STATE OF ALASKA

Department of Natural Resources
Division of Support Services

NOME OFFSHORE MINING PROGRAM, NORTON SOUND, ALASKA

IRFP 10-016-22

ADDENDUM 1

ISSUED DECEMBER 03, 2021

This addendum is being issued to answer questions from vendors.

Important Note to Offerors: You **MUST** sign and return this page of the addendum document with your proposal. Failure to do so will result in the rejection of your proposal. Only the IRFP terms and conditions referenced in this addendum are being changed. All other terms and conditions of the IRFP remain the same. This Addendum 1 is hereby made part of the IRFP and is a total of 215 pages.

OFFERORS MUST SIGN AND RETURN THIS PAGE

Tamra M. Czerny
Procurement Specialist
Phone: (907) 269-8665
Email: tamra.czerny@alaska.gov

_____
COMPANY SUBMITTING PROPOSAL

_____
AUTHORIZED SIGNATURE

_____
DATE

QUESTIONS SUBMITTED BY POTENTIAL OFFERORS AND ANSWERS FROM THE STATE:

Question 1: Can DNR please provide the 1999 and 1989 BIF for the area in order to prepare our proposal?

Answer 1: Yes, see attachments 6, 7, and 8 for 1999 and 1989 BIF

Question 2: What data would be provided by DNR in order to complete the scope of work?

Answer 2: The 1999 and 1989 BIF and any beneficial information that DNR Mining has access too.

Question 3: Would DNR be willing to consider a progress payment following submission of drafts rather than a single payment when contract is completed?

Answer 3: Yes.

Question 4: Regarding Attachment 4, Chapter Reasonably Foreseeable Effects of Prospecting and Mining—Cultural Resources. Has ADNR Office of History and Archaeology completed the research for historic properties or resources in the lease area?

Answer 4: The BIF for 1989 and 1999 found no historical, prehistorical, or archeological resources in the area for this project.

ATTACHMENT 6

FINAL BEST INTEREST FINDING AND COASTAL CONSISTENCY DETERMINATION REGARDING ISSUANCE OF OFFSHORE PROSPECTING PERMITS NEAR NOME, ALASKA

State of Alaska
Department of Natural Resources
Division of Mining
Anchorage, Alaska

June 22, 1989

Introduction

Beginning in July, 1989, the State of Alaska will issue offshore prospecting permits (OPP's) to the holders of existing OPP applications for selected areas near Nome, Alaska, as shown in Figure 1. During this time, the state also will open other offshore areas, and issue other OPP's by non-competitive leasing procedures outlined in 11 AAC 82.500-.540. This noncompetitive disposal will include state tide and submerged land.

The disposal will grant offshore prospecting permits to the qualified pending applicants, Ronald C. and Karin Sheardown, and Greatland Exploration Ltd., plus other qualified applicants to be selected during a drawing. These permittees will acquire the exclusive right to explore for deposits of "locatable minerals" in or on state tide and submerged land. "Locatable minerals" are minerals that, before statehood, were subject to location under the federal mining laws. They include gold, silver, copper, zinc, platinum, etc.; minerals such as oil, gas, coal, oil shale, and construction materials such as sand and gravel are not locatable.

Under AS 38.05.250, offshore prospecting permits are granted for a period of 10 years and are limited to an area no larger than 2,560 acres. During this time, limited amounts of minerals necessary for sampling or testing may be extracted, but no minerals may be mined and marketed or used. Upon discovery of a workable mineral deposit, the permittee has the right to convert the area shown to contain the deposit to a noncompetitive lease. Leases shall be for a period of up to 20 years, and for so long as there is production from the leased area. The statutory and regulatory terms applicable to prospecting permits and leases are outlined in Table 1.

In accordance with AS 38.05.035(e) and 11 AAC 86.500(g), the Director of the Division of Mining must consider whether the disposal best serves the state's interest before a decision to issue permits is made. A preliminary best interest finding, including a Resource Assessment Report attached as Appendix A, was released for comment on April 17, 1989. The preliminary finding described the proposed disposal area, analyzed the potential effects of the disposal, and proposes measures to mitigate possible adverse effects. In addition, a determination of the project's consistency with standards of the Alaska Coastal Management Program was made. Written public comment was accepted until May 22, and public hearings were held in Nome, Golovin and White Mountain on May 3, May 11, and May 2.

In preparing this best interest finding and coastal consistency determination, the Division of Mining coordinated and reviewed resource data collection and considered comments about this disposal from the various state agencies, and the Bering Straits Coastal Management District and the general public.

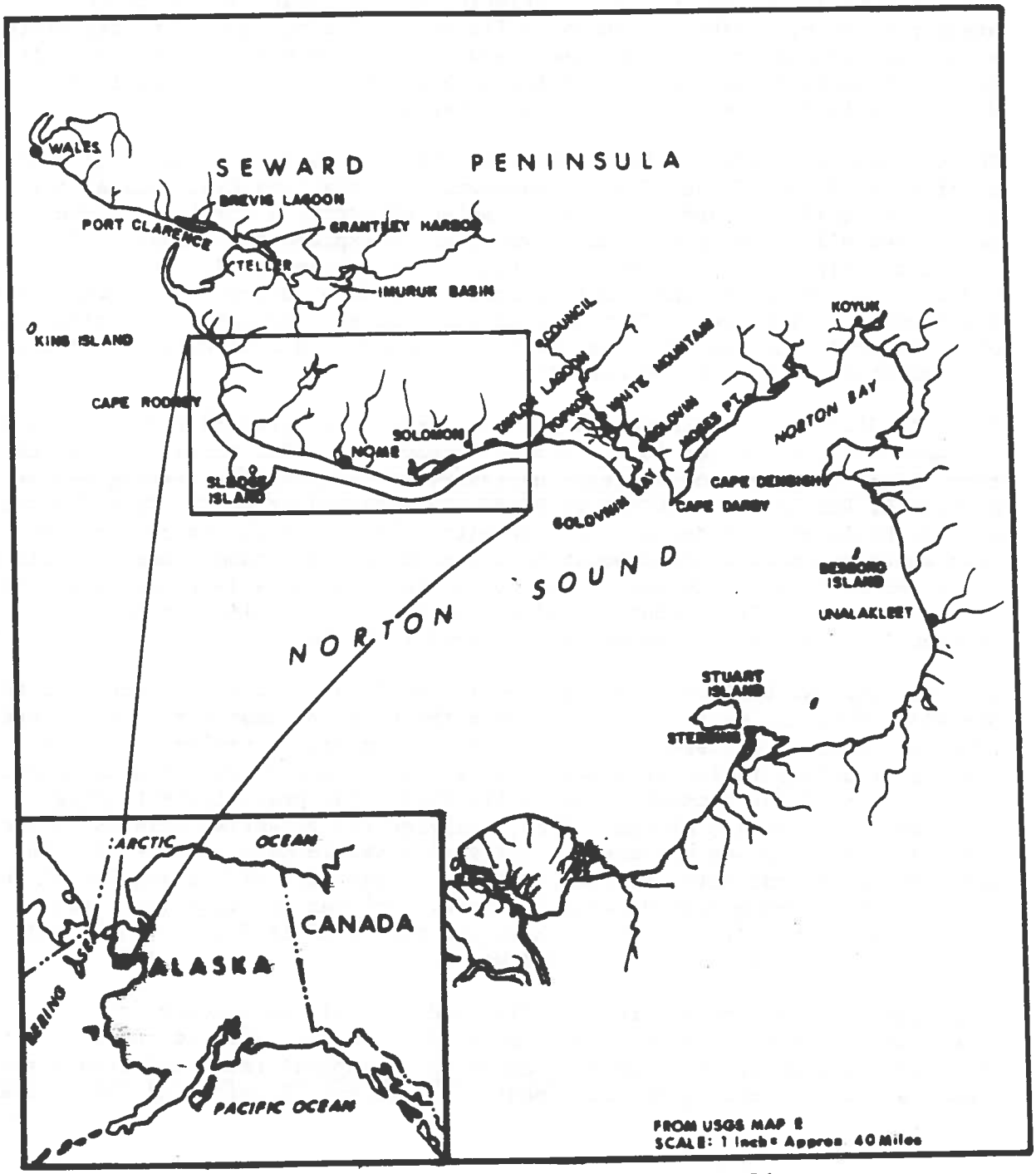


Figure 1. LOCATION MAP SHOWING DISPOSAL AREA

TERMS FOR OFFSHORE PERMITS AND LEASES - TABLE 1

	Prospecting Permits	Noncompetitive Leases
Total Acreage Limits	300,000 acres	100,000 acres
Size	2,560 acres	2,560 acres
Filing Fee	$50.00	$50.00
Duration	10 years	20-year primary term
Bond	May be required	Required
Extension/Renewal	None	Extension by production
Diligence	None	Continuous operations required
Rental	$3.00/acre per year	$0.50 to $1.00 per acre/per year
Royalty/Tax	None	Royalty - 3% net income Mining license tax ranges from 3 - 7% of taxable income (net profits) plus a $1,500 or $4,000 base tax depending upon range of taxable income
Credit Against Rental	On or before the anniversary date of each permit, rent must be paid, or an affidavit of work submitted as credit against all or part of the rent.	
Suspension/ Termination	If the permittee or lessee is in non-compliance with applicable statutes, regulations, and permit or lease provisions, then the director may suspend or terminate the permit or lease if failure continues 30 days after written notice	If the permittee or lessee is in non-compliance with applicable statutes, regulations, and permit or lease provisions, then the director may suspend or terminate the permit or lease if failure continues 30 days after written notice
Relinquishment/ Segregation	May be relinquished if obligations up to date	May be relinquished if obligations up to date
Plan of Operations	To be required either by proposed regulation or disposal condition	To be required either by proposed regulation or disposal condition
Transfer	Approval required	Approval required
Conversion to lease	Upon satisfying Director that workable deposits exist	

Objectives of The State Offshore Mining Program

By issuing offshore prospecting permits and leases for offshore exploration and eventual development, the State of Alaska seeks to diversify its economic base and employment opportunities and to make mineral exploration and development possible on tide and submerged land. Administration of the state's offshore program is guided by the following objectives:

1. To offer the state's promising offshore areas for exploration and development by private industry.

2. To develop an offshore mining industry that could provide stable and diverse job opportunities for Alaska's local communities.

3. To develop offshore resources that would contribute to the industrial needs and strategic mineral base of Alaska and the United States.

4. To increase the knowledge of Alaska's offshore resources by the collection of geologic, geochemical, and geophysical data.

5. To minimize negative effects upon the environment through permit and lease stipulations, plans of operations, and comprehensive monitoring of operations.

6. To consider and incorporate the views of the general public, government agencies, the mining industry, local residents, and other resource users when selecting and refining particular areas for offshore prospecting permits and when designing the terms of the disposal.

7. To establish and broaden the stable long-term economic and revenue base of the state and local government.

8. To stimulate the growth of other industries through the use of shared infrastructure.

Policy and Statutory Background of the State Offshore Program

The primary policies governing Alaska's offshore mining program are found in the Constitution of the State of Alaska, which became operative with the formal proclamation of statehood on January 3, 1959. Article VIII of the constitution is devoted exclusively to natural resources and signifies the importance of minerals, fish and wildlife to the state. Section 8 authorizes exploration permits and leases for any of the resources within the public domain. Sections 11 and 12 specifically address mineral rights, leases and permits. In 1959 the Alaska legislature passed the Alaska Lands Act and established the framework for state mining law. The Act stated that, in the case of tide and submerged lands, "the right to mine and remove such (locatable) minerals may be acquired only by lease". Basic provisions of the current law were set out in statute AS 38.05.250.

Interest in offshore mineral deposits peaked in the 1960's and early 1970's when there were monthly drawings for offshore prospecting permits and thousands of permits covering millions of acres were issued throughout the

state's coastal waters. Most of these permits have expired, were terminated, or were relinquished, often when the first rental payment became due. Out of the thousands of permits issued, only 12 leases were issued. The offshore leasing and permitting program was suspended in 1975 to avoid conflicts with federal oil and gas leasing in the Gulf of Alaska. Litigation over the state's Kachemak Bay oil and gas lease sale and subsequent legal changes in disposal procedures created uncertainties that led to a continuation of the suspension. The Department of Natural Resources has accepted several hundred applications for offshore prospecting permits since 1975, but has only taken action on those OPP applications in Cook Inlet and offshore of Goodnews Bay since that time. At the time of publication of this analysis, state records indicate 261 pending OPP applications, 84 currently active OPP's, and 9 currently active leases (see table 2).

TABLE 2

Statewide Offshore Prospecting Permit
Applications, Permits, and Leases

261 Pending Applications — 571,523 acres

- 75 Southeast/Copper River Meridian
- 128 Seward Peninsula/Kateel River Meridian
- 58 Cook Inlet and Gulf of Alaska/Seward Meridian

54 ~~84~~ Issued Offshore Prospecting Permits — 140,935 acres

- 84 Cook Inlet/Seward Meridian

8 ~~9~~ Leases — ~~23,590~~ 25,129 acres

- ~~1 Southeast/Copper River Meridian~~
- 8 ~~7~~ Seward Peninsula/Kateel River meridian
- ~~1 Cook Inlet and Gulf of Alaska/Seward Meridian~~

Under 11 AAC 86.500, the state intended to open all tide and submerged land for offshore prospecting permit applications on June 30, 1984, unless the state finds that: (1) the land contains known mineral deposits that will be offered by competitive leasing; (2) mining would be incompatible with significant surface use; or (3) adequate funding has not been appropriated for disposal of these minerals under the procedures provided by law. At this time, adequate funding has not been provided to open all of the state's coast line and the state's tide and submerged lands are closed to the filing of new OPP applications. This finding proposes to open a small, discreet portion of tide and submerged lands, and is not intended to open the remainder of state tide and submerged lands to the filing of OPP applications.

The key authority relating to offshore mining is found in Alaska law, AS 38.05.250. The state owns the mineral rights in almost all land covered by tidal waters along the coast, regardless of the ownership of adjoining upland (43 U.S.C. secs. 1301 et seq., the Submerged Lands Act). The Alaska offshore mining program applies to mineral resources on the state's submerged lands which are lands covered by tidal waters between the line of mean high water and seaward to a distance of three geographical miles or further as may hereafter be properly claimed by the state.

> 38.05.250. Prospecting permits and leases on tide and submerged land. (a) The exclusive right to prospect for deposits of minerals subject to AS 38.05.185 - 38.05.275 in or on tide and submerged state land may be granted by a permit issued by the director. Permits shall be granted to the first qualified applicant. A permit may not include an area larger than 2,560 acres, subject to the rule of approximation. Lands subject to a prospecting permit shall be as compact in form as possible taking into consideration the area involved. The term of the permit shall be 10 years. Prospecting permits shall be conditioned upon payment of rental against which credit shall be given for useful expenditures on land covered by the permit or group of contiguous permits under common ownership or assignment. Excess expenditures may be applied against rentals due for the following four years. The rental shall be $3 per acre for the first two-year period of the permit, payable on the second anniversary of the permit and $3 per acre each following year, payable annually on the anniversary date of the permit. Minerals from land under a prospecting permit may not be mined and marketed or used, except for limited amounts necessary for sampling or testing. A person may not take or hold prospecting permits for minerals on state land under this section exceeding in the aggregate 300,000 acres. A person may not take or hold leases for minerals on state land under this section exceeding in the aggregate 100,000 acres.

A summary of the statutory and regulatory terms for offshore prospecting permits and leases is contained in Table 1. Before issuing a permit or lease, the Division of Mining (DOM) must comply with laws applicable to the "disposal of an interest in state land" (transferring state-owned property rights). One of those laws is AS 38.05.035(e), which requires that I prepare a written finding that the state's interests will best be served by issuance

of the OPP. The document must discuss the facts and applicable laws upon which the finding is based and may include conditions and limitations designed to serve the state's interests. I must also determine whether the issuance of a OPP is consistent with the Alaska Coastal Management Program.

This process is limited to determining the state's best interest under AS 38.05.035(e). It does not authorize any activities to be conducted on the OPP's. Such authorizations will be made through the local, state and federal permitting process.

Location and Background of the Proposed Nome Offshore Disposal

The Nome offshore disposal area is located along the southern coast of the Seward Peninsula between Taylor Lagoon on the east and Cape Rodney on the west (see Figure 1). Gold was first discovered on the beaches near Nome in 1899. In 1900 and 1901, over 20,000 miners were mining the beaches for gold. Gold in the beach deposits was recovered through sluicing operations in the summer and fall. During the winter and spring, miners sunk shafts and drift mined the buried auriferous stream channel deposits along the coastal plain. After World War I, large-scale dredging, preceded by cold water thawing of permafrost, replaced most hand-mining operations. As part of these early mining operations, miners attempted various dredging techniques during the winters through the sea ice. In the winter of 1940, a large-scale mining operation involving a clamshell scoop was attempted through the sea ice. The offshore sediments were loaded into trucks and transported to the beach for sluicing during the summer. In 1962, Shell Oil Company was issued 6 offshore prospecting permits covering approximately 21,750 acres. During the winter, in 1963 and 1964, Shell successfully drilled through the ice over 500 test holes on their permits. In 1967 and 1968, the U.S. Bureau of Mines drilled 35 holes from a drill ship as part of a regional program to evaluate heavy metals in the Nome area. They also conducted offshore geophysical surveys and sea-floor sediment sampling In 1967, the Department of Natural Resources (DNR) issued leases on Shell's OPP tracts. In 1968, Shell assigned 50% of their leases to American Smelting and Refining Company (ASARCO) (the other 50% was assigned to ASARCO in 1976). Over the next several years, ASARCO drilled approximately 500 exploration holes through the sea ice. They also completed extensive feasibility studies, bulk sampling, and environmental studies in conjunction with the University of Alaska. In 1972, ASARCO was issued a mining lease on a portion of a prospecting permit tract adjacent to their existing leases. In 1985, ASARCO assigned all 7 of their leases to Inspiration Mines, Inc. (Name changed to Inspiration Gold, now Westgold). Westgold is a limited partnership between Inspiration Gold, Inc. and Minorco, a Luxenbourg based investment company. In 1985, Westgold began its offshore dredging operations from the marine vessel Kokohead. A crane operated clamshell bucket was used to dredge offshore sediment which was processed through an on-board treatment wash-plant. After evaluating the 1985 mining season, Westgold decided to employ a bucketline dredge in their operation. Westgold purchased the BIMA, a large bucketline mining vessel; refurbished it in Singapore; and transported it to Nome for the 1986 mining season. The BIMA dredge has been operating offshore of Nome ever since.

