]. The harbor seal population in Cook Inlet proper is estimated at more than 3000 animals (AGAACL 1981).

Walrus (Odobenus rosmarus), once thought to be rare visitors to CKIN (Scheffer 1972) apparently are expanding their range into the Gulf of Alaska; there have been many sightings in CKIN in recent years (MMS 1984a).

The many kelp beds and rocky shores of CKIN are habitat. for sea otter, Enhydra lutris. Medium to high concentrations of otters occur in nearshore areas throughout the Planning Area, with the exception of central and northern Cook Inlet above 60°N (MMS 1984a). Sea otters have been sighted as far into Cook Inlet as the vicinity of Kalgin Island (AGAACL 1981), and the Kamishak Bay population is estimated at 500-1000 individuals [BLM 1980a (Graphic 11)1.

Non-endangered cetaceans common in CKIN include the Minke whale (Balaenoptera acutorostrata), killer whale (Orcinus orca), beluga whale (Delphinopterus leucas), and harbor porpoise (Phocoena phocoena). The Cook Inlet beluga population (500 individuals) appears to be reproductively isolated from others and may be genetically distinct (AGAACL 1981). Other non-endangered cetaceans common or endemic in the Gulf of Alaska are oceanic which occur only occasionally or accidentally in CKIN.

Several species of terrestrial mammals depend on coastal habitats in CKIN for feeding, wintering, and reproduction, Brown bear (Ursus SP.) use the lowlands and anadromous streams of Cook Inlet for feeding in spring and summer, Moose (Alces alces) winter and calve in lowland areas adjacent to the Inlet, and caribou (Rangifer arcticus) summer and calve near Kenai.

BIRDS

More than 100 species of seabirds, shorebirds, and waterfowl inhabit the CKIN OCS Planning Area (AGAACL 1981), including approximately 95 marine and coastal species (SAII 1979). Many seabird colonies are distributed along the shores and islands of western Prince William Sound, Blying Sound, and the outer Kenai Peninsula (Sowls et al. 1978). The largest of these are listed in Table 6.

Wetland areas of Kachemak Bay, Kalgin Island, Redoubt Bay, Tuxedni Bay, MacArthur Flats, annd the Kenai lowlands are staging, nesting, and feeding grounds for waterfowl, including snow geese (Chen caerulescens) and trumpeter swans (Cygnus buccinator) (ADFG 1979b; AGAACL 1981; ADFG 1984a), More than 89 bald eagles (Haliaeetus leucocephalus) nest in the Cook Inlet basin, and peregrine falcons (Falco peregrinus) may nest on Chisik Island (AGAACL 1981).

Table 6. Large seabird colonies in CKIN OCS Planning Area (after Sowles et al. 1978).

Location and approximate coordinates		MAP #	Principal species	Total population
Chiswell island	59°40'N 149°35'W	10D	kittiwakes puffins	9100
Oatuhka Island	59°40'N 149°37'W	100	murres puffins auklets	8280
Unnamed Island	59°40'N 149°36'W	100	puffins	201580
Beehive island	59°40'N 148°36'W	100	kittiwakes puffins	12,860
Natoa Island	59°42'N 149°36'W	100	murres puffins	5636
Gull Island	59°39'N 151°20'W	105	murres kittiwakes	7448
Outer Island	59°20'N 150°23'W	100	puffins kittiwakes	7750
Chisik, Duck Islands	60°08'N 152°35'W	106	kittiwakes murres puffins gulls	77 J850
Passage Canal	60°49'N 148°42'W	101	kittiwakes	5640

SHUM Coastal Habitats

VERTEBRATES

SHUM

MARINE 14 AMMALS

Data on marine mammals in the SHUM OCS Planning Area are very sparse, and the population estimates given in Table 1 are crude for all but fur seals, sea lions, and gray whales. The region appears to be a center of abundance for sea otters, sea lions, and harbor seals, with vast areas of excellent, undisturbed habitat (Gusey 1979).

The primary migration route of 1.0-1.3 million fur seals passes through the offshore waters and eastern Aleutian passes in SHUM. All of these seals (about 75% of the world population) probably are present in the Planning Area during spring and fall migrations to and from their breeding grounds in the Pribilof Islands. Recent harvests have averaged approximately 30,000 seals annually, but this is believed to be less than the maximum sustainable yield (MMS 19$.32).

Steller sea lion rookeries and hauling grounds are distributed on rocky shores and islands throughout SHUM (Calkins and Pitcher 1982; ADFG 1984). Sears and Zimmerman (1977) observed large concentrations (1000-5000 individuals) on or near Little Koniuji and Chernabura Islands. Direct counts at rookeries indicate that 5000-10,000 sea lion PUPS are produced in SHUM annually (Calkins and Pitcher 1982).

ADFG (1984) maps place most of the SHUM harbor seal habitat in the northeastern portion of the Planning Area, but Sears and Zimmerman observed substantial numbers throughout the region. The highest concentrations (>100) were in the vicinities of Yantarni Bay and Chignik Lagoon, and Ugamak Island.

There are a few records of walrus from the Kodiak Island vicinity (Scheffer 1972). This species may be expanding its range from the Bering Sea into the Gulf of Alaska (MMS 1984), but no records of walrus from SHUM have been located,

The many kelp beds in coastal waters of the Alaska Peninsula and adjacent islands provide excellent habitat for sea otters, Sears and Zimmerman (1977) observed more than 1000 sea otters within SHUM; especially noteworthy was a concentration of 650 otters near Bird Island in the Shumagin Group (MAP #113).

Eleven species of non-endangered cetaceans are known or presumed to occur in the northwest Gulf of Alaska. Because data for SHUM are virtually non-existent, information from the much better-documented KODK OCS Planning Area have been adapted by extension for Table 4, and for this discussion. Species expected to be common in SHUM are minke whales, killer whales, Dall

porpoises, and harbor porpoises. The remaining species are questionable or likely, but unknown.

Birds

Sowls et al. (1978) identified 128 seabird colonies (Table 3), containing more than 3.0 million birds, within the SHUM OCS Planning Area. Portions of the Alaska Peninsula and some islands had not been surveyed as of 1978, and populations undoubtedly were underestimated. 'l'his is a highly productive area for seabirds, with a great proportion of excellent habitat. The area appears to be a center of abundance for several species; about 80% of the Alaskan population of Cassin's auklet (Ptychoramphus aleuticus), and substantial portions of horned puffin (Fratercula corniculata), tufted puffin (Lunda cirrhata), and storm-petrel (Oceanodroma spp.) populations nest in the Planning Area.

Waterfowl and shorebird density and distribution are poorly known for SHUM. Arneson (1980) reported that the lagoons of Cold and Morzhovoi Bay (MAPS #118, 123) were very important to staging geese in fall, and Sowls et al. (1978) indicated that the waters surrounding Sanak Island and the Sandman Reefs (MAP #118) were important for wintering waterfowl.

The Planning Area contains suitable habitat and potential nesting sites for the rare Aleutian Canada goose (Branta canadensis leucopareis).

Table 4. Marine mammals in SHUM OCS Planning Area (Sears and Zimmerman 1977; Gusey 1979a; Calkins and Pitcher 1983; Forsell et al. 1981; Rugh 1984).
KEY: P = permanent resident; M = seasonal migrant; E = endangered species; U = unlikely or rare occurrence; C = coastal habitat; O = offshore habitat; * = critical habitat and/or breeding area in SHUM; ND = no data.

Common name	Scientific Name	Status	Primary Habitat	Estimated Numbers
Sea otter	Enhydra lutris	P	C	>25,000
Stellersea lion	Eumetopias jubata	P	C	)301000
Northern fur seal	Callorhinus ursinus	M	0	1.3 x 10^6
Harbor seal	Phoca vitulina	P	C	)15,000
Walrus	Odobenus rosmarus	P(?), U	C	NO
Gray whale	Eschrichtius robustus	E, M	C	17, 000
Minke whale	Balaenoptera acutorostrata	P(?)	C	NO
Fin whale	B. physalus	E, M	C, O	10's100's
Sei whale	B. borealis	E, M	O	common
Blue whale	B. musculus	E, M	0	NO
Humpback whale	Megaptera novaeangliae	E, M	C, O	10's-100's
Pacific right whale	Eubalaena glacialis	E, M	0	NO
Sperm whale	Physeter macrocephalus	E, M	0	ND
Beluga whale	Delphinapterus leucas	U	C	NO
Killer whale	Orcinus orca	P	C, O	100'5
Bering sea beaked whale	Mesoplodon steinegeri	M	0	ND
Goose-beaked whale	Ziphius cavirostris	M	0	ND
Giant battle-nosed whale	Berardius bairdi	M	0	NO
Harbor porpoise	Phocoena phocoena	P	C	common
Dal I porpoise	Phocoenoides dalli	P	O	common
Pacific white-sided dolphin	Lagenorynchus obliquidens	U	0	ND
Right whale dolphin	Lissodelphis borealis	U	0	NO
Short-finned pilot whale	Globicephala macrorynchus	U	0	NO

Table 3. Major seabird colonies in the SHUM OCS Planning Area (Sowls et al. 1978).

	Location	MAP #	Total seabirds	Chief species
Rootok Island	54°04'N 165°34'W	123	1001000	tufted puffin
Avatanak Island	54°05'N 165°20'W	123	50,000	tufted puffin
Kaligagan Island	54°07'N 164°55'W	123	3?5)500	tufted put fin
Sankin Island	54°48'N 163°16'W	123	8,700	tufted puffin horned puffin
Bird Island	54°39'N 163°17'W	123	22,626	common murre glaucous-winged gull
Nigrud Group (Sandman Reefs)	54°37'N 162°09'W	118	111,914	Cassin's auklet tufted puffin black-legged kittiwake Leach's storm-petrel
High Island	54°38'N 162°20'W	118	135}316	Leach's storm-petrel fork-tailed storm-petrel horned puffin tufted puffin murres
Midun island	54°50'N 162°11'W	118	18,266	tufted puffin horned puffin murres black-legged kittiwake glaucous-winged gull
Sozavarika Island	54°51'N 162°31'W	116	25,422	Leach's storm-petrel horned puffin glaucous-winged gull
Amagat	54°54'N 162°53'W	118	451,140	fork-tailed storm-petrel horned puffin tufted puffin glaucous-winged gull pelagic cormorant red-faced cormorant

Continued. .,

Table 3. Major seabird colonies in the SHUM OCS Planning Area (Sowls et al. 1978).

	Location	MAP #	Total seabirds	Chief species
Sushilnoi Island	54 °52'N 161°51'W	118	35,330	Leach's storm-petrel tufted puffin
Patton Island	54054'N 162°08'W	118	10,840	Leach's storm-petrel Cassin's auklet
Hunter Island	54°58'N 161°46'W	118	22,092	Leach's storm-petrel Cassin's auklet
Rena Islands	54 °59'N 161 °50'W	118	16,036	Leach's storm-petrel tufted puffin
Umga Island	54°48'N 162°43'W	118	1031156	Cassin's auklet horned puffin tufted puffin
Cherni Group	54°39'N 162°22'W	118	9,392	tufted puffin glaucous-winged gull red-faced cormorant
Goose:Little Goose, Hay	54°41'N 162°09'W	118	29,674	tufted puffin horned puffin glaucous-winged gull
Hunt Island	54°45'N 162°15'W	118	10,186	ancient murrelet
Bird Island	54° 39'N 159°46'W	113	96,500	tufted puffin horned puffin murres black-legged kittiwake cormorants
Mountain Cape	54°54'N 160°13'W	118	8,000	tufted puffin
Near Island	54°57'N 160°03'W	118	27,040	horned puffin tufted puffin black-legged kittiwake
Twins	54°58'N 159°51'W	113	131490	tufted puffin black-legged kittiwake

Continued . . .

Table 3. Major seabird colonies in the SHUM OCS Planning Area (Sowls et al. 1978).

	Location	MAP #	Total seabirds	Chief species
Yukon Harbor	55 °04'N 159 °30'W	113	30,564	crested auklet
Hall Island	55°05'N 159°28'W	113	19,005	tufted puffin parakeet auklet ancient murrelet horned puffin pigeon guillemot glaucous-winged gull Leach's storm-petrel
Koniuji Strait	55 °03'N 159°31'W	113	*38,044*	horned puffin crested auklet
Herendeen Island	55°04'N 159°25'W	113	*61803*	tufted puffin horned puffin parakeet auklet
Atkins Island	55 °03'N 159°17'W	113	16,000	tufted puffin parakeet auklet pigeon guillemot
Peninsula Island	55°03'N 159°39'W	113	7,156	tufted puffin horned puffin ancient murrelet
Cape Thompson Colony	55°14'N 159°30'W	113	27,092	tufted puffin horned puffin parakeet auklet crested auklet black-legged kittiwake
Castle Rock	55°17'N 159 °29'W	113	271,222	tufted puffin horned puffin common murre Cassin's auklet crested auklet parakeet auklet ancient murrelet Leach's storm-petrel fork-tailed storm-petrel black-legged kittiwake

Continued ...

Table 3. Major seabird colonies in the SHUM OCS Planning Area (Sowls et al. 1978).

	Location	MAP #	Total seabirds	Chief species
Kupreanof Point	55°34'N 159°36'W	113	5,200	tufted puffin horned puffin
Fox Cape	55°40'N 159°32'W	113	51'200	tufted puffin glaucous-winged gull
Spitz Island	55°47'N 158°53'W	113	231,515	tufted puffin horned puffin murres black-legged kittiwake
Chiachi Island	55°50'N 159°09'W	113	*10}000*	tufted puffin glaucous-winged gull
Mitrofania Island	55°52'N 158 °49'W	113	46,000	tufted puffin horned puffin pigeon guillemot
Brother islands	55 °56'N 158 °51'W	113	*661000*	tufted puffin horned puffin murres glaucous-winged gull black-legged kittiwake
Olaga Islands	55°07'N 161°50'W	118	6,350	tufted puffin
Delarof Harbor	55°11'N 160°28'W	118	64,500	tufted puffin horned puffin black-legged kittiwake cormorants
Wasnesenski Island	55°13'N 161°20'W	118	6,800	tufted puffin red-faced cormorant
The Haystacks	55°16'N 160 °03'W	118	26,130	tufted puffin horned puffin murres black-legged kittiwake
Big and Little Egg island	55°17'N 160°31'W	118	12,540	tufted puffin horned ptfin glaucous-winged gull

Continued, . .

