ENVIRONMENTAL ASSESSMENT

CO-MANAGEMENT AGREEMENT BETWEEN THE NATIONAL MARINE FISHERIES SERVICE AND THE COOK INLET MARINE MAMMAL COUNCIL FOR THE YEAR 2005

September 8, 2005

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Abbreviations and Acronyms

ADFG	Alaska Department of Fish and Game
ANO	Alaska Native organization
EA	Environmental Assessment
EIS	Environmental Impact Statement
CI	Cook Inlet
CIMMC	Cook Inlet Marine Mammal Council
ESA	Endangered Species Act, as amended
MMPA	Marine Mammal Protection Act, as amended
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration

SUMMARY

Description of the Proposed Action

The National Marine Fisheries Service (NMFS) is entering into an agreement with the Cook Inlet Marine Mammal Council (CIMMC) for the cooperative management of the Cook Inlet (CI) beluga whales under section 119 of the Marine Mammal Protection Act, as amended (MMPA) and Public Law 106-553 for the year 2005. The co-management agreement specifies the conditions under which a subsistence harvest on CI beluga whales could be undertaken during the year 2005 The agreement specifies a harvest level of up to two (2) whale strikes

Abundance estimates for the CI beluga whale stock indicated a decline of nearly 50 percent between 1994 and 1998, which caused NMFS to designate the stock as depleted under the MMPA on May 31, 2000 (65 FR 34590). Subsequent surveys conducted between 1999 and 2004 have resulted in abundance estimates ranging from 313 to 435 with no clear trend. Federal authority to enter into the co-management agreement for the year 2005 derives from Public Law 106-553, which prohibits the hunting of CI beluga whales except pursuant to a cooperative agreement between NMFS and Alaska Native organizations (ANO); and Section 119 of the MMPA which allows the Secretary to enter into cooperative agreements with ANOs to conserve marine mammals and provide co-management of subsistence use by Alaska Natives.

During hearings before an Administrative Law Judge, which included testimony from various experts on beluga whale conservation issues for the purpose of developing a long term harvest plan for the CI beluga whale, the parties agreed to an interim harvest of two whales in 2005. Although the full impact of this harvest could not be determined, the harvest was considered a reasonable level during the interval when data was not sufficient to determine an actual growth rate of the population The proposed harvest plan will account for the actual harvest in 2005 and adjust future harvests to meet the recovery goals of the plan. NMFS has determined that the harvest of two beluga whales during the year 2005, as specified in the co-management agreement, will not significantly impact the overall quality of the human environment or cause any adverse impacts on species listed under the Endangered Species Act, as amended (ESA)

Summary of Environmental Impacts

Alternative 1 (No Action) would result in the diminishment of

cultural values and traditional needs within the local CI Native community and the Native Village of Tyonek

Alternative 2 would allow for the harvest of up to two strikes during 2005 from a stock which has been significantly exploited in recent history, and which is now depleted. The level of removal under this alternative would meet NMFS intent to provide opportunity for continued traditional Native harvest while not significantly extending time to recovery. The delay in recovery time by selecting this alternative is considered to be negligible in the context of the proposed long term harvest plan. This is the alternative preferred by NMFS

Required Actions or Approvals

NMFS would enter into a co-management agreement with CIMMC under section 119 of the MMPA for 2005 under the preferred alternative A harvest of two whales would be authorized in this agreement under the provisions of Public Law 106-553 for the year 2005 Harvest in 2006 and subsequent years would be subject to Public Law 106-553 and Federal regulations under section 101(b) of the MMPA, following the finalization of an Environmental Impact Statement (EIS) drafted by NMFS and subsequent promulgation of regulations.

1.0 PURPOSE AND NEED FOR ACTION

1.1 Introduction

The MMPA generally prohibits the taking, which includes harassing, capturing, and killing, of marine mammals by U.S citizens or within the jurisdiction of the United States. The MMPA imposes a general moratorium on the taking of marine mammals. However, section 101(b) of the MMPA provides an exemption from the take prohibitions by allowing Alaska Natives to harvest marine mammals for subsistence use or for purposes of traditional Native handicrafts Under the MMPA, the Federal Government may regulate this Native harvest if (1) the stock in question is depleted, and (2) specific regulations are issued (16 U S C 1371(b)).

The CI beluga whale stock was hunted by Alaska Natives, some of whom reside in communities on or near Cook Inlet and some of whom are from other Alaska towns and villages. The whales concentrate off the mouths of several rivers entering upper Cook Inlet during the ice-free season, making them especially vulnerable to hunting. Most hunters used small motorboats launched from Anchorage to hunt near these river mouths. The most common hunting technique was to isolate a whale from a group and pursue it into shallow waters Whales were shot with high-powered rifles and may have been harpooned to aid in retrieval The muktuk (skin with some of the underlying blubber attached), flippers, and tail flukes were normally harvested for food, and some hunters also retained the meat.

The CI stock of beluga whales is genetically and geographically isolated from other Alaska populations of beluga whales. NMFS has conducted annual surveys of the CI beluga whale since 1994. Results of these surveys indicated that the CI beluga whale stock declined by approximately 50 percent between 1994 (estimate of 653 whales) and 1998 (estimate of 347 whales). Subsequent surveys conducted between 1999 and 2004 have resulted in abundance estimates ranging from 313 to 435 with no clear trend

The harvest of beluga whales in Cook Inlet for subsistence purposes is believed to be the primary factor responsible for the decline. Historically, harvest levels have been largely unreported However, during a study between 1995 and 1997, CIMMC estimated that the annual harvest (including struck and lost whales) of CI beluga whales averaged 77 whales per year Harvest at these rates could account for the 50 percent decline observed between 1994 and 1998.

Responding to the dramatic decline in this stock, NMFS initiated a Status Review of the CI stock pursuant to the MMPA and ESA on November 19, 1998. The present status and health of the CI beluga whales were reviewed and recommendations were accepted for possible designation as depleted under the MMPA and/or listing as endangered or threatened under the ESA The comment period on the status review (November 19, 1998 through January 19, 1999) was initiated at the same time that workshops were being convened to review beluga whale stocks throughout Alaska. The workshops were held by the Alaska Beluga Whale Committee (ABWC) and the Alaska Scientific Review Group, a body established under the MMPA to provide scientific advice to NMFS regarding marine mammal conservation. To further ensure the status review was comprehensive and based on the best available scientific data, the closure of the public comment period was followed by a NMFS-sponsored workshop that reviewed relevant scientific information on this stock and received additional public comments and recommendations on March 8-9, 1999, in Anchorage, Alaska. The proceedings and abstracts of presentations from that workshop are summarized at Moore et al. (2000)

In January and March 1999, NMFS received petitions to list the CI stock of beluga whales as "endangered" under the ESA. NMFS determined that each of the petitions presented substantial information which indicated the petitioned action may be warranted (64 FR 17347, April 9, 1999)

At the time of the petitions, Federal regulations did not exist to control the subsistence harvest, and cooperative management agreements were not in place. To address this critical issue, the following temporary moratorium was enacted (Pub L No. 106-31, §3022, 113 Stat. 57, 100 (May 21, 1999)):

> Notwithstanding any other provision of law, the taking of a Cook Inlet beluga whale under the exemption provided in section 101(b) of the Marine Mammal Protection Act [16 U.S.C. 1371 (a)] between the date of the enactment of this Act and October 1, 2000, shall be considered a violation of such Act unless such taking occurs pursuant to a cooperative agreement between the National Marine Fisheries Service and affected Alaska Native organizations.

This moratorium was made permanent in December 2000 (Pub. L. No. 106-553, §1(a)(2), 114 Stat. 2762 (December 21, 2000)).

As a result of the abundance data and other information presented in the status reviews, NMFS published a proposed rule to designate the Cook Inlet, Alaska stock of beluga whales as

depleted under the MMPA on October 19, 1999 (64 FR 56298) NMFS issued a final rule designating the CI beluga whale stock as depleted on May 31, 2000 (65 FR 34590) While the declining trend from 1994-1998 was significant, the 1999-2004 estimates of 367, 435, 386, 313, 357, and 366 respectively, indicate that the population has no clear trend. The six abundance estimates following the restriction of the harvest are insufficient evidence for a conclusive evaluation of the restriction.

The 2005 agreement is presented in Appendix A. NMFS anticipates developing similar agreement(s) to address the management of this stock from 2006 to recovery.

1.2 Purpose of the Action

The purpose of this action is to enter into a co-management agreement to authorize the taking of up to two CI beluga whales in 2005 by Alaska Natives for traditional and cultural subsistence purposes. This action is based on expert opinion and agreement of the parties to the administrative hearing on the long-term management and recovery of CI beluga whales. This is an interim measure until such time as the true growth rate can be determined from an abundance time series. NMFS has found this level of effect negligible on the recovery of the beluga whale population. This level of take also provides for the continuation of the subsistence harvest in Cook Inlet for Native cultural and traditional purposes. Therefore, NMFS selected this alternative as the preferred alternative. Issues associated with this action include the impact of the level of harvest and its effects on the recovery of this stock, the impacts of not authorizing this harvest on Native culture, and how Native subsistence harvest may be managed in the future.

The primary factor supporting this action is the need to recognize the importance of the CI beluga whale to Native culture and nutrition, and to provide for the continued opportunity to harvest these whales within the recovery phase. The subsistence harvests and use of the beluga whale is a component of Alaska Native culture. The importance of the harvest transcends the nutritional or economic value of the whale and provides identity to the cultures which now harvest the whales. Native hunters have stated their willingness to reduce harvest levels during the recovery period, but also express their belief that the skills, knowledge, and traditions associated with the subsistence hunting of these whales cannot be passed on to younger generations unless some level of harvest continues.

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 General Considerations

The principal objectives of this document are to assess the consequences of entering into a co-management agreement allowing two strikes on CI beluga whales during 2005 on the recovery of this depleted stock to its Optimum Sustainable Population[1] (OSP) level, and to provide for the continued traditional subsistence use by Alaska Natives to support their cultural needs.

The agreement between NMFS and CIMMC for 2005 represents a sharing of responsibilities and is intended to provide for the necessary authorities to manage this harvest, while allowing Alaska Natives to manage many aspects of the hunt. The agreement will minimize wasteful practices and improve the efficiency of the harvest. All hunting parties must have a Native elder and/or an experienced beluga whale hunter present to direct the harvest. This will reduce the chances of striking a calf, or female accompanied by a calf, or of striking any whale in an area or manner that may result in the loss of the whale. The agreement requires hunters to have equipment necessary to recover and process the harvested whale. Hunting will be allowed after June 30, 2005 to reduce the possibility of harvesting pregnant females. Taking of calves, or adults accompanied by calves, will be prohibited. The sale of edible portions will be prohibited. These, and several other conditions to the hunt that have been agreed upon and specified in the agreement, will greatly improve harvest efficiency. Some of these requirements will be contained in subsequent Federal regulations under the MMPA, while others will remain the responsibility of the ANO.

Another provision of the agreement is the requirement for the parties to consult whenever any unusual event has occurred which might affect the impact of each year's harvest on recovery, such as an oil spill or mass stranding. The harvest would not proceed after such an event until NMFS and CIMMC had both given their approval

The alternatives are presented in Section 2.2 The impacts of these alternatives are evaluated from information and analyses presented in Chapters 3 (Affected Environment) and 4 (Environmental Consequences). Chapter 4 of this Environmental

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[1]Optimum Sustainable Population is defined as the range of population sizes between a stock's carrying capacity and its maximum net productivity level.

Assessment (EA) discusses the impacts of a harvest of two whales (alternative 2) as compared to alternative 1 which would result in a moratorium on hunting CI beluga whales. Chapter 4 also reviews the socio-cultural impacts of the harvest on the traditional Alaska Native cultures of Cook Inlet

2.2 Alternatives

2.2.1 Alternative 1 - Status Quo or No Action

NMFS would not enter into any cooperative agreements under the provisions of Public Law 106-553 for the 2005 harvest under this alternative. There would be no harvest authorized under this alternative. This alternative would maximize the recovery potential of the CI beluga whale stock.

2.2.2 Alternative 2 - NMFS enters into an agreement with CIMMC that provides up to two strikes on CI beluga whales

Alternative 2 establishes a harvest at two strikes in 2005. The goal of Alternative 2 is to allow the traditional subsistence harvest of CI beluga whales by Alaska Natives to continue while recovering this stock.

Subsistence hunting for CI beluga whales would only occur under the terms of a co-management agreement (Appendix 1) under this alternative. The terms of the agreement would (1) specify the level of an allowable take as two strikes; (2) require all hunting to occur after July 1, to minimize the harvest of pregnant females; (3) prohibit the taking of calves or beluga whale accompanied by a calf, and (4) provide other measures to improve harvest efficiency

This harvest would be administered jointly with Alaska Natives through a cooperative agreement under section 119 of the MMPA. The cooperative agreement would specify the level of harvest as two strikes. A strike would be considered any event in which a bullet, harpoon, spear, or other device intended to take a whale contacts a beluga whale. Multiple strikes on a single whale would be considered one strike.

3.0 AFFECTED ENVIRONMENT

The purpose of this chapter is to describe the existing environment, including conditions and trends, that may be affected by the management alternatives Because this assessment focuses only on the development of a co-management agreement

between NMFS and CIMMC, and the biological and cultural environment surrounding that activity, this section focuses only on beluga whales and the use of beluga whales for subsistence purposes. The reader may find a more detailed discussion of the region's natural and human environments in the following NMFS' reference documents: Final Federal Actions Associated with Management and Recovery of Cook Inlet Beluga Whales Environmental Impact Statement (2003) and Draft Conservation Plan for the Cook Inlet Beluga Whale (*Delphinapterus leucas*) (2005)

3.1 Biological Environment: Beluga Whales

In Alaska, beluga whales are found in marine waters from Yakutat to the Alaska-Canada border in the Beaufort Sea These comprise five distinct stocks: Beaufort Sea, eastern Chukchi Sea, eastern Bering Sea, Bristol Bay, and Cook Inlet (Angliss and Lodge 2004). Of these, the CI stock is now considered to be the most isolated, based on the degree of genetic differentiation between the CI beluga whale stock and the four other stocks (O'Corry-Crowe et al. 1997). Murray and Fay (1979) postulated that this stock has been isolated for several thousand years

3.1.1 Stock Abundance

Abundance surveys of CI beluga whales prior to 1994 were often incomplete, highly variable, and involved non-systematic observations or counts of concentrations in river mouths and along the upper Inlet.

NMFS began systematic aerial surveys of beluga whales in Cook Inlet in 1994. Unlike previous efforts, these surveys included the upper, middle, and lower Inlet. Using both observers and videotape, this method also developed correction factors to account for whales not observed due to coloration (calves and juveniles are gray colored), diving patterns, or because whales were missed by the survey track These surveys have continued annually and have tracked a decline in abundance of nearly 50 percent between 1994 and 1998

3.1.2 Distribution and Movements of CI Beluga Whales

Sightings throughout 1976 to 1979, February and March 1997, and June 2001 through June 2002; and satellite information on seventeen beluga whales tagged in late summer 2000-2002, indicate that at least some beluga whales are present in Cook Inlet year round, including Turnagain Arm and Knik Arm.

The beluga whales typically form several large groups during

spring and summer, and reside in and near the Susitna River, the Little Susitna River, Knik Arm and Turnagain Arm feeding on eulachon, salmon smolt, and adult salmon.

3.1.3 Feeding Behavior

Beluga whales are opportunistic feeders, and are known to prey on a wide variety of animals. They eat octopus, squid, crabs, shrimp, clams, mussels, snails, sandworms, and fish such as capelin, cod, herring, smelt, flounder, sole, sculpin, lamprey, and salmon (Perez 1990, Haley 1986, Klinkhart 1966). CI Natives also report that CI beluga whales feed on freshwater fish· trout, whitefish, northern pike, and grayling (Huntington 2000)

The smelt-like eulachon (also named hooligan and candle fish) is undoubtedly a very important food source for beluga whales in Cook Inlet. These fish enter the upper Inlet in May. Two major spawning migrations of eulachon occur in the Susitna River, in May and July The early run is estimated at several hundred thousand fish and the later run at several million (Calkins 1989).