In December, 1982, Ronald and Karin Sheardown, and Greatland Exploration Co. Inc., filed 58 applications for offshore prospecting permits both east and west of Westgold's leases. The pending OPP's cover approximately 131,656 acres, and are shown on the folded map in the back of this Finding.

Best Interest Finding

Determining whether the disposal will best serve the state's interests is only possible after considering the potentially positive and negative aspects of the disposal and considering agency and public comment. Offshore lands are subject to multiple and sometimes conflicting uses as described in the Resource Assessment Report. Extreme adverse effects created by a disposal will be avoided by deletion of certain areas from that disposal. Other effects can be lessened or eliminated through mitigation, permit stipulation, and monitoring requirements.

The Resource Assessment Report (RAR) provides a detailed description of the biologic, oceanographic, physical, social and economic resources of the project area. That description is not repeated here, but is incorporated by reference. A complete copy was included in the preliminary best interest finding. Anyone wishing a copy of the RAR may receive one by contacting the Division of Mining. Sections 1 and 2 of the RAR describe the physiography, coastal processes, geology, and exploration and mining activities in the project area. In addition, it describes possible future mining activities that could occur. Sections 3 and 4 of the RAR describes the biological resources and community and land use characteristics present in the disposal area. Section 5 identifies potential impacts that mining exploration and mining production may have upon these biological resources, and mitigation alternatives that can be implemented to reduce these impacts so that they do not endanger the resources. The mitigation measures described may be incorporated through stipulation requirements into the OPP, a mining lease or any exploration and/or mining permits issued.

Section 6 of the RAR describes community, subsistence, commercial fishing and land use issues. This section of the report emphasizes several important issues, the subsistence lifestyle, and how it relates to the communities social and economic activities, and the concern local residents have for mining impacts on subsistence and commercial fishing. This section specifically addresses exploration and mining impacts to community life, subsistence activities, commercial fishing and general land use, and indicates how subsistence activities would be impacted if mining exploration or production are allowed. Section 7 of the RAR deals with mitigation alternatives, and specifically recommends mitigation applicable to scheduling mining exploration and production activities, limitations on areas explored or mined, and how exploration and mining might benefit the communities.

The RAR and information obtained from concerned agencies and individuals indicate the importance of the subsistence life style and the marine resources that must be protected during offshore exploration and mining operations. The biological resources are important to the towns and villages throughout the Seward Peninsula. As such, the resources will be protected under the mitigation measures identified.

On the other hand, there is good potential for workable gold reserves in the offshore areas of the project area. Exploration and mining would generate additional local jobs, as well as generate a need for additional local supplies and services. From a statewide perspective, mining would continue to diversify the economy, as well as increase state revenue via rental, royalty and the Mining License Tax. Mining would be allowed only in a manner that would minimize adverse impacts through lease and permit stipulations.

It is clear from the RAR that Safety Sound is an area of high biological productivity and local use of the biological resources are high. Safety Sound is a shallow estuary, important as a sea bird nesting area, and salmon spawning area. The barrier beach separating the Sound from offshore is the site of numerous subsistence fish camps during the spring, summer, and fall. From March to September, sea birds, shore birds, gulls, and waterfowl use Safety Sound and the marshes and lowlands immediately adjacent to it for breeding purposes. Within Safety Sound the mineral resource potential is considered low.

In the offshore coastal areas within the project area, the primary biologic concern is adjacent to the shoreline. Capelin use the surf zone for spawning from late May to the middle of August, and all fish species use a limited but undetermined band adjacent to the shoreline for migration. Because the offshore coastal area is such a high energy environment the bottom sediments support a limited benthos community of clams, snails, and worms that are preyed upon by crabs and bottom feeding fish. In general, the offshore coastal areas are less environmentally sensitive and are utilized less than those areas within Safety Sound.

The mineral resource potential, particularly gold, in the offshore coastal areas near Nome is considered moderate to high. Previous studies indicate numerous anomalous concentrations of gold in bottom samples and coincident geophysical anomalies. These areas provide good exploration targets. However, this public information does not indicate the presence of known mineral deposits, as defined in 11 AAC 86.545. These are clearly exploration targets, not prospects that may be developed. Even though OPP applications ADL 314806 (320 acres) and 314807 (160 acres) lie totally within the existing leases owned and operated by Westgold, no specific sampling, drilling or geophysical data is available. Lack of any data from these tracts will not allow the finding of a known mineral deposit. In addition, the small size of those tracts prohibit the conclusion that a mine would be feasible on either of these tracts. Resources on these tracts may eventually be discovered and mined as part of a larger operation, but these tracts cannot stand alone as a known mineral deposit. Therefore, this process will be conducted under the non-competitive leasing process defined in 11 AAC 86.500-.580 and 11 AAC 82.500-.540.

Public Comment and Response:

Prior to reaching this final decision, public comment was taken on the proposed action during the period April 17 to May 22, 1989. Twelve written comments were received and verbal testimony was taken at public hearings in Nome, Golovin and White Mountain.

Testimony at the Nome public hearing (May 3) was divided between those who favored the disposal as proposed and those who recommended it be delayed until more environmental studies are completed. Most testimony at the public hearings in Golovin (May 11) and White Mountain (May 2) opposed issuing OPP's in state waters around Sledge Island and east of Cape Nome. In response to those comments, I have decided to defer issuance of OPP's around Sledge Island and east of Cape Nome at Safety Sound (see folded map at back). This deferral is intended to allow both the Division of Mining and the Bering Straits Coastal District additional time to consider these areas. A final decision on these deferred areas will be made in November, 1989.

Written comments from three commenters supported the disposal as proposed. We received three other written comments opposing the disposal and recommending delay of the disposal until more environmental studies are completed. I believe deferral of the Sledge Island and Safety Sound areas combined with the various stipulations adequately protects the various resources and provides for additional environmental studies.

Written comments focused on recommended changes to many of the proposed stipulations. Those comments are addressed below.

Anadromous River Mouth Buffers: Six commenters recommended modifying this stipulation in a manner that allows a case by case authorization of exploration and mining within the 1-mile buffer. In response to those comments, we have included the language provided by the Alaska Department of Fish and Game as stipulation 1. One commenter recommended adding the Penny, Snake, Nome and Saunders River to this stipulation. However, these river mouths are not within the disposal area. One commenter recommended a 3-mile buffer and one commenter recommended a 1/4 mile buffer. The 1-mile buffer with stipulation 1 provides protection of these stream mouths.

Herring/Capelin Spawning Area Buffers: Several commenters recommended changes to this stipulation to provide for greater protection of these areas. One commenter recommended the areas should be closed, while another recommended it should be expanded. In response to these concerns, I have amended stipulation 7 and added new stipulation 6. These changes and stipulations 2 and 3 will assure full protection of these subsistence resources and the near shore environment.

Cultural and Archeological Resources: One commenter recommended adding a required Artifact Preservation Plan in case cultural or archaeologic resources are discovered. We believe current stipulation 12 provides proper protection in conjunction with the authorities of the State Historic Preservation Officer.

Bonding: One commenter recommended that the Bering Straits Coastal Management Program (BSCMP) be included in the consultive process of stipulation 14. That change has been made.

Public Notice and Coordination with Local Communities: Three commenters recommended that notice under AS 38.05.945 be expanded. One commenter recommended notice be given to IRA Traditional Councils, Village Corporations and City Councils. In response to these concerns, we have amended stipulation 16 to include notice for the Bering Straits Native Corporation, Kawerak, Inc., the City of Nome and the Bering Straits Coastal Management Program, in addition to the need to comply with the Northwest Area Plan. These groups may alert local people to certain activities if they wish.

Liability Damage/Mitigation: One commenter recommended that this stipulation be replaced with Policy F-2 of the Bering Straits Coastal Management Plan. This stipulation was not intended to be in place of policy F-2, but rather, it is intended to augment it. Stipulation 17 has been amended to clarify that this is in addition to the requirements of the Northwest Area Plan and the BSCMP.

Commercial and Subsistence Salmon Fishing: The Alaska Department of Fish and Game recommended a new stipulation be added to protect the area within 300 feet of the coast. That stipulation has been added as Stipulation 6.

Mercury: Several commenters expressed concern about the potential health risks associated with mercury. Some recommended base-line studies be conducted prior to mining. One commenter recommended the disposal be cancelled based on the draft Environmental Impact Statement prepared by the Minerals Management Service. The Alaska Department of Fish and Game requested it be made clear that based upon monitoring data, restrictions on mining may be required. While we do not believe the data demonstrates a link between mining and mercury related health risks, it is prudent to require continued monitoring and the right to restrict future mining. Stipulation 9 has been amended to reflect this.

OPP Tracts To be Rejected

Areas under OPP application within Safety Sound will be rejected (see folded map). All acreage in the following OPP application tracts will be rejected, ADL's 314843-314845. Part of the acreage (within Safety Sound) in the following OPP application tracts will be rejected, ADL's 314829-314833, 314835, 314836, 314839, 314841, 314846, and 314847. The folded map shows the location of all OPP applications and tracts. The Alaska Department of Fish and Game (ADF&G) and Bering Straits Coastal Resource Management Plan (BSCRMP) have identified Safety Sound as an unusually important resource area for waterfowl, sea birds, aleutian terns, salmon, and subsistence activities. The Sound is a critical habitat area which will be protected from exploration or mining activities. This action is in the best interest of the state.

OPP Tract Decisions to be Deferred Until November, 1989

A Final Best Interest Finding (FBIF) and Coastal Zone Consistency Determination for OPP applications within "Special Use Areas" as defined in BSCMP will be deferred until November, 1989 (see folded map). These areas include Sledge Island and Safety Sound. OPP application areas that are deferred until November are ADL's 314829-314836, 314838-314842, 314846-314849, 351114, 351117, 351118, and Tracts 4-15 and 30-34. See folded map in rear for location of deferred areas. This deferral period is intended to allow time to address concerns expressed by the Bering Straits Coastal Management Program.

OPP Tracts to Be Issued and Discussion of Stipulations Necessary in the Offshore Coastal Areas Within the Project Area

There are 34 OPP's to be issued in the project area (excluding the deferred areas). In addition, 19 OPP tracts which are not presently under OPP application or in deferred areas will be made available for OPP application and leasing. While resource conflicts are less in offshore areas, site specific concerns need to be addressed by stipulation. The major concerns include disturbance in and near the mouths of anadromous streams and set-net sites, mammal haul-out areas, bird nesting areas, and fish passages along the coast.

Salmon migration near shore, especially in the vicinity of anadromous streams, occurs primarily from May 1 to September 30 each year. Exploration and mining within one mile of these anadromous streams will be prohibited unless approved by the state and local coastal districts. Herring spawn offshore, along certain beaches within 500 feet of mean lower-low water (MLLW) from May 15 to August 15 each year. Exploration and mining within 500 feet of these specific beaches will be prohibited during spawning periods. Capelin spawn within 100 feet of MLLW along beaches within the project areas from the middle of May to August 15 each year. Again, exploration and mining will be prohibited within 100 feet of all of the beaches in the project area. Cape Nome is another site where peregrine falcons nest. The cape area is also an important waterfowl nesting area. Subsistence salmon set-net fishery sites occur on both sides of Cape Nome. Subsistence fishing occurs from June 1 to September 30. The nets are set anywhere from 100 to 300 feet from shore. Exploration and mining within 1/2-mile of the cape will be prohibited during these fishing periods.

One of the primary concerns expressed by local residents is about the potential for mercury contamination of the food chain due to mining activity. Concern is greatest for pregnant women and developing fetuses. Elevated mercury levels have been found in both Canadians and Alaskans engaged in subsistence hunting and fishing who consume large amounts of seal, walrus, fish and polar bear. No link has been established between new mining activity and mercury levels in humans. No information is available regarding the present mercury levels in the residents of Nome. However, in a joint letter to various health organizations dated March 17, 1989, the state and federal governments suggested a base-line survey be conducted to determine existing mercury concentrations and establish if a human health concern

exists. The monitoring requirement (stipulation 9) is appropriate at this stage to respond to this issue. As more data is made available, the state, through the permitting process, may specify specific monitoring needs, mitigation methods or restrictions to assure the public health.

The Department will accept non-competitive bids on 19 OPP tracts not under application. These 19 tracts are shown on the folded OPP project map and labeled as Tracts 1-3, 16-22, 24-26, 29 and 35-39. All stipulations will apply as appropriate to these tracts. These tracts will be leased non-competitively under the process described in this document and defined by 11 AAC 82.500-.540. (For more information see page 17).

Stipulations Attached to OPP's Issued

The state recognizes the importance of numerous issues which are of local concern. These issues include consistency with coastal management programs; subsistence; wildlife and fishery habitat protection; environmental monitoring; public access and navigation; protection of cultural and archeological resources; air, land, and water quality; local hire; and coordination with local governments and others. In response to these concerns, the state is rejecting all of the OPP application areas within Safety Sound and is deferring the Final Best Interest Finding and Coastal Consistency Determination on the "Special Use Areas" as defined in BSCMP. The state is also attaching the following stipulations for the remainder of the project area . Some of the stipulations are site-specific, resulting in conditional closures of certain areas during specific time periods. Virtually all of the beach areas in the project area will be closed to exploration and mining out to a minimum of 100 feet from mean lower-low water (MLLW). Some stipulations will require closures out to 1/2-mile or 1-mile from the beach. General stipulations which are not site-specific apply to all of the OPP's.

Site-specific stipulations 1-4 listed below require conditional closures.

1. Anadromous River Mouth Buffer. Exploration and mining will be prohibited within a 1-mile radius of the mouth of anadromous streams. On a case by case basis, mining and exploration may be authorized within the closure upon submittal of information adequate for the resource agencies to judge the effects of the proposed mining or exploration activity on the movement of both juvenile and adult anadromous fish and on the rearing of juvenile anadromous fish. Approval must be obtained from the applicable state resource agencies and local coastal districts under the process set out in 6 AAC 50.

   The rivers and water areas this stipulation applies to are the Sinuk River, Cripple Creek, entrance to Safety Sound, Bonanza River and Solomon River. OPP's which will be issued that are affected by this stipulation are ADL's 351119 and 351120 (Sinuk River), and 314805 (Cripple Creek). (See folded map).

2. Herring Spawning Area Buffer. In order to protect herring spawning areas, exploration and mining will be prohibited within 500 feet of MLLW between May 15 and August 15 on the following OPP's: ADL's 351112, 314802, 314803, and 314805. (See folded map).

3. Capelin Spawning Area Buffer. In order to protect Capelin spawning areas, exploration and mining will be prohibited within 100 feet of MLLW between May 15 and August 15 for OPP application ADL's 351119, 351121, Tract 2, 351113, 314813, 314815, and 314854. (See folded map).

4. Cape Nome Buffer. In order to protect the important resources of the Cape Nome area, exploration and mining will be prohibited within 1/2 mile of MLLW at the cape between June 1 and September 30. OPP applications affected by this conditional closure are ADL's 314851, 314852 and 314854. (See folded map).

General stipulations 5 - 17, listed below, apply to all OPP's that will be issued.

5. Consistency with Coastal Management Programs. All OPP exploration activities will be conducted in a manner consistent with the Nome and Bering Straits Coastal Management Programs. The Division of Mining may require modifications of existing stipulations or additional stipulations necessary to ensure consistency with the Alaska Coastal Management Program (AS 46.40).

6. Commercial and Subsistence Salmon Fishing and Coordination. Should mining, exploration and/or a turbidity plume occur within 300 feet of MLLW, the permittee shall coordinate with the Commercial Fisheries Nome Area Management Biologist of the local Alaska Department of Fish and Game to avoid conflicts with commercial and/or subsistence fishing.

7. Subsistence. The state reserves the right to require both a pre- and post-operational study of subsistence harvest activities and the cumulative impact of exploration and mining to subsistence resources and uses. Prior to exploration activity occurring on an OPP and requiring a permit under 11 AAC 96, a plan of operations must be submitted which includes provisions to ensure that subsistence use and resources including, but not limited to, crab, capelin, salmon, seals, beluga, and seabirds are protected. It is recommended this portion of the plan of operations be developed in cooperation with the Division of Subsistence of the Alaska Department of Fish and Game.

8. Habitat Protection and Fishery. Prior to exploration activity occurring on an OPP and requiring a permit under 11 AAC 96, a plan of operations must be submitted which includes provisions to ensure that habitats for shellfish, anadromous fish, and marine mammals are protected and that commercial and subsistence fishing activities are not curtailed. In addition to the requirement of 11 AAC 86.800, it must specifically include the following, where applicable:

A. If offshore exploration operations are proposed to take place within 1-mile of anadromous streams, the effects of those operations on the movement of juvenile and adult anadromous fish.

B. If offshore exploration operations are proposed to take place within 100 feet of mean lower-low water, the effects of those operations on anadromous fish.

C. If offshore exploration operations are proposed to take place during open commercial and subsistence fishing periods, the effects of those operations on actual commercial and subsistence fishing activities.

D. If offshore exploration operations are proposed to take place at the same time as operations on immediately adjacent areas, the combined effects of the existing and proposed operations on marine habitat within and adjacent to the leased area.

9. Environmental Monitoring. The state reserves the right to require the applicant to design and carry out an environmental monitoring program to measure parameters such as heavy metals concentrations, turbidity, salinity, sediments, and pre-mining benthonic habitat plus bottom contours. As more data is made available, the state, through the permitting process, may specify specific monitoring needs, mitigation methods, or complete or partial restrictions on mining and exploration activity to assure the public health, and to protect the biological community if the OPP were converted to a lease. Such safeguards would be reviewed and approved thorough the coastal management authorization process set out in 6 AAC 50.

10. Public Access and Navigation. No facilities or activities may be located where they would block public access to navigable public waters, as defined in AS 38.05.965(12) and (16). Public access to and within the OPP area may not be restricted, except for safety reasons and only if approved by the Director of the Division of Mining. All activities must be conducted so as not to interfere with shipping lanes, navigational channels, and navigational devices. It is the permittee's responsibility to inform itself as to the location of shipping lanes, navigational channels, and navigational devices.

11. Cultural and Archaeological Resources. Norton Sound coastal areas may contain important cultural resources. If any site, structure, or object of cultural or archaeological significance is discovered during operations on the OPP areas, the permittee shall report the discovery immediately to the director of the Division of Mining and shall make every reasonable effort to protect the site, structure,

or object against damage until the director, after consultation with the State Historic Preservation Officer, has given directions as to its preservation.

12. Air, Land, and Water Quality. The permittee shall comply with all applicable state and federal air and water quality standards.