Table 3. Major seabird colonies in the SHUM OCS Planning Area (Sowls et al. 1978).

	Location	MAP #	Total seabirds	Chief species
Andronica Light	55°21'N 160 °04'W	118	6,050	tufted puffin
Round Island	55°20'N 160 °37'W	118	19]480	tufted puffin horned puffin glaucous-winged gull black-legged kitti wake
High Island	55 °22'N 160°19'W	118	8]500	tufted puffin glaucous-winged gull
Bay Paint	55°19'N 160°51'W	118	25,000	murres pigeon guillemot black-legged kittiwake red-faced cormorant
Karga Island	55°31'N 160 °03'W	118	247,320	tufted puffin horned puffin murres glaucous-winged gull
Atkulik Island	56°17'N 157°44'W	114	57,000	tufted puffin murres pigeon guillemot glaucous-winged gull black-legged kitti wake

VERTEBRATES

NAVB

MAMMALS

Twenty-two species of marine mammals, including eight species of endangered whales, are known or presumed to occur in NAVB (Table 1). Endangered whales are discussed under Endangered Species, below.

Marine mammal abundance data for NAVB are relatively sparse; much of the information contained in reports has been extrapolated from the eastern Bering Sea or from very limited sighting data. The baleen whale harvest summaries presented by Nasu (1974) are an exception. but these data must. now be regarded as historic.

NAVB is on the fringe of the ranges of Steller sea lions and northern fur seals. Sea lions occur in the MIZ in winter, and some may feed in the mid-shelf domain in other seasons. The summer feeding grounds of northern fur seals extend into the southwestern corner of NAVB; substantial numbers may be present at times (MMS 1984 b).

Four species of ice-inhabiting seals and the walrus are associated with the MIZ. Mating and pupping occur during seasons when the MIZ is usually present in NAVB. High densities of walrus, bearded seals, and spotted seals may occur, and this OCS Planning Area may provide important habitat for ribbon seals as well In addition to their winter use of the MIZ, ribbon seals may feed along the shelf break during ice-free seasons.

Ringed seals are more closely associated with shorefast ice than with pack ice or the MIZ, but could be present in NAVB in substantial numbers, especially during heavy ice years (ADFG 1981d, MMS 1984 b). The southern limit of polar bear range extends into northern NAVB. Polar bears tend to occur in association with ringed seals, their principal prey.

Non-endangered cetaceans in NAVB include substantial numbers of minke and killer whales, some of which may be permanent residents; Dan porpoises from spring through fall; and beluga whales during winter. Beaked whales probably occur in the oceanic domain, but there are no data from which to estimate their abundance or seasonal occurrence (Strauch 1984).

Birds

Approximately 1.5 million seabirds nest in the St. ,Nlatthew-Hail Island group east of NAVB. Most or all of these, in addition to millions of shearwaters and other seabirds which migrate into the Planning Area seasonally, may be present in NAVB at certain times. Density estimates reported in Springer and Strauch (1984) multiplied by the total area of NAVB suggest a seabird

population of about 2.8 million in spring (May-June) and about 2 million in summer (July-August).

Seabird densities decrease seaward from the mid-shelf to oceanic domains. Very high densities (especially alcids) are common in the MIZ of the Bering Sea during winter. Density data from Hunt et al. (1981b) for the eastern Bering Sea suggest that seabird populations in NAVB could be higher than the estimates given here; perhaps as many as 10 million birds could be present at times.

Table 6. Marine mammals known or presumed to occur in the NAVB OCS Planning Area (Nasu 1974, ADFG 1981d, Strauch 1984, MMS 1984 b).

KEY: P = permanent resident; M = seasonal migrant; E = endangered species; I = ice pack ice habitat; MIZ = marginal ice zone habitat; MS = mid-shelf; O = oceanic; SB = shelf break; * = critical habitat within NAVB; ND = no data or basis for estimating abundance.

Common Name	Scientific Name	Status	Primary Habitat	Estimated Numbers
Polar bear	Ursus maritimus	M	I	ND
Steller sea lion	Eumetopias jubata	M	MS, MIZ	462[a]
Northern fur seal	Callorhinus ursinus	M	SB, O	ND
Spotted seal	P. larga	M	MIZ*	1771[a]
Ribbon seal	P. fasciata	P	MIZ, MS, SB*	231[a]
Ringed seal	P. hispida	M	I	ND
Bearded seal	Erignathus barbatus	M	MIZ*	38[a,c]
Walrus	Odobenus rosmarus	M	MIZ*	22,600[a]
Gray whale	Eschrichtius robustus	E, M	MS	500[b]
Minke whale	Balaenoptera acutorostrata	P	MS	25[b]
Fin whale	B. physalus	E, P	SB	259[b]
Sei whale	B. borealis	E, M	O	NO
Blue whale	B. musculus	E, M	O	NO
Humpback whale	Megaptera novaeangliae	E, M	SB	few
Pacific right whale	Eubalaena glacialis	E, M	MS, SB	57b
Bowhead whale	Balaena mysticetus	E, M	MIZ*	171[b]
Sperm whale	Physeter catodon	E, M	O	ND
Beluga whale	Delphinapterus leucas	M	MIZ	462[b]
Killer whale	Orcinus orca	P	SB, MS, MIZ	798[b]
Bering sea beaked whale	Mesoplodon stejnegeri	M	O	NO
Giant bottle-nosed whale	Berardius bairdi	M	O	ND
Dan porpoise	Phocoenoides dalli	M	O	65[b]

[a]Based on MIZ density estimates of Brueggeman and Grotefendt (1983); MIZ assumed to be 110km wide and 350km from east to west.

[b]Maximum seasonal abundance estimated by Brueggeman (1983).

[c]Probably not a representative estimate; AOFG (1981d) considered this area important bearded seal habitat and characterized the species as seasonally abundant.

VERTEBRATES

SGBA

MAMMALS

Twenty-four species of marine mammals, including eight species of endangered whales, occur in the SGBA as permanent residents, seasonal migrants, or occasional visitors (Table 3). The endangered whales are discussed under "Endangered Species, " below.

The Pribilof Islands are breeding grounds for about 75% of the world's population of 1.7 million fur seals (Callorhinus ursinus). Although some adult males winter in the southern Bering Sea and Aleutian Islands, most of the population migrates through the Aleutian passes, especially Unimak Pass, in spring and fall. SGBA waters are critical to this species, both as a breeding ground and as a summer feeding area. The annual harvest of fur seals averages about 3×10^3 animals, somewhat below the estimated maximum sustainable yield. Harvests averaged 5.9×10^3 during the 1960's (Scheffer 1972; MMS 1982a).

Approximately 40% of the world's Stelier sea lions (Eumetopias jubata), or 1.0-1.3 x 10^5 animals, inhabit the Aleutian Islands, Pribilof Islands, and southern Bering Sea. Rookeries and haul-outs on the Pribilof, Aleutian, and Amak Islands have been estimated to contain 6.7×10^4 sea lions (Gusey 1979 b). The Aleutian sea lion population has shown a 50% decrease in the past two decades, probably because of disease, food competition with commercial fish harvests, and taking of pelts (Braham et al, 1980), but recent estimates place the SGBA population at 33,000 sea lions (Braham et al. 1982).

Most of the SGBA is outside of the normal range of the Pacific walrus (Odobenus rosmarus), but large spring concentrations occur in Bristol Bay to the east (see NABA) and there have been occasional sightings on Amak and the Pribilof Islands (Gusey 1979b; MMS 1982a). Braham et al. (1982) estimated the seasonal walrus population in SGBA at 23,000-30,000 animals

Harbor seals (Phoca vitulina) inhabit coastal waters and islands throughout the SGBA. Izembek Lagoon and Bechevin Bay are important breeding and pupping areas (MMS 1982a: (Graphic 3). The SGBA population is believed to consist of 30,000-35,000 animals (Braham et al. 1982).

Ice-breeding harbor (spotted) seals (Phoca larga), ribbon seals (P. fasciata), and bearded seals (Erignathus barbatus) depend on sea ice for breeding, pupping, and molting, and therefore their abundance in the SGBA varies both seasonally and from year to year with changes in sea ice distribution. All three species are fairly abundant within their ranges (Gusey 1979b; MMS 1982a), but they should be scarce in SGBA during periods when Bering Sea pack ice does not extend into the Planning Area.

The total sea otter (Enhydra lutris) population in the Aleutian area, including the northern Alaska Peninsula and small numbers in the Pribilofs, is estimated to be 6.7-8,0 x 104 animals. The majority of these otters inhabit the western Aleutians, outside the SGBA boundary, but substantial numbers live in offshore waters north of Unimak Island and the Alaska Peninsula. There are breeding concentrations in the Fox and Krenitzin Island groups (Gusey 1979b; MMS 1982a). Braham et al. (1982) placed the SGBA population at 17,000 individuals.

Eight species of non-endangered cetaceans {whales and porpoises) are regular inhabitants of the southern Bering Sea (Table 3), and all may range within the waters of SGBA. A general abundance of food resources in these very productive waters indicate that the region could be an important feeding area for some or all of these species. Unfortunately, there appears to be a lack of population and distributional data for non-endangered cetaceans in SGBA. Minke whales (Balaenoptera acutorostrata), killer whales (Orcinus orca), Dall's porpoise (Phocoenoides dalli), and harbor porpoise (Phocoena phocoena) are probably present in reasonable numbers. Beluga whales (Delphinapterus leucas) concentrate in coastal waters and estuaries adjacent to the eastern boundary of the SGBA OCS Planning Area (Braham et al. 1982).

Coastal habitats and resources in the SGBA are likely to be of some importance for brown bear (Ursus sp.), wolves (Canis lupus), wolverines (Gulo luscus), caribou (Rangifer arcticus), red foxes (Vulpes fulva), and arctic foxes (Alopex lagopus). Large terrestrial mammals other than foxes and caribou do not range in the Aleutians west of Unimak Island (Gusey 1979b).

Birds

The eastern Bering Sea is one of the more important areas in the world for seabirds, shorebirds, and waterfowl. The Pribilof and Aleutian Islands are centers of distribution, abundance, and reproduction for many species, especially the alcids (murres, puffins, and auklets). Sowls et al. (1978) catalogued 46 seabird colonies, representing an estimated total of 4.5 million birds, within SGBA. The largest of these are listed in Table 4. Because of a lack of survey effort in the Aleutian Islands, these numbers are undoubtedly underestimates.

Habitats in SGBA are probably critical for several species of seabirds, but particularly for such species as the red-legged kittiwake (Rissa brevirostris), red-faced cormorant (Phalacrocorax urile), and the rare Aleutian tern (Sterna aleutica) which, with few exceptions, nest only in SGBA (Gusey 1979b; Hunt et al. 1981a). In addition to the importance of colonial nesting habitats in the Planning Area, the distribution of foraging pelagic birds in the Bering Sea appears to center on the continental shelf and shelf-break in the vicinity of the Pribilof Islands (Hunt et al. 1981b; Gould et al. 1982).

The Aleutian Islands and western Alaska Peninsula contain abundant habitat and food for migratory waterfowl. Ice-free bays and estuaries in the

Aleutians are important. wintering areas for waterfowl and large numbers of sea ducks and emperor geese (Philacte canagica) have been observed during winter surveys. The Aleutian common teal (Arias crecca nimia) and the endangered Aleutian Canada goose (Branta canadensis leucopareis) nest only in this region. Izembek Lagoon serves as a major nesting, foraging, and staging area for waterfowl. The world's population of American emperor geese and black brant (Branta nigricans) stage in the lagoons of the Alaska Peninsula during spring and fall. More than one million geese and even greater numbers of ducks use this area on a seasonal basis.

Gill and Handel (1981) characterized the beaches and intertidal areas of the eastern Bering Sea as having "global significance" for migrating shorebirds. Unfortunately, shorebird surveys apparently have not been performed in most of the habitats within SGBA, although Bechevin Bay and Izembek Lagoon are known to be important, habitat. areas (Kinnetic Labs., Inc. 1984a) Islands are the principal breeding grounds for the Aleutian rock sandpiper (Gusey 1979 b).

Table 3. Marine mammals in the SGBA OCS Planning Area (adapted from Gusey 1979 and Braham et al. 1982).

KEY: P = permanent resident; M = seasonal migrant; E = endangered species; C = coastal habitat; O = offshore habitat I = pack ice habitat; " = critical breeding and/or habitat area within SGBA

Common name	Scientific Name	Status	Primary Habitat
Sea otter	Enhydra lutra	P	C *
Steller sea lion	Eumetopias jubata	P	C *
Northern fur seal	Callorhinus ursinus	M	O *
Harbor seal	Phoca vitulina	P	C
Spotted seal	P. larga	M	I
Ribbon seal	P. fasciata	M	I
Bearded seal	Erignathus barbatus	M	I
Walrus	Odobenus rosmarus	M	C
Gray whale	Eschrichtius robustus	E, M	O, C *
Minke whale	Balaenoptera acutorostrata	P	c
Fin whale	B. physalus	E, M	o
Sei whale	B. borealis	E, M	0
Blue whale	B. musculus	E, M	0
Humpback whale	Megaptera novaeangliae	E, M	O *
Pacific right whale	Eubalaena glacialis	E, M	o
Bowhead whale	B. mysticetus	E, M	0
Sperm whale	Physeter_macrocephalus	E, M	0
Beluga whale	Delphinapterus leucas	P	c
Killer whale	Orcinus orca	P	c
Bering Sea beaked whale	Mesoplodon steinegeri	P?	o
Goose-beaked whale	Ziphius cavirostris	M	0
Giant bottle-nosed whale	Berardius bairdi	M	0
Harbor porpoise	Phocoena phocoena	P	c
Dall's porpoise	Phocoenoides dalli	P	o

Table 3. Marine mammals in the SGBA OCS Planning Area (adapted from Gusey 1979b and Braham et al. 1982).