Salmon smolt may also be an important prey item, as large numbers leave these river systems in spring and summer and are available to the beluga whales. Adult pink and chum salmon are most numerous during June and July, and all five species of Pacific salmon are present in the upper Inlet.

3.1.4 Natural Mortality

Three sources of natural mortality are considered in this section: strandings, predation, and disease.

3.1.4.1 Strandings: Beluga whales commonly strand in upper Cook Inlet. NMFS estimates more than 800 beluga whale strandings (both individual and mass strandings)in upper Cook Inlet since 1988[2] Mass strandings have been most common along Turnagain Arm, often coinciding with extreme tidal fluctuations ("spring tides"). NMFS has responded to such events since 1988, and although the live stranded animals usually swims away with the returning tide, some mortalities have also been observed

3.1.4.2 Predation: The number of killer whales visiting the upper Inlet appears to be small However, they are known to

[2]This estimate includes 44 beluga whale carcasses found along the shoreline which had been harvested for subsistence.

prey upon CI beluga whales. NMFS has received reports of killer whales in Turnagain and Knik Arms, between Fire Island and Tyonek, in the tide rips that extend from Fire Island to Tyonek, and near the mouth of the Susitna River.

No quantitative data exist on the level of removals from this population due to killer whale predation or its impact to the beluga whale population. A potential dietary shift may account for some of the more recent sightings of killer whales in Cook Inlet.

3.1.4.3 Disease: Bacterial infection of the respiratory tract is one of the most common diseases encountered in marine mammals. Bacterial pneumonia, either alone or in conjunction with parasitic infection, is a common cause of beach stranding and death (Howard et al 1983)

Beluga whales appear relatively free of ectoparasites, although both the whale louse, Cyamus sp , and acorn barnacles, Coronula reginae, are recorded from stocks outside of Alaska (Klinkhart 1966). Endoparasitic infestations are more common. An acanthocephale, Coryosoma sp , was identified in beluga whales, and Pharurus oserkaiae has been found in Alaska beluga whales Anisakis simplex is also recorded from beluga whales in eastern Canada (Klinkhart 1966). Results of necropsies from CI beluga whales have found infestations in adult whales. Approximately 90 percent of CI beluga whales examined have had kidneys parasitized by the nematode Crassicauda gilliakiana. This parasite occurs in other cetaceans, such as Cuvier's beaked whale, but has not been extensively reported in other Alaska beluga whale stocks. Although extensive damage and replacement to tissues have been associated with this infection, it is unclear whether this results in functional damage to the kidney (Burek 1999a).

Parasites of the stomach (most likely Contracecum or Anisakis) are often present in CI beluga whales. These infestations have not, however, been considered to be extensive enough to have caused clinical signs Also recorded within muscle tissues of CI beluga whales is Sarcocystis sp. The encysted (muscle) phase of this organism is thought to be benign; however, acute infections can result in tissue degeneration leading to lameness or death (Burek 1999b).

3.2 Cultural Environment: History of Beluga Whale Hunting in Cook Inlet

Throughout the Cook Inlet basin and specifically in Knik Arm and the Kenai River, archeological research has found items both from

the Dena'ına Athabaskan and hıstoric Eskımo cultures.

Unıque among Alaska Athabaskan people, the Dena'ına lıve along the Pacıfic Ocean and exploited the marıne resources, as well as lake, rıverine, and ınterıor environments. The good clımate and constant supply of adequate food made it possible for the Dena'ina to lıve ın semı-sedentary vıllages throughout the Cook Inlet regıon.

The Dena'ına seasonally crossed the Inlet in skın covered sıngle- or double-holed kayaks and the larger open boat, the *badı*, that resembled the Eskımo *umiak*

Cook Inlet offered a rich supply of marıne resources such as beluga whales, sea lıons, seals, porpoıse, and sea otter that fed on salmon, eulachon, herrıng, cod, halibut, and shellfish

3.2.1 Beluga Whale Use

Beluga whales provıded meat and oil to the hunter's famıly and dogs. Beluga whales were an important food source for the upper and outer Inlet Dena'ına, especially before the moose arrıved ın the Inlet regıon in the late 1800's (Kari and Karı 1982) As ımportant as the meat was, whale blubber and oil were of even greater economıc ımportance (Fitzhugh and Crowell 1988).

The blubber from beluga whales was rendered into oil to store other foods or used ın lamps for heat and lıght The beluga whale meat is eaten fresh, drıed, roasted, boiled, and ground. The skin and a layer of fat (*kımmuq*, or muktuk) are eaten raw, pıckled, canned, or boıled. The ivory teeth are used ın a variety of functions and were important trade ıtems (Fitzhugh and Crowell 1988). Whale bone was used ın Native art (e.g , masks) and handıcraft work.

3.2.2 Historical Methods of Hunting Beluga Whales in Cook Inlet

The *Susi Kaq* "sand island mouth" (the Susıtna Delta area, including Bıg Island and the west channel of the lower Susıtna) was an important spring campıng area on the Inlet at the mouth of the Susıtna Rıver (Pete 1987) Dena'ina gathered to hunt beluga whales, ducks, and geese, to fish for salmon and eulachon, and to trade.

Beluga whales were hunted between May and August at the mouths of the rıvers and streams (Pete 1987) It required several hunters to successfully harvest the beluga whale. The upper Inlet

Dena'ina method of catching the small white beluga whale seems to be unique in North America, not borrowed from the Eskimo or Alutiiq people (Pete 1987). The Dena'ina used the tidal flats in the Susitna Delta to hunt beluga whales According to Pete's (1987) description, the hunters erected a *yuyqul* (beluga spearing trees), which are dead spruce trees, root side up, in the mud during a low tide Each spruce tree had many ropes extending from it and five or more people would pull on each rope to lift the tree up The sinew ropes were then secured to stakes The hunters climbed into the "nest" formed by the tree roots (Fall et al. 1984) to wait for the beluga whale that would swim by with the incoming tide. The hunters had harpoons fitted with a toggle point and attached with braided sinew ropes (about 25 fathoms long) to floats (usually inflated sealskin). During the incoming tide, beluga whales would chase the salmon and the hunters would strike the beluga whale many times as it came by (Pete 1987). The struck whales with the attached floats were pursued by the hunters in boats until the whales tired and could be killed by a hunter with a boneheaded spear. The whales were then taken to shore and butchered

With the introduction of firearms around the turn of the century, the Dena'ina abandoned the *yuyqul* and weir methods for beluga whale hunting, and used boats and firearms to shoot beluga whales at the shallow river mouths. The three-man skin kayaks and baidarkas were used on the Inlet, as late as the turn of this century, to hunt seal, beluga whales, ducks and to collect clams (Kalifornsky 1991).

Prior to the 1940's, beluga whales were a major part of Tyonek's diet, with Tyonek hunting six or seven whales annually in the 1930's and 1940's (Pete 1987). Between the late 1940's and 1978, with a growing number of moose in the area, there was little interest in beluga whales or any other marine mammal hunting However, since 1979, the beluga whale hunt has been reestablished in Tyonek. The meat and blubber are shared throughout the village (Fall et al. 1984).

3.2.3 Contemporary Beluga Whale Hunting

About 60 percent of Alaska's population lives within the traditional lands of the Dena'ina (Matanuska Valley, Anchorage Municipality, and the Kenai Peninsula). In this dynamic region, about 30,000 people are Alaska Natives

The CI marine mammal hunters who hunt beluga whales consist of (1) the Dena'ina of Tyonek, who continue their historical hunting of beluga whales near their village, (2) hunters who have lived

in other parts of Alaska, but have made the Cook Inlet area their home, and (3) visitors to the Cook Inlet area from other parts of the state. As the participants increase in these hunter groups, the demand for CI beluga whales grew. However, the actual number of CI beluga whale hunters is unknown due to the dispersal of hunting "communities" and hunting locations. The number of Eskimo, or non-area hunters greatly exceeds that of the CI tribal hunters, although no detailed estimates exist. NMFS believes there were at least 16 Eskimo whaling crews in 1997 The CIMMC has estimated the number of people currently hunting beluga whales to be approximately 50. Of the six Cook Inlet Treaty Tribes and villages, only the Native Village of Tyonek has regularly harvested beluga whales in recent history Tyonek's harvest of beluga whales has been modest. About three beluga whales were taken in 1979, and one whale was harvested annually between 1981 and 1983 (ADFG undated) Recently, Tyonek's harvest has been regulated to one beluga whale each year. The Beluga and Susitna Rivers are major hunting areas for this village.

Beluga whales are now hunted with high-powered rifles from April through October with most of the hunting between May and August at the Susitna Delta area (Little Susitna River, west to the Beluga River) Hunters use small motorboats launched from Anchorage to access these camps and hunt in or near the river mouths Crews are often small, two to four persons, although hunters may also hunt in groups. The hunters always collect the muktuk. Sometimes they collect the meat and blubber for food, and bones and teeth for handicrafts. The hunters wait at camp for the whales to enter shallow water or chase whales already in the shallow waters. The dark, murky waters of upper Cook Inlet prevent detection of submerged whales, so the hunters must follow the beluga whale's "covenough," or, wake, that is created by the whale in shallow water. As the whale breaches, the hunters generally shoot, then harpoons immediately after, or harpoon first and then shoot When the whale is dead, the hunters attach a line through the lower mandible or around its tail to tow it to shore.

The flippers and tail are considered a delicacy by some people, and are generally removed first. The muktuk is taken from the whale in large strips and the blubber is removed in square chunks. If any meat is collected, it is the back strap and ribs The remaining skeleton, meat, and organs are often left on site, or if near a village (like Tyonek), these parts may be used for dog food. In Tyonek, the muktuk, blubber, and meat are shared throughout the village. In Anchorage, portions are kept and shared with family and friends. CI beluga whale parts have been sold in Anchorage to Alaska Native food stores, sold within the

Anchorage Native community, and sold to Alaska Natives who live outside the Anchorage area.

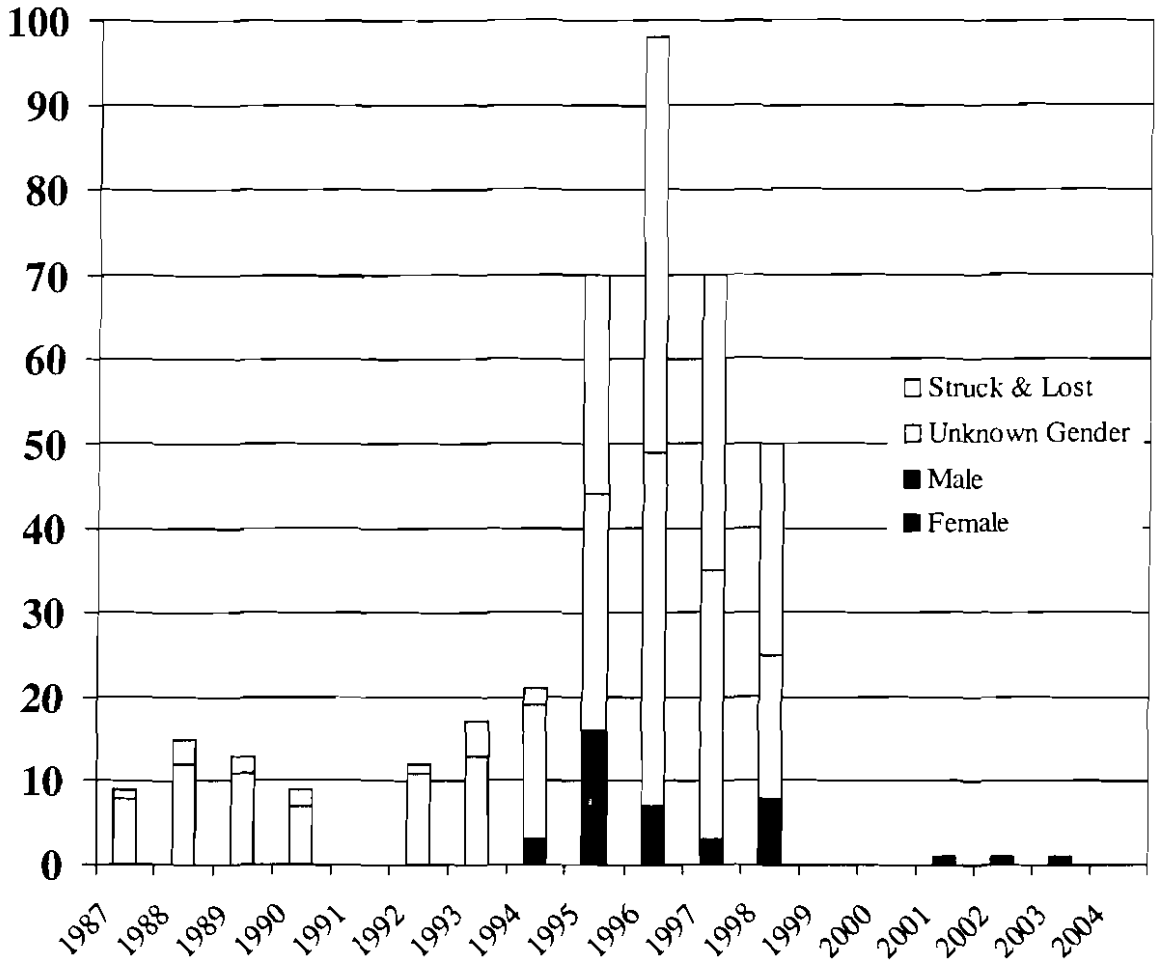
Reliance on whales as a primary food source diminished with the rise of alternative means of subsistence, but the importance of whaling in economic and cultural terms never disappeared (Fitzhugh and Crowell 1988). Alaska Natives continue to share the meat and blubber in traditional patterns that reaffirm social ties and provide a strong sense of ethnic identity (Fitzhugh and Crowell 1988). The use of beluga whales and other wild resources continues to be economically, nutritionally, and culturally valuable to the Dena'ina and other Alaska Natives in the Cook Inlet area

A significant portion of the beluga whale hunters that currently hunt within CI is not originally from the area, although they hunted beluga whales in their villages and continued to hunt beluga whales when they moved to the Cook Inlet area (Anchorage, Matanuska Valley, or Kenai Peninsula). There is some development of a "community" from similar geographic areas, but most hunters are independent. Other hunters, who are not local residents, but regularly visit the Cook Inlet area, hunted with family or friends in Cook Inlet where beluga whales are available all season

Historically, subsistence harvest levels of CI beluga whales have been largely unreported. Estimated harvest for the years 1987-2004 is presented in the Figure below.

The sources of these data include estimates by Alaska Department of Fish and Game (ADFG), reports from CIMMC, and data compiled by NMFS based on reports from hunters and direct observations of harvested whales. The large difference in the number of beluga whales harvested before and after 1995 is due, in large part, to improved efforts by the hunters themselves in reporting and the application of a correction factor for struck and lost whales. No whales were reported harvested in 1999, 2000, and 2004 with one beluga whale harvested in 2001, 2002 and 2003 under co-management agreements

The 1996-1998 estimates include animals struck, but lost, using a ratio of one beluga whale lost for each landed. Struck and loss estimates may be highly variable, although CIMMC (1997) reported that this may be between one and two for each whale landed. Data compiled by CIMMC for the 1995 harvest estimated strike and loss at less than 1:1 (44 CI beluga whales were landed and 26 were struck and lost) (CIMMC 1996). NMFS estimated that the harvest between 1995 and 1997 averaged 79 whales annually At such a



level of harvest, this stock could be reduced by 50 percent of its current level within five years.

It is not uncommon for beluga whale harvest efficiencies to be low. Native hunters, themselves, reported an increase in the number of struck and lost beluga whales, evidenced by whales observed washed up on shore along the west side of the Inlet (Huntington 2000). An efficient harvest in Cook Inlet is confounded by the turbidity of the water, large tidal fluctuations, and changing mudflats and currents.