13. Local Hire. The permittee is encouraged to hire Alaska residents, especially residents from the local area, if they are available and qualified to do the required work.

14. Bond. A bond is required for prospecting permits or leases before substantial operations will be approved under the plan of operations. The bond amount will be based on the scale of operations proposed and will be determined by the Director of the Division of Mining. Whether an operation is considered "substantial" is a decision made by the Director of the Division of Mining after consultation with the Alaska Department of Fish and Game and the Bering Straits Coastal Management Program; this decision will involve a weighing of biological and economic interests at risk and not just scale of operation.

15. Management Practices. The permittee or lessee will utilize impact control measures, management techniques, and monitoring methods to protect all other resources including species listed as endangered in AS 16.20.185.

16. Coordination with Local Communities. Coordination with local communities will be required. Prior to the commencement of permitted activities, notices will be sent to the mayor of each town within 6 miles of such activity describing approved activities and schedules. Notices will also be sent to Kawerak, Inc., Bering Straits Native Corporation, City of Nome and BSCMP, in addition to notice required by the Northwest Area Plan.

17. Liability Damage. In addition to requirements in BSCMP and NWAP, compensation to the owner for damage to commercial or subsistence fishing gear from exploration and mining activities shall be required.

Tracts Available for Non-Competitive Sale:

A total of 19 tracts are available for non-competitive leasing under 11 AAC 82.100-310, 11 AAC 82.500-540, and 11 AAC 88.100-185. These tracts, shown on the folded map include Tracts 1, 2, 3, 16, 17, 18, 19, 20, 21, 22, 24, 25, 26, 29, 35, 36, 37, 38 and 39. The 30 day simultaneous filing period will open on July 5, 1989 and close at 4:30 pm on August 4, 1989. All applications received during this period are considered to be filed simultaneously and, if more than 1 application is submitted for any tract, the first three priorities will be established by public drawing. The public drawing will be held at

3:00 pm on August 8 in the Division of Mining Conference Room, Suite 880, 3601 C. Street, Anchorage, Alaska. Applications must be on a form provided by the Department and each application must include a non-refundable $50.00 filing fee. Each tract requires a separate application.

Applicant qualification forms, OPP application forms, a tract map and specific instructions are included in "Applicant Packets" available from the Division of Mining. Packets may be requested from:

Mr. Kerwin Krause
Division of Mining
Alaska Department of Natural Resources
3601 C. Street, Suite 880
Anchorage, Alaska 99503
Telephone: 762-2162

If no applications are filed or if no OPP is issued as a result of this simultaneous filing period, the tract will become available on a first come, first serve basis after notation of its availability.

Permitting

Prior to exploration activities commencing each year, a exploration plan of operations will be submitted to the state for review and approval. This plan is required under 11 AAC 86.800 and must include, among other details, a complete description of the activities, actions to be taken to avoid or minimize impacts to fish and wildlife, and compliance with other laws and regulations. The exploration plans will be subject to consistency determination by state agencies and either the the Bering Straits or Nome Coastal Resource Service Area (CRSA) Boards. Agencies and the CRSA Boards will be able to recommend additional and more specific stipulations to address particular impacts and concerns. It is difficult to predict at this time the precise scope of exploration activities or future development that will result from issuing the proposed OPP's, and therefore, site specific stipulations and monitoring requirements are expected to be developed during this permitting phase.

The legal framework for preventing adverse effects from offshore mineral exploration and development is provided by many local, state and federal laws and regulations. The Department of Natural Resources and Fish and Game are responsible for, among other things, protecting the habitats of biological resources on state land. The Department of Environmental Conservation is responsible for the maintenance of water and air quality under applicable Alaska laws. Several federal agencies are also responsible for issuing permits for offshore mining. They include the U.S. Coast Guard (effects on Navigation), Army Corp of Engineers (navigable waters), Environmental Protection Agency (air and water quality), National Marine Fisheries Service (activities impacting marine mammals), and the U.S. Fish and Wildlife Service (activities impacting endangered species and migratory birds). These agencies

will not allow offshore mining exploration or development to occur without required permits and attached stipulations to protect the environment and resources.

State/Federal Boundary Dispute

Two areas exist within the project area where the state and federal governments do not agree where the boundary lies between state and federal lands at the 3-mile limit. These two areas are both associated with permanent extensions to the coastline; the first the result of the Nome Causeway and the second the result of the Cape Nome Rock Jetty. This dispute involves approximately 730 acres at the 3-mile limit of the Nome Causeway and approximately 204 acres at the 3-mile limit of the Cape Nome Rock Jetty. The Nome Causeway dispute includes land in OPP applications 351105, 314810 and Tract 23. The Cape Nome Rock Jetty dispute includes land in Tracts 27 and 28.

Although it is in the state's best interest to issue these OPP's and accept bids on these tracts, I will delay both the issuance of the disputed acreage in the OPP applications (351105, 314810) and delay opening the new tracts (23, 27, 28) until the dispute is resolved.

Alaska Coastal Management Program (ACMP) Consistency Determination

The Alaska Coastal Management Act of 1977 created Coastal Resource Service Areas (CRSA's) and allowed them to prepare local coastal management plans to better reflect local issues, goals and objectives. Residents in the CRSA's help develop guidelines and policies that state agencies utilize in making consistency determinations. The consistency process conducted under 6 AAC 50 plays a major role in project activities. Under 6 AAC 50, the State DNR as lead agency, is required to make a determination of consistency with ACMP as amended by Bering Straits Coastal Management Plan (BSCMP) and the Nome Coastal Management Program (NCMP) for the planned OPP disposal. The entire OPP disposal project area falls within BSCMP boundaries while only a small portion of the project area is contained within NCMP boundaries. The discussion below reviews applicable BSCMP policies and performance standards as they might apply to the OPP project area. DNR finds the stipulations described earlier address the protection of subsistence resources and habitats which are critical to the subsistence life style in the BSCRSA.

Not all of the policy performance standards within the BSCMP apply to this disposal. The stipulations described above are for OPP issuance only, and address exploration and mining in the context of competing land uses.

Although actual exploration mining might involve drilling or sampling sea floor sediments, and processing them on the surface, we do not know the specific methods, extent or schedule of exploration operations until a plan of operations is submitted. Particular methods of exploration, such as geophysical techniques will be addressed in the operator's plan of operations (a mandatory requirement), which must also be found consistent with applicable ACMP standards before approval.

Policy A. Subsistence: Traditional subsistence use of coastal areas has the highest priority in the BSCMP. Access to subsistence use areas is a concern, and activities that may cause adverse impacts to subsistence resources and habitats, or subsistence users during subsistence activities is also a major concern. The rejection of pending OPP application areas in Safety Sound plus the conditional timing closures along all of the beaches where subsistence activities occur will protect the subsistence resources and habitats. Interference with subsistence users will also be avoided. (See stipulations 1-9).

Policy B. Habitat and Biological Resource Protection: This policy requires that offshore areas be managed to maintain or enhance fisheries and marine mammal subsistence harvesting. The policy also requires that rocky islands and bird nesting sea bluffs be managed to avoid harassment of wildlife. Barrier islands and lagoons such as Safety Sound will be managed to discourage activities which would decrease use by nesting birds and sea mammals. Fish passage will be protected so as not to impede or interfere with migratory access to spawning streams by adult anadromous fish or movements of juvenile anadromous fish. Sea bird and endangered peregrine falcon nesting sites, plus marine mammal haul-out sites should not be disturbed by high levels of noise or visual change closer than 1 mile from April 15 through September 30. The conditional timing and protection closures indicated in proposed stipulations 1-9 will adequately protect habitat and biological resources.

Policy C. Air Land and Water Quality: Oil spill contingency plans, and water quality plus siltation and sedimentation resulting from discharge of production waters are the applicable concerns under this policy. These concerns will be addressed under the plan of operations and future NPDES permitting process.

Policy D. Historic, Prehistoric and Archaeological Sites: The primary concerns identified under this policy that are applicable to the proposed OPP disposal involve development activities with the potential to adversely affect cultural resource areas. Stipulation 11 plus other more site-specific stipulations in future plans of operation will address these concerns.

Policy E. Geophysical Hazards: The primary concern under this policy that has to do with coastal processes involves resource extraction activities. The policy recommends that such activities should be located so as to minimize accelerated coastal erosion or impacts to coastal processes. These concerns will be dealt with in the annual permitting associated with the plans of operation.

Policy F. Coastal Development: This policy contains several concerns which apply to the OPP disposal project. All water use activities shall be conducted with appropriate planning and implementation to mitigate potentially adverse effects which could affect fish and wildlife populations and their habitats; and subsistence and cultural resources. Proposed stipulations 1-10 effectively mitigate these concerns. Another concern under this policy has to do with dredge and fill. Stipulations regarding dredge and fill will be mitigated during the plan of operation permitting process. Timing of offshore exploration and development activities so that they do not coincide or

interfere with subsistence activities is another concern. The conditional closures identified in the first 4 stipulations and stipulations 5-8 mitigate this affect. Project research is also mentioned under this policy. Large projects shall conduct baseline research in order to substantiate mitigation of adverse impacts. Proposed stipulation 9 addresses this concern.

Policy G. Mining and Mineral Processing: Under this policy, preliminary planning which involves local affected communities and the BSCRSA Board is a concern. Stipulation 16 provides for this process to occur. Several offshore mining performance standards are identified under this policy. Concerns relating to essential biologic habitats, subsistence harvest activities, and navigation are mentioned. Stipulations 1-12 mitigate the broad concerns mentioned here. Offshore mining shall not occur within 1-mile of the mouths of anadromous fish streams. Stipulation 1 limits exploration and mining within 1-mile of anadromous streams during fish migration periods.

The other performance standards mentioned under this policy deal with dredge spoils and toxic mineral sediments. Both of these concerns will be dealt with during the plan of operation permitting process.

The remaining BSCMP policies do not relate to this OPP disposal project.

Several broad policy issues are identified in the Nome CMP or (NCMP). Under Mining and Mineral Processing, the goal is to encourage mining and mineral processing in a manner consistent with economic needs and natural resource protection. The plan states that mining and mineral processing in coastal areas must be regulated and conducted so as to be compatible with ACMP standards, adjacent uses and activities, statewide and national needs, and district programs. Mining companies are encouraged to work with local planning organizations in identifying future development areas. All stipulations address these goals and objectives.

Another goal of the NCMP is to protect important habitat areas from incompatible uses. Offshore areas must be managed so as to conserve fishery habitat for commercial and subsistence use, and estuaries, lagoons, wetlands, tidelands, barrier islands, rocky islands and sea cliffs must be managed so as to protect habitat. One of the NCMP habitat objectives is to protect tidelands and offshore waters from developments that would disturb or impact biological resources. The conditional timing closures and buffers outlined in stipulations 1-8 will protect habitats from impact.

Protecting the continuation of traditional subsistence lifestyles by area residents is another goal of the NCMP. Activities which may conflict with subsistence may require a study of possible adverse impacts affecting the subsistence resource. Stipulation 7 allows the state to require a study if required.

Conclusions:

In my opinion, the proposed offshore prospecting permit disposal near Nome can be conducted in a manner that is environmentally safe and beneficial to local communities, as well as the State of Alaska.

Upon review of resource information, the deletion of certain tracts plus the addition of proposed stipulations, and the deferral of other areas, I find the offshore prospecting permit disposal near Nome to be in the best interest of the State of Alaska and consistent with ACMP, BSCMP, and NCMP standards.

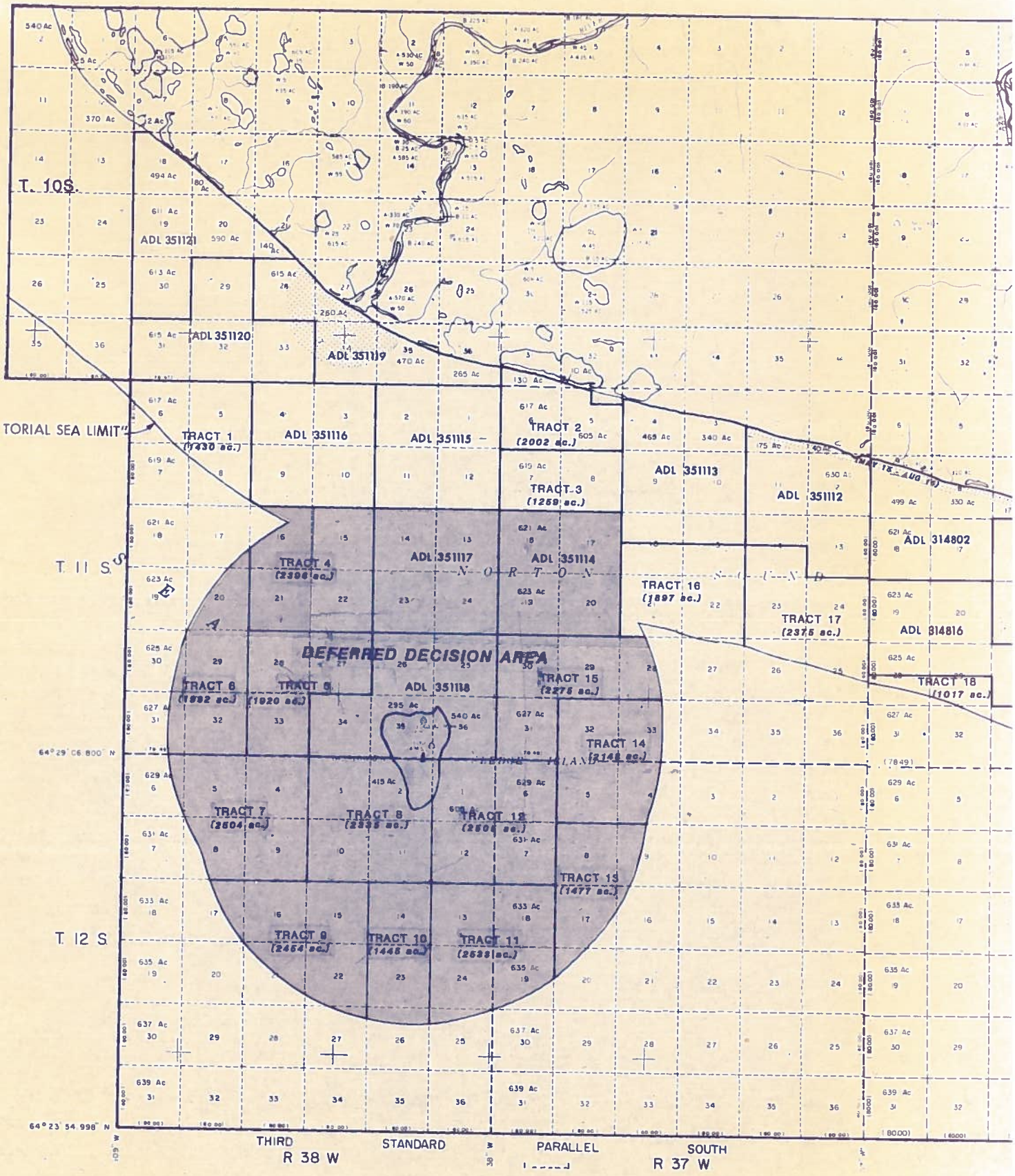
6/22/89
Date

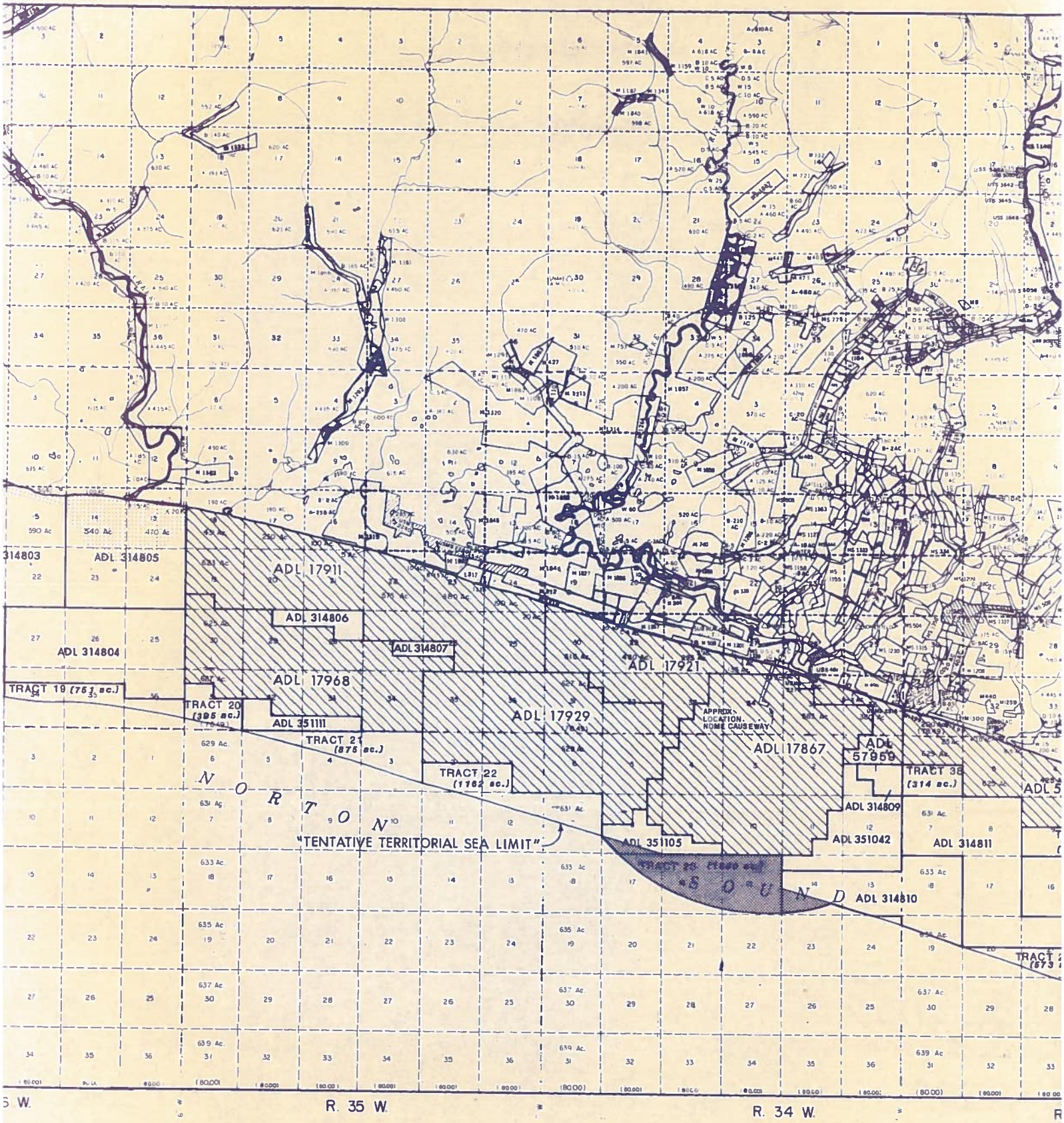
Gerald Gallagher, Director
Division of Mining

I Concur

June 22, 1989
Date

Lennie Gorsuch, Commissioner
Department of Natural Resources


T. 10S.
T. 11 S.
T. 12 S.
ADL 351121
ADL 351120
ADL 351119
ADL 351116
ADL 351115
ADL 351117
ADL 351114
ADL 351113
ADL 351112
ADL 351118
ADL 314802
ADL 314816
TRACT 1 (1430 ac.)
TRACT 2 (2002 ac.)
TRACT 3 (1259 ac.)
TRACT 4 (2396 ac.)
TRACT 5 (1920 ac.)
TRACT 6 (1932 ac.)
TRACT 7 (2504 ac.)
TRACT 8 (2335 ac.)
TRACT 9 (2464 ac.)
TRACT 10 (1445 ac.)
TRACT 11 (2533 ac.)
TRACT 12 (2504 ac.)
TRACT 13 (1477 ac.)
TRACT 14 (2148 ac.)
TRACT 15 (2276 ac.)
TRACT 16 (1897 ac.)
TRACT 17 (2375 ac.)
TRACT 18 (1017 ac.)
DEFERRED DECISION AREA
TORIAL SEA LIMIT"
64°29' 06.800" N
64°23' 54.998" N
THIRD STANDARD PARALLEL SOUTH
R 38 W
R 37 W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ADL 314805
ADL 17911
ADL 314806
ADL 314807
ADL 314804
ADL 17968
ADL 17921
TRACT 19 (751 ac.)
TRACT 20 (385 ac.)
ADL 351111
ADL 17929
TRACT 21 (875 ac.)
TRACT 22 (1762 ac.)
APPROX. LOCATION NOME CAUSEWAY
ADL 17867
ADL 57959
TRACT 38 (314 ac.)
ADL 314809
ADL 351042
ADL 314811
ADL 351105
ADL 314810
N O R T O N
"TENTATIVE TERRITORIAL SEA LIMIT"
S O U N D
R. 35 W.
R. 34 W.