KEY: P = permanent resident; M = seasonal migrant; E = endangered species; C = coastal habitat; O = offshore habitat I = pack ice habitat; * = critical breeding and/or habitat area within SGBA

Common name	Scientific Name	Status	Primary Habitat
Sea otter	Enhydra lutra	P	C *
Steller sea lion	Eumetopias jubata	P	C *
Northern fur seal	Callorhinus ursinus	M	O *
Harbor seal	Phoca vitulina	P	C
Spotted seal	P. larga	M	I
Ribbon seal	P. fasciata	M	I
Bearded seal	Erignathus barbatus	M	I
Walrus	Odobenus rosmarus	M	C
Gray whale	Eschrichtius robustus	E, M	O, C *
Minke whale	Balaenoptera acutorostrata	P	C
Fin whale	B. physalus	E, M	O
Sei whale	B. borealis	E, M	O
Blue whale	B. musculus	E, M	O
Humpback whale	Megaptera novaeangliae	E, M	O *
Pacific right whale	Eubalaena glacialis	E, M	O
Bowhead whale	B. mysticetus	E, M	O
Sperm whale	Physeter macrocephalus	E, M	O
Beluga whale	Delphinapterus leucas	P	C
Killer whale	Orcinus orca	P	C
Bering Sea beaked whale	Mesoplodon steinegeri	P?	O
Goose-beaked whale	Ziphius cavirostris	M	O
Giant bottle-nosed whale	Berardius bairdi	M	O
Harbor porpoise	Phocoena phocoena	P	C
Dall's porpoise	Phocoenoides dalli	P	O

Table 4. Major seabird colonies (>5000 individuals) in SGBA OCS Planning Area (Sowls et al. 1978).

	Location	Map #	Total seabirds	Chief species
Amukta Island	52°30'N 171°15'W	132	51000	murres glaucous-winged gul 15
Chagulak Island	52°35'N 171"10'U	132	607,200	northern ful mar murres black-legged kittiwake parakeet auk let
Yunaska Island	52°37'N 170°40'W	132	51500	whiskered auk let tufted puffin horned puffin
Kamagi I Island	52°58'N 169°43'W	132	2137 ,000	murres red-faced cormorant tufted puffin
Uliaga Island	53 °04'N 169 °45'W	133	201000	tufted puffin horned puffin
Bogoslof Island	53°56'N 168°03'W	127	50)673	murres tufted puffin
Fire Island	53°57'N 168°05'W	127	42,010	thick-billed murre common murre black-legged kitti wake
Baby Islands	53°54'N 166°04'W	127	100 I875	tufted puffin
Rootok Island	54 °04'N 165 °32'W	123	1001000	tufted puff n
Avatanak Island	54°05'N 165°20'W	123	50,000	tufted puff n
Kal igagan Island	54 °07'N 164°55'W	123	375,500	tufted puff n
Sankin Island	54°48'N 163°16'W	123	8,700	tufted puffin horned puffin

Continued . . .

Table 4. Major seabird colonies (>5000 individuals) in" SGBA OCS Planning Area (sOwls et al. 1978).

	Location	Map #	Total seabirds	Chief species
Bird island	54°39'N 163°17'W	123	22,626	common murre glaucous-winged gull
Amak Island	55°24'N 163"10'W	124	11,667	murres black-legged kittiwake red-faced cormorant
St, George island	56°40'N 169°35'W	134	2,519,000	thick-billed murre common murre parakeet auklet least auklet crested auklet horned puffin tufted puffin red-legged kittiwake black-legged kittiwake northern fulmar red-faced cormorant
St, Paul Island	57°12'N 170°15'W	135	253,800	[same as St. George I.]
Otter Island	57°04'N 170°25'W	135	15,200	murres black-legged kittiwake

VERTEBRATES

NABA

MARINE MAMMALS

At least 25 species of marine mammals, including eight species of endangered whales, range within the waters of the southern Bering Sea shelf (Table 1). Several of these are primarily oceanic and do not occur regularly in the virtually estuarine environment of inner Bristol Bay. Bottom-feeding mammals (walrus, bearded seals, and gray whales) may be of special importance in the shallow coastal waters of NABA, because their feeding activity stirs up large amounts of sediment. This bioturbation can release buried nutrients (e. g., nitrogen and phosphorus) from sediment pore waters, thereby enhancing the potential for phytoplankton primary production in the overlying euphotic zone (Fay 1981).

The primary breeding grounds and summer foraging range of the northern fur seal are just to the west of NABA (see SGBA Coastal Habitats and Communities), but these arc oceanic animals and do not occur commonly in the Planning Area (Harry and Hartley 1981; MMS 1982a: Graphic 3).

Known Steller sea lion haulouts in NABA are the Walrus Islands, Hagemeister Island, and Cape Newenham (Gusey 1979b; MMS 1982a: Graphic 3; ADFG 1984 b). Sears and Zimmerman (1977) observed 575 sea lions in the Cape Newenham-Walrus Islands' vicinity during aerial surveys. Sea Lion Rocks, near Amak Island, support the only large sea lion breeding rookery in NABA (Armstrong et al. 1984).

Adult female and juvenile walrus migrate into Bristol and Kuskokwim Bays in winter, while adult males remain throughout the year. Winter pack ice in this area apparently is a breeding ground for large numbers of walrus (Fay 1981). There are several walrus hauling grounds along the coast of Bristol Bay, and large summer concentrations occur on Round Island in the Walrus Island group (MMS 1982a: Graphic 3; ADFG 1984 b). Sears and Zimmerman recorded 2000 walrus on Round Island during the summer of 1976; probably all of the summer sightings have involved adult males. The number of walrus wintering in NABA varies according to ice conditions; the number has been estimated at approximately 25'% of the total Alaskan population, or about 62,500 animals, Summering males in NABA number 12,000-20,000 (Kinnetic Lab., Inc. (KLI) 1984a).

The gently sloping beaches and rich coastal waters of Bristol Bay are well-suited to the requirements of harbor seals for hauling, pupping, and feeding grounds. Population estimates range from 28,000-60,000 animals, of which 80% use hauling sites in Port Moller, Port Heiden, and the Cinder River. Harbor seal concentrations also have been reported from Izembek Lagoon and other estuaries in NABA (Sears and Zimmerman 1977; MMS 1982a: Graphic 3; KLI 1984a).

Sea otter distribution and numbers within NABA are variable, apparently depending upon winter ice conditions as well as on natural population dynamics. In general, moderate to high sea otter concentrations occur from Izembek Lagoon to Port Moller, with occasional sightings further north. An expansion of the sea otter population 'in Bristol Bay apparently was reversed by severe winters in the late 1970's. No population estimates are available for NABA as a unit, but regional estimates suggest that less than 5000 otters permanently reside in the Planning Area (Schneider 1981; KLI 1984a; MMS 1982a: Graphic 3).

Spotted seals, ringed seals, ribbon seals, and bearded seals migrate into the southern Bering Sea with the pack ice front during winter and early spring. Spotted and bearded seals are the most common of these ice inhabitants in NABA. Ringed seals depend primarily upon shore-fast ice and are considerably less common in the Planning Area. Distributions and numbers of these species in NABA vary according to seasonal and annual variations in ice cover (Braham et al. 1977).

The NABA is included within the broad geographic ranges of eight non-endangered cetacean species. Beluga whales and harbor porpoises are permanent residents of coastal waters and estuaries in Bristol Bay. The beluga population is estimated at 1000-1500 individuals; the number of harbor porpoises in this area apparently is not known. Sighting records indicate that minke whales, killer whales, and Dan porpoises are fairly common in NABA, chiefly during summer months. There have been no recorded sightings of beaked whales within the Planning Area; the three species that occur in the Bering Sea inhabit deep oceanic and slope waters and should not be expected to occur in NABA.

Marine and Coastal Birds

Lagoons, estuaries, and wetlands in NABA are of major importance as nesting, staging, and feeding areas for migratory waterfowl during spring and fall migrations. The Planning Area also includes a small portion of the Kuskokwim-Yukon Delta, an area with high summer concentrations of breeding waterfowl.

The Alaska Peninsula contains critical habitats and food resources for several species of waterfowl, including the entire world population of 150,000-200,000 black brant (Branta bernicla nigricans), which stage and feed in Izembek Lagoon (MAP #118), emperor geese (Philacte canagica), king eiders (Somateria spectabilis), Steller's eiders (Polysticta stelleri), and cackling Canada geese (Branta canadensis minima). More than a million geese and considerably greater numbers of ducks occur seasonally in NABA. Areas of special importance to waterfowl are Izembek Lagoon, Nelson Lagoon, Port Moller, Herendeen Bay, Cape Newenham, and Kuskokwim Delta (Gusey 1979b; King and Dau 1981; KL1 1984a).

NABA Coastal Habitats

The millions of shorebirds that rely on coastal habitats of the eastern Bering Sea are a resource of "global significance" (Gill and Handel 1981). Thirty species are common in the region; ten of these are represented seasonally by major portions of their Alaskan or North American populations. Shorebirds are most numerous and diverse in the Yukon Delta to the north of NABA (see SMHL Coastal Habitats and Communities), but large numbers use littoral and intertidal areas of the northern Alaska Peninsula. This area is especially important to spring migrants, when the more northern shores are still ice-covered (Gill and Handel 1981).

Sowls et al. (1978) cataloged 55 seabird colonies in NABA, the largest of which are listed in Table 2. Although NABA is probably of less importance to seabirds than the Aleutian and Pribilof Islands (see SGBA Coastal Habitats and Communities), there are several large colonies in the Cape Peirce-Cape Newenham area, and Gould et al. (1982) reported high pelagic seabird densities in central and northern Bristol Bay,

Table 1. Marine mammals in the NABA OCS Planning Area (adapted from Gusey 1979b and Braham et al. 1982).

Key: P = permanent resident; M = seasonal migrant; E = endangered species; C = coastal habitat; O = offshore habitat; I = ice pack or landfast ice habitat; U = unknown or unlikely occurrence in NABA, although area is within geographic range of species; * = critical breeding and/or habitat area.

Common name	Scientific name	Status	Primary Habitat
Sea otter	Enhyrda lutra	P	C
Steller sea lion	Eumetopias jubata	P	C
Northern fur seal	Callorhinus ursinus	M	u
Harbor seal	Phoca vitulina	P	c*
Spotted seal	P. larga	M	I
Ribbon seal	P. fasciata	M	I
Ringed seal	P. hispida	M	C, I
Bearded seal	Erignathus barbatus	M	I
Walrus	Odobenus rosmarus	M,P(males)	C
Gray whale	Eschrichtius robustus	E, M	O,C*
Minke whale	Balaenoptera acutorostrata	M	O,C
Fin whale	B. physalus	E, M	O
Sei whale	B. borealis	E, M	u
Blue whale	B. musculus	E, M	U
Humpback whale	Megaptera novaeangliae	E, M	o
Pacific right whale	Eubalaena glacialis	E, M	u
Sperm whale	Physeter macrocephalus	E, M	o
Beluga whale	Delphinapterus leucas	P	C, I
Killer whale	Orcinus orca	M	c
Bering Sea beaked whale	Mesoplodon steinegeri	M	u
Goose-beaked whale	Ziphius cavirostris	M	u
Giant bottle-nosed whale	Berardius bairdi	M	u
Harbor porpoise	Phocoena phocoena	P	c
Dall porpoise	Phocoenoides dalli	M	o

Table 2. Large seabird colonies (>5000 birds) in NABA OCS Planning Area (Sowls et al. 1978).

	Location	MAP #	Total seabirds	Chief species
Nelson Lagoon Islands	56 °02'N161°00W	119	14)450	glaucous-winged gul I arctic tern
Cape Seniavi n	56°24'N 16 O"1O'W	119	5700	black-legged kittiwake cormorants
Chistiakof Island	56°55'N 158°45'W	114	5500	glaucous-winged gul I
Bird Rock	58 °39'N162°08'W	120	215,500	murres black-legged kittiwake tufted puffin
Cape Newenham	58°38'N 162°11'W	120	48)032	murres black-legged kittiwake
Jagged Mountain	58 °37'N162°05'W	120	66]240	murres black-legged kittiwake
Oracle Mountain	58 °36'N162°01'W	120	21,830	murres black-legged kittiwake
Gap Mountain	58°37'N161"S7'	120	151070	murres black legged kittiwake
Tokomarik Mountain	58°37'N 161 °50'W	120	20,507	murres black-legged kittiwake
Cape Peirce	58°32'N 161°46'W	120	702] 187	common murre black-legged kittiwake pffins
Shaiak Island	58°33'N 161°39'W	120	*155,800*	tufted puffin common murre black-legged kitti wake glaucous-winged gul I

Continued, . .

Table 2. Large seabird colonies (>5000 birds) in NABA OCS Planning Area (Sowls et al. 1978).

	Location	MAP #	Total seabirds	Chief species
SW Hagemeister Island	58°36'N 160 °05'W	120	24,733	common murre black-legged kittiwake
High Island	58°43'N 160°25'W	120	69,955	common murre black-legged kittiwake pelagic cormorant
South Twin	58°36'N 160°19'W	120	54,968	common murre black-legged kitti wake
North Twin	58 °36'N 160'17' W	120	239 J 554	common murre black-legged kitti wake tufted puffin
Black Rock	58°43'N 160°12'W	120	57,088	common murre black-legged kittiwake
Round Island	58°36'N 159°58'W	115	142,300	common murre black-legged kittiwake pelagic cormorant horned puffin parakeet auklet

VERTEBRATES

SMHL

MAMMALS

Sources differ on the precise number of marine mammal species which occur in the northern Bering Sea, and specifically, in the SMHL OCS Planning Area. Of the 23 species listed in Table 1, the occurrence of six (sea otter, northern fur seal, narwhal, right whale, and the two beaked whales) either is rare or very poorly known. Sightings of sea otters and fur seals in SMHL and farther north have been recorded, but apparently these represent only stray individuals (Schneider 1981; Harry and Hartley 1981). Two narwhals were sighted near King Island (see NORB OCS Planning Area) by Ljungblad et al. (1983), which suggests that these arctic animals may occur in SMHL in association with winter ice. The distribution of beaked whales in the Bering Sea is very poorly known, but the giant bottle-nosed (Baird's) and goose beaked (Cuvier's) whales probably occur seasonally in SMHL. The Bering Sea beaked (Stejneger's) whale apparently does not. occur north of the Pribilof Islands (in the SGBA OCS Planning Area; Frost and Lowry 1.981).