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter evaluates the probable environmental, biological, cultural, economic, and social consequences of the presented alternatives Generally, the direct biological consequences of

the alternatives concern the impacts of harvest on the recovery of the CI beluga whales. Cultural and social impacts or consequences would be realized within local Alaska Native communities who are dependent on subsistence resources. There are no apparent consequences of either of the alternatives on the physical environment of Cook Inlet, or on activities other than hunting, that is ongoing in Cook Inlet. Co-management of Alaska's marine mammals has generally proven to be very successful in allowing self-determination among Alaska Natives in their subsistence harvest practices while allowing for the necessary conservation of important stocks The endangered bowhead whale is harvested under such an agreement between the Alaska Eskimo Whaling Commission (AEWC) and National Oceanic and Atmospheric Administration. Under that agreement, the bowhead whale stock has increased steadily. The AEWC is responsible for monitoring and reporting on the harvest, as well as enforcing certain actions within their membership, while Federal authority is retained.

4.1 Biological Model of Effects of Harvest on the Recovery Time of CI Beluga Whales

Based on evidence submitted at the 2004 administrative hearing, the parties to the hearing agreed that the interim harvest strategy of a total of two whales during 2005 was acceptable in the context of the long term harvest plan, acknowledging that it was necessary to set harvest levels based on a consensus until such time that the harvest could be set based on an observed growth rate.

4.2 Evaluation of Alternative 1 - Status Quo or No Action

NMFS would not enter into an agreement with an ANO under Alternative 1 Therefore, under the requirements of Public Law 106-553, there could be no harvest on the CI stock of beluga whales. This would result in a moratorium on the stock during 2005. Authorized human-caused mortalities would be eliminated in 2005.

4.2.1 Biological Consequences

Alternative 1 has few direct biological effects A harvest would not occur and whales would not be removed from this population by hunting in 2005. Several indirect biological effects have been identified as a possible result of selecting Alternative 1. The lack of CI beluga whales taken in subsistence harvest by Alaska Natives might place additional hunting pressure on other marine mammal stocks in Cook Inlet Of these other marine mammals, only

harbor seals occur regularly in upper Cook Inlet and an increased harvest of this species for subsistence uses would be expected Similarly, there may be increased pressure on the harvest of beluga whales from other stocks throughout Alaska. The stock considered most likely as an alternative source of beluga whale muktuk for those living in the CI region would be from Bristol Bay because of its proximity and ease of shipping to Anchorage The muktuk from one beluga whale harvested in Bristol Bay was delivered to the Anchorage Native community in 1999 This whale was incidentally caught in a fishing net and was sent to an Anchorage hunter, who then distributed it to Alaska Natives in both Tyonek and Anchorage. In another instance, muktuk from a beluga whale taken in October 1999 on the Naknek River was subsequently sold in Anchorage. Some level of importation of beluga whale products into the CI region may be expected The four other Alaska beluga whale stocks are currently healthy and could support an additional small level of harvest However, the subsistence use of these stocks is managed through an agreement between NMFS and ABWC, who would continue to address and manage any village concerns associated with this trade

Increased subsistence takes of waterfowl and fish in the region may occur without a CI beluga whale harvest. However, it is difficult to predict whether or not there would be an increased harvest of other subsistence species Traditional Native foods consist of a variety of things that are not necessarily equivalent on a pound-for-pound basis (i.e., beluga whale muktuk would not be replaced by a pound of fish or seal). Therefore, there may be little interest among hunters in harvesting more of these other subsistence species than they currently do. Also, the amount of these resources harvested is determined in part by their availability, which is not expected to change

Despite the loss of the opportunity to harvest beluga whales, Alaska Natives would be expected to continue to utilize Cook Inlet for purposes of subsistence hunting, fishing, and gathering These activities may include large game hunting (moose and bear), hunting of fur bearing animals, waterfowl hunting, marine mammal hunting (mainly harbor seals), fishing for salmon and eulachon (smelt), and plant and berry picking. The harvest and use of these foods are activities with significant social and cultural meaning as well as having economic importance.

4.2.2 Social and Cultural Consequences

Alternative 1 could impact traditional Native culture in at least two ways. Alaska Natives who have recently participated in the

hunting of CI beluga whales would not have the opportunity to harvest this resource. Native hunters have expressed their belief that traditional hunting skills and knowledge must be passed on first-hand. Social standing within the Native community is based, in part, on whaling activities Whaling captains, and those who secure and distribute Native foods, are highly regarded.

Those hunters who have relied on beluga whales as part of their annual Native food source, or for money through sale of edible portions, would be adversely affected by this alternative.

The cultural aspects of this harvest may erode under this alternative if it were implemented for an extended period of time. However, it is doubtful that the traditional skills and knowledge associated with this hunt would be lost based on the one year implementation of this alternative. Nonetheless, it has been emphasized to NMFS by Native hunters that without direct experience in this harvest, these skills may not be taught and passed on with the consequence being that the skill levels of the hunters would eventually diminish.

4.3 Evaluation of Alternative 2

NMFS would establish a harvest level of up to two strikes for the year 2005 under Alternative 2 The agreement authorized under this alternative would expire at the end of 2005.

4.3.1 Biological Consequences

The direct biological consequence of this alternative would be the removal of two adult beluga whales from this population or less than 1 percent of the adult population (366 beluga X 0 6 mature fraction / 100 = 2.2). With the uncertainty in the current growth rate of the population a range of possible growth rates must be considered. For an intrinsic growth rate that would allow the population to recover in 100 years, the delay in recovery resulting from this single year of harvest is less than one year For growth rates that cannot recover in 100 years the concern is with the loss in the current population size With this harvest, at a low growth rate or a declining growth rate, a loss of two beluga whales from the adult population would not have a significant adverse effect on beluga whales. This is because the harvest plan halts the harvest if the population declines below 350 whales, or has less than 95 percent certainty of recovering in 100 years, such that a harvest in 2005 is compensated by possible lost harvest opportunities in future years. Therefore, the biological consequences would not be

distinguishable from the no-harvest regime in Alternative 1.

4.3.2 Social and Cultural Consequences

A few Alaska Natives who have recently participated in the hunting of CI beluga whales would have the opportunity to harvest this resource, while additional Alaska Natives would benefit as the beluga whale is shared under Alternative 2. Native hunters have expressed their belief that the skills, cultural values, and knowledge associated with this harvest must be passed on first-hand to younger generations, and that the tradition would die if no hunting occurs for many years

Those hunters who have relied on the harvest of beluga whales for money would be adversely impacted by this alternative, as the agreement prohibits such sales. The intent of this harvest is to enrich and maintain the cultural tradition of hunting. The traditional skills and knowledge associated with this hunt would not be lost, and direct experience in this harvest would continue to be taught and passed on.

4.4 Cumulative Effects

A cumulative effects analysis is a requirement of NEPA. An EA or EIS must consider cumulative effects when determining whether an action significantly affects environmental quality The Council on Environmental Quality (CEQ) guidelines for evaluating cumulative effects state that "..the most devastating environmental effects may result not from the direct effects of a particular action but from the combination of individually minor effects of multiple actions over time."

The CEQ regulations for implementing NEPA define cumulative effects as:

> "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7).

A cumulative effects analysis takes into account the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions (40 CFR 1508.7). Cumulative effects may result in significant effects even when

the Federal action under review is insignificant when considered by itself. The CEQ guidelines recognize that it is not practical to analyze the cumulative effects of an action on the universe but to focus on those effects that are truly meaningful This section analyzes beluga whale management alternatives with other factors that may affect physical, biological, and socioeconomic resource components of the CI region, and on the beluga whales and their habitat.

The methodology for conducting the cumulative effects analysis in this EA is the same as that in the Subsistence Harvest Management of Cook Inlet Beluga Whales, Final EIS (NMFS 2003).

4.4.1 Methodology

The intent of the cumulative effects analysis is to capture the total effects of many actions over time that would be missed by evaluating each action individually. A cumulative effects assessment describes the additive and synergistic result of the actions proposed in this EA, as they interact with factors outside our proposed actions To avoid the piecemeal assessment of environmental impacts, cumulative effects were included in the 1978 CEQ regulations, which led to the development of the CEQs cumulative effects handbook and federal agency guidelines based on that handbook (e.g., EPA 1999). Although predictions of direct effects of individual proposed actions tend to be more certain, cumulative effects may have more important consequences over the long term. The possibility of these "hidden" consequences presents a risk to decision makers, because the ultimate ramifications of an individual decision might not be obvious. The goal of identifying potential cumulative effects is to provide for informed decisions that consider the total effects (direct, indirect, and cumulative) of alternative management actions.

The methodology for cumulative effects analysis in this EA is taken from the Subsistence Harvest Management of Cook Inlet Beluga Whales, Final EIS (NMFS 2003). It consists of the following steps:

- *Identify characteristics and trends within the affected environment that are relevant to assessing cumulative effects of the action alternatives.*

- *Describe the potential direct and indirect effects* - The two alternatives reviewed in this EA would be similar in their effects on the environment and are treated together. For example, each of the

alternatives would have a similar additive effect if considered with the potential effects of habitat loss on beluga whales in Cook Inlet The effect of the proposed actions (alternatives) is largely a null effect or "sum-zero." Therefore, the potential cumulative effect on beluga whales is largely the result of the effect of the external activity when considered with the alternatives, not the effect of the alternatives themselves.

- *Identify past, present and reasonably foreseeable external factors such as other fisheries, other types of human activities, and natural phenomena that could have additive or synergistic effects* - Past actions must be evaluated to determine whether there are lingering effects that may still result in synergistic or incremental impacts when combined with the proposed action alternatives. The CEQ guidelines require that cumulative effects analysis assess reasonably foreseeable future actions In these analyses the most significant past action was the commercial harvest; the most significant current action evaluated is the changing environment (natural).

- *Evaluate the significance of the potential cumulative effects using criteria established for direct and indirect effects and the relative contribution of the action alternatives to cumulative effects* - Of particular concern are situations where insignificant direct and indirect effects lead to significant cumulative effects or where significant external effects accentuate significant direct and indirect effects; and

- *Discuss the reasoning that led to the evaluation of significance, or lack of significance, citing evidence from quantitative information where available.*

The advantages of this approach are that it (1) closely follows CEQ guidance, (2) employs an orderly and explicit procedure, and (3) provides the reader with the information necessary to make an informed and independent judgment concerning the validity of the conclusions.

4.4.1.1 External Factors and Effects: For the purposes of this EA, the definition of other or "external" actions includes both human controlled events such as industrial development, and natural events such as disease, natural mortality or predation,

and short and long term climate change.

The following external actions which could be considered human controlled and which are important to these analyses are the past commercial harvest; prey availability in Cook Inlet (indirect effects of competition with state managed fisheries), potential interactions with state fisheries in Cook Inlet; oil and gas development in the Inlet and adjacent lands, municipal activities; commercial vessel traffic, impacts from noise, and potential impacts from NMFS research activities.

4.4.2 Direct Cumulative Effects

4.4.2.1 Effects of the Commercial Harvest: Commercial whaling has occurred periodically in Cook Inlet during the last 100 years (Mahoney and Shelden 2000) The Beluga Whaling Company operated for five years at the Beluga River in upper Cook Inlet where the company harvested 151 beluga whales before going bankrupt in 1921 (Bower 1919, 1920, 1921). Longtime residents interviewed by ADFG personnel recalled a commercial hunt of 100 beluga whales on the Beluga River in the 1930's (Klinkhart 1966; Fall et al. 1984; Lowry 1985, Stanek 1994); however, no record of this hunt exists in the Alaska Fishery and Fur-seal Industries documents for this time period.

Alaska Natives and other residents living in the lower Susitna Basin and the villages of Knik and Eklutna sold beluga products in Anchorage during the 1940's and 1950's (Stanek 1994). Some of these products (such as muktuk and meat) were sold to the Alaska Native Medical Center, which opened in 1953, in an effort to supply traditional foods to the patients (Stanek 1994).

Guided sport hunting for beluga whales out of Anchorage and Kenai enjoyed some popularity during the 1960's (ADT 1965), however, no information exists on the level of this harvest.

Although the actual level of the commercial harvest of beluga whales in Cook Inlet is not known, it is thought that the harvest was sustainable with the beluga whale population at that time. It is doubtful whether the trends in CI beluga whales can be attributed to the cumulative, long term or residual effects of the past commercial hunts Therefore, the effect of the commercial harvests, when considered with other cumulative effects of the environment on the alternatives, is insignificant.

4.4.2.2 Effects of the Subsistence Harvest Prior to 1999: The CI beluga whale stock was subjected to annual unregulated hunts by Alaska Natives from outside the CI tribes prior to 1999

The hunters may be broadly divided into two groups, a small group of hunters from Cook Inlet area tribes and villages (of Athabascan descent) and hunters living in or visiting the CI region from northern tribes and villages (these hunters are of Eskimo descent). The number of Eskimo, or non-area, hunters greatly exceed that of the CI tribal hunters, although no detailed estimates exist. NMFS believes there were approximately 16 Eskimo whaling crews in 1997, consisting of two to four hunters in each crew. CIMMC estimated that approximately 50 people were hunting beluga whales. It is common for whalers to be accompanied by friends and relatives while on hunting trips Of the six CI Treaty Tribes and villages, only the Native Village of Tyonek has harvested beluga whales in recent history Tyonek's harvest of beluga whales has always been modest. Recently, residents in Tyonek have reported that their harvest has averaged one to two beluga whales each year. The Beluga and Susitna Rivers are major hunting areas for this village

The primary hunting areas for beluga whales are within upper Cook Inlet, off the mouths of a few river systems. Traditional Native hunting camps exist on two islands in the delta of the Susitna River. Beginning in April, hunters used small motorboats launched from Anchorage to access these camps and hunt in or near the river mouths Crews are often small, consisting of only two to four hunters, although several crews may hunt together. A common hunting technique is to isolate a whale from a group and pursue it into shallow waters (DeMaster et al. 1999). Whales are shot with high-powered rifles and may be harpooned to aid in retrieval of the whale. Most of the products obtained from these whales are used for human consumption. The type and quantity of portions retained by the hunters are largely determined by the customs and practices of the hunter, which maybe culturally determined. While some Alaska Native villages typically remove muktuk (skin and underlying fat layer) and muscle, others do not like the taste of the meat and retain only the muktuk. The flukes and flippers are highly-valued and are kept The muktuk is most often retained and is desired above other portions Muktuk is dried and/or frozen and is eaten raw or cooked (usually by boiling). The muscle tissues of beluga are sometimes retained, and the meat preserved by drying. Teeth may be used for carving and the creation of traditional handicrafts

The Native Village of Tyonek describes their customary use of the beluga whale (ADFG undated): "The flippers and tail were removed and discarded The skin and blubber were removed by making parallel cuts the length of the carcass about 16 inches apart. As these strips of blubber were fleshed from the animal, they were cut into blocks approximately 24" in length. After the

blubber was removed exposing the flesh, the backstrap was cut from the backbone. The ribs with the meat remaining on them were then separated from the backbone, exposing the internal organs. The liver, heart, and inner tenderloins were then removed. The remaining skeleton and internal organs were either used for dog food or returned to the Inlet. The blubber and meat were cut into smaller portions and shared throughout the village."

Historically, harvest levels of CI beluga whales have been largely unreported. There are no reliable estimates of harvest prior to 1994. Estimated harvests for the years 1987-2002 is presented in the Figure above.

Based on this information, NMFS estimated that the average annual takes in this harvest, including whales that were struck and lost, was 67 whales per year from 1994 through 1998 The estimated annual average harvest from 1995 through 1996 (including struck and lost) was 97 whales (CIMMC 1996 and 1997). Annual harvest estimates for 1994 through 1998 are 21 whales (1994), 70 whales (1995), 123 whales (1996), 70 whales (1997) and 50 whales (1998). The harvest, which was as high as 20 percent of the stock in 1996, was sufficiently high to account for the 14 percent annual rate of decline in the stock during the period from 1994 through 1998.