NOME OFFSHORE PROSPECTING PERMIT (OPP) DISPOSAL AREA

State of Alaska
Department of Natural Resources
Division of Mining
P.O. Box 107016
Anchorage, Alaska
99510-7016

ADL 314850 — OPPs To Be Issued

Tract 8 — OPP Tract Available For Filing During 30-Day Simultaneous Filing Period
July 5, 1989 - August 4, 1989

ADL 57950 — Existing Offshore Leases

OPP Application Areas To Be Rejected

(MAY 1 - SEP 30) — Buffer Areas Subject To Stipulation

Deferred Decision Area

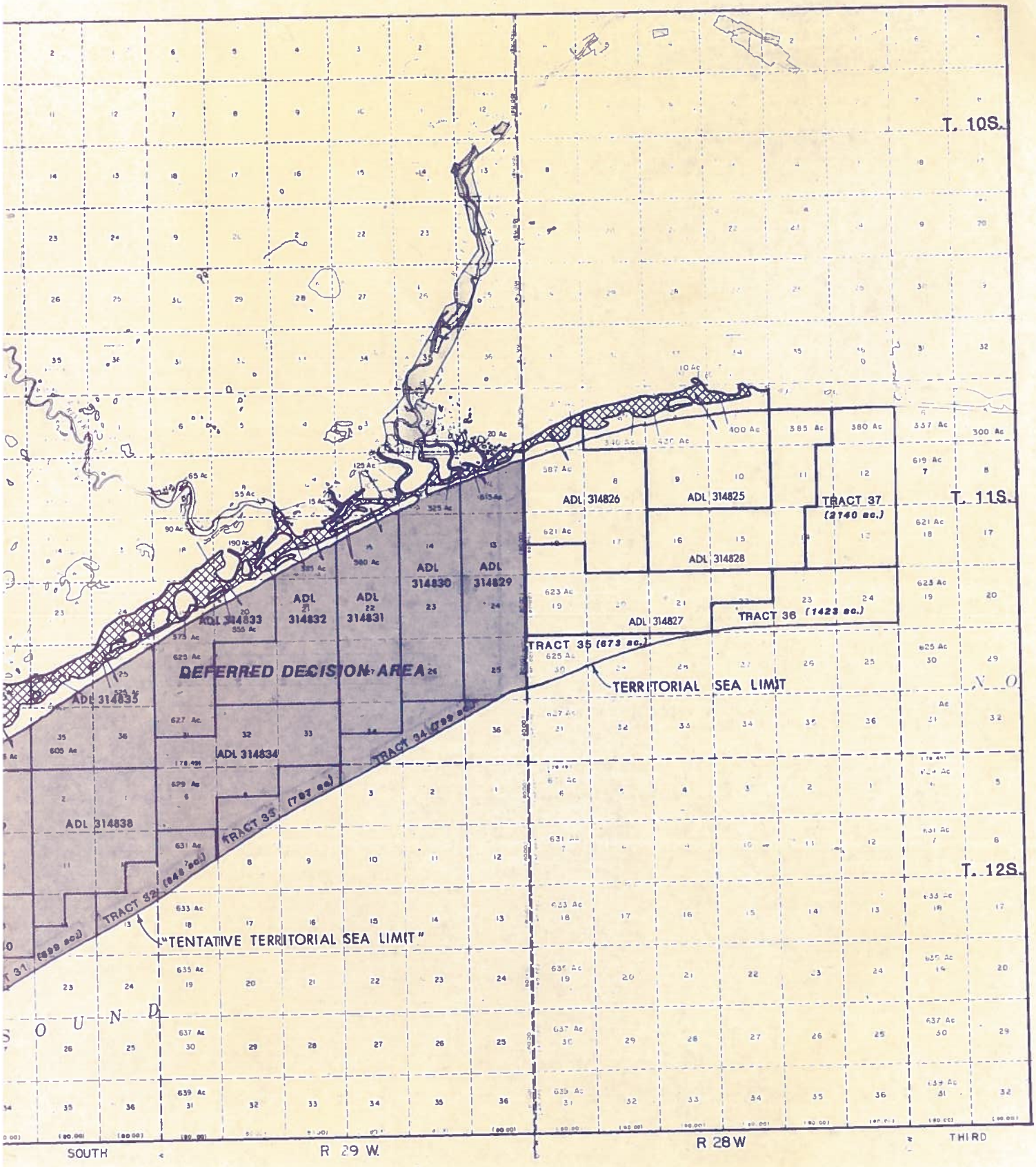
Delayed Issuance Subject
To Resolution Of 3-Mile Limit

N

0 1 2 3 4 Miles
SCALE

June 14, 1989

ADL 314813
ADL 314812
ADL 314814
ADL 314815
ADL 314854
ADL 314844
ADL 314843
ADL 314837
ADL 314845
ADL 314846
ADL 314841
ADL 314842
ADL 314847
ADL 314849
ADL 314852
ADL 314851
ADL 314850
ADL 314855
ADL 314853
ADL 314848
DEFERRED DECISION AREA
TRACT 25 (440 ac.)
TRACT 26 (255 ac.)
TRACT 30 (958 ac.)
TRACT 28 (416 ac.)
TRACT 29 (1120 ac.)
THIRD STANDARD PARALLEL NORTH
T. 13S.
R33W
R32W
R31W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T. 11S.
T. 12S.
ADL 314826
ADL 314825
ADL 314828
ADL 314827
TRACT 37 (2740 ac.)
TRACT 36 (1423 ac.)
TRACT 35 (673 ac.)
TRACT 34 (799 ac.)
TRACT 33 (787 ac.)
TRACT 32 (848 ac.)
ADL 314829
ADL 314830
ADL 314831
ADL 314832
ADL 314833
ADL 314834
ADL 314835
ADL 314838
DEFERRED DECISION AREA
TERRITORIAL SEA LIMIT
"TENTATIVE TERRITORIAL SEA LIMIT"
S O U N D
SOUTH
R 29 W.
R 28W
THIRD

ATTACHMENT 7

FINAL DRAFT

RESOURCE ASSESSMENT REPORT FOR THE NOME AREA PRELIMINARY BEST INTEREST FINDING

Prepared for

State of Alaska
Department of Natural Resources
Division of Mining
Anchorage, Alaska

Prepared by

ENSR Consulting and Engineering
(Formerly ERT)

and

Jon Isaacs and Associates

March 13, 1989

INTRODUCTION

The offshore region in the vicinity of Nome, Alaska is being evaluated for the purpose of recovering gold and other minerals other than oil, gas, and sulphur.

Before these metals can be developed in waters belonging to the State of Alaska, offshore prospecting permits (OPPs) must be obtained. The first step is to apply for an OPP. Next, the Director of the Division of Mining prepares a preliminary Best Interest Finding (BIF). The Director's finding recommends which of the OPPs will be granted and also recommends attaching stipulations to the OPPs when needed to protect other interests or uses.

This report was prepared for the OPP applicant to submit to the Director. The report contains basic data and baseline information that the Director can use to help him to make his decisions. It provides a preliminary assessment of potential impacts, resource sensitivity to impacts, and the more obvious mitigation measures. As plans for exploration and mining are developed and submitted for permit review and approval, a more detailed assessment of impacts and appropriate mitigation measures can be prepared. The purpose of this report is not to suggest specific mitigation measures since that is the responsibility of the Director.

The report contains sections from several sources:

- ENSR Consulting and Engineering wrote the executive summary; the biological assessment; sections on physical description, mining activities, and mitigation; and managed overall report preparation.
- Jon Isaacs and Associates described the social, economic, and land management aspects.

A companion report entitled Title Report for the Nome Area Preliminary Best Interest Finding by W. O. Vallee has also been submitted to the Director.

EXECUTIVE SUMMARY

Physical Description. The study area extends offshore of Nome for approximately 4.8 km and from Cape Rodney east to Topkok Head, a distance of approximately 115 km. The area is located about 877 km from Anchorage, Alaska.

Norton Sound has the moderating effects of a marine climate in summer and the extreme effects of continental air in winter. The area has one high tide and one low tide per day, rarely ranging more than 1 m. Storm surges are common during open water periods, particularly in the fall. The seafloor in the study area is flat and featureless, and water depth at the three-mile limit bordering the study area is 20 to 25 m. Freezeup begins in November and the area is generally ice covered until late April. Oxygen levels are typically high in surface and bottom waters. During the summer, salinities decrease and water temperatures increase due to river runoff and solar heating. Suspended sediment concentration increases in the summer and during severe storms. The predominant sediment types in the Nome region are relict gravels and medium to fine sands.

The nome coastal plain has been glaciated twice. It is probable that glaciers once eroded gold-bearing bedrock and pre-existing fluvial placers and redeposited them on the coastal plain, possibly several miles seaward of the present coastline. The majority of the gold recovered on the Nome coastal plain has been from relict beach deposits, and it is possible that economic gold concentrations may be present along the coast and where glacial detritus was deposited on the now submerged coastal plain.

Exploration and Mining. WestGold, formerly Inspiration Gold, Inc., began mining operations in 1985 to recover gold from mineral leases covering an area of 21,750 acres. Since 1986, approximately 225 acres have been dredged using the mining vessel Bima, recovering more than 75,000 fine ounces of gold. Future mining activity in

and around the study area will be influenced by the November 1989 offshore mineral lease sale currently being developed by the Minerals Management Service (MMS). These mining activities, projected to begin in 1993 and to continue for 14 years, would consist of two processing vessels. Yearly average acreage is expected to range between 100 and 200 with concomitant processing of 20 to 40 million cubic meters of sediment over the operation's life.

NOMECO, in conjunction with Great Bay Resources, has completed an exploration program east of the study area; Auric Minerals holds a mineral lease east of the study area. Mining activity in the greater Nome area will involve two dredges by 1989. Issuance of offshore prospecting permits to present applicants between Cape Rodney and Taylor Lagoon can be expected to generate additional exploration activity.

The first three years following issuance of offshore prospecting permits would likely be spent on exploration activities to locate and assess potential ore deposits. This would involve initial geophysical surveying of leases using one vessel during the summer of 1989. These data would be used to plan an offshore drilling program to be conducted in 1990 and 1991. An additional geophysical survey is likely in 1990 to further delineate potential ore deposits for drilling.

Biological Communities. The study area consists of a high energy coastal plain rich in biological resources. Planktonic productivity compares favorably with that of the southeast Bering Sea. Norton Sound zooplankton is diverse, generally decreasing in diversity in the nearshore areas. The benthic environment in and around the study area and its reaction to dredging is currently under investigation. Planktonic and benthic organisms are an important part of the study area food cycle and are particularly important to king crab, fish, and marine mammals.

The red king crab population in Norton Sound is centered in the northwestern part of the Sound, south and east of Sledge Island. The study area is on the periphery of the crab's favored habitat. However, during the ice-covered period of the winter, they are widely distributed along the coast in nearshore waters.

The dominant demersal fish species are saffron cod, arctic cod, starry flounder, yellowfin sole, sculpin, and Alaska plaice. These species provide food for sea mammals and are harvested for subsistence. Important pelagic fish include salmon; especially chum and pink, and to a lesser degree coho, chinook, and sockeye; herring; toothed smelt; and capelin. Salmon are known to spawn in rivers within and adjacent to the study area for mid-June through August. Herring are not known to spawn in the study area. Capelin spawn in the study area in the spring and, along with salmon and herring, are harvested for subsistence.

Five of the more common marine mammals in the study area are ringed, bearded, and spotted seal; beluga whale; and Pacific walrus. Ringed seal, and to a lesser extent walrus, are observed in the study area in winter, and walrus are known to use Sledge Island as an occasional haulout area. Bearded and spotted seal and beluga whale are observed in the study area in late spring, summer, and early fall. Spotted seal haulout in an area extending approximately 5 to 6 km east and west of Safety Sound during the summer and early fall. There have been occasional sightings of lone gray whales near the study area offshore of Nome in May and June.

Seabird colonies exist at Sledge Island and Safety Sound within the study area and at several rookeries along the coastline outside of the study area. Nesting occurs generally from May through September. Seabirds prey mainly on fish. Waterfowl use coastal wetlands for feeding, nesting, and staging. Staging peaks in August and September. Safety Sound is the most intensively used wetland environment in the study area.

Communities and Land Use. Nome, Golovin, and White Mountain area the communities likely to feel possible impacts from exploration and mining in the study area. In 1987 Nome had 3,876 residents. Golovin and White Mountain had 1986 estimated populations of 113 and 164 residents, respectively. Nome is the center of wage employment and social services in the Norton Sound region. Nome is a predominantly Native city founded as a result of gold mining and prospecting. There are several Native subcommunities within Nome comprised of small populations from other villages. Golovin and White Mountain are significantly smaller, predominantly Native communities east of the study area whose economies are based largely on subsistence activities.

Infrastructure to support mining and exploration currently exists in Nome including an airport and communications system as well as buildings and equipment. Because Nome is a regional hub, some social and community services are continuously used to capacity.

Nome residents probably rely on subsistence harvests less than residents of Golovin and White Mountain for a substantial majority of Nome's Native population although subsistence harvest continues to provide an important part of the diet. A wide variety of marine resources are procured including fish, sea mammals, crab, birds, and bird eggs. Seals are a very important subsistence resource, and they are hunted most intensively during spring (April through June) and fall (September through November). Walrus are hunted in the spring and people fish throughout most of the year. Safety Sound and salmon streams in the study area are heavily used during subsistence fish harvests. Because of an inexplicable decline in the king crab population, crab subsistence activities have dropped substantially since 1980. The king crab subsistence fishery, however, is still viable and important despite this decline. Bird eggs are procured from rookeries during the nesting season. Fall bird hunts are common along the coast adjacent to the study area.

The area in the vicinity of the study area is affected by four land use plans: the Alaska Maritime National Wildlife Refuge Comprehensive Conservation Plan, the State of Alaska's Northwest Area Plan, and the Nome and Bering Straits Coastal Management Plans. The issuances of offshore prospecting permits and mining leases are subject to a review of the Northwest Area Plan and coastal consistency determination under the Nome and Bering Strait CMPs (concurrent with the Department of Natural Resources Best Interest Finding).

Biological Impacts. Few, if any, impacts to biological resources are expected from exploration activities, which would involve seismic testing and drilling. For exploration activities, marine and air traffic around bird rookeries, particularly during nesting season, would be the main concern.

Mining would have more impacts on these resources than exploration activities. Past monitoring has determined that dredging has had little impact on trace metals concentrations in the water column. Recolonization of benthic organisms in cobble substrate appears to lag behind that of sand substrate. Results of the Nome Offshore Placer Project studies indicate that two years after mining has occurred, benthic organism density values are similar to those in non-mined areas. Disturbances to plankton and fish resources consisting of habitat disturbance, turbidity, and entrainment and disturbances to benthos consisting of habitat disturbance and turbidity would be minor given the ability of these organisms to escape the relatively small, disturbed area created by mining. Currently, there is insufficient data to determine the effects of shallow water dredging on the fry and smolt of anadromous fish. Certain marine mammals will avoid affected areas but this avoidance would result in negligible impact. Disturbance to seabirds during egg laying would have the biggest impact to nesting success. Once eggs are laid, birds are less likely to abandon nests and are more tolerant of disturbances.

Socioeconomic Impacts. Exploration and mining activities would be based out of Nome with accompanying impacts including an increase in employment and population, new revenue, and increased demand on community infrastructure (e.g., water, fuel, and power). Hunting and fishing by workers brought into the Nome, Golovin, and White Mountain; mining operations may interfere somewhat with subsistence harvests. Disruption of subsistence harvests, particularly to salmon and marine mammals, can create economic and social stress in Native populations.

Mitigation Measures. Specific mitigation of negative impacts include: coordination of exploration and mining with state agencies, local governments, and residents; scheduling mining activities to avoid conflicts during periods of particular sensitivity; limiting mining by avoiding dredging in fish spawning areas; maintaining a reasonable distance from seabird colonies and the mouths of anadromous fish streams; and avoiding enclosed estuaries, where appropriate.

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1.0 PHYSICAL DESCRIPTION OF OFFSHORE AND COASTAL AREAS

This chapter describes the geologic setting and mineral resource potential of the Norton Sound offshore area adjacent to the Seward Peninsula, extending from near Cape Rodney on the west to Topkok Head on the east, a distance of approximately 115 km (Figure 1-1).