Polar bears are thoroughly arctic animals, but occasionally they range south of St. Lawrence Island in years when winter pack ice is heavy (Gusey 1979b).

Steller sea lions haul out on St. Matthew and Hall Islands, and on the seasonal ice front, but no breeding rookeries have been located within SMHL (ADFG 1984a).

Harbor seals occur in coastal areas of SMHL but their numbers and distribution are poorly known. This species is probably of very minor importance in the Planning Area.

Five species of pinnipeds are closely associated with winter pack ice in SMHL. During most winters, entire Bering Sea populations of these species are present in or near SMHL, including 200,000-250,000 spotted seals, 100,000 ribbon seals, 1. 1.5 million ringed seals, 300,000 bearded seals, and 300,000 walrus. Portions of spotted seal, ribbon seal, and walrus populations also summer in the Planning Area (Lowry and Frost 1981a).

Of the eight non-endangered cetacean species likely to occur in SMHL, only the beluga whale is of major importance. Most of these whales migrate with the pack ice front, summering in the Beaufort and Chukchi Seas. A few belugas probably summer in coastal waters of SMHL (BLM 1982a). Minke whales, killer whales, harbor and Dali porpoises all are relatively common summer visitors in the Planning Area: no population estimates are available, however (Frost and Lowry 1981).

Birds

SMHL Coastal Habitats

The intertidal wetlands of the Yukon Delta (MAPS #126, 126A and 131) are probably the most critical habitat in western North America for waterfowl and shorebirds. The summer nesting population of 1.9 million waterfowl produces a fall flight, with numbers increased by young produced on the Delta and staging migrants which have bred elsewhere, estimated at more than 3.6 million birds. About 540,000 Yukon Delta waterfowl are harvested each year, mostly outside of Alaska. Most or all of the Pacific flyway populations of tundra swans (Cygnus columbianus), cackling Canada geese (Branta canadensis minima), white-fronted geese (Anser albifrons), black brant (Branta bernicla nigricans), and emperor geese (Philacte canagica) nest in the region. The Delta also provides habitats of major importance to several other species of waterfowl (Gusey 1979b; King and Dau 1981).

At least. 100 million shorebirds use littoral and intertidal wetland habitats in the Yukon Delta for nesting, molting, foraging, and staging. During summer and early fail, this area supports the largest concentration of shorebirds in Alaska and perhaps in North America (Gusey 1979b; Gill and Handel 1981).

Twenty-five sea bird colonies, containing 1.8 million birds, have been identified within the bounds of SMHL. The largest of these, located on St. Matthew, Hall, Pinnacle (MAP #140) and Nunivak (MAP #130) Islands, are listed in Table 2. High densities of pelagic birds have been reported from waters near St. Matthew Island, Nunivak Island, and the north shore of Kuskokwim Bay (Gould et al. 1982).

Table 1. Marine mammals in the SMHL OCS Planning Area (Fay 1974a; Braham et al. 1977; Gusey 1979b; Frost and Lowry 1981; Lowry and Frost 1981a; Ljungblad et al. 1983).

KEY: P = permanent resident; M = seasonal migrant; U = rare or unlikely occurrence in SMHL; E = endangered species; C = coastal habitat; O = offshore habitat; I = ice pack or shore ice habitat; * = critical breeding and/or habitat area.

Common name	Scientific Name	Status	Primary Habitat
Sea otter	Enhydra lutris	U	C
Polar bear	Ursus maritimus	M	I
Steller sea lion	Eumetopias jubata	M	C, I
Northern fur seal	Callorhinus ursinus	U	O
Harbor seal	Phoca vitulina	P	C
Spotted seal	P. larga	P	C, I*
Ribbon seal	P. fasciata	P	I*
Ringed seal	P. hispida	M	C, I
Bearded seal	Erignathus barbatus	M	I*
Walrus	Odobenus rosmarus	P	C, I*
Gray whale	Eschrichtius robustus	E, M	O, C*
Minke whale	Balaenoptera acutorostrata	M	O, C
Fin whale	B. physalus	E, M	O
Humpback whale	Megaptera novaeangliae	E, M	O, C
Bowhead whale	Balaena mysticetus	E, M	I*
Pacific right whale	Eubalaena glacialis	E, M	O
Beluga whale	Delphinapterus leucas	P	C, I
Narwhal	Monodon monocerus	U	I
Killer whale	Orcinus orca	M	C
Goose-beaked whale	Ziphius cavirostris	M	O
Giant bottle-nosed whale	Berardius bairdi	M	O
Harbor porpoise	Phocoena phocoena	M	C
Dan porpoise	Phocoenoides dalli	M	O

Table 2. Large seabird colonies (>5000 birds) in SMHL OCS Planning Area (Sowls et al. *1978*).

	Location	MAP #	Total seabirds	Chief species
Pinnacle island	60°12'N 172°47'W	140	1s41000	northern ful mar murres black-legged kitti wake
Cape Upright	60°18'N 172°13'W	140	177,767	murres crested auk let least auklet northern fulmar horned puffin parakeet auklet black-legged kittiwake
Sugar loaf Mountain	60°19'N 172°38'W	140	58,475	least auklet crested auklet murres northern ful mar back-legged kittiwake
Split Rock and Cliffs	60 °23'N 172 °46'W	140	*7,s30*	murres northern fulmar
West Colony	60°26'N 172°52'W	*140*	*7,420*	murres northern fulmar
North West Colony	60°31'N 173°03'W	140	*2111295*	murres least auk let crested auklet parakeet auk let northern ful mar black-legged kittiwake

Continued . . .

Table 2. Large seabird colonies (>5000 birds) in SMHL OCS Planning Area (Sowls et al. 1978).

	Location	MAP #	Total seabirds	Chief species
Hall Island	60°39'N 173°04'W	140	658} 107	murres crested auk let least auklet horned puffin pigeon gui I lemot pelagic cormorant northern fulmar black-legged kittiwake
Glory of Russia Cape	60 °36'N 172 °56'W	140	97,280	murres least auklet crested auklet tufted puffin northern fulmar black-legged kittiwake
Bull Seal Point	60°32'N 172"% '(J	140	14)691	murres black-legged kittiwake
Receipt Bluff	60°28'N 172°49'W	140	30,270	murres least auklet parakeet auk let
South Big Lake Cliffs	60°23'N 172°25'W	140	191090	murres least auklet black-legged kitti wake
Nunivak Island (Cape Mohican vicinity)	60°12'N 167°28'W	130	152,400	murres parakeet auklet horned puffin black-legged kittiwake
Ingri Butte	60°01'N 167°11'W	130	169,175	murres parakeet auklet horned puffin black-legged kittiwake

VERTEBRATES

NORB

Marine Mammals

An estimated 1.7-2.4 million marine mammals migrate through or into the Bering Straight region each year, Most of these mammals, including entire populations of several species, either reproduce, feed, or overwinter in or near the NORB OCS Planning Area. Population estimates and habitat use for important species are recorded in Table 4.

Sources differ on the precise number of marine mammal species which occur in the northern Bering Sea. Of the 22 species listed in Table 5, the occurrence of five (sea otter, northern fur seal, narwhal, and the two beaked whales} either is rare or very poorly known, Sightings of sea otters and fur seals in the northern Bering Sea have been recorded, but apparently these represent. only stray individuals (Schneider 1981; Harry and Hartley 1981). Two narwhals were sighted near King Island by Ljungblad et al. (1983); these arctic animals may occur sporadically in NORB in association with pack ice. The distribution of beaked whales in the Bering **Sea** is not well known, but the giant bottle-nosed (Baird's) and goose-beaked (Cuvier's) whales probably occur seasonally in NORB.

Polar bears are thoroughly arctic, but in winters of heavy pack ice they regularly range as far south as St. Lawrence Island (ADFG 1981e: Map 6).

A few Steller sea lions haul out on St. Lawrence Island and the Panuk Islands, and some have been observed at other sites in NORB, but there are no breeding rookeries, nor is this an important area for the species (ADFG 1981e; ADFG 1984a). Harbor seals occur in coastal areas of NORB, but their numbers and distribution are poorly known. This species is probably of very minor importance in the Planning Area.

Five species of pinnipeds (spotted seal, ringed seal, ribbon seal, bearded seal, and walrus) are closely associated with winter pack ice in NORB. Population estimates and habitat use are summarized in Table 4. Portions of spotted seal, ribbon seal, and walrus populations also summer in the Planning Area (Lowry and Frost 1981a; ADFG 1981e: Maps 6 & 7).

Of the eight non-endangered cetacean species likely to occur in NORB, only the beluga whale is of major importance, Most of these whales migrate with the pack ice front, summering in the Beaufort and Chukchi Seas. Some belugas summer in coastal waters of NORB, and Norton Bay may be a calving area (ADFG 1981e; BLM 1982a). Minke whales, killer whales, harbor and Dali porpoises all are relatively common summer migrants in the Planning Area, however no population estimates are available (Frost and Lowry 1981).

NORB Coastal Habitats

Marine and Coastal Birds

Coastal lowlands, marshes, lagoons, mud flats, and river mouths along the mainland coast of NORB, and barrier island lagoons on the south shore of St. Lawrence Island, are important resting, staging, feeding, and stopover sites for waterfowl, The Akulik-Inglutalik Delta (approximately 20,000 birds) and Golovin Lagoon (approximately 14,000 birds) are especially important staging and stopover areas dufing spring and fall migrations (Drury et al. 1981; ADFG 1981e: Map 5). Approximately 49,000 waterfowl use mainland coastal habitats along the south shore of the Seward Peninsula from Cape Denbigh to Cape Spencer (Drury et al. 1981). The portion of the Yukon Delta within the Planning Area supports high densities of nesting and molting waterfowl; actual numbers are not known, but available information suggests that more than 100,000 and perhaps as many as one million waterfowl may use this critical area (Drury et al. 1981; ADFG 1981e: Map 5).

In spring, ice-free waters near river mouths in Norton Sound are critical resting and feeding areas for migrant waterfowl. The large polynya south of St. Lawrence Island supports winter densities of 500,000 oldsquaw (Clangula hyemalis) and 50,000 king and common eiders (Somateria spp.), as well as high densities of seabirds (ADFG 1981e: Map 5; Zimmerman 1982).

Lagoons and mudflats surrounding Norton Sound are critical nesting, molting, and staging areas for large numbers of shorebirds. During some fall migrations, the entire Siberian population of sandhill cranes (Grus canadensis) stages in the Akulik-Inglutalik Delta; as many as 16,000 cranes have been observed there in a single day (Drury et al. 1981; ADFG 1981e: Map 5). Estimates in the Norton Sound Area suggest that more than 150,000 shorebirds occur there; to these must be added an unknown fraction of 100 million shorebirds of the Yukon Delta (Gill and Handel 1981).

Fifty seabird colonies, containing approximately 2.2 million birds, have been identified in NORB (Sowls et al. 1978). The largest of these (Table 6) are on St. Lawrence and King Islands. It should be noted that seabird estimates for NORB usually have included the large colonies at Little Diomede Island and Fairway Rocks in the Bering Strait (e.g., ADFG 1981e: Map 5), however, these islands are outside of the formal OCS Planning Area boundary [see Hope Basin (HBAS) text for more information],

Pelagic seabird densities generally are high within 100km of the large island colonies and throughout mutt of the Chirikov Basin. Especially critical seasons include the late summer molt of eiders and scoters and the fall migratory molt of murres. These molts take place at sea when the birds are flightless and vulnerable to even minor water contamination or other environmental disturbance (Drury et al. 1981; Gould et al. 1982).

Table 4. Marine mammals for which NORB is exceptionally important (ADFG 1981e: Graphics 6 and 7).

Species	Estimated numbers	Habitat use
Spotted seal	2,0-2,5 X 10^5	summer feeding and haul ing in coastal areas
Ringed seal	1,0-1,5 x 10^6	overwintering; spring breeding, puping and molting on land-fast ice
Ribbon seal	*0.8-1.0* x 10^5	breeding, pupping, and molting on pack ice front in late winteri pelagic feeding in Bering Sea during summer
Bearded seal	3.0 x 10^5	pack ice during spring and falli breeding, molting, pupping, and feeding in NORB
Walrus	2,0-2.5 X 105	overwintering, feeding, breeding, and pupping on loose pack ice
Beluga whale	9500	Overwintering in broken pack ice; possible calving area in Norton Bay (MAP #146)
Bowhead whale	*1700-4000*	overwintering and migration in ice front during spring and fall
Gray whale	16,500-19,000	primary summer feeding ground n. of St, Lawrence I, (MAPS #148, 149)

Table 5. Marine mammals in the NORB OCS Planning Area (Fay 1974a; Braham et al. 1977; Gusey 1979c; Frost and Lowry 1981; Lowry and Frost 1981a; ADFG 1981e; BLM 1982a; Ljungblad et al. 1983).

KEY: P = permanent resident; M = seasonal migrant; U = rare or unlikely occurrence in NORB; E = endangered species; C = coastal habitat; O = offshore habitat: I = ice pack or shore ice habitat; * = critical breeding and/or habitat area.

Common name	Scientific name	Status	Primary Habitat
Sea otter	Enhydra lutris	u	C
Polar bear	Ursus maritimus	M	I
Steller sea lion	Eumetopias jubata	M	C, I
Northern fur seal	Callorhinus ursinus	u	O
Harbor seal	Phoca vitulina	P	C
Spotted seal	P. larga	M	C, I*
Ribbon seal	P. fasciata	P	O, I*
Ringed seal	P. hispida	M	C, I
Bearded seal	Erignathus barbatus	M	I*
Walrus	Odobenus rosmarus	P	C, I*
Gray whale	Eschrichtius robustus	E, M	O, C*
Minke whale	Balaenoptera acutorostrata	M	O, C
Fin whale	B. physalus	E, M	O
Humpback whale	Megaptera novaeangliae	E, M	O, C
Bowhead whale	Balaena mysticetus	E, M	I*
Beluga whale	Delphinapterus leucas	P, M	C, I*
Narwhal	Monodon monocerus	U	I
Killer whale	Orcinus orca	M	C
Goose-beaked whale	Ziphius cavirostris	M	O
Giant bottle-nosed whale	Berardius bairdi	M	O
Harbor porpoise	Phocoena phocoena	M	C
Dall porpoise	Phocoenoides dalli	M	O

Table 6. Major seabird colonies in NORB OCS Planning Area (Sowls et al. 1978).