Since 1999, a moratorium was enacted (Pub. L. No. 106-31, [section] 3022, 113 Stat. 57, 100 (May 21, 1999)) to prohibit the harvest of CI beluga whales except through a co-management agreement between NMFS and an ANO. This moratorium was made permanent when signed by President Clinton on December 21, 2000 (Pub L. No 106-553, [section] 1(a)(2), 114 Stat. 2762 (December 21, 2000)). As a result, no harvest has occurred since 1999 unless it has been through a cooperative agreement which provides for the management of the beluga whale harvest.

Since the protective legislation was put in place, NMFS has entered into several co-management agreements with CIMMC to allow for one or two whales to be taken annually. No beluga whales were harvested in 1999, 2000, and 2004; while one whale was harvested in 2001, 2002, and 2003 The effects of this strategy are considered insignificant and the preferred alternative evaluated in this EA provides for such a harvest strategy

4.4.2.3 Effects of Stranding Events: Stranding events are not uncommon to the CI beluga whale stock. NMFS estimates that more than 800 whales have stranded (both individual and en mass)

in upper Cook Inlet since 1988[3], although most of these were live strandings and the whales swam away after the tide returned (Vos and Sheldon 2005). Mass stranding events have most commonly occurred along Turnagain Arm and have often coincided with extreme tidal fluctuations ("spring tides") and/or killer whale reports. These mass strandings involve both adult and juvenile beluga whales

Beluga whale mortalities have been observed during some of these stranding events. A 1996 mass stranding of approximately 60 beluga whales in Turnagain Arm resulted in the death of four known adult whales. Another stranding of approximately 60 whales in August 1999 left five known adult beluga whales dead. An August 2003 mass stranding left five known dead beluga whales after more than 46 belugas stranded. The causes for these deaths are unknown, but may have to do with stress and hyperthermia from prolonged exposure. Whales which strand at higher elevations during an outgoing tide may be exposed for ten hours or more. Unless caught in an overflow channel or pooled area, the whale may have difficulty regulating body heat. An extensive network of capillaries within the flukes and flippers allows beluga whales to lose body heat to the environment. If these structures are out of the water, this mechanism cannot function properly and body heat rises. Additional stress is placed on internal organs and breathing may be difficult without the support provided by the water.

Mortalities due to individual stranding events are generally considered in the population model discussed in this Chapter as natural mortality. Mortality due to mass stranding events are not considered in the model. A large number of mortalities due to a mass stranding event could significantly impede recovery. Such a mortality event has not occurred, and has not been a significant factor in the recent abundance trends for this stock of whales. Even the mass stranding events of 46 and 60 whales resulted in four and five known mortalities. Therefore, mass stranding events are not believed to be a causal factor that has reduced this stock to depleted levels

(i) Summary of Effects of Stranding Events: The potential cumulative effect of stranding events on CI beluga whales, when considered with the alternatives proposed by this action, neither increases the likelihood of mortality nor increases the amount of time it would take to recover the stock

[3]This estimate includes 44 beluga whale carcasses found along the shoreline which had been harvested for subsistence.

of beluga whales to OSP Therefore, the cumulative effects of this natural activity are considered insignificant.

4.4.2.4 Effects of Predation: Killer whales are the only natural predators of beluga whales in Cook Inlet. It has been suggested that the potential for significant impacts on the CI beluga whale population by killer whales cannot be ruled out, given recent changes in prey availability to killer whales throughout the Gulf of Alaska (referring to declines in pinniped populations in the Central and Western Gulf of Alaska since the mid 1970s) It has been further suggested that even a small increase in predation could result in population decline or impede recovery of the CI beluga whales.

The number of killer whales visiting the upper Inlet appears to be small given the numbers that are reported and those that occasionally strand in the Inlet (Shelden et al. 2003) However, predation by killer whales on CI beluga whales was considered by some to be a mortality factor that may have contributed to the CI beluga whale declines in recent years. NMFS has reports of killer whales in Turnagain and Knik Arms, near Fire Island, Tyonek, and the Susitna River. Native hunters report killer whales are usually found along the tide rip that extends from Fire Island to Tyonek (Huntington 2000).

No quantitative data exist on the level of removals from this population due to killer whale predation, or its impact. However, killer whale pods are known to prey selectively on either salmon, or marine mammals, including beluga whales in Cook Inlet. During a killer whale stranding in Turnagain Arm in August 1993, one observer reported that a killer whale vomited pieces of beluga flesh. In Sept 2000, NOAA Enforcement witnessed four killer whales attacking a small pod of beluga whales in Turnagain Arm. Declines of sea lions and seals throughout the central Gulf of Alaska (including lower Cook Inlet) may have resulted in a partial dietary shift from pinnipeds to beluga whales in Cook Inlet during recent years. This result may account for some of the more recent sightings of killer whales in upper Cook Inlet. The whales may be seeking beluga whales as prey in the absence of the once plentiful harbor seals and sea lions. However, killer whales also prey on salmon, a prey species of beluga whales. Therefore, seeing killer whales in proximity to beluga whales in the upper Inlet does not necessarily imply that they are searching for beluga whales, rather they may be competing for available prey.

Quantifying the impact of predation by killer whales on CI beluga whales is difficult (Shelden et al. 2003). Their sightings in

upper Cook Inlet are rare and actual witness reports of attacks are few.

The loss of a few beluga whales could impede recovery, as suggested by the petitioners. However, in order for killer whale predation to have an impact significant enough to result in a decline in the population trajectory, a level of predation mortality that approximates the level of recruitment in the population, would be required No indication exists that natural mortality in the CI beluga whale population exceeds levels considered normal for other small cetacean populations.

(i) Summary of Effects of Predation: The recorded information indicates that more killer whales were present in the Inlet in the past than at present (Shelden et al. 2003). However, only recently have most records been kept The number of recent sightings in upper Cook Inlet identifies a small (4-6 killer whales) pod of animals. These whales may prey exclusively on marine mammals and are, therefore, of concern

Mortality due to predation is not believed to be significant enough to cause the population to decline Shelden et al (2003) suggests a minimum estimate of roughly one adult beluga whale per year is taken by killer whales. The documentation of killer whale predation on CI beluga whales indicates that natural mortality in the CI beluga whale population does not exceed levels considered normal for other small cetacean populations. Therefore, the effects of killer whale predation are thought to be insignificant.

4.4.2.5 Effects of Vessel Strikes on CI Beluga Whales: The presence of beluga whales in and near river mouths entering upper Cook Inlet predisposes them to strikes by high speed water craft associated with sport and commercial fishing and general recreation. The mouths of the Susitna and Little Susitna Rivers in particular are areas where such vessel traffic and whales commonly occur. Beluga whales with propellor scars are observed in the Inlet. Most propellor injuries by small boats are thought to be nonlethal. NMFS enforcement agents investigated a report of a jet skier approaching and striking beluga whales in Knik Arm in 1994. A stranded beluga whale examined in 1999 had an injury consistent with an old propeller injury (Burek 1999c).

It appears that the potential cumulative effects of mortality due to vessel interactions on CI beluga whales, when considered with the alternatives proposed by this action, would not increase the amount of time it would take to recover the stock of beluga whales to OSP. Therefore, the cumulative effects of this

activity are considered insignificant There are no data available to quantify this impact for the CI stock of beluga whales, but it is not believed to have had a significant impact on the stock.

4.4.2.6 Direct Effects of Commercial Fisheries on CI Beluga Whales: State and federally-permitted commercial fisheries for shellfish, groundfish, herring and salmon occur in the waters of Cook Inlet, and have varying likelihoods of interacting with beluga whales due to differences in gear type, timing, and location of the fisheries Incidental interactions refer to entanglements, injuries, or mortalities occurring incidental to fishing operations

(i) Incidental Mortality:

(1) Commercial Fisheries: Reports of marine mammal injuries or mortalities incidental to commercial fishing operations are obtained from observer programs, fisheries reporting programs, and reports in the literature. During 1990-93, certain fisheries were required to participate in a logbook reporting program, which provided information regarding the amount of fishing effort and interactions with marine mammals and the outcome (deterred, entangled, injured, killed). Data from this program were difficult to interpret due to sampling problems (Young et al. 1993), and tended to underestimate actual incidental mortality rates (Credle et al. 1994) This program was replaced by the 1994 MMPA amendments with a fisher self-reporting program, in which all commercial fishers are required to notify NMFS of injuries or mortalities to marine mammals occurring during the course of commercial fishing. This program became effective in 1995, and is currently in operation. In general, however, significantly fewer reports have been received under this program than expected based on the logbook reporting program and on results from observer programs. Thus, annual mortality rates derived from these programs should be considered minimum estimates (Angliss et al. 2001).

NMFS designed a rotational observer program to identify potential interaction 'hot spots' among eight Category II fisheries in Alaska. Because of the heightened concern in Cook Inlet, the program observed the two Cook Inlet Category II fisheries (salmon drift and upper and lower Cook Inlet set gill net) in 1999 and 2000.

Given the recent distributional trend for beluga whales to be concentrated in upper Cook Inlet during summer (Rugh et al. 2000), fisheries occurring in those waters during that time could have a higher likelihood of interacting with beluga whales.

However, the only fisheries active in the Inlet during that period are in the lower Inlet/Northern Gulf waters for groundfish and crab No interactions between beluga whales and northern Gulf of Alaska groundfish trawl, longline or pot fisheries were reported by federal observers during 1990-2000 (Angliss et al. 2001)

Other fisheries also occur in the lower Cook Inlet for herring sac roe, lingcod and rockfish, and salmon. The lower Cook Inlet herring sac roe fishery is of extremely short duration (often minutes to hours) taking place sometime in or near April within Kamishak Bay Landed herring biomass has fluctuated greatly since 1977, and this fishery was closed in 1999 through 2002. A mechanical / hand jig fishery for lingcod and rockfish also occurs in lower Cook Inlet state and federal waters. Salmon purse seine fisheries in the lower Cook Inlet operate south of a line drawn west from Anchor Point within two districts, Kamishak Bay and Southern (divided at 152°20' W longitude), with most of the catch coming from the Southern District These fisheries were not participants in the logbook reporting program. No reports of injury or mortality to beluga whales have been received from participants in these fisheries under the fisher self-reporting program during 1995-2001

Upper Cook Inlet commercial fisheries include a razor clam hand-dig fishery, a herring gill net fishery, and salmon drift and set gill net fisheries. Prior to 1998, the herring fishery had been closed for five years, and in 1998 was open briefly during April-May to gill net gear. Harvests of herring have generally been concentrated in Tuxedni and Chinitna Bay areas (Ruesch and Fox 1999). These fisheries were not participants in the logbook reporting program. No reports of injury or mortality to beluga whales have been received from participants in these fisheries under the fisher self-reporting program during 1995-99.

The largest fisheries, in terms of participant number and landed biomass in Cook Inlet, are the salmon drift and set gill net fisheries concentrated in the Central and Northern Districts of upper Cook Inlet. Times of operation change depending upon management requirements, but in general the drift fishery operates from late June through August, and the set gill net fishery during June through September. Seine nets are infrequently employed in Chinitna Bay. Salmon fishery effort varies between years, and within years effort can be temporally and spatially directed through salmon management regulations. In general, however, though the number of permits fished in CI salmon gill net fisheries has been relatively constant, the landed salmon biomass has fluctuated greatly during the past 20

years.

In the southern part of the Inlet, the commercial set gill net salmon fisheries are limited to five beach areas on the southern shore of Kachemak Bay, where approximately 25 permit holders operate sites. Salmon fisheries in lower Cook Inlet are generally in operation during May-August.

For the drift gill net fishery, observers were deployed during all 12 fishing periods in 2000 and observed approximately 903 hauls among 160 vessels for a total of 1,584 hours observation time. In 1999, observations were made of 744 sets and/or hauls among 102 vessels (of 487 total permitted vessels) for 845 hours observation time. Over the two years of observation, an estimated total of 384 net-days was observed. Beluga whales were not observed to interact (approach within 10 m) with the drift gill nets in either year For the set net fishery, observers were deployed during all fishing periods in 2000 and observed 800 hauls from 269 permits during 2,149 hours of observation time. In 1999, observations were made of 1,450 soaks and/or hauls by 275 unique permit holders (among a total of 556 fishing permits) for a total fo 1,545 hours observation time. Over the two year program, an estimated 614 net days were observed No marine mammal mortalities were observed in either year among this fishery. Although a few marine mammals were entangled and released, beluga whales were never observed within 10 m of a net (i.e., within a distance categorized as an 'interaction') in the drift of set net fisheries.

(2) <u>Personal-use Fisheries</u>: Personal-use gill net fisheries also occur in Cook Inlet and have been subjected to many changes since 1978 (Ruesch and Fox 1999) that are summarized in Brannian and Fox (1996). The most consistent recent personal-use fishery is the use of single ten-fathom gill nets for salmon in the Tyonek Subdistrict of the Northern District (Ruesch and Fox 1999). Personal-use gill nets have also been allowed within waters approximately 2.4 km (1.5 miles) of the Kasilof River. In 1995, personal-use gill nets were allowed in most areas open to commercial salmon set gill net fishing. Most of this area was closed to personal gill net use in 1996 Personal-use salmon set gill net fisheries are also found in the Port Graham subdistrict of lower Cook Inlet NMFS is unaware of any beluga whales injured or killed in the CI personal use/subsistence gill net fisheries.

(ii) <u>Summary of Direct Effects of Commercial Fisheries on CI Beluga Whales</u>: The only reports of beluga whale mortality caused incidental to commercial salmon gill net fishing in Cook

Inlet are from the literature. Murray and Fay (1979) stated that salmon gill net fisheries in Cook Inlet caught five beluga whales in 1979 Incidental take rates by commercial salmon gill net fisheries in the Inlet was estimated at three to six beluga whales per year during 1981-83 (Burns and Seaman 1986). Neither report, however, differentiated between the set and drift gill net fisheries In contrast, there have been no recent and verified reports of incidentally caught beluga whales in Cook Inlet No reports of injuries or mortalities incidental to salmon drift or set gill net fishing were made during the 1990-91 logbook reporting program. There were no reports of entanglement in the observer program. Some mortalities might be expected as the population increases However, the effect of the current rate of direct mortality in commercial fisheries in Cook Inlet is insignificant in that it would not result in a significant delay in recovery time to OSP.

4.4.2.7 Effects of Disease: Little is presently known about the effects of disease on CI beluga whales. Bacterial infection of the respiratory tract is one of the most common diseases encountered in marine mammals. However, some basic information exists on the occurrence of diseases in CI beluga whales, and a considerable amount of information exists for other beluga whale populations, and the effect(s) of these diseases on the species.

Bacterial pneumonia, either alone or in conjunction with parasitic infection, is a common cause of beach stranding and death (Howard et al. 1983). From 1983 to 1990, 33 percent of stranded beluga whales in the Saint Lawrence estuary (n = 45 sampled) were affected by pneumonia (Martineau et al. 1994). One beluga apparently died from the rupture of an "aneurysm of the pulmonary artery associated with verminous pneumonia" (Martineau et al. 1986).

Beluga whale populations in Alaska appear relatively free of ectoparasites, although both the whale louse, *Cyamus* sp , and acorn barnacles, *Coronula reginae*, are recorded from stocks outside of Alaska (Klinkhart 1966). Endoparasitic infestations are more common: An acanthocephale, *Coryosoma* sp., was identified in beluga whales, and *Pharurus oserkaiae* has been found in Alaska beluga whales. *Anisakis simplex* is also recorded from beluga whales in eastern Canada (Klinkhart 1966). Necropsies conducted on CI beluga whales have found heavy infestations in adult whales. Approximately 90 percent of CI whales examined have had kidneys parasitized by the nematode *Crassicauda giliakiana*. This parasite occurs in other cetaceans, such as Cuvier's beaked whale. Although extensive damage and replacement to tissues have

been associated with this infection, it is unclear whether this results in functional damage to the kidney (Burek 1999a) Parasites of the stomach (most likely *Contracecum* or *Anisakis*) are often present in CI beluga whales. These infestations have not, however, been considered to be extensive enough to have caused clinical signs.