The discussion is based on information available in the public domain. It describes the regional geologic setting and the influence of geologic processes on the development of mineral deposits in the offshore environment.

1.1 Physical Environment

1.1.1 Climate

Because of the geographic position of Norton Sound, the area is subject to both the moderating effects of a marine climate in the summer (June - October) and the extreme effects of continental air in the winter (November - May). January temperature means of -15° to -17°C and July means of 10° to 13°C characterize this variability. Wind directions vary seasonally, with southerly to southwesterly flows during summer changing to easterly to northeasterly flows during winter. Winds during summer storms can be quite strong, reaching sustained speeds in excess of 25.7 m/s (50 knots) several times each summer. Precipitation in the summer averages between 35 and 50 cm. Snowfall in the winter period typically ranges from 130 to 180 cm.

1.1.2 Tides and Storm Surges

While most of the Bering Sea has mixed, semi-diurnal tides, the Nome area is dominated by diurnal tides having one high and one low tide per day. The tidal range is typically less than 0.5 m and rarely exceeds 1 m.

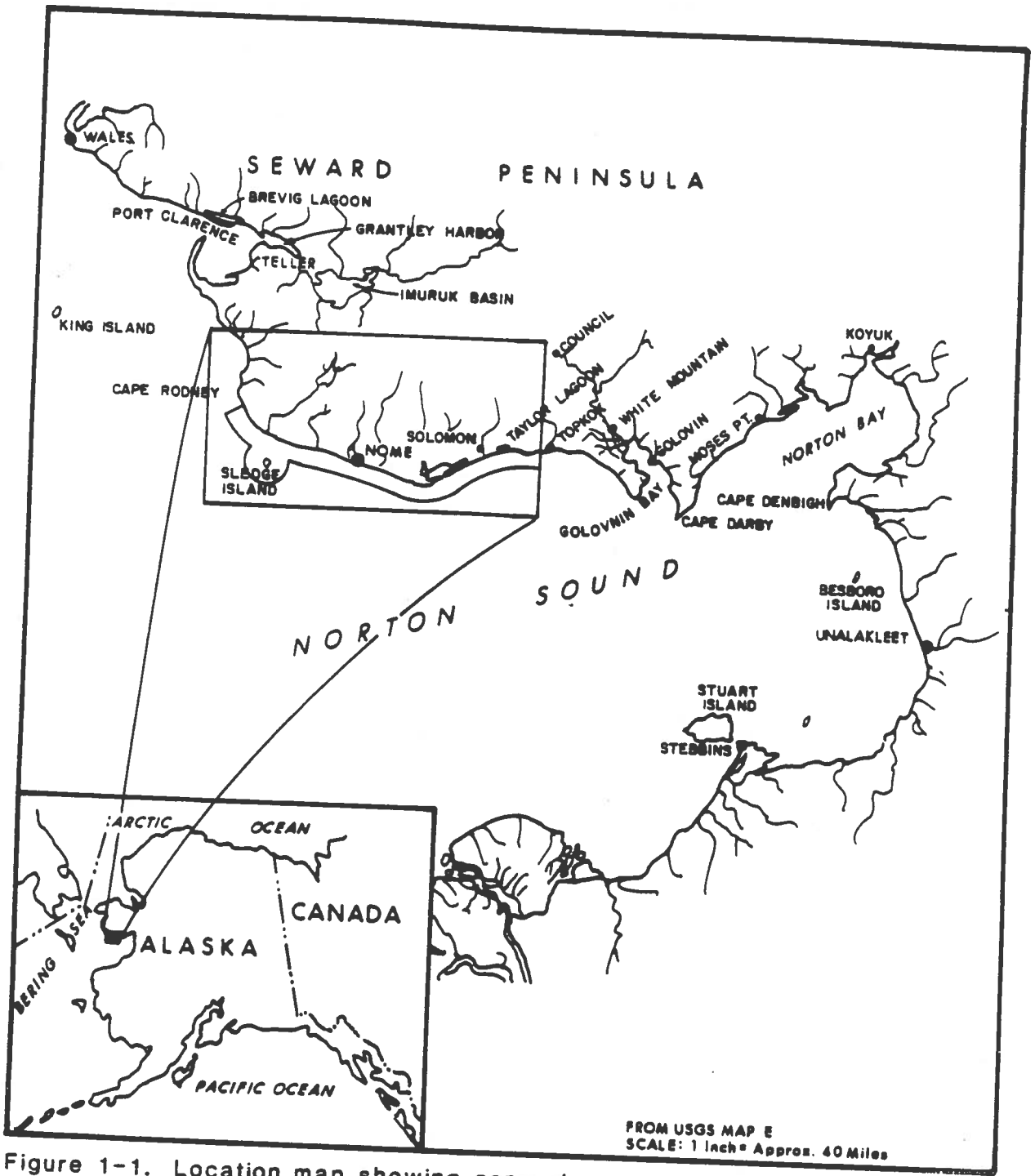


Figure 1-1. Location map showing general area of offshore prospecting permit applications for the Preliminary Best Interest Finding.

Storm surges occur when wind blowing towards the land causes the water level to be built up by as much as several meters. Storm surges are common in the Nome area. Local storm surges can be either positive or negative, depending on whether the wind is from the south or north, respectively. Surges are often reinforced by a rise in sea level induced by a reduction in barometric pressure. Significant surges occur only during open water periods and are most commonly related to fall storms.

From November 10 through 17, 1974, a once-in-30-year storm event occurred in the Nome area. Total water level rises of 7.6 m (not including waves) were estimated in this area where the normal tidal range is 1.2 m; some parts of Nome were under 3 m of water. A storm originating as tropical typhoon "Freda" passed through the Nome area October 13 through 16, 1987, but documentation of storm surge water level rises is not available. This storm was of lesser magnitude than the 1974 storm.

1.1.3 Bathymetry

The seafloor is featureless and flat throughout the area. An offshore slope of 1-2 percent extends offshore for over 10 km along most of the coastline. Water depths at the three-mile limit of state waters are roughly 20-25 m deep. The deepest point in Norton Sound is approximately 40 m deep.

1.1.4 Sea Ice

Ice begins to form in the northeastern portion of Norton Sound in October. The eastern half of the sound is essentially ice covered by mid-November. Except during occasional strong east to northeast wind episodes, the area is almost 100 percent ice covered until late April.

This ice sheet consists of landfast ice, Norton Sound pack ice, and offshore pack ice. The shorefast ice reaches a thickness of 1.5 to 1.8 m due to freezing degree days; additional thickness develops

from shearing, compression forces, and under-sliding of small plates. The pack ice probably averages less than 1 m in the thickest portion of the pack during the winter cycle. The predominant direction of pack ice movement is southwestward and out of the sound toward St. Lawrence Island. Movement can be as large as 15 km/day (Stringer, 1978). During breakup, sea ice moves south and west under the influence of northerly winds or under more sporadic winds to the northwest. In the nearshore zone, sea ice gouging is a significant feature of the seafloor and an important factor in reworking the bottom sediment.

1.1.5 Currents and Waves

Norton Sound can be characterized as a shallow subarctic embayment within which the general water circulation is driven by the Alaska coastal current. This current flows north parallel to the Alaska coast toward the Chukchi Sea. A portion of this flow enters the southern area of the Norton Sound and induces a counterclockwise flow within the sound. Speeds have been reported as pulses of 50 to 100 cm/s offshore (Drake et al., 1980; Moser and Hein, 1984). Most of the river discharge from the Yukon River is entrained in this coastal flow and enters the Norton Sound counterclockwise circulation. This counterclockwise flow results in a net east to west current along the northern shore of Norton Sound.

During the summer of 1988, oceanographic data were collected in the vicinity of the mining operation in approximately 12 to 15 m of water. The currents fluctuated diurnally from a westerly direction to an easterly direction and back again as a result of tidal forces. During summer, fresh water influx from rivers results in a highly stratified flow with the upper layer showing a slightly stronger transport than the lower layer. Typical mean current speeds are 1 to 10 cm/s in the eastern sound and are somewhat greater in the western sound. During summer, strong winds can induce current flows in excess of 78 cm/s. It is not uncommon for waves during summer storms to reach heights in excess of 12 m in

the western portions of Norton Sound. In the nearshore areas near Nome, however, storm waves are typically less than 3 m. Turbulence created by storm waves can suspend and transport seafloor sediments to water depths of at least 20 m.

1.1.6 Water Quality

Water column characteristics (i.e., salinity, temperature, dissolved oxygen, turbidity, and suspended sediments) are strongly affected by the Yukon River plume and by tides and winds. Water quality is also affected by the offshore northerly and mean currents during summer and by the mean current circulation of the Bering Sea during winter. Oxygen levels are typically high in surface and bottom waters, often exceeding 8 milligrams per liter (mg/l).

During summer, salinity within the sound decreases to less than 19 parts per thousand (ppt) and less than 3 ppt near the Yukon River Delta. During winter, oceanic conditions prevail with salinities generally greater than 30 ppt.

Mean sea water temperatures increase in summer due to river runoff and solar heating. During July, water temperatures can reach 12°C in the central portion of the sound and up to 16°C in the eastern part of the sound. During the winter, water temperatures hover near the freezing point of sea water (-1.85°C).

Suspended sediment concentrations are seasonally dependent. During winter when the sea ice cover prevents wave-induced particle motion and river discharge ceases, suspended sediments concentrations are typically less than 1 mg/l.

During summer, both river discharge and wave and current generated turbulence increase suspended sediments and values of 1 to 5 mg/l are typical. Storms will cause sediment loads to increase to 50 mg/l or more. Severe storms can increase suspended sediments to an excess of 140 mg/l.

A storm event documented during the 1988 intensive plume monitoring study at the Bima mining operation produced turbidities of about 40 NTU at 1 m from the bottom compared to <10 NTU prior to the storm. In 1988, west to east tide-driven currents in the vicinity of the Bima operation were observed to redistribute sediments along the nearshore zone. As a result of this redistribution, the water column is well mixed throughout the summer.

1.1.7 Sediments

Shoreward of the 20 m depth contour, wind generated waves and currents strongly control erosional and depositional processes during summer. During storms, currents scour bottom sediments resulting in substantial transport of bed material (Larsen et al., 1981). Up to 2 m of bottom scour in one season has been observed in Norton Sound. Even during quiescent periods, however, much of the fine-grained depositional material is resuspended during spring tides and is transported northward with the mean current (Cacchione and Drake, 1979). In storm periods larger-grained sediments are resuspended and transported.

Sources of sediments include coastal erosion and river discharge. Approximately 90 percent of all sediments entering the Bering Sea are contributed by the Yukon River (Nelson et al., 1974). Discharge rates and suspended sediment concentration data collected over the past 20 years suggests an annual Yukon River suspended sediment discharge of 70-90 million tons.

Both relict and modern sediments occur in Norton Sound. Relict sediments were deposited as late as the last glacial recession 12,000 to 13,000 years ago. Gravel deposits occur nearshore in the vicinity of Nome, Cape Nome, Sledge Island, Cape Rodney, and Port Clarence (Figure 1-1). These gravel deposits are typically less than 0.5 m thick.

Recent sediments are mostly fine sand and coarse silts originating from the Yukon River. These Yukon River sediments, mixed with relict sediments and sands derived from local erosion, occur most commonly in the Nome area The predominant sediment types in the Nome region are relict gravels and medium sands. East of Cape Nome there is an increase in the occurrence of fine sands and silt.

Surficial sediment samples collected as part of the Bima monitoring program were primarily fine sands; they ranged from 75 to 85 percent fine sand with 10 to 20 percent silt; less than 17 percent were medium and coarse sand. Sediment samples of the Bima dredged material were, in general, well graded silty gravelly sands; grain size distribution curves reflected near equal distributions among gravel, silt, and sand fractions. Side scan sonar records of a 67 acre control area surveyed in 1988 showed 50.4 percent cobble, 1 percent sand waves, 0.5 percent sand/fine gravel, and 89 percent sand/silt (Jewett et al., 1989).

1.2 Onshore Geological Setting

The onshore area of the Seward Peninsula from Cape Rodney east to Topkok Head is characterized by a Precambrian to Paleozoic age basement complex consisting of metamorphic rocks overlain by Ordovician and Silurian age sediments (Sainsbury, 1965 and 1969; Sainsbury et al., 1969; Hopkins and Nelson, 1972) (Figure 1-2). These metamorphic assemblages probably represent the bedrock source of the extensive onshore placers of the Seward Peninsula. The classical stratigraphic sequence of chlorite-albite-graphite schist overlain by Ordovician-Silurian age carbonates is present over a large area of the central Seward Peninsula. This sequence is present onshore adjacent to the offshore area of interest.

Figure 1-3 illustrates the distribution of onshore gold placers. The entire portion of the coastline of interest in this report contains onshore gold placer deposits which have been almost continuously commercially mined since the turn of the century.

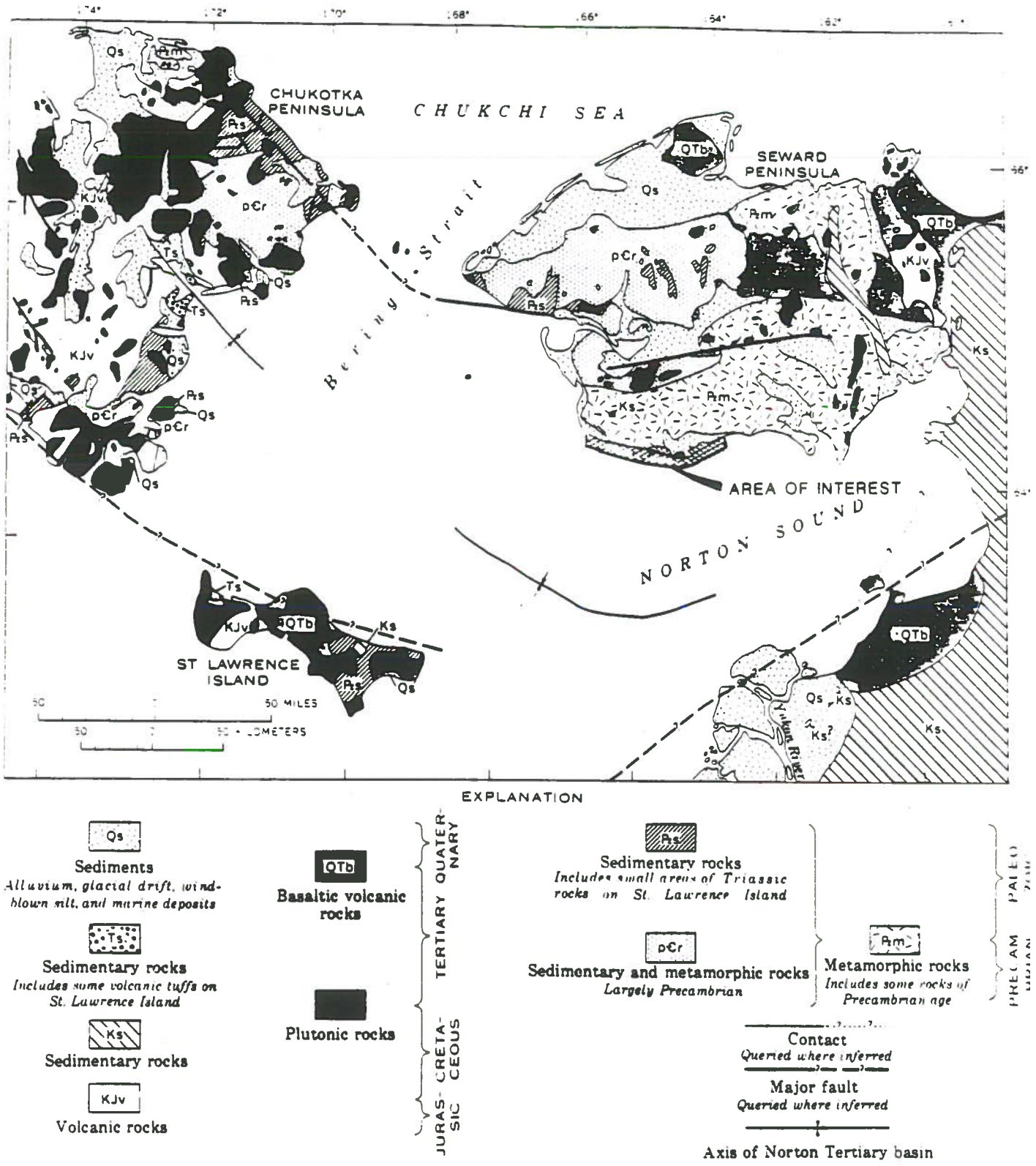


Figure 1-2. Generalized geologic map of the northern Bering Sea (modified from Nelson and Hopkins, 1972).

1.3 Glacial History of the Area

Glaciers have played an active role in the development of offshore placer deposits in the Nome area. The Nome coastal plain has been glaciated at least twice, the first during early Pleistocene times, the last during the Illinoian glaciation. The most recent Holocene glaciers were restricted to the Kigluaik Mountains north of Nome (Nelson and Hopkins, 1972).

In the area of interest, glacial erosion occurred in several rivers and creeks including the Sinuk River east of Cape Rodney; the Snake and Nome Rivers, near Nome; and the Flambeau, Eldorado, and Bonanza Rivers north of Solomon (Figure 1-3).

During both glacial advances it is probable that valley glaciers eroded gold bearing bedrock and pre-existing fluvial placers and redeposited them as glacial detritus on the coastal plain and possibly several miles seaward of the present shoreline (Nelson and Hopkins, 1972). Nearshore areas have already proven economically productive.

In at least one case east of the study area near Bluff, the high grade fluvial placer of Daniels Creek is truncated by the present coastline. This deposit has not been glaciated, but the seaward extension of Daniels Creek represents excellent potential for a drowned fluvial placer.

1.4 Offshore Geologic Environment

Knowledge of the offshore geologic environment is derived from several scientific cruises undertaken by the U.S. Geological Survey and the U.S. Bureau of Mines in the late 1960s. Data collected on these cruises includes high resolution sparker (seismic) profiling (Tagg and Greene, 1973), grab sampling (R/V Thompson, 1967; OSS-1 Oceanographer, 1968; OSS-32 Surveyor, 1968; and M/V Tomcod, 1968), and Becker Hammer and sonic drill core (R/V Virginia City, 1967).