	Location	MAP #	Total seabirds	Chief species
Southwest Cape	63°19'N 171 °25'W	149	709,000	least auklet murres crested auklet
Sevuokuk Mountain	63°47'N 171°40'W	149	187/000	least auklet crested auklet parakeet auklet horned puffin
Kaghkusal i k	63°36'N 170°50'W	149	*94)300*	murres least auklet crested auklet black-legged kittiwake
Savoonga	63°41'N 170°29'W	149	90,000	least auklet crested auklet murres
Cape Myaughee	63°39'N 170°14'W	149	640,500	least auklet crested auklet murres
Singikpo Cape	63°37'N 170°06'W	149	64,080	crested auk let least auklet murres black-legged kittiwake
Owalit Mountain	63°25'N 171°50'W	149	54,230	least auklet crested auklet parakeet auklet murres black-legged kittiwake
Bluff	64°34'N 163°44'W	147	49,320	common murre black-legged kittiwake

Continued, .,

Table 6. Major seabird colonies in NORB OCS Planning Area (Sowls et al. 1978).

	Location	MAP #	Total seabirds	Chief species
Cape Denbigh, South	64°23'N 161 °33'W	146	5,197	horned puffin common murre
Cape Denbigh, North	64°25'N 161°33'W	146	7,250	common murre black-legged kitti wake
King Island	64°57'N 168°03'W	148	245,971	least auklet parakeet auk let crested auklet common murre thick-hi I led murre horned puffin tufted puffin black-legged kittiwake

VERTEBRATES

HBAS

MAMMALS

Ten species of marine mammals, including the endangered gray and bowhead whales, inhabit HBAS in substantial numbers (Table 2). Several other species occur rarely or in low numbers within the Planning Area.

Hundreds of thousands of ringed seals migrate through HBAS in spring. Summer concentrations are associated mainly with pack ice, ordinarily farther north than HBAS. Pack ice and landfast ice are important winter and spring habitats for ringed seals in the Planning Area (Burns et al. 1981a).

Spotted seals winter in the Bering Sea, but move into HBAS in spring. During the open water season, these seals haul out on land and feed in coastal waters. Bearded seals are abundant in HBAS in spring and fall, common in winter, and uncommon in summer. Open pack ice, flaw zones, and the pack ice fringe are used for migration, pupping, and molting, Ribbon seals use the pack ice fringe when it is present, and become pelagic after it disintegrates in summer. They are common in HBAS in spring, but primarily inhabit the Bering Sea in other seasons (Burns et al. 1981a).

Pacific walrus are abundant, in HBAS from spring through fall, but rare or occasional in winter. Walrus are mostly associated with the pack ice fringe, but also haul out on land. Migration, birth, feeding, and molting take place in the Planning Area (Burns et al. 1981a).

Polar bears are abundant in HBAS in fall, winter, and spring, but move farther north during winter. Apparently, HBAS is outside of the normal denning range for the species.

Kotzebue Sound is an intensive summer use area for beluga whales, the only abundant non-endangered cetacean in HBAS. Small numbers winter in the vicinity as well. During spring and fall migrations, more than 10,000 belugas use HBAS waters.

Minke whales, killer whales, and harbor porpoises are fairly common summer visitors to HBAS, but in low numbers, Narwhals, fur seals, sea lions, and harbor seals are rare in the southern Chukchi Sea, but a few individuals may occasionally enter the Planning Area.

Coastal habitats in HBAS are seasonably important to more than 100,000 caribou (Rangifer tarandus), Arctic fox (Alopex lagopus), and brown bear (Ursus dalli).

Birds

More than three million colonial seabirds nest in HBAS; the larger bird colonies are listed in Table 2. Near Cape Lisburne are the northernmost colonies of cliff-nesting birds in Alaska. Gulls and terns nest on the many barrier islands and extensive coastal wetlands in HBAS, as well as in the cliff colonies (Sowls et al. 1978; Drury et al. 1981).

Waterfowl and shorebirds nest in coastal tundra wetlands in HBAS. High densities of ducks and geese occur on the northern Seward Peninsula and Kotzebue Sound, hut. no estimates of total numbers of waterfowl and shorebirds have been found for the Planning Area as a unit. Regional estimates suggest that hundreds of thousands of waterfowl and similar numbers of shorebirds use coastal habitats in HBAS. Ikpek and Shismaref Lagoons and the Kobuk River Delta have been identified as critical areas for waterfowl and shorebirds.

Table 2. Marine mammals in HBAS OCS Planning Area (Burns et al. 1981a; Davis and Thompson 1984).

KEY: P = permanent resident; M = seasonal migrant; E = endangered species; U = unlikely or rare occurrence in HBAS; C = coastal habitat; O = offshore habitat; I = pack ice habitat; * = critical habitat and/or breeding area in HBAS.

Common name	Scientific name	Status	Primary Habitat	Estimated Numbers
Polar bear	Ursus maritimus	P	I*	<4250
Spotted seal	Phoca larga	M	cl I*	30,000-37,500
Ribbon seal	P. fasciata	M	O, I	<10,000
Ringed seal	P. hispida	P, M	C,I*	300,000-450,000
Bearded seal	Erignathus barbatus	P, M	I*	120,000
Walrus	Odobenus rosmarus	P, M	c1 I*	1501000
Gray whale	Eschrichtius robustus	E, M	C, O	4250
Minke whale	Balaenoptera acutorostrata	U	C, O	few
Fin whale	B. physalus	E, U	O	few
Humpback whale	Megaptera novaeangliae	E, U	O	few
Bowhead whale	Balaena mysticetus	E, M	C, O, I*	3000-4000
Beluga whale	Delphinapterus leucas	M	C, O, I*	10,500-14)000
Narwhal	Monodon monocerus	U	I	rare
Killer whale	Orcinus orca	M	C, O	150
Harbor porpoise	Phocoena phocoena	M	C	few

Table 3. Major seabird colonies in HBAS OCS Planning Area (Sowls et al. 1978).

	Location	MAP #	Total seabirds	Chief species
Fairway Rack	65°37'N 168°43'W	152	46,792	thick-billed murre least auklet crested auklet common murre
Little Diomede Island	65°45'N 168°55'W	152	11261,570	least auklet crested auklet parakeet auklet common murre thick-billed murre horned puffin tufted puffin black-legged kittiwake
Cape Deceit	66°06'N 162°46'W	150	7,250	black-legged kittiwake
Puffin Island	66°14'N 161°50'W	150	29,090	common murre thick-billed murre horned puffin black-legged kittiwake
Crowbill Island	68°06'N 165°49'W	154	6,071	murres
Artigotrat	68°07'N 165°51'W	154	133,986	murres black-legged kittiwake
Agate	68°08'N 165°58'W	154	50,194	black-legged kittiwake
Cape Thompson	68°08'N 165°59'W	154	12,060	black-legged kittiwake
Imnakpak Cliff	68°09'N 166°00'W	154/155	2151384	black-legged kittiwake
Cape Lewis	68°43'N 166°13'W	155	28,442	black-legged kittiwake
Cape Lisburne	68°53'N 166°14'W	155	1261768	common murre thick-billed murre horned puffin black-legged kittiwake

VERTEBRATES

CHUKCHI SEA

MAMMALS

The numerical estimates of marine mammals given in Table 4 are taken mostly from Alaska Department of Fish and Game figures for the Alaskan Chukchi Sea. This includes a small portion of the BEAU OCS Planning Area. As all of these mammals make extensive seasonal or ice-associated migrations, it is reasonable to assume that entire Chukchi Sea populations could be present in CHKS at times. The persistent flaw-lead zone that extends along the CHKS coast in winter **and** spring provides habitat of "outstanding importance" for bearded and ringed seals, polar bears, and bowhead and beluga whale migrations (Burns et al. 1981a).

The large area of shallow shelf in CHKS is "ideal" habitat for benthic-feeding bearded seals (Davis and Thomson 1984), which use ice for migration, birth, and molting. Bearded seals are most abundant in CHKS during spring, summer, and fall, but are common in winter as well. Bearded seal harvest statistics reported by Burns and Frost (1983) show a combined U. S.-U.S.S.R harvest of 989,701kg over a 1.5-yr period, equivalent to 659,800 $kg \cdot yr^{-1}$, with an economic value of approximately $1.1 million.

Ringed seals occur in high densities on landfast ice in winter and spring (0.7-2.4 $seals \cdot km^{-2}$), and large numbers migrate through the area in spring, Densities are lower on pack ice ($0.08 \cdot km^{-2}$), but. absolute numbers are larger due to the much greater extent of this habitat, More than 1000 ringed seals are harvested in CHKS annually (Davis and Thomson 1984).

Spotted seals use littoral and lagoon habitats in CHKS during the open water season. Akoliakatat Pass and Utokok Pass are important haul-out areas (Davis and Thomson 1984). Spotted seals are primarily associated with pack ice in winter and spring.

Ribbon seals are not particularly common in the Chukchi Sea, especially in the more northern portions. Their primary habitats are in the Bering Sea.

Walrus are abundant in CHKS from spring through fall, mostly in association with the pack ice fringe and the coastal flaw zone. Although a few walrus may be present. in winter, most of the population winters in the Bering Sea.

Polar bears are present in CHKS all year. Most remain with the pack ice, but pregnant females move inland in winter for denning. Winter-spring density in CHKS was one bear $\cdot 70\text{-}130 km^{-2}$; 24-50 polar bears are harvested annually in CHKS (Davis and Thomson 1984).

CHKS Coastal Habitats

With the exception of beluga whales, non-endangered cetaceans (whales and porpoises) are rare (narwhal), or seasonally present in low numbers (killer whale, harbor porpoise) in CHKS. Two groups of belugas apparently use habitats in the Planning Area. One population of about 11,500 belugas migrates in the coastal flaw zone from March to May enroute to summering grounds in the Beaufort Sea. A second population (1500-2500) summers in lagoons and coastal waters south of Wainwright. The fall migration is mostly in offshore waters and the pack ice fringe (Davis and Thomson 1984),

Arctic fox (Alopex lagopus) winter on sea ice in CHKS, where they feed on young seals and the remains of polar bear kills (Burns et al.1981a; Davis and Thomson 1984). Large numbers (>100,000) of caribou (Rangifer arcticus) winter in coastal areas of CHKS, and calving grounds extend to the coast in the vicinity of Point Lay (ADFG 1981a).

Birds

There are no large seabird colonies in CHKS due to the lack of cliff nesting habitat. However, large numbers (300,000-500,000) of seabirds, mostly murres (Uria spp.) from colonies in the Cape Lisburne area (see HBAS), forage in Ledyard Bay and offshore waters in the southern part of the Planning Area. Barrier islands in CHKS are important nesting habitat for Arctic terns (Sterna paradisaea), glaucous gulls (Larus hyperboreus), black guillemot (Cepphus gryllae) and common eiders (Somateria mollissima) (Roseneau and Herter 1984; Sowls et al. 1978).

More than 40 species of shorebirds occur in CHKS, 12-15 of which breed in tundra habitats. Thousands to tens of thousands of shorebirds feed in CHKS coastal habitats in summer. Phalaropes (Phalaropus spp.) and sandpipers (Calidris spp.) are the most abundant shorebirds in CHKS (Roseneau and Herter 1984).

Lagoons, salt marshes, mud flats, and coastal ice leads in CHKS constitute vital habitat for millions of waterfowl. Waterfowl nest, feed, stage, molt, and migrate in CHKS coastal habitats from spring through fall. About one million king eiders (Somateria spectabilis), and tens of thousands of common eiders (S. mollissima) migrate along coastal leads in May and June. Thousands of eiders nest on barrier islands and in the vicinity of Kasegaluk Lagoon. Tens of thousands of black brant (Branta bernicla) migrate and feed in CHKS coastal areas in spring and fall. The Icy Cape marshes are particularly important to this species. Tundra habitats near Icy Cape are important nesting and migratory habitat for more than 10,000 loons (Gavia spp.). Oldsquaw (Clangula hyemalis) reach high densities and numbers (100,000's) during spring and fall migrations (Roseneau and Herter 1984). Alaska Department of Fish and Game identified kasegaluk Lagoon as a critical area for waterfowl.

Table 4. Marine mammals in CHKS OCS Planning Area (Burns et al. 1981a; Davis and Thomson 1984).

KEY: P = permanent resident; M = seasonal migrant; E = endangered species; U = unlikely or rare occurrence in CHKS; C = coastal habitat; O = offshore habitat; I = pack ice habitat; * = critical habitat and/or breeding area in CHKS.

Common name	Scientific name	Status	Primary Habitat	Estimated Numbers
Polar bear	Ursus maritimus	P	I*	45 00-4750
Spotted seal	Phoca large	M	C, I*	30}000-371500
Ribbon seal	P. fasciata	M	0, 1	(10,000
Ringed seal	P. hispida	P, M	C, I*	300,000-450,000
Bearded seal	Erignathus bar batus	P, M	I*	120,000
Walrus	Odobenus rosmarus	P, M	C, I*	1501000
Gray whale	Eschricht ius robustus	E, M	C, O	4250
Minke whale	Balaenoptera acutorostrata	U	C, O	few
Fin whale	B. physalus	E, U	0	few
Humpback whale	Megaptera novaeangl iae	E, U	0	few
Bowhead whale	Balaena mysticetus	E, M	C, O} I*	3000-4000
Beluga whale	Delphinapterus leucas	M	C, 0, I*	10,500-14,000
Narwhal	Monodon monocerus	U		rare
Killer whale	Orcinus orca	M	C, O	150
Harbor porpoise	Phocoena phocoena	M	C	few

VERTEBRATES

BEAU

MAMMALS

Nine species of marine mammals (Table 2), including the endangered gray and bowhead whales (see Endangered Species, below), commonly occur in BEAU. A few other species occur only rarely, as this OCS Planning Area is far outside their usual ranges.