Sarcocystis sp. have also been found in muscle tissue from CI beluga whales. The encysted (muscle) phase of this organism is thought to be benign. The arctic form of *Trichenella spiralis* (a parasitic nematode) is known to infect many northern species including polar bears, walrus, and to a lesser extent ringed seals and beluga whales (Rausch 1970) The literature on "arctic trichinosis" is dominated by reports of periodic outbreaks among Native people (Margolis et al. 1979). The effect of the organism on the host marine mammal is not known (Geraci and St. Aubin 1987).

Therefore, parasites, and the potential for diseases, do occur in CI beluga whales. However, no indication exists that the occurrence of parasites or disease has had any measurable (detrimental or adverse) impact on the survival and health of beluga whale stock despite the considerable pathology that has been done on this species. Therefore, the cumulative effects of disease are considered insignificant.

4.4.2.8 Effects of Research on CI Beluga Whales: Because many important aspects of the biology of CI beluga whales remain unknown, or are incompletely studied, and because management of this stock through recovery will require knowledge of annual abundance levels, NMFS anticipates continuing, and possibly expanding, their research program throughout the range of this stock. This would certainly include continuing the annual abundance surveys. Other research may include: satellite tag beluga whales to investigate seasonal movements and migration patterns; biopsy individual whales to obtain tissue samples for research into population genetics; a population age and growth model; 12 month forage fish analysis; fatty acid analysis, and behavioral-telemetry studies associated with disturbance and avoidance of human activities. Research may occur at Federal, state, and private levels.

NMFS is required to ensure that these activities will not have harmful impacts to the beluga whale stock Any research which may take a beluga whale, including a take by harassment or disturbance, will require authorization under the MMPA Such authorization can only be granted if an activity, by itself or in combination with other activities, would not cause a significant

adverse impact on the stock. NMFS conducts aerial surveys under MMPA Scientific Research Permit No. 782-1438. Satellite tagging has been conducted under MMPA Scientific Research Permit No 957 and 782-1438. The cumulative effects of research activities on CI beluga whales are considered insignificant.

4.4.2.9 Summary of Direct Cumulative Effects: The direct cumulative effects of activities in the Inlet generally impact all of the alternatives in a similar manner. Which means there is very little difference in the direct effect of fishing on CI beluga whales whether it is under alternative 1 or alternative 2.

Commercial Harvest of Beluga Whales: The level of the commercial harvest of beluga whales in Cook Inlet is surmised from the historical documentation and records. Since the MMPA (1972), all marine mammals are protected from 'takes' which prevented the continuation of a commercial harvest of beluga whales The effects of this activity to the present population are difficult to quantify. Generally, they are considered insignificant.

Subsistence Harvest of Beluga Whales: Subsistence harvests between 1994 and 1998 can account for the estimated decline of the stock during that period; that unsustainable rate of decline (15 percent per year) was halted in 1999 by the legislation described above which has since limited subsistence harvests to sustainable numbers in accordance with co-management agreements between NMFS and CIMMC. Thus, authorized and mitigated subsistence harvests of beluga whales are determined to be insignificant.

Commercial Fisheries: The direct effects of state-managed fisheries on CI beluga whale incidental mortality considered insignificant at this time There have been no recent and verified reports of incidentally caught beluga whales in Cook Inlet. No reports of injuries or mortalities incidental to salmon drift or set gill net fishing were made during the 1990-91 logbook reporting program There were no reports of entanglement in the observer program. Some mortalities might be expected as the population increases. The effect of the current rate of direct mortality in commercial fisheries in Cook Inlet is insignificant in that it would not result in a significant delay in recovery time to OSP.

Stranding Events and Disease: The potential cumulative effect of stranding events on CI beluga whales, when considered with the alternatives proposed by this action, neither increases the likelihood of mortality nor increases the amount of time it would take to recover the stock of beluga whales to OSP. Therefore,

the cumulative effects of this natural activity are considered insignificant.

There is no indication that the occurrence of disease has had any measurable (detrimental or adverse) impact on the survival and health of beluga whale stock despite the considerable pathology that has been done on this species. Therefore, the cumulative effects of disease are considered insignificant

Predation: Predation by killer whales on beluga whales in Cook Inlet is not thought to have been a factor that would delay recovery of the stock in a significant manner. In order for killer whale predation to have an impact significant enough to result in a decline in the population trajectory, a level of predation mortality that approximates the level of recruitment in the population, would be required No indication exists that natural mortality in the CI beluga whale population exceeds levels considered normal for other small cetacean populations. Shelden et al (2003) suggests a minimum estimate of roughly one adult beluga whale is taken per year by killer whales. It is believed that killer whale predation falls within the level of natural mortality for this population. Therefore, the cumulative effects of killer whale predation are considered insignificant.

4.4.3 Indirect Cumulative Effects

4.4.3.1 Effects of Commercial Fishing in Cook Inlet on Beluga Whales: The indirect interactions between marine mammals and commercial fisheries are, in most cases, difficult to identify Examples of observable interactions are generally restricted to direct mortality in fishing gear. Even then, the ecological significance of the interaction is related to the number of animals killed and subsequent population level responses There were no reported takes of beluga whales in commercial fisheries in Cook Inlet; therefore, those interactions are not expected to have large ecosystem consequences.

More difficult to identify and potentially more serious are interactions resulting indirectly from competition for resources that represent both marine mammal prey and commercial fishery targets. Such interactions may limit foraging success through localized depletion, disaggregation of prey, or disturbance of the predator itself. Compounding the problem of identifying competitive interactions is the fact that biological effects of fisheries may be indistinguishable from changes in community structure or prey availability that might occur naturally. The relative impact of fisheries perturbations, compared to broad, regional events such as climatic shifts, are uncertain However,

given the potential importance of localized prey availability for foraging marine mammals, they warrant close consideration

Lowry (1982) developed qualitative criteria for determining the likelihood and severity of biological interactions between fisheries and marine mammal species in the Bering Sea. His criteria were based on marine mammal diet, focusing on species consumed, prey size composition, feeding strategy, and the importance of the Bering Sea as a foraging area Using these criteria and applying them to this analysis, beluga whales are known to forage on salmon, eulachon and herring, and foraging areas include the upper Inlet at the mouths of salmon rivers, spring through fall. The winter diet and foraging area are not so well known except that it is generally believed that beluga whales remain in Cook Inlet throughout the year.

As with other apex predators, ecological interactions between beluga whales and fisheries may be caused by spatial and temporal overlap between beluga whale foraging areas and salmon fisheries, and from competition by the state managed salmon fisheries. Therefore, a potential mechanism by which beluga whales may be disadvantaged by competition with commercial fisheries for food resources is through competition or localized depletion of prey

Competition between fisheries and marine mammals has a long history and has been described from different perspectives. On one hand, fishermen have observed the numbers of target species that have been consumed by marine mammals and treated the mammals as economic competitors for their catch. On the other hand, biologists and conservationists have observed the large amount of biomass that is removed from marine ecosystems by fisheries and have been concerned that the fisheries compete with marine mammal populations Within Cook Inlet there is a temporal overlap between the commercial salmon fisheries and the beluga whales in the Inlet. This overlap suggests that these two consumers have the potential to demand a common resource and may, as a result, be competitors for that resource, even if there is little spacial overlap.

The timing of fisheries, relative to foraging patterns of beluga whales in the Inlet represents a potential, significant and relevant management concern. Thus, the indirect effects of commercial fishing may be either an increase or decrease in the potential prey of beluga whales in a manner that may change prey availability or the harvest rate of beluga whales.

(i) Effects of Fishing on Prey Availability to CI Beluga Whales: CI beluga whales actively feed at the river

mouths of the upper Inlet, where prey species would be expected to form concentrations in spring and summer. The large numbers of beluga whales that congregate during spring, also coincides with the eulachon migration, and soon afterwards with smolt out-migrations, and the first king salmon spawning runs. Hazard (1988) stated that beluga whales in the Bering Strait form dense aggregations which are dependent on concentrations of food organisms

NMFS biologists have sampled stomachs from harvested whales, and have found a significant portion of these to contain adult salmon and eulachon. Native hunters' observations are that the occurrence of beluga whales in Cook Inlet is dependent upon fish runs. Feeding behavior is commonly observed near stream mouths, evidenced by salmon jumping in front of whales, whale "lunges" or sudden turns and acceleration, and salmon and eulachon swimming onto shores away from the beluga whales

NMFS placed a satellite tag on an adult beluga whale in June 1999, and this animal remained in and near the mouth of the Little Susitna River for several weeks between June and July 1999. This whale was observed swimming among a group of approximately 90 beluga whales. This beluga whale moved into the central region of the upper Inlet and into Knik Arm during the coho runs.

If the occurrence and distribution of these whales within Cook Inlet are assumed to be, in large part, related to prey distribution and availability, then the occurrence and distribution of these runs are extremely important to CI beluga whales. Native observations reported in Huntington (2000) suggest that severe declines in fish runs have occurred in Cook Inlet during the past few years and those changes in fish distribution create changes in beluga whale distribution

Several anadromous waterways entering Cook Inlet are monitored by ADFG The Fish Creek system has been enhanced since 1976. Even with the commercial fishery in Knik Arm and the personal use dip net fishery in Fish Creek being closed, often Fish Creek sockeye salmon escapements are well below the sockeye salmon based escapement goal.

The Yentna River is a major tributary to the Susitna River Sockeye salmon returns to the Yentna have remained above average over the period of observed decline for CI beluga whales: 1994-1998.

Since 1990, the Crescent River on the west side of Cook Inlet has

been producing at a lower level than is required to meet escapement goals without sever restrictions to the commercial fisheries In 1999, the based escapement goal for this system was lowered in response to decrease productivity in Crescent Bay.

Finally, the Kenai and Kasilof Rivers sockeye above-average escapement rates occurred during the period of time that the decline in CI beluga whales was observed 1994-1999. Despite these salmon escapements, NMFS has received reports of fewer beluga whales in the Kenai River, as compared to the 1970s and 1980s. However, this observation could be the result of a reduced population of beluga whales in Cook Inlet in recent years, and has little to do with fish abundance or availability.

Herring are also an important component of the beluga whales' diet, in that they are a lipid-rich fish which occurs in concentrations. During a study of salmon smolt within the upper Inlet, juvenile herring (ages 0 and 1) were the most consistently caught species, and were second in abundance of all species encountered (Moulton 1994). Herring spawning occurs along the western side of lower Cook Inlet, and supports a local commercial fishery for sac-roe. This commercial fishery allowed for quotas up to 3,420 short tons (1997), but was closed in 1999 through 2002 because of declining herring biomass.

No data are available to quantify the levels of forage fish (e.g , eulachon) present in upper Cook Inlet. A commercial venture to harvest eulachon in the lower Susitna River operated during 1999. This fishery was limited to fifty (50) tons[4] and was stopped in 2000 because of the importance of the eulachon to beluga whales.

Therefore, a preliminary review of escapement data of Pacific salmon in Cook Inlet does not suggest recent returns have suffered significant declines Rather they suggest that the salmon runs have remained almost constant over the past decade, and should not have adversely impacted beluga whales simply due to biomass availability. To what extent herring and eulachon are significant in the diet of beluga whales is not known, but they likely are important prior to the salmon runs. However, this information highlights the importance of foraging areas to beluga whales

The satellite transmitter information on 17 beluga whales from

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[4]Shields, P. 1999. Personal Communication, via B. Smith, NMFS, Alaska Region, Anchorage, Alaska.

August through May (2000, 2001, and 2002), have suggested that beluga whales stay north of the Forelands, and often in the Knik and Turnagain Arms. Beluga whales travel as far south as the Forelands, but predominantly stay in the Susitna delta, Turnagain and Knik Arms through October. November through January, the satellite tagged beluga whales moved around the Susitna delta, Turnagain and Knik Arms and as far south as Kalgin Island. The belugas that transmitted positions in February and March 2002 and through May 2003 remained around Kalgin Island. The speculation as to what the beluga whales may be feeding on at this time includes late coho and chum runs, salmon carcasses that wash downriver, and whitefish. With the glaciers and rivers freezing in the autumn, less fresh water enters Cook Inlet. With the decrease in freshwater input, it is possible that more marine species travel north and become available to beluga whales.

(ii) Summary of Potential Indirect Effects of Commercial Fishing on Beluga Whales in Cook Inlet: In summary, and based on best available scientific and commercial data, the salmon fisheries may compete with beluga whales for common resources. The extent of this competition is not known and at this time it is not known whether overlap of foraging and resources demonstrates a significant interaction for this stock of marine mammal However, fisheries and beluga whales both consume salmon in significant quantities, and other species in lesser quantities. The high degree of temporal overlap between these fisheries and the foraging needs of beluga whales points to the potential for competitive interactions on a number of scales or axes.

Also, given that the beluga whales forage to a great extent in the upper Inlet, the continued health of these fish runs and their natal rivers are important Maintaining the health of the spawning rivers may be as significant to the beluga whale as is maintaining the health of the Inlet. Therefore, activities that occur in the upland drainage areas of the major spawning rivers, such as the Kenai and Susitna River basin, are likely as significant to beluga whales as are activities in the estuarine and saltwater portions of Inlet. These activities have, and will continue to be, monitored by NMFS, with focus being on the impact of these activities on their spawning habitat.

Salmon fisheries do harvest prey of CI beluga whales. Changes in harvest activities or levels of salmon returning to Cook Inlet may differentially impact beluga whale foraging efficiency or habitat, or both However, it is assumed at this time, that the salmon harvest strategies, or affects to the spawning habitat that might impact fisheries harvest rates will not immediately

change and therefore, the effect of beluga whale mortality in Cook Inlet is insignificant, in that it would not result in a significant delay in recovery time to OSP.

4.4.3.2 Effects of Tourism: Tourism is a growing component of the State and regional economies, and wildlife viewing is an important component of this use Visitors highly value the opportunity to view the region's fish and wildlife, and opportunities to view the beluga whale are especially important due to their uniqueness. Many tour buses routinely stop at several wayside sites along Turnagain Arm in the summer, where beluga whales are seasonally observed. Presently there are no vessel-based commercial whale watching ventures operating in upper Cook Inlet, however, the popularity of whale watching and the close proximity of beluga whales to Anchorage, increases the probability that such operations will exist in the near future. NMFS will monitor any commercial whale watching operations that may develop. Any potentially significant impacts would be mitigated by consultation with tour operators, development of guidelines to avoid harassment, or development of regulations to avoid takings. The impact of this activity, if any, is generally considered to be positive because of the educational component of whale watching Based on studies elsewhere, NMFS does not believe that any impacts from this activity are detrimental to the population. No indication exists that land-based tourism (vehicle traffic along Turnagain Arm) has had any effect on the CI beluga whale stock. The effect of this activity is considered insignificant.

4.4.3.3 Indirect Effects of Pollutants on CI Beluga Whales: The principal sources of pollution in the marine environment are 1) discharges from municipal wastewater treatment systems; 2) discharges from industrial activities that do not enter municipal treatment systems (petroleum and seafood processing); 3) runoff from urban, mining, and agricultural areas; and 4) accidental spills or discharges of petroleum and other products. Natural and man-made pollutants entering the Inlet are diluted and dispersed by the currents associated with the tides, estuarine circulation, wind-driven waves and currents (MMS 1996).