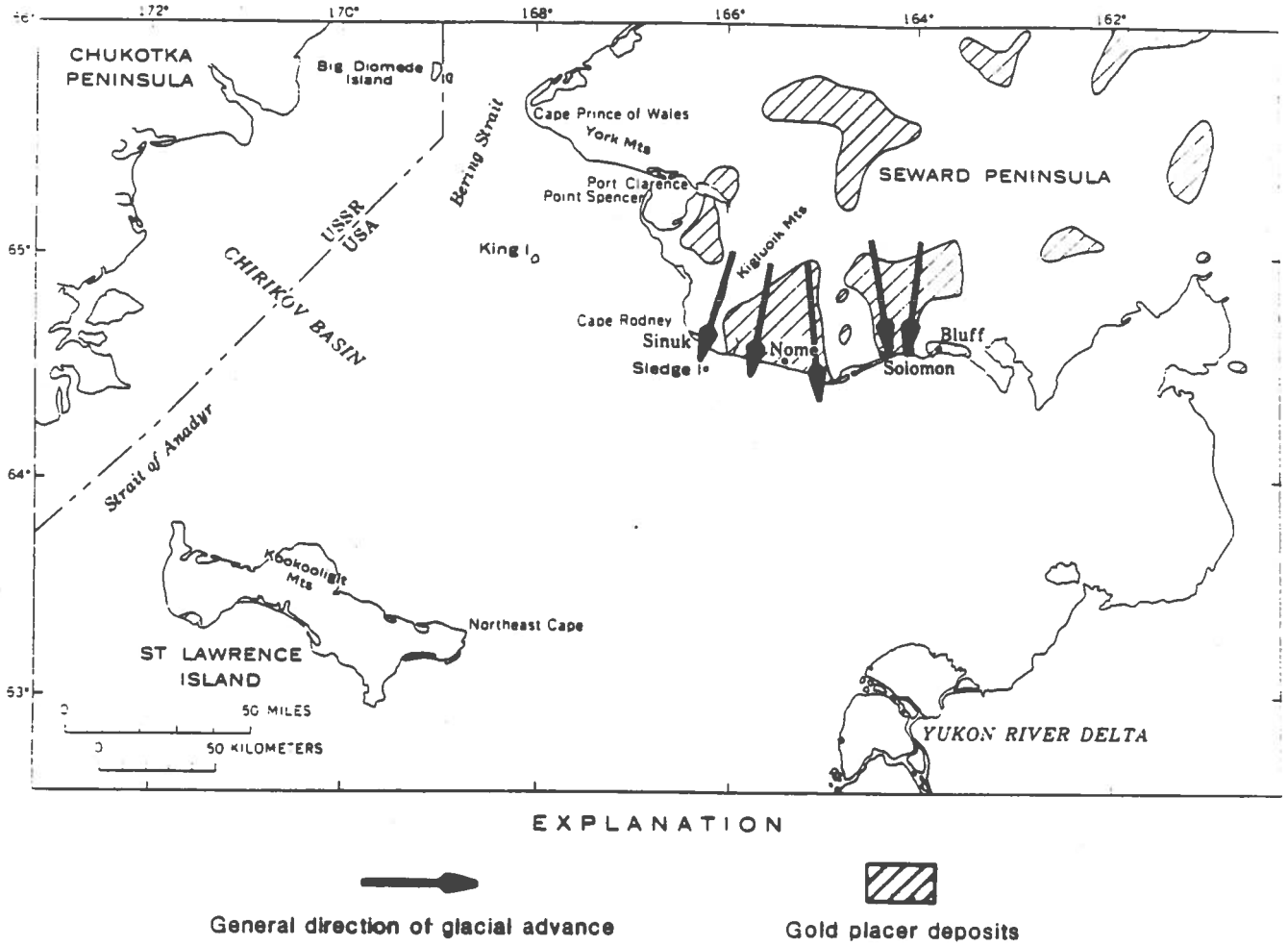


Figure 1-3. Location of onshore placer districts, Seward Peninsula (modified from Nelson and Hopkins, 1972).

The seafloor geology offshore of the area of interest ranges from a very thin veneer of gravel overlying basement rocks near the Cripple River to a very thick section of fine-grained marine sediments overlying basement at the eastern limit of the area of interest (Nelson and Hopkins, 1972). Water depths at the state boundary may be as deep as 25 m.

Figure 1-4 illustrates the general distribution of percent gravel in surficial sediments in the northern Bering Sea. These data indicate the presence of anomalous concentrations of coarse detrital material offshore the area of interest. Based on the known track of early Pleistocene valley glaciers, it is probable this material is of glacial origin.

Three possible beach scarps at 13 m, 21 m, and 24 m water depths have been recognized in the offshore Nome area (Tagg and Green, 1973) (Figure 1-5). The majority of the gold recovered on the Nome coastal plain has been won from relict beach deposits. If the same concentrating processes were present offshore during post early Pleistocene and Illinoian glaciations, the beach scarps represent sea level stillstands developed along the entire coast. It is possible that economic gold concentrations may be present along the coast of the southern Seward Peninsula where glacial detritus was deposited on the now submerged coastal plain and subsequently reworked as beach deposits (Nelson and Hopkins, 1972).

1.5 Offshore Mineral Potential

The most extensive treatment of offshore mineral potential in Norton Sound is found in Nelson and Hopkins (1972). The potential for offshore mining in the Nome region of Norton Sound has been discussed in numerous other publications (Lu et al., 1968; Nelson and Hopkins, 1969; Moore and Welkie, 1976; Tagg, 1979; Moore, 1979; McKelvey, 1986; and Bureau of Mines, 1987). In general, at least three paleobeach strands occur offshore at water depths of 13 m, 21 m, and 24 m (Figure 1-5) and are considered to have significant

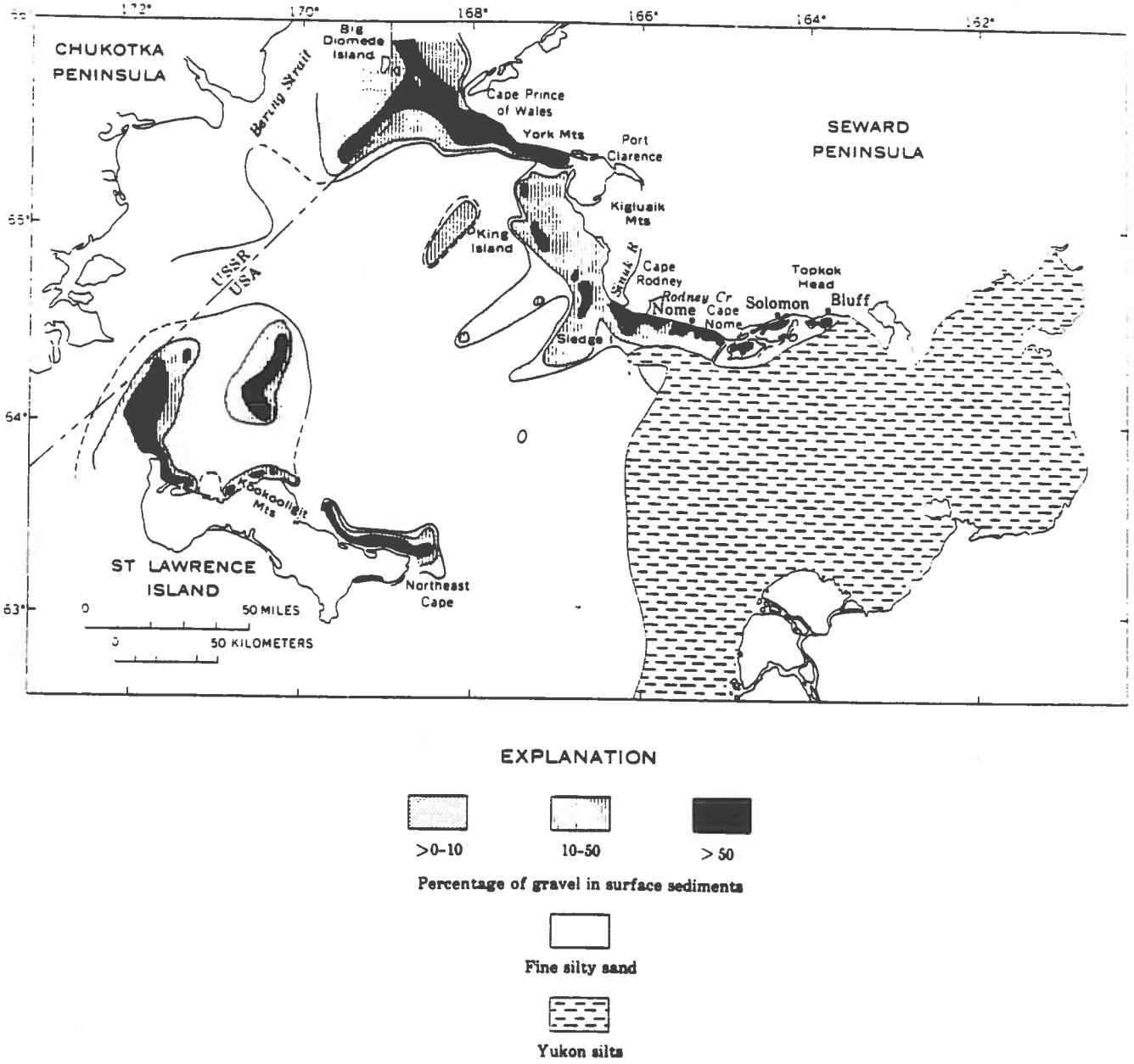


Figure 1-4. Distribution of gravel in offshore surface sediments. Data collected during various cruises in the late 1960's (Nelson and Hopkins, 1972).

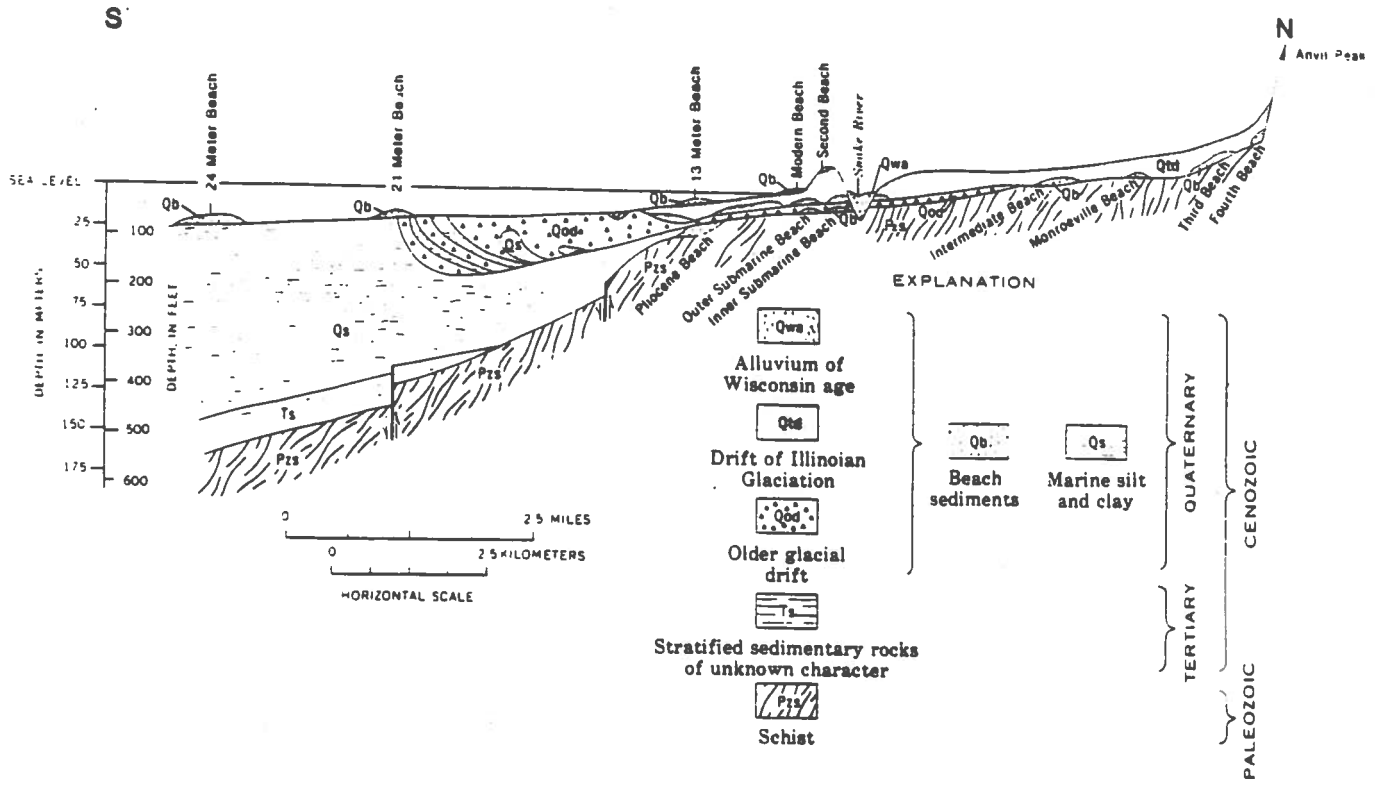


Figure 1-5. Geologic section across the coastal plain area at Nome (Nelson and Hopkins, 1972).

potential for gold recovery. These beach deposits all consist of reworked morainal material and are known to extend over a distance of approximately 32 km (20 mi) parallel to shore. The deepest water beach strand lies more than 4.8 km (3 mi) offshore.

Although data are very limited (34 samples), the highest reported offshore concentration of gold from a relict gravel deposit was 2.5 parts per million (ppm) by Nelson and Hopkins (1969). They also reported average gold concentrations of 0.556 ppm in relict gravel deposits overlying glacial till while background sand and gravels showed an average value of 0.003 ppm. Most of the high gold values seem to be concentrated in the top meter of sediment with gold content being dependent upon the degree of reworking.

Present offshore mining operations being conducted by WestGold in glaciated offshore terrain have shown that gold does occur in concentrations that can make offshore mining economically viable. It is therefore reasonable to expect that in other glaciated offshore locations similar concentrations of gold could be found using suitable exploration techniques.

2.0 EXPLORATION AND MINING ACTIVITIES

2.1 Physical Description of Present Mining Activity

2.1.1 WestGold

Inspiration Gold, Inc. (IGI), formerly Inspiration Mines, Inc. and now known as Western Gold Exploration and Mining Company Limited Partnership (WestGold), began mining operations in October 1985 to recover gold from mineral leases near Nome. These leases cover an area of 21,750 acres extending from about 1.6 km east of Nome to about 16 km to the west and approximately 4 km seaward.

In June 1986, WestGold began offshore mining with the mining vessel Bima which had been brought to Nome from southeast Asia. The Bima is approximately 158 m long, 43 m wide, and 45 m high. It is currently the world's largest active bucket line offshore mining vessel. The bucket ladder is 88 m long; contains 137 buckets, each of 0.9 cubic meter capacity; has a top speed of 40 buckets per minute; and is capable of digging to a depth of 45 m. In the Nome area of Norton Sound, this dredge is capable of recovering up to 1,300 m^3/hr under optimal conditions, with an associated process water discharge of 47.8 million gallons per day (mgd). This lower recovery rate is due to the shallowness of waters in Norton Sound and the extremely difficult digging conditions in the area.

In the past three seasons of operations (1986 - 1988 combined), the Bima has dredged approximately 225 acres and recovered over 75,000 fine ounces of gold. The dredging season extends from late May through mid-November. During this time two to three million cubic meters of sediment are processed through the Bima. Digging depths vary from less than three meters to approximately 10 or more meters below the seafloor. Depending upon digging depth, annual mined surface acreage varies from 50 to 150 acres. The level of activity in future years is expected to be in the range of 200 to 250 acres per year.

2.1.2 Other Companies

The only other company active in the offshore Nome area is NOMECO. They recently completed an exploration program on a single mineral lease east of and adjacent to those held by WestGold. This exploration activity was conducted in conjunction with Giant Bay Resources of Vancouver, B.C., Canada. Further activity on this lease is pending completion of environmental studies and the permitting necessary to undertake full-scale mining activity.

Auric Minerals holds a mineral lease to the east of Nome near Bluff (Figure 1-1). Preliminary exploration activities were undertaken in 1984. There has been no offshore exploration activity in the last few years.

2.2 Potential Future Mining Activities

2.2.1 WestGold

WestGold has initiated permitting efforts associated with expansion of their Nome operations. This expansion involves bringing an additional dredge on-line in the next 12 to 24 months (Table 2-1). In 1989, WestGold will conduct a test mining program in water depths ranging from 2 to 8 m. The test program will involve a barge 76 m by 23 m by 5 m with a 1.5 m draft, from which several mining methods will be evaluated on a pilot scale. A full production dredge system capable of mining 600 m^3/hr will be developed on the basis of the test program conducted in 1989.

Prior to mining, exploration activities will be conducted. These activities would include seismic testing and core drilling only. Test dredging would be considered a short-term mining activity rather than an expoloration activity.

Table 2-1. Potential future mining activities.

Area	Company	Cumulative Activity[1]		
		Present Dredges	Expansion	Timing
Nome	WestGold	1	1 to 2	1989/1990
Nome	Giant Bay Resources	-	?	1990 ?
Bluff	Auric	-	-	-
Norton Sound Offshore	?	-	1	1993
Study Area[2]	Greatland	-	1	1993/1997

[1] Expansion and timing figures are best guest estimates by the mining companies involved.

[2] An area three geographic miles distant from the coastline extending from approximately Cape Rodney to Topkok Head, approximately 115 km (72 mi).

2.2.2 Norton Sound Federal Lease Sale Area

The Minerals Management Service (MMS) is currently developing an offshore mineral lease sale near Nome. The Draft Environmental Impact Statement was issued in November 1988 with the lease sale scheduled for November 1989. While this schedule may very likely be delayed, it is highly probable that the lease sale will occur. Exploration activity from at least one vessel can be expected in the summer of 1990 and succeeding years. Test and/or production mining can be anticipated to begin in 1993. The MMS projects up to two processing vessels in operation for a period of 20 years (6 years of exploration and 14 years of production). Yearly average acreage is expected to range between 100 and 200 with concomitant processing of 20 to 40 million cubic meters of sediment over the operation's life.

2.2.3 Nome Area OPP Disposal

Issuance of offshore prospecting permits (OPPs) to present applicants between Cape Rodney and Taylor Lagoon (Figure 1-1) can be expected to generate additional exploration and mining activities. The first three years following issuance of OPPs would likely be spent on exploration activities to locate and assess potential ore deposits. Exploration would involve initial geophysical surveying of OPPs using one vessel during the summer of 1989. Data collected would be used to plan an offshore drilling program to be conducted in 1990 and 1991. An additional geophysical survey is likely in 1990 to further delineate potential ore deposits for drilling.