Ringed seals are the most abundant marine mammals in BEAU. They inhabit shorefast and pack ice, where pupping and molting take place in spring and early summer, respectively. Numbers are highest in summer when migrants from the Bering and Chukchi Seas augment the winter population. Winter and spring densities are highest in the shorefast ice zone, but most ringed seals move offshore with the pack ice in summer. Ringed seals are the primary prey for polar bears (Eley and Lowry 1978).

Low numbers of spotted seals inhabit coastal areas of BEAU in summer and fall. These are migrants from the Chukchi and Bering Seas, and are most common in estuaries. Peard Bay, Dease Inlet, and Smith Bay are high-use areas (Eley and Lowry 1978; ADFG 1981c).

Bearded seals are common in the western part of BEAU from spring to fall, when they inhabit ice with areas of open water. They are rare in the Planning Area in winter. Walrus are present on the pack ice fringe in BEAU from July to October, but, except for areas west and south of Point Barrow, BEAU is not an important habitat area for the species (Eley and Lowry 1978).

Beluga whales migrate in a northeasterly direction through the Planning Area in spring, and occur mainly in offshore waters east of Point Barrow from spring to fall. Some belugas summer and calve in BEAU coastal waters. The westward fall migration is associated with the pack ice fringe, generally some distance offshore (Eley and Lowry 1978). Killer whales are fairly common from Wainwright to Point Barrow, but uncommon in the Beaufort Sea. Numerical estimates are not available.

Polar bears inhabit pack ice in BEAU throughout the year. Barrier islands and the mainland coast from Peard Bay to the eastern Planning Area boundary are critical denning and tubbing areas (ADFG 1981c).

Other non-endangered mammals which occur only rarely, or in extremely low numbers in the Planning Area, probably include narwhals (Monodon monoceros), harbor porpoise (Phocoena phocoena), fur seals (Callorhinus ursinus), sea lions (Eumetopias jubata), hooded seals (Cystophoca cristata), harp seals (Phoca groenlandica), ribbon seals (P. fasciata), and minke whales (Balaenoptera acutorostrata). Hooded and harp seals are native to the eastern Canadian

Arctic; the rest of these species are inhabitants of the Bering and Chukchi Seas.

Coastal habitats in the BEAU OCS Planning Area are quite important, perhaps critical, to portions of four separate Alaskan Arctic barren ground caribou (Rangifer arcticus) herds. Beaches, barrier islands, and shallow waters are used for insect relief during summer months, and some caribou winter on the coastal plain. The combined herds number almost 300,000 animals; the number which use coastal habitats is substantial, but not fully documented.

Birds

Between five and ten million birds, mostly waterfowl and shorebirds, migrate through BEAU in spring. Fewer birds remain through the summer, but barrier islands and river deltas are important nesting areas from June to mid-August. Flightless molting birds concentrate in coastal lagoons in late summer; up to 100,000 birds have been observed in Simpson Lagoon in one day (Houghton et al. 1984). Howe Island is a critical nesting area for the only colony of snow geese (Chen hyperborea) in the U.S. A summary of important coastal avian species, habitats, and estimated numbers is given in Table 3,

Due to a lack of suitable cliff nesting habitat, there are no large seabird colonies in BEAU. However, barrier islands are important nesting grounds for eiders (Somateria spp.), arctic terns (Sterna paradise), and black guillemots (Cepphus gryllae). Lagoon shores and wetlands are also important to eiders (Sowls et al. 1973).

Table 2. Marine mammals in BEAU OCS Planning Area (Eley and Lowry 1978; Ljungblad et al. 1983; AGAACL 1982).

KEY: P = permanent resident; M = seasonal migrant; E = endangered species; U = unlikely or rare occurrence; C = coastal habitat; O = offshore habitat; I = pack ice habitat; * = critical habitat and/or breeding area in BEAU; ND = no data.

Common name	Scientific name	Status	Primary Habitat	Estimated Numbers
Ringed Seal	Phoca hispida	P, M	I*	$2\text{-}6 \times 10^5$
Spotted seal	P. larga	M	C	104-121500
Bearded seal	Erignathus barbatus	P, M	I	45,000
Pacific walrus	Odobenus rosmarus	M	I	12,500
Gray whale	Eschrichtius robustus	E, M	C	(650
Bowhead whale	Balaena mysticetus	E, M	I*	1500-3000
Beluga whale	Delphinapterus leucas	M	I*	6300-7200
Killer whale	Orcinus orca	M	C	ND (few)
Polar bear	Ursus maritimus	P	I*	2200-2300

Table 3. Important coastal birds in BEAU.

KEY: N = nesting habitat; M = molting habitat; F = feeding area; S = staging area, None of these species, except possibly eiders, are present in winter.

Common and scientific name		Habitat	Habi tat use	Numbers i n BEAU
Oldsquaw	Clangula hyemaLis	offshore	M, S	1 x 10^6
		wetlands	N	
		ice leads	C	
		lagoons	M, F, S	
King eider	Somateria spectabi I is	barrier islands	N	1 x 10^6
		lagoon shores	N	
		wetlands	N	
		ice leads	F	
		lagoons	M, F	
Common eider	Somateria mol I issima	same as king eider	as above	1 x 10^5
Shorebirds	various species	wet lands	N, F	)1 x 10^6
		deltas	N, F	
		barrier islands	F, S	
		shoreline	F] S	
Black brant	Branta bernicla nigricans	wet lands	N, F	*201000*
		deltas	N, F	
		coastal tundra	M	
Glaucous gul I	Larus hyperboreus	barrier islands	N, F	*120}000*
		shoreline	F, S	
		wetlands	N	
Canada goose	Branta canadensis	wetlands	N, S	30,000
		deltas	S	
White-fronted goose	Anser al bifrons	wetlands	N, S	>50,000
		deltas	S	

Continued. . .

Table 3. Important coastal birds in BEAU (ADFG 1982)

KEY: N = nesting habitat; M = molting habitat; F = feeding area; S = staging area. None of these species, except possibly eiders, are present in winter.

Common and scientific name		Habitat	Habitat use	Numbers in BEAL!
Tundra swan	Cygnus columbianus	wetlands deltas	N, S S	4,200
Loons	Gavia spp.	wetlands offshore	N F	76,000

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Rept. No. BLM-YK-ES-82-012-1792. 373pp.

ALASKA : SMHL NORB
Keywords: Marine Mammals; Birds;
Distribution; Abundance.

Color graphics of faunal habitats and migrations and species accounts for mammals, birds, fish, and endangered species are included in this EIS.

BUREAU OF LAND MANAGEMENT. 1982b.
Final supplement to the final environmental statement : Proposed five-year OCS oil and gas lease sale schedule: January 1982-December 1986.
BLM. 2 Volumes. 890pp. + appendices.

PACIFIC: SCAL NCAL
Keywords: Marine mammals; Finfish;
Benthos; Coastal environment.

This schedule summarizes marine biological, physiochemical, and environmental factors that may be influenced by oil and gas development . Possible effects upon endangered animal and plant species is discussed.

BURNS, J. J. & K. J. Frost. 1983.
The natural history and ecology of the bearded seal, 'Erignathus barbatus' .
pp.311 - 392 In: NOAA, National Ocean Service. Juneau. AK (cd.). Environmental Assessment of the Alaskan Continental Shelf. Final reports of the principal investigators. vol. 19, December, 1983. Prepared for MMS. Washington, D.C.

ALASKA : CHKS
Keywords: Marine Mammals; Distribution;
Trophies; Reproduction; Harvest.

This report of a four-year study of bearded seals contains detailed information on distribution, abundance, population dynamics, life histories, and harvests.

BURNS, J. J., L. H. Shapiro,
& F. F. Fay. 1981a.
The relationships of marine mammal distributions,
densities and activities to sea ice conditions.
pp.489 - 670 In: NOAA, Office of Marine Pollution Assessment,
Fairbanks, AK. (eds.).
Environmental Assessment of the Alaskan Continental
Shelf. Final reports of principal investigators. Vol.11.
Biological studies. Prepared for BLM. Washington, D.C.

ALASKA : HBAS CHKS
Keywords: Marine Mammals; Distribution;
Abundance; Migration; Habitats.

Most of this paper is concerned with analysis of ice distribution and morphology. Marine mammal distributions and abundance are classified by seasons, ice types, and OCS planning areas.

BURT, W. H. & R. P. Grossenheider. 1976.
A Field Guide to the Mammals.
Houghton Mifflin Co. Boston, MA. 289pp.

GULF OF MEXICO: EGUL
Keywords: Mammals.

This book is useful primarily for its large-scale distribution maps summarizing known ranges of mammal species in the United States.

CALKINS, D. G. & K. W. Pitcher. 1983.
Population assessment, ecology, and trophic
relationships of Steller sea lions in the Gulf of Alaska.
pp.445 - 546 In: NOAA, National Ocean Service. Juneau, AK. (cd.).
Environmental Assessment of the Alaskan Continental Shelf.
Final reports of principal investigators.
vol. 19. Prepared for MMS. Washington, D.C.
565pp.

ALASKA: GOAK CKIN KODK SHUM
Keywords: Distribution; Abundance;
Reproduction; Trophies; Mammals.

CALKINS, D. G., K. W. Pitcher,
& K. Schneider. 1975.
Distribution and abundance of marine mammals in the
Gulf of Alaska.
AK Dept. Fish & Game. Anchorage, AK.

ALASKA : GOAK
Keywords: Mammals.

Details of distribution and population estimates for Steller sea lions, sea otters, and harbor seals from southeast Alaska to Unimak Pass are given. Summary information is included on other marine mammals.

CHAPMAN, J. A. & G. A. Feldhamer. 1982.
Wild Mammals of North America.
Johns Hopkins Univ. Baltimore, MD. 1147pp.

PACIFIC: SCAL

This edited volume provides detailed and up-to-date information on morphology, taxonomy and ecology of North American mammals. Bibliographies are extensive and useful.

CONDIT, R. & B. J. LeBoeuf. 1984.
Feeding habits and feeding grounds of the northern
elephant seal.
J. Mammal. 65 :p.281 - 290.

PACIFIC: ORWA
Keywords: Macroalgae.

The only information, descriptive or otherwise, located for the kelp beds of southeastern Alaska.

DAILEY, M. D.. 1974.
Marine Mammals. Chapt. 12.
pp.1 - 37 In: M. D. Dailey, B. Hill, & N. Lansing (cd.).
A summary of knowledge of the Southern California coastal zone and offshore areas. Vol.II. Biological environment.
Performed for BLM. Contract No. 08550-CT4-1.
The So. CA. Ocean Studies Consortium.

PACIFIC: SCAL
Keywords: Cetaceans; Pinnipeds; Mammals.

Species are described by range, approximate population size, life history, study area sitings and diseases. Locations and dates of sitings in the study area are reported. Quantitative information is not provided.

DAVIS, R. A. & D. H. Thomson. 1984.
Marine mammals. Chapt.4
pp.47 - 79 In: J. C. Truett (cd.).
The Barrow Arch Environment and Possible Consequences of Planned Offshore Oil and Gas Development. Proceedings of a synthesis meeting, Girdwood, AK, 30 Ott - 1 Nov 1983.
NOAA/MMS, OCSEAP. Juneau, AK.

ALASKA : CHKS HBAS
Keywords: Distribution; Abundance; Migration; Endangered Species; Mammals.

Distribution maps and species accounts for marine mammals in the Chukchi Sea includes a discussion of mammal sensitivity to development.

DELONG, R. L.. 1978.
Northern elephant seal.
pp.207 - 211 In: D. Haley (cd.).
Marine Mammals of Eastern North Pacific and Arctic Waters.
Pacific Search Press. Seattle, WA. 256pp.

PACIFIC: ORWA
Keywords: Marine Mammals; Distribution;
Abundance; Life History.

The absence of breeding north of the Farallon Islands, but occurrence of extensive feeding offshore Oregon, Washington, and British Columbia by elephant seals are reported in this chapter.

DRURY, W. H., C. Ramsdell,
& J. B. French, Jr.. 1981.
Ecological studies in the Bering Strait Region.
pp.175 - 487 In: NOAA, Office of Marine Pollution Assessment (cd.).
Environmental Assessment of the Alaskan Continental Shelf.
Final reports of principal investigators. Vol.11.Biological studies. Prepared for BLM. Washington, D.C.

ALASKA : NORB HBAS CHKS
Keywords: Birds; Abundance;
Ecology; Distribution.

Though rambling and idiosyncratic, this report contains valuable first hand accounts of coastal habitats in the Kotzebue Sound region, as well as bird density maps and colony counts.

ELEY, T. & L. Lowry (eds.). 1978.
Marine mammals. Part 4.
pp.134 - 151 In: NOAA, Arctic Project Office. (cd.).
Environmental Assessment of the Alaskan Continental Shelf.
Interim synthesis report: Beaufort/Chukchi. Prepared for BLM. Washington, D.C.
NOAA, OCSEAP, Environmental Research Labs. Boulder, CO.

ALASKA : BEAU
Keywords: Mammals.

Distributional maps, life histories, and trophic information for arctic marine mammals are provided.

FAY, F. H.. 1974a.
The role of ice in the ecology of marine mammals of the Bering Sea. Chapt. 19.
pp.383 - 399 In: D. W. Hood & E. J. Kelley (cd.).
Oceanography of the Bering Sea with emphasis on Renewable Resources.
Univ. AK, Inst. Marine Science. Fairbanks, AK.
Occas. Publ. No. 2.

ALASKA : NORB SMHL
Keywords: Marine Mammals; Distribution; Ecology; Adaptation.

Review examines the importance of Bering Sea ice not only for those mammals for which ice is an essential habitat, but also for those mammals which must migrate to avoid ice.

FISCUS, C. H.. 1978.
Northern fur seals.
pp.153 - 159 In: D. Haley (cd.).
Marine Mammals of Eastern North Pacific and Arctic Waters.
Pacific Search Press. Seattle, WA. 256pp.

PACIFIC: ORWA
Keywords: Marine Mammals; Distribution; Abundance; Life History; Harvest.

This illustrated account of the fur seal includes transect sighting data from off the Washington and California coasts.

FLYGER, V. & J. E. Gates. 1982.
Fox and gray squirrels.
pp.209 - 229 In: J. A. Chapman & G. A. Feldhamer (cd.).
Wild Mammals of North America.
The Johns Hopkins Univ. Press. Baltimore, MD. 1147pp.