Pollutants may be classified as chemical, physical, and biological Chemical pollutants include organic and inorganic substances. The decomposition of organic substances uses oxygen and, if enough organics are present, the concentration of oxygen could be reduced to levels that would threaten or harm oxygen-using inhabitants of the water column

(i) Oil Spills: Petroleum production, refining, and

shipping in Cook Inlet present a possibility for oil and other hazardous substances to be spilled, and to impact the CI beluga whale stock. The Outer Continental Shelf Environmental Assessment Program estimated 21,000 barrels of oil were spilled in the Inlet between 1965 and 1975, while 10,000 barrels were spilled from 1976 to 1979 (MMS 1996) In July 1987, the tanker *GLACIER BAY* struck an uncharted rock near Nikiski, Alaska, discharging an estimated 1,350 to 3,800 barrels of crude oil into the Inlet (USCG 1988). Beluga whales are found in the area where this spill occurred

Data do not exist which describe any behavioral observations or deleterious effect of these spills to beluga whales or accurately predict the effects of an oil spill on beluga whales. Some generalizations, however, can be made regarding impacts of oil on individual whales based on present knowledge.

An oil spill that occurred while beluga whales were present in Cook Inlet could result in skin contact with the oil, ingestion of oil, respiratory distress from hydrocarbon vapors, contaminated food sources, and displacement from feeding areas (Geraci 1990). Whales could be affected through residual oil from a spill even if they were not present during the oil spill. Most likely, the effects of oil would be irritation to the respiratory membranes and absorption of hydrocarbons into the bloodstream (Geraci 1990).

If an oil spill were concentrated in open water (e.g., within tide rips), it might be possible for a beluga whale to inhale enough vapors from a fresh spill to affect its health While there are no reliable data on the effects of petroleum vapor inhalation on cetaceans, inhalation of vapors in excess of 10,000 ppm is rapidly fatal to humans (Ainsworth 1960; Wang and Irons 1961). Inhalation of petroleum vapors can cause pneumonia in humans and animals due to large amounts of foreign material (vapors) entering the lungs (Lipscomb et al 1994). Although pneumonia was not found in sea otters that died after the *EXXON VALDEZ* oil spill, inhalation of vapors was suspected to have caused interstitial pulmonary emphysema (accumulation of bubbles of air within connective tissues of the lungs). Crude oil evaporation rates are greatest during the first few days after an oil spill (Meilke 1990).

Whales may also contact oil as they surface to breathe, but the effects of oil contacting skin are largely speculative Experiments in which *Tursiops* were exposed to petroleum products showed transient damage to epidermal cells, and that cetacean skin presents a formidable barrier to the toxic effects of

petroleum (Bratton et al. 1993). Geraci and St Aubin's (1985) investigations found that exposure to petroleum did not make a cetacean vulnerable to disease by altering skin microflora or by removing inhibitory substances from the epidermis.

Geraci (1990) reviewed a number of studies pertaining to the physiologic and toxic impacts of oil on whales and concluded no evidence exists that oil contamination had been responsible for the death of a cetacean. Cetaceans observed during the *VALDEZ* oil spill in Prince William Sound made no effort to alter their behavior in the presence of oil (Harvey and Dahlheim 1994, Loughlin 1994).

Following the *VALDEZ* oil spill, daily vessel surveys of Prince William Sound were conducted from April 1 through April 9, 1989, to determine the abundance and behavior of cetaceans in response to the oil spill (Harvey and Dahlheim 1994). During the nine surveys, 80 Dall's porpoises, 18 killer whales, and two harbor porpoises were observed. Oil was observed on only one individual, with oil on the dorsal half of its body it appeared stressed due to it's labored breathing patterns. A total of 37 cetaceans was found dead during and after the *VALDEZ* oil spill, but cause of death could not be linked to exposure to oil (Loughlin 1994) Dalheim and Matkin (1994) reported 14 killer whales missing from a resident Prince William Sound pod over a period coincident with the *VALDEZ* oil spill. They note it is likely nearly all resident killer whales swam through heavily oiled sections of the Sound, and that the magnitude of that loss was unprecedented. That study concluded a correlation existed between the loss of these whales and the spill, but could not identify a clear cause and effect relationship

Toxicity of crude oil decreases with time as the lighter, more harmful, aromatic hydrocarbons such as benzene, evaporates Acute chemical toxicity (lethal effects) of the oil is greatest during the first month following a spill. Sublethal effects may be observed in surviving birds, mammals, and fish for years after the spill Sublethal and chronic effects include reduced reproductive success, blood chemistry alteration, and weakened immunity to diseases and infections (Spies et al. 1996).

(ii) Other Pollutants: The discharge of soluble inorganic substances may change the pH or the concentration of trace metals in the water, and these changes may be toxic to some marine plants and animals Physical pollutants include suspended solids, foam, and radioactive substances Suspended solids may inhibit photosynthesis, decrease benthic activity, and interfere with fish respiration. Foam results from surface active agents

and may cause a reduction in the rate of oxygen-gas transfer from the atmosphere into the water. Biological pollutants may cause 1) waterborne disease by adding viruses, protozoa, or bacteria to the receiving waters or 2) excessive biological growth.

(1) Produced Waters: Produced waters constitute the largest source of naturally occurring and manmade substances discharged into the waters of Cook Inlet. The characteristics of the produced waters, as well as other discharges—except drilling muds and cuttings—described in this section are based on information obtained during the Cook Inlet Discharge Monitoring Study that, basically, was conducted between April 10, 1988, and April 10, 1989 (EBASCO Environmental 1990a, 1990b). These waters are part of the oil/gas/water mixture produced from the wells and contain a variety of dissolved substances Also, chemicals are added to the fluids that are part of various activities including waterflooding; well workover, completion, and treatment; and the oil/water separation process. Before discharging into Cook Inlet, produced waters pass through separators to remove oil from the waters. The treatment process removes suspended oil particles from the waters, but the effluent contains dissolved hydrocarbons or those held in colloidal suspension (Neff and Douglas 1994) Although the discharge of produced waters is an issue of concern, the toxicity of produced waters, as indicated in the Monitoring Study, ranged from only slightly toxic to practically nontoxic (to shrimp) and would not, therefore, be expected to impact beluga whales.

(2) Drilling Muds and Cuttings: Environmental Protection Agency (EPA), National Pollution Discharge Elimination System general permit, authorizes the discharge of approved generic drilling muds and additives into waters of Cook Inlet. Drilling muds consist of water and a variety of additives; 75 to 85 percent of the volume of most drilling muds currently used in Cook Inlet is water (Neff 1991).

When released into the water column, the drilling muds and cuttings discharges tend to separate into upper and lower plumes (Menzie 1982) The discharge of drilling muds at the surface ensures dispersion and limits the duration and amount of exposure to organisms (NRC 1983). Most of the solids in the discharge, more than 90 percent, descend rapidly to the sea floor in the lower plume. The sea floor area in which the discharged materials are deposited depends on the water depth, currents, and material particle size and density (NRC 1983). In most outer continental shelf areas, the particles are deposited within 152 m (500 ft) below the discharge site; however in Cook Inlet, which is considered to be a high-energy environment, the particles are

deposited in an area that is >152 m (500 ft) below the discharge site (NRC 1983). Small particles of drilling mud--several centimeters in diameter--also may settle to the sea floor immediately following a discharge but would disperse within a day The upper plume contains the solids and water-soluble components that separate from the material of the lower plume and are kept in suspension by turbulence

Since 1962, there were about 546 wells drilled in Cook Inlet. One Continental Offshore Stratigraphic Test Well and 11 exploration wells were drilled in Federal waters and 75 exploration and 459 development and service wells were drilled in State waters--mainly in upper Cook Inlet (State of Alaska, AOGCC 1993). From 1962 through 1970, 292 wells were drilled (62 exploration and 230 development and service wells) (State of Alaska, AOGCC 1993). From 1971 through 1993, the number of wells drilled per year has ranged from 3 to 20; the average number drilled per year is about 11

The toxicity (96-hr LC_{50}) of the muds used to drill 39 production wells in Cook Inlet between August 1987 and February 1991 ranged from 1,955 to >1,000,000 ppm for a marine shrimp (Neff 1991). Concentration levels >10,000 are considered practically nontoxic and between 1,000 and 10,000 are slightly toxic. The percentages of the wells with toxicities >10,000 was 89 percent of the total number. Therefore, 89 percent of the muds from this production were considered nonionic to shrimp. The remaining 11 percent exceeded toxic levels for the test subjects. Given the results of these studies, the toxicity level of production muds are not considered to be toxic to beluga whales and, as a result, not likely to adversely impact beluga whales.

(3) Heavy Metals and Organic Compounds: NMFS has obtained biological samples from 28 CI beluga whales since 1992 under protocols developed for the Alaska Marine Mammal Tissue Archival Project[5]. From these collections, selected tissues have been analyzed for Polychlorinated Biphenyls (PCBs) and trace elements, including heavy metals[6] in liver and kidneys Similar

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[5]The Alaska Marine Mammal Tissue Archival Project began in 1987, and is now conducted by the U S. Geological Survey, NMFS, and the National Institute of Standards and Technology. This project includes the collection, analysis, and archival of marine mammal tissues

[6]Instrumental neutron activation analysis is routinely used to measure 37 elements (Na, Mg, Al, Cl, K, Ca, Sc, V, Mn, Fe, Co,

to beluga whales from other regions in Alaska, Canada, and Greenland, the CI beluga whales were found to have relatively high concentrations of mercury, selenium, and silver in their livers. These levels are much higher than one finds in ringed seals, harbor seals, bowhead whales, and walrus in Alaska However, as compared to other Alaska beluga whale stocks (eastern Chukchi Sea and eastern Beaufort Sea), the levels of these three metals, as well as cadmium, were much lower in the CI animals (Becker et al. 2000) These elements accumulate in liver tissue and increase with age of the animal The uptake and bioaccumulation of these elements are determined by many factors, of which the position of the beluga whale in the food web and the diet of the animal probably plays a major role (Becker et al. 2000).

Concentrations of PCB congeners and chlorinated pesticides were found to be lower in the blubber of beluga whales from Cook Inlet than from beluga whales from Point Lay (eastern Chukchi Sea stock) and Point Hope (eastern Beaufort Sea stock), Alaska. Generally, CI beluga whales are "cleaner" than other beluga whale populations throughout the Arctic and the eastern United States.

A comparison of tissue concentrations of persistent organic contaminants, heavy metals, and other elements between CI beluga whales and other beluga whales in North America confirms that the CI animals are very distinct from other populations and stocks of this species The CI animals had much lower concentrations of PCBs and chlorinated pesticides than those which have been reported from the eastern Beaufort Sea and eastern Chukchi Sea stocks. In the case of heavy metals and other elements, cadmium, mercury, selenium, vanadium, and silver were much lower in the livers of CI whales than in the other beluga whale stocks. Due to the lower concentrations of PCBs and chlorinated pesticides in CI beluga whales, their effects on the animals' health may be less significant for CI animals than for the other beluga whale stocks.

(iii) Summary of Cumulative Indirect Effects of Oil and Other Pollutants on CI Beluga Whales and Their Habitat:

(1) Summary of Effects of Oil Spills on Beluga Whales in Cook Inlet: Generally, oil and petroleum product production, refining, and shipping in Cook Inlet present a possibility for oil and other hazardous substances to be spilled,

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Cu, Zn, As, Se, Br, Rb, Sr, Mo, Ag, Cd, Sn, Sb, I, Cs, Ba, La, Sm, Eu, Tb, Hf, Ta, Au, Hg, Th, and U).

and to impact the CI beluga whale stock. Data do not exist which describe any behavioral observations or deleterious effect of these spills to individual beluga whales Therefore, it is difficult to accurately predict the effects of an oil spill of CI beluga whales. Even a decade after the *VALDEZ* oil spill, the relationship to that event and the trends in the marine mammal populations of Prince William Sound is poorly understood. It is likely that the indirect effects of a spill on the availability of prey, or prey habitats, could have a greater impact on beluga whales than any direct impact. Whales could be affected through residual oil from a spill even if they were not present during the oil spill but the effects are largely speculative. Therefore, accurately predicting the effects of an oil spill on CI beluga whales is difficult. While much of our understanding of how an oil spill affects a marine mammal is in development, it is known that effects of CI beluga whales, their prey and habitat or both the whales and prey, might be affected by such an event Since such an occurrence is considered remote in the near future, it is not expected to impact beluga whales and is generally considered insignificant

4.4.3.4 Potential Effects of Municipal Wastes and Urban Runoff on CI Habitat for Beluga Whales: Ten communities currently discharge treated municipal wastes into Cook Inlet Wastewater entering these plants may contain a variety of organic and inorganic pollutants, metals, nutrients, sediments, and bacteria and viruses. Of these, the Municipality of Anchorage's John M. Asplund treatment center, English Bay, Port Graham, Seldovia, and Tyonek receive only primary treatment[7], while Eagle River, Girdwood, Homer, Kenai, and Palmer receive secondary treatment. The maximum permitted wastewater discharges for Anchorage are 44 million gallons per day (GPD), and the other communities have a range from 10 thousand to 1.6 million GPD. For Anchorage, the effluent limitations requested for the daily discharge of BOD and total suspended solids in the wastewater are 90,100 pounds per day (lb./d) and 57,000 lb./d, respectively. Based on the daily maximums presently permitted for these ten communities, they could release about 16.38 million pounds of BOD and 13 82 million pounds of suspended solids into Cook Inlet

[7]The Clean Water Act requires all publicly owned treatment works to have secondary-level treatment by July 1977. Subsequent amendments to that act allow EPA to modify this requirement. The Municipality was granted a permit in 1985 to continue primary treatment That permit expired in 1990, and the Municipality has applied for renewal. The EPA allows the operation of this facility to continue until a new permit is issued.

annually.

Monitoring studies performed for the Municipality of Anchorage assessed the contribution of this effluent to waters of the upper Inlet using both hydrodynamic and transport modeling, and estimated the effluent contribution to be on the order of 0.01 to 1 percent of the background concentrations. The Municipality of Anchorage has asserted that riverine discharge into the upper Inlet can easily account for most of the dissolved and virtually all of the total recoverable metals in the receiving water (AWWU 1999). Bioassay of marine invertebrate species found the lowest observed effect concentration in echinoderms ranged from 5 to 10 percent effluent, and in molluscs ranged from 5 to 10 percent effluent for survival and 0.5 to 10 percent effluent for abnormalities The Municipality reported the effluent is nontoxic at dilutions greater than 20:1 (they estimate the minimum initial dilution at 180 1).

(i) Summary of Effects of Municipal Wastes and Urban Runoff on CI Habitat for Beluga Whales: Determining the impact of municipal discharges on the beluga whale stock is not possible. The rivers entering Knik Arm alone carry an estimated 20 million tons of sediment annually (Gatto 1976), making the suspended loading that naturally occurs in the extreme upper Inlet parallel the discharge by the Municipality of Anchorage. This is not wastewater, and the impacts of minimally treated wastewater on the beluga whales is unknown, but needs further study. However, given the relatively low levels of contaminants found in CI beluga whale tissues, municipal discharge levels are not believed to be having a significant impact on the beluga whale population

4.4.3.5 Potential Effects of Noise on Beluga Whales and their Habitat in Cook Inlet: Upper Cook Inlet is one of the most industrialized and urbanized regions of Alaska. As such, noise levels may be high. The common types of noises in upper Cook Inlet include sounds from vessels, aircraft, construction equipment such as diesel generators, bulldozers, and compressors, and from activities such as pile-driving.

Any sound signal in the ocean is detectable by marine mammals only if the received level of the sound exceeds a certain detection threshold (Richardson et al. 1995). If the sound signal reaching a marine mammal is weaker than the background noise level, it may not be detected. This concept is important in understanding the effects of noise on whales in at least two areas: 1) the audibility of an industrial noise is dependent in part on the background (ambient) noise levels, and 2) as

industrial noises add to the level of background noise, they may prevent or diminish the effectiveness of communication between whales or between whales and their environment.