3.0 COMPOSITION OF BIOLOGICAL COMMUNITIES

This section provides an overview of the aquatic biological communities that need to be considered in evaluating the potential effects of exploration and mining in the study area. It is based on the text and resources in the Draft Environmental Impact Statement for the Outer Continental Shelf (OCS) Mining Program Norton Sound Lease Sale (USDOI/MMS, 1988), the Ocean Discharge Criteria Evaluation (ODCE) Information Database for Lease Sale 45, Nome Gold Project (ENSR, 1989), and the Nome Offshore Placer Project Annual Report, Volume I (Jewett et al., 1989).

3.1 Plankton

This section concerns planktonic organisms living in the water column that are subject to the vagaries of the water's movements; they are unable to swim effectively against currents. Plankton is comprised of two basic groups: (1) phytoplankton, the primary producers or plants; and (2) zooplankton, the animal component of the plankton.

3.1.1 Phytoplankton

Primary phytoplankton productivity measured near Nome in July 1973 was 238 to 498 milligrams of carbon per square meter per day, comparing favorably with average summer estimates for the southeastern Bering Sea (Goering, 1972). Annual values, however, could be expected to be relatively lower for Norton Sound due to the shorter ice-free period (Redburn, 1976).

The transfer of the organic matter produced at the ice edge, under the ice, or in open-water phytoplankton blooms to primary consumers (e.g., zooplankton) depends on the structure of the grazing community within the water column. Where phytoplankton are efficiently grazed, there is little direct transfer of carbon

from the phytoplankton to the benthos (those animals living in association with the bottom). Changes in zooplankton composition across Norton Sound and the study area would vary the extent to which phytoplankton are efficiently grazed, thus affecting the input of carbon to the benthos.

3.1.2 Zooplankton

Detailed information on the abundance of the nearshore assemblage of zooplankton is found in Neimark (1979). Cooney (1977) notes that in the nearshore and inner Norton Sound regions, zooplankton are dominated by small-bodied copepods (e.g., Acartia spp. and Eurytemora spp., approximately 1 mm long).

Distribution patterns are basically known from summer observations but species may shift seasonally. For example, Neimark (1979) found Acartia clausi to be the predominant zooplankter in the nearshore region of Norton Sound, although A. longiremis might succeed A. clausi in the nearshore regions in the fall in response to seasonal changes in the environment. In general, nearshore regions of Norton Sound evince a lower species diversity, presumably because fewer species can tolerate the wide-ranging salinities and temperatures.

3.2 Benthic Invertebrate Resources

3.2.1 Importance of Benthos

The sensitivity of benthic infauna to environmental disturbance and pollutants is well documented. Although natural and man-made stresses on benthic organisms are exerted on the individual, responses to stress also may be measured at the community level. This is especially true for infaunal organisms which have limited abilities to avoid disturbed or polluted areas because of their immobility. Alterations in community structure and function depend on the severity and persistence of the perturbation. Benthic

infauna can be indicators of the areal extent and intensity of environmental disturbances caused by point source pollutant discharges such as dredging. However, they can also respond to a variety of natural changes (e.g., predation, temperature, salinity, etc.).

The importance of benthos to the study area ecosystem may be judged by four criteria: whether the benthos are important mediators of nutrient recycling in the detrital food web; whether they are sensitive monitors for bioaccumulation of trace metals; whether they are important prey for higher trophic levels; and whether they are harvested for commercial or subsistence use.

Present research on nutrient recycling by benthic organisms remains limited. Recent studies conclude that the activities of benthic organisms are important to nutrient recycling (Henriksen et al., 1980; Hyllsberg and Henriksen, 1980; Jorgensen et al., 1980; Kautsky and Wallentinus, 1980). Mann (1982) concludes that nutrients regenerated from benthic sediments in coastal waters are generally a major factor influencing primary production. Although nutrient recycling from the sediments has not been studied in Norton Sound, there is no reason to believe that benthic organisms in that region respond differently.

Benthic invertebrates have been shown to be very important prey of large decapod crustaceans (e.g., king crab), fishes, and marine mammals.

3.2.2 Abundance and Composition of Benthos

Five major studies of the marine environment have been carried out relative to benthos in and around the study area. These include Feder and Mueller (1974) and the Nome Offshore Placer Project in 1985, 1986, 1987, and 1988 (Rusanowski et al., 1986, 1987, and 1988; Jewett et al., 1989). Detailed lists of species can be found in these reports.

In the Feder and Mueller (1974) sampling conducted in the summer of 1973, 83 invertebrate species were collected with a van Veen grab sampler; 62 invertebrate species were collected by trawling. Of the invertebrates taken from sandy-gravel-rock bottom off Nome, sea stars, sea urchins, sea cucumbers, and brittle stars were the most common and contributed the greatest invertebrate biomass.

The 1985 Nome Offshore Placer Project sampling (Rusanowski et al., 1986) in the offshore Nome vicinity yielded 75 separate invertebrate taxa. The most numerous taxa were polychaetes, followed by amphipods, cumaceans, clams, and snails. Stations at 7.0 to 7.6 m water depths (Figure 3-1), showed an increase in both number of taxa present and abundance by 30 and 34 percent, respectively (Figure 3-1 in Rusanowski et al., 1986). Only sand substrates were sampled.

The 1986 Nome Offshore Placer Project sampling (Rusanowski et al., 1987) in the Nome vicinity included both sand and cobble substrates. A total of 122 taxa were collected from sand substrate. Polychaete worms, clams, and sand dollars were the dominant groups. The cobble habitat yielded 163 taxa. Polychaete worms and crustaceans predominated in cobble habitat along with molluscs (mussels and barnacles) and echinoderms (sea urchins).

During 1987 Nome Offshore Placer Project sampling (Rusanowski et al., 1988), a total of 132 different taxa were collected from sand substrate. Polychaete worms and crustaceans were the dominant groups. Polychaete worms accounted for 57 to 65 percent of the total invertebrate density at non-dredged sand stations. At a dredged station, polychaetes accounted for less than 20 percent of the density while crustaceans comprised 72 percent. In addition, at a dredged station the number of taxa, average density, and average biomass were low relative to other deep or intermediate sites.

Cobble substrate samples yielded 140 different taxa. Polychaete worms and crustaceans were the most diverse groups, with 55 and 45 taxa, respectively. The most abundant invertebrates at intermediate water depth stations (7.0 to 7.6 m) were crustaceans, polychaetes, and molluscs. At deep water sites, 10.7 m, polychaetes predominated.

The 1988 Nome Offshore Placer Project sampling included both sand and cobble substrates (Jewett et al., 1989). Samples yielded 97 invertebrate taxa from sand substrate and 155 invertebrate taxa from cobble substrate. The benthic invertebrates which characterized the sand community in 1988 were polychaete worms, clams, and sand dollars. The benthic invertebrates which characterized the cobble community in 1988 were echinoderms (brittle star), clams, polychaete worms, and ribbon worms.

Samples taken from non-mined areas typically had higher values for number of taxa, density, and biomass than did samples taken from areas mined the previous year. At a station which was sampled one year after mining, the number of taxa, density, and biomass were low relative to other stations, and polychaetes accounted for nearly 75 percent of the invertebrate density. At another station, two years after mining, the number of taxa, density, and biomass values increased from 21 to 58 taxa, 160 to 1,308 individuals/m^2 and from 0.8 to 7.3 g/m^2 of biomass, which were comparable to values obtained from non-mined areas. Species diversity in sand substrates was highest at non-mined deep-water stations, lowest at non-mined shallow-water stations, and intermediate at stations mined in previous years. Species diversity in cobble substrates was lowest at stations mined in previous years. Recolonization of the faunal assemblage in cobble appears to be lagging behind that of the sand substrate.

Although monitoring has only occurred for four years, data are still being collected on the effects of dredging on the density and biomass of benthic organisms.

3.2.3 Ice Scouring and Benthic Communities Near Nome

Ice ridges have been observed extending downward to water depths of 11.6 m. In 1987, an ice ridge estimated to extend above sea level by at least 15 ft was observed to be grounded in 38 ft of water. Such ice gouging and abrasion is likely to be responsible for the changes observed in the shallow epifaunal community (Jewett et al., 1989).

3.2.4 King Crab

The red king crab population in Norton Sound is centered in the northwestern part of the sound, south and east of Sledge Island (Wolotira et al., 1977; Powell et al., 1983). The study area is located on the periphery of the favored habitat of the red king crab (S. Jewett, University of Alaska Fairbanks, personal communication, 1989). Of the 155 crabs collected in March 1988 studies within the study area, only 3 were females (Jewett et al., 1989).

The late summer distribution of red king crab generally approximates an area deeper than 15 m (generally outside the study area) that extends in an east-west direction in northern Norton Sound. There appears to be a seaward (southwesterly) migration of at least adult males in early summer and a return northeastward migration during fall. Alaska Department of Fish and Game (ADF&G) survey data in 1985 notes high densities of king crab within state waters adjacent to Cape Nome in late winter to early spring (June/July). ADF&G estimates approximately one-third of the crab population resides within state waters at some point during their annual migratory movements, typically in winter and early summer (ADF&G, 1989).

Major foods for adult red king crab include bivalve mollusks, polychaetes, echinoderms, and crustaceans (Feder and Jewett, 1981; Jewett and Feder, 1982; Rusanowski et al., 1988). Post-larval

crabs also eat benthic foods--diatoms, copepods, ostrocods, and other small organisms that have presumably settled from the water column, plus other detrital material.

The relatively small size of adult king crab in Norton Sound and the proximity of Norton Sound to the northern distributional limits of this species has suggested to some that low water temperatures may be an important physical constraint to crab populations. It also appears that water depth is an important consideration; crab in Norton Sound are found in relatively shallow waters. Water temperature and depth constraints, possible competition for food by the abundant sea stars, and commercial and subsistence harvests may all affect the distribution and population levels of red king crab in Norton Sound. A National Marine Fisheries Service (NMFS) population survey is underway which may or may not provide some clues on population dynamics of crab in Norton Sound (C. Lean, ADF&G, Nome, personal communication, 1988).

3.2.5 Important Habitats or Areas

The most important benthic habitat identified thus far in Norton Sound is central Norton Sound where red king crab are most abundant and the commercial fishery is centered (Powell et al., 1983). The major subsistence harvest of this crab species occurs in the Nome vicinity. Highest biomass values for eight dominant epifaunal species are located in northern Norton Sound, primarily off Nome and extending northwest toward the Bering Strait (Feder and Jewett, 1978).

3.3 Fish Resources

3.3.1 Demersal Fish

Demersal fish in the Norton Sound NMFS survey data (Wolotira et al., 1977) are represented by 14 families and 51 species. The two most abundant families are Gadidae and Pleuronectidae. The dominant species are saffron cod (Eleginus gracilis), arctic cod

(Boreogadus saida), starry flounder (Platichthys stellatus), yellowfin sole (Limanda aspera), and Alaska plaice (Pleuronectes quadrituberculatus). Most of the fish biomass is represented by these five species.

Saffron cod were the dominant species during the fall (September-October) sampling period making up 60 percent of the total catch. Saffron cod are an important subsistence resource throughout the area, and are harvested primarily during the winter. From spring through fall they are an important marine mammal food source. They are fall-winter spawners and eggs are deposited on sandy bottoms. Pelagic larvae have been found in the area in early spring.

Arctic cod are also an important marine mammal food source during the winter. Although distribution and movement patterns of the cod family Gadidae are not well known, it appears that Saffron cod tend to be distributed more nearshore than Arctic cod. Arctic cod appear to have a deeper-water, offshore distribution during the summer and inhabit the shallower, nearshore waters of Norton Sound during the winter. Generally, the codfishes move inshore in the fall, spend the winter and spawn nearshore, and then move offshore during summer. Both adult and juvenile forms are important forage fish.

Starry flounder appear to be the most abundant species of the family Pleuronectidae, in both offshore and nearshore waters. In terms of total abundance, from the 1976 survey (Wolotira et al., 1977) they were the second most abundant, comprising 17 percent of the demersal fishes in Norton Sound. They were the only flatfish species found in slightly brackish waters such as Imuruk Basin (Figure 1-1).

Yellowfin sole, the third most abundant demersal species from the same survey, represented 5 percent of the catches. This species migrates from deeper outer continental shelf and slope waters occupied in winter to shallower inner shelf waters (15 m to 76 m),

where spawning occurs in summer. In contrast to the cod, the migratory pattern for flatfishes that have been studied is an inshore movement in the spring, followed by summer spawning. Adults move offshore in fall and winter. Juveniles remain in shallow nearshore areas throughout their first few years before dispersing to offshore waters.

Alaska plaice spawning is confined to the continental shelf. Spawning has not been documented in Norton Sound. This species made up 3 percent of the 1976 survey catches.

Most of the demersal fishes in the 1976 survey were found in greatest abundance in areas where bottom waters were warmer than 9°C (39°F) and shallower than 30 m. Arctic cod were the exception, occurring at all temperatures and at depths greater than 20 m.

3.3.2 Pelagic Fish

The important groups of pelagic fish found in the study area include five species of North American Pacific salmon, with chum (Oncorphynchus keta) and pink salmon (O. gorbuscha) being the most abundant. Coho (O. kisutch), chinook (O. tshawytscha) and sockeye salmon (O. nerka) are far less abundant in this area, and are listed in rank abundance. Pacific herring (Clupea harengus pallasi), toothed smelt (Osmerus mordax dentex), and capelin (Mallotus villosus) are important forage fishes.

Salmon streams which are regularly surveyed by ADF&G (1978) or which are at least known to be salmon producers of some significance in the study area include Cripple Creek and the Bonanza, Eldorado (producing the largest number of fish in the Nome area), Fish, Flambeau, Nome, Penny, Sinuk, Solomon, and Snake Rivers (Figure 3-1).

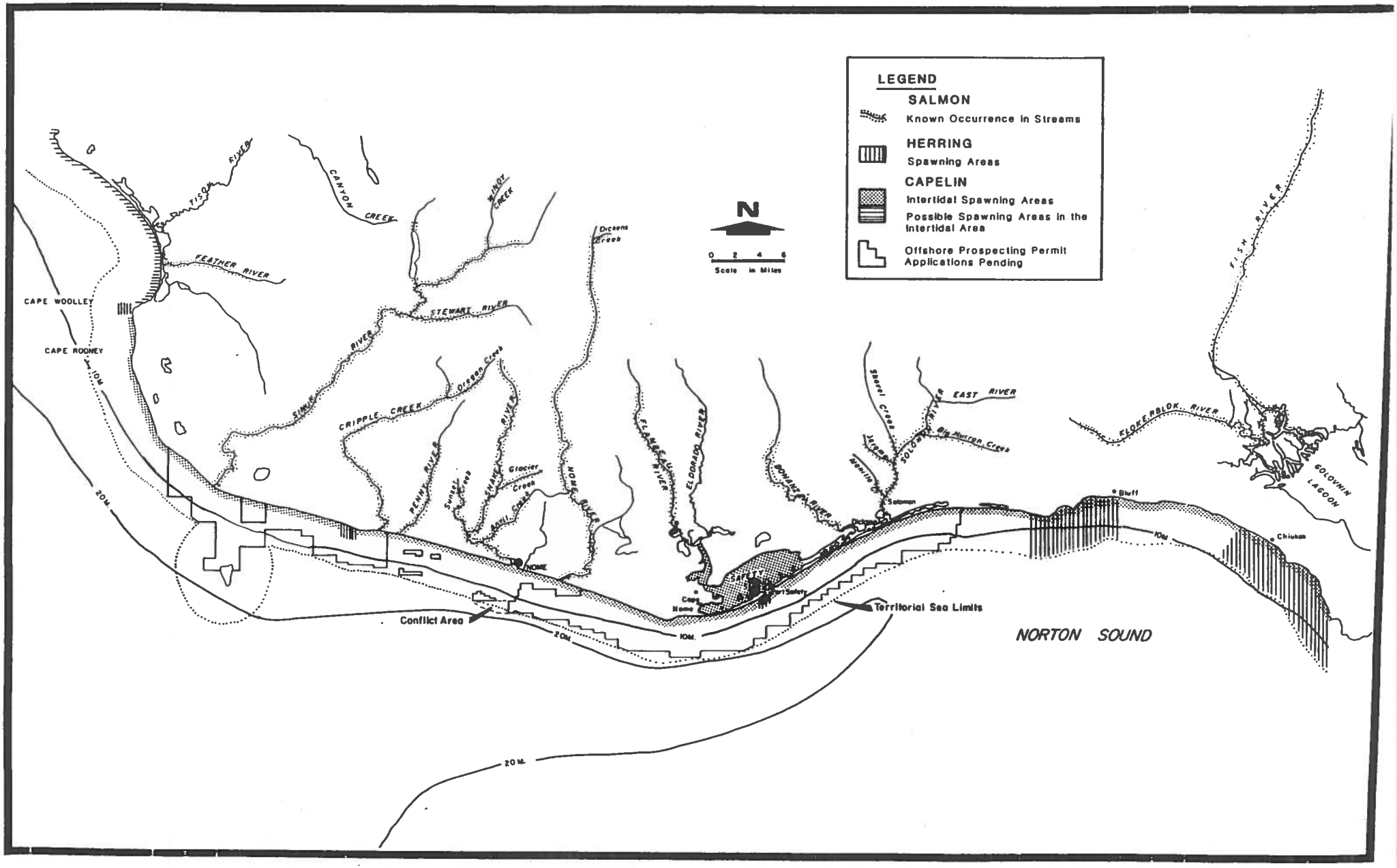


Figure 3-1. Spawning areas of salmon, herring and capelin (USDOI/MMS, 1988 modified as per C. Lean, ADF&G, personal communication,1989; ADF&G, 1986)

The commercial fishing season coincides with the adult salmon migrations into Norton Sound and runs from about mid-June through August. Chinook salmon are the earliest to appear and coho salmon are the latest.

Juvenile chum and pink salmon (fry) outmigrate in the spring from the previous fall spawning areas in freshwater to estuarine and nearshore regions in the study area. The fry may remain nearshore for several weeks before moving into ocean feeding areas. This period is believed to be a particularly critical phase for anadromous species as they adjust to the transition from a freshwater to marine environment. Predation, temperature, and food availability are basic factors influencing survival rates.

Most coho and chinook salmon remain in freshwater for one to four years after hatching. After leaving these freshwater areas, young salmon remain in nearshore waters for several weeks to several months before venturing further offshore (Bering Straits CRSA Board, 1984).