ATLANTIC: MATL
Keywords: Mammals; Coastal resources; Endangered species.

This chapter is a detailed account of natural history, morphology and eccology of the large tree squirrels of North America.

BIBLIOGRAPHY - Vertebrates

FORSELL, D., J. Gould,
& J. Patrick. 1981.
Distribution and abundance of marine birds and
mammals wintering in the Kodiak area of Alaska.
BLM/ USFWS, Office of Biological Services. Washington, D.C.
FWS/OBS 81/13. 81pp.

ALASKA : KODK SHUM
Keywords: Seabirds.

Winter shipboard and aerial surveys were conducted of Kodiak Island seabirds, with marine mammal sightings also recorded. Data limited mostly to inshore areas because of severe weather.

FRITTS, T. H. & R. P. Reynolds. 1981.
Pilot study of the marine mammals, birds and
turtles in OCS areas of the Gulf of Mexico.
USFWS , Office of Biological Services. Washington, D.C.
FWS/OBS-81/36. 77pp.

GULF OF MEXICO: WGUL CGUL EGUL
Keywords: Birds; Reptiles;
Mammals; Distributions.

The distributions of marine mammals, birds, and turtles on the continental shelf of the Gulf of Mexico are summarized.

FRITTS, T. H., A. B. Irvine,
R. D. Jennings, L. A. Collum, W. Hoffman & M. A. Mc Gehee. 1983.
Turtles, birds, and mammals in the northern Gulf
of Mexico and nearby Atlantic waters.
MMS/ USFWS, Office of Biological Services. Washington, D.C.
FWS/OBS 82/65. 465pp.

ATLANTIC: SATL
GULF OF MEXICO: EGUL CGUL WGUL
Keywords: Mammals; Turtles;
Birds; Overflight surveys; Beaches.

Report summarizes study of seasonal distribution and abundance of marine turtles, birds, and mammals observed from aircraft surveys from April 1980 through April 1981. Species accounts include description, and geographical, seasonal, and ecological variation in distribution and abundances. Discussions of geographical, seasonal, and ecological trends relevant to the areas studied are arranged in separate sections. Potential impacts of OCS development are discussed and vulnerability indexes for populations and individuals are developed (which can be used for risk evaluation). Plots of distribution are included.

FROST, K. J. & L. F. Lowry. 1981.
Foods and trophic relationships of cetaceans in the
Bering Sea. Chapt. 50.
pp.825 - 836 In: D. W. Hood & J. A. Calder (cd.).
The Eastern Bering Sea Shelf: Oceanography and Resources
Vol.II. NOAA/BLM, Office of Marine Pollution Assessment.
Washington, D.C. Distributed by: Univ. WA Press, Seattle.

ALASKA : SMHL NORB
Keywords: Mammals; Abundance;
Trophic Ecology; Distribution.

Review stresses the competition between cetaceans, seabirds and humans for food. Only the gray whale, a benthic feeder is not involved in this competition. Food requirements for the gray whale population are estimated.

GILL, R. E., JR. & C. M. Handel. 1981.
Shorebirds of the eastern Bering Sea. Chapt. 41.
pp.719 - 738 In: D. W. Hood & J. A. Calder (cd.).
The Eastern Bering Sea Shelf: Oceanography and Resources.
Vol.II. NOAA/BLM, Office of Marine Pollution Assessment.
Washington, D.C. Distributed by: University of Washington
Press , Seattle, WA.

ALASKA : NABA SGBA SMHL NORB
Keywords: Shorebirds; Ecology;
Distribution; Littoral; Feeding.

Shorebirds are known to be extremely abundant in the eastern Bering Sea, but data are very sparse. Species accounts are included.

GOULD, P. J., D. J. Forsell,
& C. J. Lensink. 1982.
Pelagic distribution and abundance of seabirds in
the Gulf of Alaska and Eastern Bering Sea.
USFWS, Biological Services Program. Washington, D.C.
FWS/OBS-82/48. 294pp.

ALASKA : GOAK KODK NABA SGBA
SMHL NORB
Keywords: Seabirds.

Atlas contains density plots of pelagic birds by species and season from aerial and shipboard surveys.

GUSEY, W. F.. 1979a.
The fish and wildlife resources of the western Gulf
of Alaska.
Environmental Affairs, Shell Oil Co. Houston, TX.
334pp.

ALASKA : GOAK KODK CKIN SHUM
Keywords: Mammals; Birds;
Finfish; Distribution & Abundance Life History.

One of a series of elegant volumes describes biotic resources of the Alaskan marine environment. Unfortunately, some of the information is now out-of-date.

GUSEY, W. F.. 1979b.
The fish and wildlife resources of the southern Bering Sea region.
Environmental Affairs, Shell Oil Company. Houston, TX.
383pp.

ALASKA : NABA NORB SGBA SMHL
Keywords: Wildlife; Finfish;
Distribution; Harvest; Abundance.

vide Gusey 1979a

HALL, E. R.. 1981.
The Mammals of North America. Vol.II.
John Wiley & Sons. New York, NY. 1271pp.

ATLANTIC: NATL
Keywords: Mammals; Mammal distribution;
Endangered species.

Hall and Kelson 1959 has been updated and is more relevant in this revision.

HALL, E. R. & K. R. Kelson. 1959.
The Mammals of North America. Vol.II.
The Ronald Press Co. New York, NY. 1162pp.

ATLANTIC: NATL
Keywords: Mammals; Mammal distribution;
Endangered species.

This book is a comprehensive but dated summary of knowledge of North American mammals.

HARRISON, W. G., D. Douglas,
P. Falkowski, G. Rowe & J. Vidal. 1983.
Summer nutrient dynamics of the Middle Atlantic
Bight : Nitrogen uptake and regeneration.
J. Plankton Res. 5 :p.539 - 556.

ATLANTIC
Keywords: Regeneration; Continental Shelf.

Primary productivity rates from this study are described in Falkowski et al. 1983.

HARRY, G. Y. & J. R. Hartley. 1981.
Northern fur seals in the Bering Sea. Chapt. 52
pp.847 - 866 In: D. W. Hood & J. A. Calder (cd.).
The Eastern Bering Sea Shelf: Oceanography and Resources
Vol.II. NOAA/BLM, Office of Marine Pollution Assessment.
Washington, D.C. Distributed by: Univ. WA Press, Seattle.

ALASKA : NABA SMHL NORB
Keywords: Mammals.

Harvest, recent sighting and food survey data for northern fur seals are summarized. Commercial fisheries, sea lion competition, disturbance of colonies, and pollutants are discussed as factors in recent population declines.

HOUGHTON, J. P., D. A. Segar,
& J. E. Zeh. 1984.
Beaufort Sea Monitoring Program: Proceedings of a
Workshop(September 1983) and Sampling Design Recommendations
NOAA/MMS, OCSEAP. Juneau, AK. 124pp.

ALASKA : BEAU
Keywords: Description; Biota;
Monitoring Strategies.

Although primarily concerned with monitoring program designs, this report includes information on habitats and faunal distribution and abundance.

HUNT, G. L., JR., Z. Eppley,
& W. H. Drury. 1981a.
Breeding distribution and reproductive biology of
marine birds in the eastern Bering Sea. Chapt. 39.
pp.649 - 687 In: D. W. Hood & J. A. Calder (cd.).
The Eastern Bering Sea Shelf: Oceanography and Resources
vol. II. NOAA/BLM, Office of Marine Pollution Assessment.
Washington, D.C. Distributed by: University of Washington
Press. Seattle, WA.

ALASKA : SGBA
Keywords: Seabirds; Biology;
Bering Sea; Distribution.

Seabird reproductive biology in relation to food and habitat
requirements is discussed. The high degree of bird concentration in
a few large colonies is stressed, along with reasons for variations
in reproductive effort and success.

HUNT, G. L., JR., P. J. Gould,
D. J. Forsell, & H. Peterson, Jr.. 1981b.
Pelagic distribution of marine birds in the eastern
Bering Sea. Chapt. 40.
pp.689 - 718 In: D. W. Hood & J. A. Calder (cd.).
The Eastern Bering Sea Shelf: Oceanography and Resources
Vol.II. NOAA/BLM, Office of Marine Pollution Assessment.
Washington, D.C. Distributed by: University of Washington
Press, Seattle, WA.

ALASKA : SGBA NAVB
Keywords: Birds; Distribution;
Density; Ecology.

Species and species-group density-distribution maps for birds at
sea are provided along with discussions of trophic and ecological
factors associated with variations in abundance.

IRVINE, A. B., J. E. Caffin,
& H. I. Kochman. 1981.
Aerial surveys for manatees and dolphins in
western peninsular Florida with notes on sightings of
sea turtles and crocodiles.
BLM, USFWS, Office of Biological Services. Washington, D.C.
FWS/OBS 80/50. 20pp.

GULF OF MEXICO: EGUL
Keywords: Mammals; Manatee;
Dolphin; Survey; Endangered species.

Aerial surveys were conducted to determine the distribution and abundance of manatees and dolphins along the southwest Florida coast. Data are summarized by location and numbers of organisms sited.

JONES & STOKES ASSOCIATES, INC.. 1981a.
Sacramento, CA.
An ecological characterization of the central and
northern California coastal region. Vol.II, Part 2. Species.
Performed for BLM, Pacific OCS Office.
USFWS, Office of Biological Services. Washington, D.C.
FWS/OBS - 80/49. 670pp.

PACIFIC: SCAL CCAL NCAL
Keywords: Marine mammals; Coastal environment;
Finfish; Phytoplankton; Benthos.

Detailed ecological information about major plant and animal species occurring in CCAL and NCAL is presented.

JONES & STOKES ASSOCIATES, INC.. 1981b.
Sacramento, CA.
An ecological characterization of the central and
northern California coastal region. Vol. 111, Part 1.
Habitats. Prepared for BLM, Pacific OCS Office.
USFWS, Office of Biological Services, Washington, D.C.
FWS/OBS-80/47.1. 463pp.

PACIFIC: SCAL CCAL NCAL
Keywords: Coastal environment; Benthos.

This volume provides detailed ecological information on major habitats that are found in CCAL and NCAL.

KENYON, K. W.. 1978.
Sea otter.
pp.227 - 235 In: D. Haley (cd.).
Marine Mammals of Eastern North Pacific and Arctic Waters.
Pacific Search Press. Seattle, WA. 256pp.

PACIFIC: ORWA
Keywords: Marine Mammals; Distribution;
Life History; Ecology.

A short illustrated account of the northern sea otter includes descriptions of transplants of otters from Alaska to the Oregon-Washington coast.

KENYON, K. W.. 1982.
Sea Otter.
pp.704 - 710 In: J. A. Chapman & G. A. Feldhamen (cd.).
Mammals of North America.
Johns Hopkins Univ. Press. Baltimore, MD. 1147pp.

PACIFIC: SCAL

This chapter is a detailed summary of knowledge of taxonomy, morphology, and ecology of the sea otter, with a useful bibliography.

KENYON, K. W. & D. W. Rice. 1961.
Abundance and distribution of the Steller sea lion.
J. Mammal. 42 :p.223 - 234.

PACIFIC: ORWA
Keywords: Marine Mammals; Distribution;
Abundance.

This paper contains the only numerical estimates located for Steller sea lions in Oregon and Washington despite being out-of-date.

KING, J. E.. 1983.
Seals of the World.
British Museum (Natural History).
Comstock Publ. Assoc. Cornell Univ. Press.
Ithaca, NY. 240pp.

PACIFIC: ORWA
ATLANTIC: NATL
Keywords: Marine Mammals; Distribution;
Abundance.

As a popularized account of pinniped ecology by species, this is a useful book for distribution maps and records.

KING, J. G. & C. P. Dau. 1981.
Waterfowl and their habitats in the eastern Bering Sea. Chapt. 42.
pp.739 - 753 In: D. W. Hood & J. A. Calder (cd.).
The Eastern Bering Sea Shelf: Oceanography and Resources.
Vol.II. NOAA/BLM, Office of Marine Pollution Assessment.
Washington, D.C. Distributed by: University of Washington Press, Seattle, WA.

ALASKA : NABA NORB SMHL
Keywords: Coastal Habitats; Numbers;
Distribution.

Waterfowl population sizes and areas of habitat in the region are reported. The habitat descriptions are extremely valuable. Species accounts are included.

KINNETIC LABORATORIES, INC. . 1984a.
Environmental characterization of the north Aleutian Shelf nearshore region. Final Report. Vol.1. Characterization processes and vulnerability to development. Prepared for NOAA/MMS, OCSEAP, Western Support Center. Seattle, WA. Contract No. 83-ABc-00113. Rept. No. KLI-R-84-4. 317pp + appendices.

ALASKA : NAVB NABA SGBA SMHL
Keywords: Bristol Bay; Nearshore habitats; Oil spill impacts. Finfish; Coastal environment; Mammals; Anadromous fishes.

Environmental, ecological, and oil impact data for north Aleutian shelf region are summarized. Trophic and life history information for biotic communities of the nearshore zone, including selected mammals and birds are described.

LE BOEUF, B. J., M. L. Bonnell, M. O. Pierson, D. H. Dettman, & G. D. Farrens. 1976. Pinnipedia: Numbers, distribution and movements in the Southern California Bight. Part 1.2. pp.1 - 269 In: Univ. CA Santa Cruz (cd.). Draft Final Report 1975-76. Marine Mammal and Seabird Survey of the Southern California Bight area. Vol.III - Principal investigators' reports. Prepared for BLM, Pacific OCS Office. Los Angeles, CA.

PACIFIC: SCAL
Keywords: Pinnipeds; Macrophytes; Marine mammals.

Monthly surveys were conducted along ship and aerial transects and censuses were conducted on islands from May 1975-March 1976.

LEATHERWOOD, S. & R. R. Reeves. 1982.
Toothed whales.
pp.369 - 414 In: J. A. Chapman & G. A. Feldhamer (cd.).
Wild Mammals of North America.
The Johns Hopkins Univ. Press. Baltimore, MD. 1147pp.

ATLANTIC: MATL
Keywords: Mammals; Marine mammals;
Human impacts; Endangered species; Whales.

This chapter documents natural history, morphology and ecology of odontocete cetaceans. It has an extensive and useful bibliography.