Considering the depth of the animal being exposed to noise is also important. The noise level from a source when measured within a few feet of the surface is significantly lower than the noise level when measured at depths of 5 - 10 m (16.4 - 33 ft). For example, a marine mammal at the surface will experience a received noise level approximately 30 dB less than the received level for an animal at the same distance from the noise source, but at a depth of 10 m (33 ft)

(i) Aircraft Noise: Richardson et al. (1995) and Richardson and Malme (1993) provided summaries on aircraft sound in water When reporting a source level for an aircraft, the standard range of 300 m (984 ft), rather than 1 m (3.2 ft), is assumed, because "the concept of a 1-m source level for underwater noise from an aircraft is not very meaningful" (Richardson et al. 1995) The surface area of sound transmission from air to water is described by a cone where the apex of the cone is the aircraft, and the cone has an aperture of 26 degrees. In general, underwater noise from aircraft is loudest directly beneath the aircraft and just below the water's surface, and sound levels from the same aircraft is much lower underwater than the sound levels in air. The duration of the noise is short, because noise is generally reflected off the water surface at angles greater than 13 degrees from the vertical. Helicopters tend to be noisier than a fixed-wing aircraft The amount of noise entering the water depends primarily on aircraft altitudes and the resultant 26 degree cone, sea surface conditions, water depth, and bottom conditions (Richardson et al. 1995)

Monitoring results of aircraft noise levels are complicated due to variables that are inherent in such analyses, including monitoring equipment averaging times, aircraft types and operations (i.e , power setting, propeller pitch, altitude changes), meteorological conditions, and aircraft altitudes. There are no data on the level of received sound that do and do not disturb toothed whales (Richardson et al. 1995). The response of beluga whales to airplanes and helicopters vary with social context, distance from the aircraft, and aircraft altitude. Because the underwater noise generated by an aircraft is greatest within the 26 degree cone directly beneath the craft, whales often react to an aircraft as though startled, turning or diving abruptly when the aircraft is overhead Richardson et al (1995) report beluga whales not reacting to aircraft flying at 500 m (1,640 ft), but at lower altitudes of 150-200 m (492 - 656

ft) these animals dove for longer periods and sometimes swam away Feeding beluga whales were less prone to disturbance. NMFS aerial surveys are normally flown at an altitude of 244 m (800 feet), using fixed-wing twin engine aircrafts and beluga whales rarely react, even to repeated overflights at this altitude The main approaches to the Anchorage International Airport, Elmendorf Airforce Base, and Merrill Field are at least partially over the upper Inlet, including Knik Arm Commercial and military jet airplanes often overfly these waters at relatively low altitudes. An acoustic measurement study in Cook Inlet, conducted by Blackwell and Greene (2002), identified peak sound levels at 2.5 (dB) higher at 3 m than 18 m depth At this level, both mid-frequency sound components and visual clues could play a role in eliciting reactions by the whales. Despite this traffic, beluga whales are common in these waters and are often observed directly under the approach corridors off the north end of International Airport and the west end of Elmendorf Air Force Base.

(ii) Ship and Boat Noise: Ships and boats create high levels of noise both in frequency content and intensity level Ship traffic noise can be detected at great distances. High speed diesel-driven vessels tend to be much noisier than slow speed diesel or gasoline engines. Small commercial ships are generally diesel-driven, and the highest 1/3-octave band is in the 500 to 2,000 Hz range. Tugs can emit high levels of underwater noise at low frequencies. An acoustic study by Blackwell and Greene (2002) suggested that beluga whales may not hear sounds produced by large ships at lower frequencies (i.e., below about 300 Hz base on data collected by Ridgway et al (2001), but below 4 kHz based on previous studies), and that at high frequencies the sounds may not be sufficiently above their hearing threshold to be bothersome.

Small outboard motor driven watercraft, such as those commonly used for recreational purposes in the upper Inlet, typically produces noise at higher frequencies (e.g , 6300 Hz) and may, therefore, have the highest potential to interfere with beluga whales.

(iii) Noise from Offshore Drilling and Production: Sound produced by oil and gas drilling may be a significant component to the noise in the local marine environment, but underwater noise from the drilling platforms is expected to be relatively weak because of the small surface area in contact with the water, namely the four legs (Richardson et al. 1995) However, vibrations from the machinery through the columns and into the bottom may be notable, accounting in part for the high

levels observed at low frequencies (<30 Hz) (Blackwell and Greene 2002) Gales (1982) summarized noise from eleven production platforms The strongest tones from four production platforms were at very low frequencies, between ~4 5 and 38 Hz, at ranges of 6-31 meters.

Various studies and observations suggest that beluga whales are relatively unaffected by these activities Beluga whales are regularly seen near drill sites in Cook Inlet (Richardson et al 1995; McCarty 1981). Stewart et al (1982) reported that beluga whales in Snake River, Alaska, did not appear to react strongly to the playback of oil industry-related noise at levels up to 60 dB above ambient Stewart et al. (1983) conducted similar playback experiments in Nushagak Bay, Alaska in 1983 and found that beluga whale movement and general activity were not greatly affected, especially when the source of the noise was constant

Beluga whales did swim faster and respiration rates sometimes increased within 1.5 km of the sound projector. During playback experiments in the Beaufort Sea, migrating beluga whales approached the sound projector and showed no overt reactions until within 200-400 meters, even though the noise was detectable by hydrophone up to 5km away (Richardson et al. 1990, 1991) Richardson et al. (1995) observed these results may be an example of the degree to which beluga whales can adapt to repeated or ongoing man-made noise when it is not associated with negative consequences.

(iv) Noise from Seismic Geophysical Exploration:

Geophysical explorations of Cook Inlet for oil and gas deposits are often accomplished using boat-based seismic surveys. Seismic surveys produce some of the loudest noises in the marine environment caused by intense bursts of underwater compressed air which may propagate energy for great distances The noise produced by these surveys is at very low frequencies, often below 100 Hz. This is below the optimum hearing range of beluga whales Higher frequencies are absorbed in water more than lower frequencies, with the energy loss being proportional to the square of the frequency. Seismic sound propagation is also dependent on bottom structure, and soft substrates such as found in the upper Inlet absorbs sound better than hard, reflective material Finally, seismic sound is poorly transmitted through shallow waters, such as exists near the mouths of the Susitna and Little Susitna Rivers

Therefore, sounds from seismic exploration in the upper Inlet may be poorly transmitted through the water and may have little direct impact on beluga whales However, seismic sound may be

very loud, with some sound energy at higher frequencies overlapping that of the beluga whale. Therefore, it is possible that beluga whales might hear, and may react, to an active seismic vessel in certain areas and under certain conditions. Presently no data exists to characterize the noise from seismic exploration in Cook Inlet NMFS observed beluga whales in Cook Inlet approximately 20 nmi from an active seismic vessel in June 1995, and reported no reactions (Moore et al 2000).

(v) Summary of the Impacts of Noise on Beluga Whales in Cook Inlet: Because sound is a critical sense to beluga whales, high levels of noise may have significant and adverse effects. However, evaluation and prediction of human-made noise impacts on marine mammals are difficult This situation is partially a result of complications introduced by the natural variability in the animals' behavioral responses. Estimating acoustic environmental impact on animals requires interpretation and integration of results from many disciplines including, but not necessarily limited to, the study of how sound waves interact with the environment (physical acoustics), how animals hear sounds with their ears (anatomy and physiology), and how animals use sounds for such things as communicating, navigating, and finding food (bioacoustics, psychoacoustics, and behavioral ecology).

One of the most obvious behavioral responses to industrial noise is to avoid the area by swimming away from or detouring around the noise source. Two other behavioral responses, habituation and sensitization, also are important when discussing the potential reactions of beluga whales to multiple exposures to a noise stimulus. Richardson et al. (1995) provided examples of beluga whales becoming habituated to noise from frequent vessel traffic in the Saint Lawrence River and to salmon fishing boats in Bristol Bay. Habituation refers to the condition in which repeated experiences with a stimulus that has no important consequence for the animal leads to a gradual decrease in response. Sensitization refers to the situation in which the animal shows an increased behavioral response over time to a stimulus associated with something that has an important consequence for the animal.

Whales tend to show little response to vessels that move slowly and are not heading toward them (Richardson et al. 1995). However, beluga whales will often leave an area in which vessel noise is related to hunting (Sergeant and Brodie 1975; Huntington 2000) Native hunters in Cook Inlet report beluga whales actively avoid approaching skiffs powered by outboard motors, particularly during the summer and fall. Many researchers report

that beluga whales commonly flee from fast and erratically moving small boats Elsewhere, beluga whales have been observed to tolerate large vessel traffic (e.g , in the Saint Lawrence River), and intensive commercial fishing vessel activity (in Bristol Bay). Beluga whales are commonly found immediately adjacent to the Port of Anchorage during summer months, often near containerships and tugs, which are docking, maneuvering, or underway

This information may indicate that these whales are 1) not disturbed by such activity, 2) habituate to such activity, or 3) the continued use of some high vessel-use areas by feeding and traveling beluga whales reflects the value of these areas to the whales, and should not be interpreted as meaning that the whales were undisturbed (Blane 1990). This conclusion would seem to be supported by the observation that beluga whales did not abandon an area within upper Cook Inlet even when they were being hunted and pursued (Shelden 1995) A large group of beluga whales remained in or near the mouth of the Little Susitna River for several weeks during June of 1999. During this period, many small motor boats sport fishing for chinook salmon move between Anchorage and the Little Susitna River.

CI beluga whales appear to display a strong fidelity to certain sites They are similar in this respect to the Bristol Bay stock. It is generally believed in western and northern Alaska, however, that modernization of coastal communities, with its associated noise, is causing beluga whales to pass farther from shore and to abandon traditional sites (Burns and Seaman 1986). Conclusions here are difficult, other than that the beluga whales' tolerance to vessel activity appears to be highly variable

To what extent, if any, noise production in the Cook Inlet area has had an effect on the current distribution or trends of these animals is not clear. It does not appear that noise represents an immediate threat of extinction or endangerment. Over the long-term, disturbance from noise, if it precluded beluga whales from foraging sites, could have an effect which would be expressed as a lower productivity rate due to low level, or chronic, stress symptoms that would inhibit successful foraging. However, no indication exists that this is happening Given the fidelity of these whales to specific foraging sites in the upper Inlet, it appears that the need to prey on available forage is stronger than the possible impacts of disturbance from noise, or other factors, in those locations. This has also been witnessed in other whale populations.

4.4.3.6 Cumulative Indirect Effects of Activities on CI Habitat for Beluga Whales: A significant part of the habitat for this species has been modified by municipal, industrial and recreational activities in Upper Cook Inlet Despite this development, the data do not support a conclusion that the range of CI beluga whales has been diminished by these activities. Cook Inlet beluga whales occupy the same range that they have always occupied. Information indicates that the summer occurrence of CI beluga whales has shifted to the upper Inlet in recent decades whereas, historically, they were also found in the lower Inlet during mid- to late summer. This is likely a reflection of the reduced population size focusing on the preferred locations within the Inlet This was the determination made during the ESA decision by NMFS not to list the species under the ESA. At that time, no indication existed that the range has been, or is threatened with being, modified or curtailed to an extent that appreciably diminishes the value of the habitat for both survival and recovery of the species. The habitat of the stock has not been destroyed, modified or curtailed in sufficient extent to cause the stock to be in danger of extinction in the foreseeable future.

However, NEPA requires that we look at the cumulative effects of the incremental effects of the proposed action when added to the effects of past, other present, or reasonably foreseeable future actions, at levels less than the threat of extinction. Cumulative effects can result from individually minor, but collectively significant, actions taking place over time. Several activities in the Inlet have the potential to cumulative effect CI beluga whales when considered in aggregate. These activities have been evaluated in previous sections of this EA and include the cumulative effects of fishing on availability of prey to beluga whales, the potential indirect effects pollutants as a result of increased municipal loading in Cook Inlet as Anchorage continues to grow, and the potential of significant effects on the physical characteristics of the Inlet (water quality, noise levels, prey suitability). The effects of these actions should not lead to the extinction of CI beluga whales in the near future, and therefore, they do not affect the current rate of direct mortality and are considered insignificant.

Section 112(e) of the MMPA requires NMFS to review impacts on rookeries, mating grounds, or other areas of similar ecological significance to marine mammals that may be impeding the recovery of a strategic stock of marine mammal. CI beluga whales are a strategic stock of marine mammal given their depleted determination. If an activity affects a strategic stock in such a manner, measures can be developed and implemented after

consultation with the Marine Mammal Commission and after opportunity for public comment. NMFS is in the process of developing a conservation plan that will focus, in part, on the monitoring of such activities that could have such an effect on CI beluga whales.

.4.4.3.7 Summary of Indirect Cumulative Effects of Activities in Cook Inlet on Beluga Whales and their Habitat:

Commercial Fishing: Commercial salmon fishing in Cook Inlet overlaps with the occurrence of beluga whales in the Inlet This overlap suggests that these two consumers have the potential to demand a common resource and may, as a result, be competitors for that resource, even if there is little spacial overlap The timing of fisheries, relative to foraging patterns of beluga whales in the Inlet represents a potential management concern. The extent of this potential competition is not known and at this time it is not known whether overlap of foraging and resources demonstrates a significant interaction for this stock of marine mammal Although this interaction must be further studied, it is not believed to be having a significant impact on the beluga whale population.

Tourism: The effects of tourism or vessel traffic would potentially be mitigated by consultation with tour operators or marine boat operators, development of guidelines to avoid harassment, or development of regulations to avoid takings. The potential for impact to beluga whales as the result of increased vessel traffic, either commercially or part of the tourism trade, is generally considered to be insignificant

Pollution and Contaminants: Pollution in the environment has the potential to be a conditionally adverse concern for this population of beluga whales. The principal sources of pollution in Cook Inlet are 1) discharges from municipal wastewater treatment systems; 2) discharges from industrial activities that do not enter municipal treatment systems (petroleum and seafood processing); 3) runoff from urban and agricultural areas; and 4) accidental spills or discharges of petroleum and other products

Contaminated food sources and displacement from feeding areas also may occur as a result of an oil spill Concentrations of beluga whales near the mouths of several major river systems entering Cook Inlet may represent a feeding strategy to utilize areas with the highest availability of prey. Such areas may be critical to the energetics of this stock, and spills (and response activities) which would displace whales from these areas could adversely affect their well-being The potential effect

from such a spill in the Inlet could have significant adverse effects, however, such an occurrence is considered remote in the near future. Therefore, it is not expected to impact beluga whales and is generally considered insignificant.

Furthermore, given that the beluga whales forage to a great extent in the upper Inlet, the continued health of fish runs and spawning habitat in salmon natal rivers are important to beluga whales Maintaining the health of the spawning rivers may be as significant to the beluga whale as is maintaining the health of the Inlet Therefore, activities that occur in the upland drainage areas of the major spawning rivers, such as the Kenai and Susitna River basin, are likely as significant to beluga whales as are activities in the estuarine and saltwater portions of Inlet These activities have, and will continue to be, monitored by NMFS, with focus being on the impact of these activities on their spawning habitat.

Generally, oil and petroleum product production, refining, and shipping in Cook Inlet present a possibility for oil and other hazardous substances to be spilled, and to impact the CI beluga whale stock. Data do not exist which describe any behavioral observations or deleterious effect of these spills to individual beluga whales Therefore, it is difficult to accurately predict the effects of an oil spill of CI beluga whales However, it is likely that the indirect effects of a spill on the availability of prey, or prey habitats, could have a greater impact on beluga whales than any direct impact However, while much of our understanding of how an oil spill affects a marine mammal is in development, it is known that CI beluga whales, their prey and habitat or both, might be affected by such an event. However, such an occurrence is considered remote in the near future. Therefore, it is not expected to impact the beluga whales and is generally considered insignificant.

Municipal Discharges: Ten communities currently discharge treated municipal wastes into Cook Inlet Wastewater entering these plants may contain a variety of organic and inorganic pollutants, metals, nutrients, sediments, and bacteria and viruses. Of these, the Municipality of Anchorage's John M. Asplund treatment center, English Bay, Port Graham, Seldovia, and Tyonek receive only primary treatment, while Eagle River, Girdwood, Homer, Kenai, and Palmer receive secondary treatment Determining the impact of municipal discharges on the beluga whale stock is not possible. The rivers entering Knik Arm alone carry an estimated 20 million tons of sediment annually (Gatto 1976), making the suspended loading that naturally occurs in the extreme upper Inlet parallel the discharge by the Municipality of

Anchorage. However, given the relatively low levels of contaminants in CI beluga whales at present, these discharges are not believed to be having a significant impact on this population, although more studies are needed.

Noise Levels in Cook Inlet: Upper Cook Inlet is one of the most industrialized and urbanized regions of Alaska. As such, noise levels may be high. The common types of noises in upper Cook Inlet include sounds from vessels, aircraft, construction equipment such as diesel generators, bulldozers, and compressors, and from activities such as pile-driving. Studies are needed to determine to what extent, if any, noise production in the Cook Inlet area has had on the current distribution or trends of these animals. Due to the continued presence of beluga whales at industrial and urban areas, noise level effects are believed to be insignificant at present levels.

Cumulative Effects on Habitat in Cook Inlet: The effects of the municipal, industrial and recreational activities in upper Cook Inlet are of concern to the management of this stock of whales. At this time the data do not support a conclusion that the range of CI beluga whales has been diminished by these activities. Cook Inlet beluga whales occupy the same range that they have always occupied. Information indicates that the summer occurrence of CI beluga whales has shifted to the upper Inlet in recent decades whereas, historically, they were also found in the lower Inlet during mid- to late summer. This is likely a reflection of the reduced population size focusing on the preferred locations within the Inlet to obtain prey. This was the determination made during the ESA decision by NMFS not to list the species under the ESA. At that time, no indication existed that the range has been, or is threatened with being, modified or curtailed to an extent that appreciably diminishes the value of the habitat for both survival and recovery of the species. The habitat of the stock has not been destroyed, modified or curtailed in sufficient extent to cause the stock to be in danger of extinction in the foreseeable future.

However, NEPA requires that we look at the cumulative effects of the incremental effects of the proposed action when added to the effects of past, other present, or reasonably foreseeable future actions, at levels less than the threat of extinction. Cumulative effects can result from individually minor, but collectively significant, actions taking place over time. Several activities in the Inlet have the potential to affect CI beluga whales when considered in aggregate over time. These activities have been evaluated in previous sections of this EA and include the cumulative effects of commercial fishing, the

potential indirect effects pollutants as a result of increased municipal loading in Cook Inlet as Anchorage continues to grow, and the potential of significant effects on the physical characteristics of the Inlet (water quality, noise levels, prey suitability). Therefore, while the effects of these actions might not lead to the extinction of CI beluga whales in the foreseeable future, these effects must be further studied. Presently, they are not believed to have a significant impact on the beluga whale population

Section 112(e) of the MMPA requires NMFS to review impacts on rookeries, mating grounds, or other areas of similar ecological significance to marine mammals that may be impeding the recovery of a strategic stock of marine mammal. CI beluga whales are a strategic stock of marine mammal given their depleted determination. If an activity affects a strategic stock in such a manner, measures can be developed and implemented after consultation with the Marine Mammal Commission and after opportunity for public comment. NMFS is in the process of developing a conservation plan that will focus, in part, on the monitoring of such activities that could have such an effect on CI beluga whales.

4.5 Impacts on Endangered or Threatened Species

NMFS has determined that no species listed pursuant to the ESA, or critical habitat, would be affected by this action.

4.6 Coastal Zone Management Act of 1972

Implementation of the preferred alternative would be conducted in a manner consistent, to the maximum extent practicable, with the Alaska Coastal Zone Management Program (CZMA) within the meaning of Section 307(c)(1) of the CZMA and its implementing regulations

5.0 CONSULTATION AND COORDINATION

The development of these annual agreements is the product of many discussions and coordination between NMFS and CIMMC since the first public review of this issue which occurred in Anchorage, Alaska, March 1999 The agreement had many drafts and the final product is the result of review by CIMMC, and legal counsel from both parties.

6.0 CONCLUSIONS: FINDING OF NO SIGNIFICANT IMPACT

NMFS proposes to enter into an agreement with an ANO authorizing

the take of up to two beluga whales during 2005. This EA has been prepared to evaluate the environmental impacts of this proposal and to provide sufficient evidence to determine the level of significance of this action Based on this evaluation, NMFS has determined that the harvest of two belugas during the year 2005, as specified in the co-management agreement, neither significantly impacts the overall quality of the human environment nor causes any adverse impacts on any species listed under the ESA or MMPA. Therefore, NMFS has determined that preparation of an EIS for the proposed action is not required by Section 102 (2) (C) of NEPA or its implementing regulations

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9/8/05
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9.0 Appendix I: AGREEMENT between the NATIONAL MARINE FISHERIES SERVICE and the COOK INLET MARINE MAMMAL COUNCIL for the CO-MANAGEMENT OF THE COOK INLET STOCK OF BELUGA WHALE for the YEAR 2005

I PARTIES

This document constitutes an agreement between the National Marine Fisheries Service (NMFS) and the Cook Inlet Marine Mammal Council (CIMMC), otherwise referred to as the Parties.

CIMMC is an association, chartered by the Cook Inlet Treaty Tribes, which represents these Tribes and Alaska Native marine mammal subsistence hunters within the Cook Inlet area who are registered with CIMMC.

The Cook Inlet (CI) stock of beluga whales applies to all beluga whales occurring in waters of the Gulf of Alaska north of 58 degrees North latitude including but not limited to, Cook Inlet, Kamishak Bay, Chinitna Bay, Tuxedni Bay, Prince William Sound, Yakutat Bay, Shelikof Strait, and off Kodiak Island and freshwater tributaries to those waters.

II. AUTHORITIES

A. NMFS has the authority to enter into this agreement pursuant to Section 119 of the Marine Mammal Protection Act of 1972 (MMPA), 16 U S.C. 1388. Guidance is provided by the Presidential Memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Government); Executive Order 13175, November 6, 2000 (Consultation and Coordination with Indian Tribal Governments); the American Indian and Alaska Native Policy of the U.S. Department of Commerce, March 30, 1995, and the Memorandum of Agreement for Negotiations of Marine Mammal Protection Act Section 119 Agreements, August 1997.

B. CIMMC has the authority to enter into this agreement under its charter and authorizing resolutions from Alaska tribal governments. Further, CIMMC is recognized as an Alaska Native organization under the MMPA and, as such, may enter into this agreement to co-manage the subsistence use of marine mammals by Alaska Natives

III. PURPOSES

The purposes of this agreement between NMFS and CIMMC are to promote the recovery of the CI stock of beluga whales while at the same time providing an opportunity for a limited harvest of the CI beluga whale by the Native Village of Tyonek (NVT) and the community of Cook Inlet Alaska Native marine mammal hunters during 2005; and to promote scientific research on the CI beluga whale stock and its habitat.

IV. BACKGROUND

In 1972, the MMPA was passed by Congress and provided an exemption which allows the taking of marine mammals by Alaska Natives provided such taking is for subsistence purposes or done for purposes of creating and selling authentic Native articles of handicraft and clothing. Such taking may not be accomplished in a wasteful manner.

In 1994, CIMMC was established to facilitate cooperation and communication among beluga whale subsistence hunters, scientists, and the government regarding the conservation and management of CI beluga whales. CIMMC is composed of CI village representatives and hunters who hunt CI beluga whales

In April 1994, the MMPA was amended to include section 119 "Marine Mammal Cooperative Agreements in Alaska." Section 119 formalizes the rights of Alaska Native organizations to participate in conservation-related co-management of subsistence resources and their use. Section 119 also authorized the appropriation of funds to be transferred by NMFS to Alaska Native organizations to accomplish these activities

Section 3022 of Pub. L. 106-31, 113 Stat. 100 (May 21, 1999), as extended by section 627 of Pub. L. 106-553 (December 21, 2000), prohibits the taking of a CI beluga whale except pursuant to a cooperative agreement between NMFS and affected Alaska Native organizations.

V. MANAGEMENT OF COOK INLET BELUGA WHALES

The Parties agree that the Native harvest of CI beluga whales during the calendar year 2005 shall consist of two (2) strikes. CIMMC shall allocate one strike to NVT and the

second strike to the community of Alaska Native Cook Inlet marine mammal hunters. The allocation of the strike for the Cook Inlet community of hunters shall be made in cooperation and consultation with the Alaska Native Marine Mammal Hunters Committee (ANMMHC) and the community of CI beluga whale hunters. A strike is defined as hitting a whale with a harpoon, lance, bullet or other object Upon striking a whale, subsequent strikes on that same whale are not counted against the strike limit.

Harvest Practices

1. Only whaling boats and captains authorized under a CIMMC harvest permit issued by CIMMC may participate in the harvest allocated under this agreement. An Elder or experienced hunter shall be present and shall direct the harvest for each beluga whaling boat This will reduce the chance of striking a calf, a female accompanied by a calf, or of striking a whale in an area or in a manner which may result in the loss of the whale.

2. Each whaling vessel must have aboard the following equipment: harpoon and attached rope/float and at least 30 feet of nylon rope or equivalent, to help insure against the loss of the whale.

3. All CI beluga whale hunting shall occur on or after July 1, 2005 to minimize the possibility of harvesting a pregnant female.

4. CIMMC, NVT, or the person or persons holding a permit for the strike allocated to the Cook Inlet community of hunters shall notify NMFS Enforcement, Anchorage office, 24 hours prior to the initiation of the 2005 hunt.

5. The intentional or negligent taking of a maternally dependent calf, or a female beluga whale accompanied by a maternally dependant calf, is prohibited

6. Beluga whale(s) shall be struck with a harpoon and float prior to shooting. This is intended to reduce struck and loss.

7. Consistent with the desire of CIMMC in regards to this agreement, the current practice of NVT, and

the desire of the ANMMHC and the Cook Inlet hunting community, the sale of the beluga whale, or parts thereof, harvested under this agreement, shall not be permitted; provided that nothing herein is intended to prohibit the use or sale of non-edible by-products of a beluga whale taken under a permit authorized herein for the creation of traditional handicrafts or clothing

8. Upon harvesting a CI beluga whale, the whaling captain shall remove and retain the left lower jawbone, and must make the jawbone available to CIMMC or NMFS within 24 hours of the harvest. CIMMC shall thereafter provide the jawbone to NMFS Anchorage office within three days of the harvest. The whaling captain shall also provide harvest information (date of harvest, location of harvest, beluga whale length and gender) to CIMMC or NMFS within 30 days.

9. All hunters shall comply with the provisions of this agreement and any harvest permit issued by CIMMC. Non-compliance with any provisions by a hunter may result in the loss of his/her hunting privileges for CI beluga whales and prosecution.

10. Any unauthorized striking of a CI beluga whale by a member of CIMMC shall be counted against the strikes allocated to CIMMC. If such a strike occurs prior to the hunt conducted legally under a CIMMC harvest permit, that harvest permit will be voided as follows: if the unauthorized strike is by a member of the CI beluga whale hunting Community or a member of the ANMMHC, the strike shall be counted against the strike allocated to the Community or to the ANMMHC and the harvest permit issued to the Community of hunters or the ANMMHC will be voided. If the unauthorized strike is by a member of the NVT, the strike shall be counted against the strike allocated to the NVT, and the harvest permit issued to the NVT will be voided.

11 In the event of any unusual loss of beluga whales through strandings or other causes, NMFS and CIMMC shall enter into consultation to determine whether to proceed with the hunt permitted by this agreement. Such

determination shall be made based upon the best available information and consistent with the primary goals of the parties as set forth in Section III of this agreement. Consistent with the above consultation, NMFS may suspend further hunting at any time if it finds unanticipated deaths within this stock are too high to permit additional removals consistent with recovery of the CI beluga whales.

VI. RESPONSIBILITIES OF CIMMC

A. CIMMC, in cooperation with NMFS, will manage the CI beluga whale subsistence harvest consistent with the authority and responsibilities of CIMMC specified by this agreement. CIMMC may provide for monitors to be aboard the whaling vessel to verify and report on the strike.

B. CIMMC and NMFS shall communicate on an as-needed basis concerning matters related to the enforcement of this agreement or the harvest permit. Either party to this agreement which initiates an enforcement action for a violation of a prohibition involving Native take of the CI beluga whale shall notify, as soon as practical, the other party to this agreement of the enforcement action.

C. CIMMC may obtain a permit to conduct research on the biology, natural history, and traditional knowledge of the CI population of beluga whales NMFS personnel may participate in such data collection. All information collected under this section shall be shared between CIMMC and NMFS.

D. No financial commitment on the part of CIMMC is authorized or required by this agreement.

VII. RESPONSIBILITIES OF NMFS

A. NMFS has primary responsibility within the United States Government for the management of beluga whales. NMFS may assert its Federal authority to enforce any provisions of the MMPA that are applicable to the Native harvest of beluga whales. Such assertion of

Federal authority will be preceded by consultation with CIMMC

B. NMFS and CIMMC shall communicate on an as-needed basis concerning matters related to the enforcement of this agreement or the harvest permit Either party to this agreement which initiates an enforcement action for a violation of a prohibition involving Native take of the CI beluga whale shall notify, as soon as practical, the other party to this agreement of the enforcement action.

C. NMFS, in consultation with CIMMC, may conduct research on the biology, natural history, and traditional knowledge of the CI population of beluga whales CIMMC personnel may participate in such data collection. All information collected under this section shall be shared between CIMMC and NMFS.

D. No financial commitment on the part of NMFS is authorized or required by this agreement.

VIII. REGULATION AND ENFORCEMENT

NMFS recognizes the existing tribal authority to regulate tribal members during the conduct of the subsistence harvest of beluga whales. CIMMC recognizes the Secretary of Commerce's authority to enforce the provisions of the MMPA and other Federal laws applicable to the Native harvest of CI beluga whales.

IX. OTHER PROVISIONS

A. Nothing herein is intended to conflict with current NOAA or NMFS directives or the directives of CIMMC. If the terms of this agreement are inconsistent with existing laws, regulations, or directives of either of the Parties, then those portions which are determined to be inconsistent shall be invalid, but the remaining terms and conditions not affected by the inconsistency shall remain in full force and effect At the first opportunity for review of the agreement, all necessary changes will be accomplished by either an amendment to this agreement or by a new agreement, whichever is deemed expedient to the interest of both Parties

B. Should disagreements arise over the provisions of this agreement, or amendments or revisions thereto, that cannot be resolved at the operating level, the area(s) of disagreement shall be stated in writing by each Party and presented to the other Party for consideration. If agreement on interpretation cannot be reached within a reasonable time, a special meeting or teleconference shall be held to resolve the issues. This meeting shall include representatives of NMFS and CIMMC.

X. ADOPTION, DURATION, AND MODIFICATION

This agreement will become effective when signed by both Parties, and may be amended at any time by written agreement of both Parties, and shall expire on December 31, 2005. Either Party may terminate this agreement by giving 45 days prior written Notice of Termination to the other Party

XI. SIGNATORIES

The Parties hereto have executed this agreement as of the last written date below:

Peter Merryman Date
Chairman,
Cook Inlet Marine Mammal Council
PO Box 82009
Tyonek, AK 99682

Ronald J. Berg 7/22/05 Date
Acting Administrator,
Alaska Region
National Marine Fisheries Service
P.O. Box 21688
Juneau, AK 99802-1668

Agreement between the Cook Inlet Marine Mammal Council and the National Marine Fisheries Service Entered into Pursuant to Section 119 of the Marine Mammal Protection Act of 1972, As Amended.

Appendix A

List of Tribally-authorized Organizations Providing Authorizing Resolutions to the Cook Inlet Marine Mammal Council. This list may be amended from time to time if additional authorizing resolutions are received from tribally authorized organizations representing CI beluga whale hunters, and with CIMMC approval.

Tribally Authorized Organization	**Resolution Date**
Cook Inlet Treat Tribes	
Kenaitze Indian Tribe	
Knik Tribe	
Native Village of Chickaloon	
Native Village of Eklutna	
Native Village of Tyonek	
Ninilchik Traditional Council	
Qutekcok Native Tribe	
Seldovia Village Tribe	