LEATHERWOOD, S. & R. R. Reeves. 1983.
The Sierra Club Handbook of Whales and Dolphins.
Sierra Club Books. San Francisco, CA. 302pp.

PACIFIC: ORWA
Keywords: Marine Mammals; Distribution;
Ecology.

Written by two very experienced cetacean scientists, this layman's book contains valuable, recent information on whales and dolphins.

LJUNGBLAD, D. K., S. E. Moore,
& D. R. Van Schoik. 1983.
Aerial surveys of endangered whales in the Beaufort,
Eastern Chukchi and Northern Bering Seas. Final Report:
April - October 1982. Prepared for MMS Alaska OCS Region.
Naval Ocean Systems Center, San Diego, CA
NOSC Tech. Dec. 605.

ALASKA : SMHL NORB BEAU CHKS
Keywords: Mammals; Endangered Species;
Distribution; Abundance; Behavior.

Data from aerial surveys of distribution and numbers of bowhead, gray, and beluga whales includes information on behavior and vocalization and photographs.

LOWRY, L. F. & K. J. Frost. 1981a.
Feeding and trophic relationships of phocid seals
and walruses in the eastern Bering Sea. Chapt. 49
pp.813 - 824 In: D. W. Hood & J. A. Calder (cd.).
The Eastern Bering Sea Shelf: Oceanography and Resources
vol. 11. NOAA/BLM, Office of Marine Pollution Assessment.
Washington, D.C. Distributed by: University of WA Press.
Seattle, WA.

ALASKA : SMHL NORB
Keywords: Marine Mammals; Distribution;
Abundance; Ecology.

Species-by-species summaries of food used by important pinnipeds in the Bering Sea includes discussions of data gaps and competition with fisheries for prey.

MATE, B. R.. 1978.
California Sea Lion.
pp.173 - 177 In: D. Haley (cd.).
Marine Mammals of Eastern North Pacific and Arctic Waters.
Pacific Search Press. Seattle, WA. 256pp.

PACIFIC: ORWA
Keywords: Marine Mammals; Distribution;
Abundance; Life History.

A short illustrated account is given for mammal species emphasizing disease, pollution, and interactions with humans.

MINERALS MANAGEMENT SERVICE. 1982a.
St. George Basin. Proposed Outer Continental Shelf oil and gas lease sale 70. Final Environmental Impact Statement. Volume 1 and Supplemental.
MMS, Alaska OCS Office. Anchorage, AK.

ALASKA : SGBA NABA KODK
GOAK SHUM
Keywords: Finfish; Physical Environment; Birds; Mammals; Impacts.

Descriptions of St George Basin physical, biotic, and human environment are summarized and potential impacts are estimated. Color graphics depict lease area, environmental geology, bird, mammal, fish and cultural resources. Supplement deals with potential impacts of development and exploration on gray whale population.

MINERALS MANAGEMENT SERVICE. 1984a.
Gulf of Alaska/Cook Inlet Lease Offering. Draft Environmental Impact Statement (October 1984). Text & Graphics 1-6.
MMS, Alaska OCS Region. Anchorage, AK.

ALASKA : GOAK KODK CKIN SHUM
Keywords: Finfish; Birds; Mammals; Endangered species.

Clear, color maps show distribution of marine and coastal birds (graphic 2), marine mammals (graphic 3), and endangered species (graphic 4).

MOREJOHN, G. V.. 1977.
Marine mammals. Report V.
pp.1 - 74 In: Winzler & Kelly Consulting Engineers (cd.).
A Summary of Knowledge of the Central and Northern
California Coastal Zone and Offshore Areas. Vol.II.
Biological Conditions. Prepared for BLM. Washington, D.C.
Contract AA 550-CT6-52.

PACIFIC: CCAL
Keywords: Cetaceans; Pinnipeds;
Mammals.

This report provides useful information about the distribution of marine mammals. Population information is less useful since it was averaged over seasons and the entire study area.

NASU, K.. 1974.
Movement of baleen whales in relation to hydrographic conditions in the northern part of the north Pacific Ocean and the Bering Sea
pp.345 - 361 In: R. W. Hood & E. J. Kelley (cd.).
Oceanography of the Bering Sea with emphasis on Renewable Resources.
Univ. AK Inst. Marine Science. Fairbanks, AK.
Occas. Publ. 2.

ALASKA : NAVB SMHL
Keywords: Mammals; Endangered species;
Distribution; Abundance.

Report on the historical distribution of sei and fin whales is gleaned primarily from whaling statistics. The numerical estimates are very out-of-date.

NATIONAL GEOGRAPHICAL SOCIETY. 1983.
Field Guide to the Birds.
National Geographical Society. Washington, D. C. 464pp.

ATLANTIC: NATL
PACIFIC: SCAL
Keywords: Birds; Endangered species;
Seabirds.

NEW YORK TIMES. 1985.
Mouse Hunt. 27 Jan 1985. p.25.

GULF OF MEXICO: EGUL
Keywords: Mammals; Perdido Key Beach Mouse;
Endangered species.

This news story summarizes efforts by the University of Mississippi to save this endangered species from habitat destruction.

NEWBY, T. C.. 1978.
Pacific harbor seal.
pp.185 - 191 In: D. Haley (cd.).
Marine Mammals of Eastern North Pacific and Arctic Waters.
Pacific Search Press. Seattle, WA. 256pp.

PACIFIC: ORWA
Keywords: Marine Mammals; Distribution;
Abundance; Ecology.

This account of the harbor seal concentrates on California and Washington populations and the effects of disturbance and pollution.

PETERSON, B. J.. 1980.
Aquatic primary productivity and the C14 - C02 method: A history of the productivity problem.
Ann. Rev. Ecol. Syst. 11 :p.359 - 385.

ALL REGIONS
Keywords: Primary Productivity; 14 C.

REEVES, R. R. & R. L. Brownell, Jr.. 1982.
Baleen whales.
pp.415 - 444 In: J. A. Chapman & G. A. Feldhamer (cd.).
Wild Mammals of North America.
The Johns Hopkins Univ. Press. Baltimore, MD. 1147pp.

ATLANTIC: MATL
PACIFIC: SCAL
Keywords: Mammals; Marine mammals;
Human impacts; Endangered species; Whales.

This chapter is a detailed and thoroughly documented account of natural history, morphology and ecology of baleen whales. It is particularly useful for summaries of human impacts, but it lacks detailed distribution data.

ROBBINS, C. S., B. Bruun,
& H. S. Zim. 1966.
Birds of North America. A guide to field identification.
Golden Press (Western Publ. Co., Racine, WI). New York.

ATLANTIC: NATL
PACIFIC: **CCAL NCAL**
Keywords: Birds; Distribution.

ROSENEAU, **D. G. & D. R. Herter. 1984.**
Marine and coastal birds. Chapt. 5.
pp.81 - 115 In: J. C. Truett (cd.).
The Barrow Arch Environment and Possible Consequences of Planned Offshore Oil and Gas Development. Proc. of synthesis meeting, Girwood, AK, 30 Ott - 1 Nov 1983.
NOAA/MMS, OCSEAP. Juneau, AK.

ALASKA : **CHKS**
Keywords: Birds; Distribution;
Abundance; Habitats; Migration, Nesting.

Migratory maps and species accounts for birds in the Chukchi Sea include a discussion of potential effects of petroleum development

RUGH, D. J.. 1984.
Census of gray whales at Unimak Pass, Alaska, November-December, 1977-1979. Chapt. 10. pp.225 - 248 In: M. L. Jones, S. L. Swartz & S. Leatherwoods (cd.). The Gray Whale, 'Eschrictius robustus' . Academic Press. New York, NY.

ALASKA : SHUM
Keywords: Mammals; Abundance.

This chapter contains the most recent population estimate for gray whales (17,000).

SCHEFFER, V. B.. 1972.
Marine mammals in the northwestern Gulf of Alaska. In: D. H. Rosenberg (cd.). A Review of the Oceanography & Renewable Resources of the Gulf of Alaska. Univ. AK. Fairbanks, AK.

ALASKA : GOAK KODK CKIN SGBA
Keywords: Food; Distribution; Ecology; Mammals.

This chapter is a useful but somewhat dated review of Alaska marine mammals. It contains harvest statistics & population estimates of marine mammal populations.

SCHNEIDER, K. B.. 1981.
Distribution and abundance of sea otters in the eastern Bering Sea. Chapt. 51. pp.837 - 845 In: D. W. Hood & J. A. Calder (cd.). The Eastern Bering Sea Shelf: Oceanography and Resources Vol. II. NOAA/BLM, Office of Marine Pollution Assessment. Washington, D.C. Distributed by: Univ. WA Press, Seattle.

ALASKA : NABA SMHL NORB
Keywords: Marine Mammals; Distribution; Abundance; Sightings.

History and status of sea otter populations in the Aleutian Islands/North Alaska Peninsula region through 1976, including reports of occasional sighting from the Northern Bering Sea and Arctic Ocean are contained in this chapter.

SCIENCE APPLICATIONS, INC.. 1979.
Boulder, CO.
Environmental Assessment of the Alaskan Continental Shelf: Lower Cook Inlet interim synthesis report, July 1979. Prepared for NOAA. Boulder, CO.

ALASKA : CKIN
Keywords: Mammals; Birds; Finfish; Benthos.

A valuable summary of data, with emphasis on fish and benthos. Includes an excellent section on distribution, biomass and productivity of macroalgae in the Kodiak region.

SEARS, H. S. & S. T. Zimmerman. 1977.
Alaska Intertidal Survey Atlas.
NOAA, NMFS. Auke Bay, AK. 449pp.

ALASKA : GOAK KODK CKIN SHUM NABA SGBA SMHL NORB
Keywords: Beach Substrate; Topography; Macrophytes; Birds; Mammals.

Aerial survey of Alaska coastline from Yakutat to Cape Prince of Wales (Bering Strait) recorded beach substrate, biological cover, slope, and observations of macrophyte, bird, and mammals on small-scale (~ 1:100,000) maps.

SHEW, D. M., R. H. Bauman, et al.. 1981b.
Texas barrier islands region ecological characterization: Environmental synthesis papers.
USFWS, National Coastal Ecosystem Team. Slidell, LA.
FWS/OBS 82/32.

GULF OF MEXICO: WGUL
Keywords: SAV; Barrier Islands; Mangrove; Species lists; Salt Marsh.

SOWLS, A. L., S. A. Hatch,
& C. J. Lensink. 1978.
Catalog of Alaskan seabird colonies.
BLM/ USFWS, Office of Biological Services. Washington, D.C.
FWS/OBS 78/78. 29pp., 153 maps, + appendices.

ALASKA : GOAK KODK CKIN SHUM
NABA SGBA SMHL NORB
HBAS CHKS BEAU
Keywords: Seabirds; Distribution;
Abundance.

Quadrangle maps for the entire Alaskan coast show locations of seabird colonies. Accompanying tables give species and numbers present for each colony. A short descriptive text is furnished for each map.

SOULS, A. L., A. R. De Gange,
J. W. Nelson, & G. S. Lester. 1980.
Catalog of California seabird colonies.
USFWS , Biological Services Program. Washington, D.C.
FWS/OBS - 80/37. 371pp.

PACIFIC: NCAL
Keywords: Seabirds.

The location, size and species composition of seabird colonies along the California coast are summarized. Maps locate bird colonies by species and provide collection/publicat ion dates.

STRAUCH, J. G., JR.. 1984.
Marine mammals. Chapt.8
In: L. E. Jarvela (cd.).
The Navarin Basin Environment and Possible Consequences of Planned Offshore Oil and Gas Development.
MMS, Alaska OCS. Juneau, AK.

ALASKA : NAVB SMHL
Keywords: Marine Mammals; Distribution;
Abundance; Endangered; Trophies.

The rather scanty knowledge of marine mammals in the Navarin Basin is summarized. Density estimates, for most species are probably very inaccurate due to limited data and high temporal variability.

U. S. FISH & WILDLIFE SERVICE. 1980a.
Directory Pacific States Region National Wildlife Refuges and Fish Hatcheries.
32pp.

PACIFIC: ORWA

UNIVERSITY OF RHODE ISLAND. 1981.
A characterization of marine mammals and turtles in the Mid- **and North Atlantic areas of US OCS.** Anual **report 1979. Prepared for BLM. Contract No. AA** 551-CT8-48.
Cetacean & Turtle Assessment Prog. Kingston, Rhode Island.

ATLANTIC: NATL MATL SATL
Keywords: Mammals; Cetaceans; Endangered species.

This report summarizes observations of marine mammals taken during 1979 from aircraft, ships, and platforms. synoptic graphics and discussion of methodology are particularly useful.

WILLNER, G. R.. 1982.
Nutria.
pp.1059 - **1076 In: J. A. Chapman & G. A.** Feldhamer **(cd.). Wild Mammals of North America.**
The Johns Hopkins Univ. Press. Baltimore, MD. 1147pp.

ATLANTIC: MATL SATL
Keywords: Mammals; Furbearers.

This chapter is a complete and up-to-date treatment of taxonomy, morphology and ecology of this introduced rodent.

WOOLFENDEN, G. E.. 1983.
Rare, threatened and endangered vertebrates of southwest Florida and potential OCS activity impacts. USFWS, Office of Biological Services. Washington, D.C. FWS/OBS 82/03. 64pp.

GULF OF MEXICO: EGUL
Keywords: Endangered Species; Florida; Vertebrates; Manatees.

Habitats of endangered vertebrates are described. The impact of oil activities on these habitats is evaluated for eight coastal counties in SW Florida.

ZIMMERMAN, S. T. (cd.). 1982.
The Norton Sound environment and possible consequences of planned offshore oil and gas development. Proceedings of a synthesis meeting, Anchorage, AK. October 28-30, 1980.
NOAA/BLM OCSEAP. Juneau, AK. 55pp.

ALASKA : NORB SMHL
Keywords: Mammals; Shellfish; Benthos; Birds. Bottomfish Resources; Ocean circulation; Oil spill impacts; NE Bering Sea.

The emphasis of this report is on impacts, however much useful information on fish, bird, and mammal distributions and coastal habitats is included. Some of material descriptive of coastal habitats is not to be found elsewhere.