Herring movement into the Norton Sound coastal spawning areas appears to be greatly influenced by climatological conditions, particularly the Bering Sea ice pack. Most herring appear near the eastern Bering Sea coast immediately after ice breakup in mid-May and early June. Spawning progresses from south to north and continues until July and August along portions of the Seward Peninsula. ADF&G Commercial Fisheries Division field observations indicate that nearly all herring spawning within the study area occurs in late May and June (ADF&G, 1989). Herring spawning is primarily confined to intertidal and shallow subtidal regions in Norton Sound and generally occurs outside of the study area (Figure 3-1). Herring eggs hatch in two to three weeks as planktonic larvae, then metamorphose to juveniles in six to ten weeks. Juveniles have been found in Port Clarence, Grantly Harbor, Imuruk Basin, and Golovnin Basin (Figure 1-1), but detailed data on distribution of juveniles in Norton Sound are not available.

Toothed (rainbow) smelt are common throughout Norton Sound. This species represented 2 percent of the NMFS trawl survey catches in 1976 (Wolotira et al., 1977). They are an important forage fish and also contribute to the Norton Sound subsistence harvest. Spawning occurs in freshwater streams and estaurine areas. Known spawning occurs in the fall, and eggs adhere to aquatic plants and rocky substrates in these areas. Toothed smelt larvae are commonly found throughout the nearshore areas of Norton Sound.

Capelin exhibit characteristics very similar to herring in terms of spring spawning migration timing and utilization of the intertidal zone for spawning. Capelin, however, spawn on sandy beach areas and the eggs remain buried approximately two weeks before hatching. Known and suspected capelin spawning locations in the study area extend from Cape Rodney on the western edge of northern Norton Sound to Cape Nome on the east (Figure 3-1). Capelin are an important prey species for several species of marine mammals as well as marine birds.

3.3.3 Miscellaneous Species

Pacific sand lance (Ammodytes hexapterus), although not studied in any detail, are believed to be very similar to capelin in spawning migration timing and habitat use. Sand lance are widely distributed in nearshore areas of Norton Sound with the greatest abundance in the northern portion of the sound in the Golovnin Bay and Bluff areas (Figure 3-1). Sand lance are a basic and important forage fish for marine birds, particularly kittiwakes and murres.

Other species include arctic char, arctic grayling, burbot, sculpin, and various whitefish.

3.3.4 Important Fish Habitats or Areas

There are several important fish habitats in the Norton Sound area. These include numerous rivers and streams, nearshore and estuarine waters, and Safety Sound.

Salmon and other anadromous fish spawn in freshwater rivers and streams which empty into Norton Sound and the bays associated with Norton Sound (Figure 3-1).

Nearshore and estuarine areas provide spawning habitat for herring and saffron cod. In addition, some populations of herring are thought to occur in nearshore areas throughout the year. Salmon fry and smolts, juvenile herring, and toothed smelt larvae all feed in nearshore waters while adult salmon and herring enter nearshore areas in spring and summer (Bering Straits CRSA Board, 1984; USDOI/MMS, 1989).

Safety Sound is also an important area for fish. In addition to providing spawning and winter habitat for herring, Safety Sound serves as an important transition zone for many young anadromous fish which spend several weeks there after leaving their freshwater hatching grounds and before entering marine waters (Bering Straits CRSA Board, 1984; USDOI/MMS, 1989; C. Lean, ADF&G, Nome, personal communication, 1989).

3.4 Marine Mammals

3.4.1 Important Species

Five of the more common marine mammals found in the study area are the ringed seal (Phoca hispida), bearded seal (Erignathus barbatus), spotted seal (Phoca largha), beluga whale (Delphinapterus leucas), and Pacific walrus (Odobenus rosmarus). Occasional sightings of gray whale (Eschrichtius robustus) have also been known to occur within or adjacent the study area.

Although estimates exist for seal populations migrating through the Bering, Beaufort, and Chukchi Seas, there are no separate figures for the smaller populations within Norton Sound (L. Lowry, ADF&G, Fairbanks, personal communication, 1989). An unpublished 1981 report by Burns and a U.S. Department of Interior Final

Environmental Impact Statement for Norton Sound Oil and Gas Lease Sale 57 provide population estimates for marine mammals in the entire North Pacific region. Burns (1981) also includes the percentages of these total populations estimated to occur in the OCS area containing Norton and Navarin Basins. Although Burns' percentages are provided in the following sections, Norton Sound numbers would consist of only a portion of these percentages. it should also be noted that estimates are between 7 and 12 years old.

Ringed seal are the most abundant and widely distributed ice-inhabiting seal of the Bering, Chukchi, and Beaufort Seas. Approximately 1.0 to 1.5 million individuals occur in the North Pacific region, less than 10 percent of which may be found in the Norton and Navarin Basins. It is an abundant species in the study area (Figure 3-2). Ringed seal are migratory and leave their winter habitat zones of land-fast ice in the spring, following the retreating ice pack northward. Most of the seal spend the summer period in the Chukchi or Beaufort Seas. Breeding occurs from mid-April through May; pups are born the following year from mid-March through April. Both breeding and pupping occurs in the land-fast ice zone. Predominant diet items include Arctic and saffron cod, sculpins, shrimp, mysids, and amphipods.

Bearded seal occur throughout the study area where suitable ice conditions exist, e.g., ice overlying shallow water for bottom feeding (Figure 3-2). They prefer ice that is in constant motion, producing leads and openings. In contrast to ringed seal, they avoid shorefast ice areas. According to the U.S. Department of Interior (USDOI, 1982), the Bering-Chukchi population is estimated at 300,000 to 450,000 seals, 40 percent of which occur in the Norton and Navarin Basins. Migratory behavior indicates that bearded seal wintering south of the Bering Strait-Norton Sound region actively migrate northward in March and April, well ahead of ice decay and recession. By late June, most seal have passed by the study area through the Bering Strait.

Breeding and pupping characteristics are similar to the ringed seal, except that pups are born on ice floes. Independent pups are present in the area from May through June; some pups and subadults will remain throughout the open water season. Major food items include crabs, clams, shrimp, and some fish (mainly cod and sculpins).

Spotted seal occur throughout Norton Sound in nearshore waters during the ice-free summer and early fall period. Haulout areas in or near the study area include Cape Darby (Figure 1-1), Rocky Point, and Safety Sound (Figure 3-2). Spotted seal can, however, be seen at various locations along the coast (L. Lowry, ADF&G, Fairbanks, personal communication, 1989). For example, ADF&G biologists observed approximately 20 individuals west of the mouth of Cripple Creek in the fall of 1988 (C. Lean, ADF&G, Nome, personal communication, 1989). During the winter, spotted seal are closely associated with the ice edge south of Norton Sound. They follow the ice edge northward and landward to rest and feed during the summer. According to Burns (1981), approximately 10 to 30 percent of the 200,000 to 250,000 spotted seal estimated to make up the Alaska population occur in the Norton and Navarin Basins. Spotted seal feed mainly on pelagic fishes such as capelin, herring, cod, and salmon during the summer.

Beluga (Belukha) whales can be found throughout Norton Sound coastal areas and within the study area during the summer months (Figure 3-2). They appear nearshore with the onset of herring spawning populations in early summer and feed on these as well as a wide variety of other fish congregating or migrating nearshore. More than 12,000 beluga whales migrate annually through the northern Bering Sea (USDOI/MMS, 1989). An unknown number reside along the edge of the summer pack ice; the total population size is unknown.

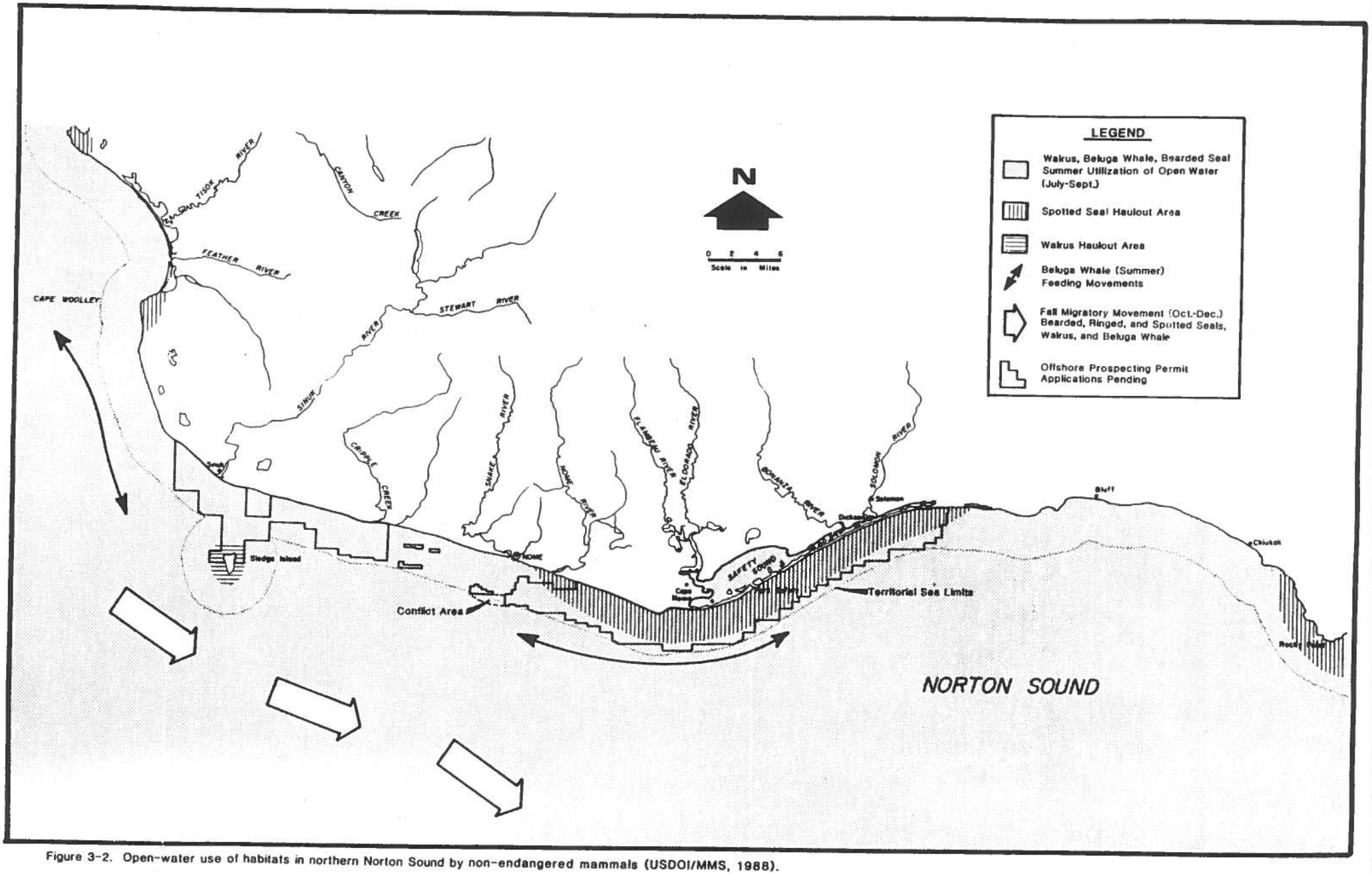


Figure 3-2. Open-water use of habitats in northern Norton Sound by non-endangered mammals (USDOI/MMS, 1988).

The winter distribution of these whales is restricted to regions of open water or young ice. Their migration is dependent upon ice conditions. The northward spring migration from southern wintering areas in the Bering Sea usually begins in late March or early April. Calving occurs in June and July; estuarine delta areas seem to be preferred, although calving may occur anywhere in near coastal areas.

Food habits of beluga can vary considerably by season or location, but some common items include saffron cod, pollock, octopus, capelin, halibut, and several species of crustaceans.

Pacific walrus are closely associated with loose pack ice. Since their winter distribution is restricted by heavy pack ice, walrus winter along the southern edge of the sea ice pack in areas which may vary annually dependent upon weather conditions (ADF&G, 1989). Walrus leave the wintering area in late March to begin a northward migration to summer feeding areas.

About 80 percent of the world population of walrus (250,000 to 300,000) occur seasonally in the Bering Sea, while 1,000 to 2,000 walrus (mostly adult males) frequent coastal haulout sites and islands near the study area.

Although most walrus activity occurs in the outer Norton Sound area, Sledge (Figure 3-2) and Besboro (Figure 1-1) Islands within Norton Sound are used occasionally as haulout areas.

Gray whales are the only endangered species within or adjacent to the study area. The current eastern North Pacific stock of gray whales is estimated at 21,000 individuals (IWC, 1988, in press).

Gray whales migrate from Baja California in February arriving at feeding areas near St. Lawrence Island in May and June. The whales begin their fall migration south around mid-October. Sightings are uncommon in Norton Sound, although some whales have been observed

in July and August. Several observations of gray whales in May and July have been recorded in the nearshore waters near Nome (Figure 3-3) (Frost et al., 1982; Ljungblad, 1981; Ljungblad et al., 1982 and 1983). None of the gray whales were observed exhibiting feeding behavior (mud plumes).

3.5 Marine and Coastal Birds

The largest seabird colony (40,000-60,000 birds) near the study area is located on the Bluff cliffs, east of Cape Nome, and two other sizeable colonies (4,000-8,000 birds) are located on Sledge Island (in the study area) and Square Rock (Figure 3-4). Smaller seabird colonies (1,000 birds or less) are located at Rocky Point, Cape Darby, Safety Sound and Topkok Head (Figure 1-1 and 3-3). Safety Sound is used by the rare Aleutian tern. Important local seabird colonies and prime wetland-nesting and feeding habitats of several breeding and migrant waterfowl and shorebird population exist in the study area (Figure 3-4). The most abundant seabirds include: common murres (35,000-70,000 birds), glaucous gulls (over 20,000 birds), black-legged kittiwakes (11,500-15,000 birds), horned puffins (1,600-4,500 birds), pelagic cormorants (1,470-2,500 birds) and thick-billed murres (950-1,250 birds); small numbers of parakeet auklet, tufted puffin, and pigeon guillemot also breed in Norton Sound (Drury et al., 1980; Roseneau et al., 1982) while peregrine falcons also nest along the coast (Figure 3-3).

Seasonal seabird occurrence (breeding, nesting, and feeding activities) in the study area is generally from May through September. The most abundant seabird species prey on fish during the nesting season with sand lance, cod, and prickleback being important food items.

According to bird census data, the common murre population at Norton Sound's largest bird colony--the Bluff Cliffs--declined markedly (from 75,000 to about 40,000 birds) from the late 1970's

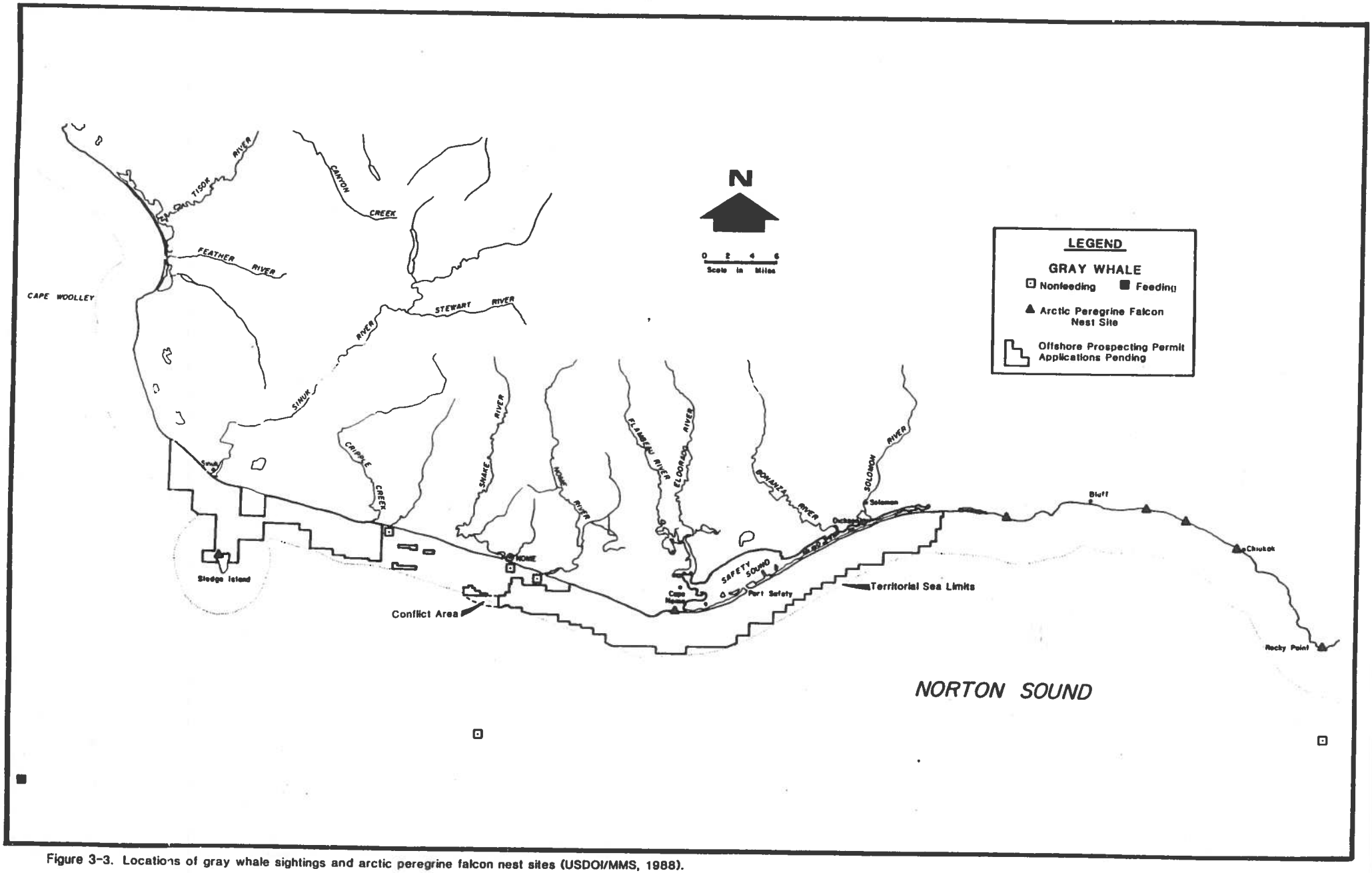


Figure 3-3. Locations of gray whale sightings and arctic peregrine falcon nest sites (USDOI/MMS, 1988).

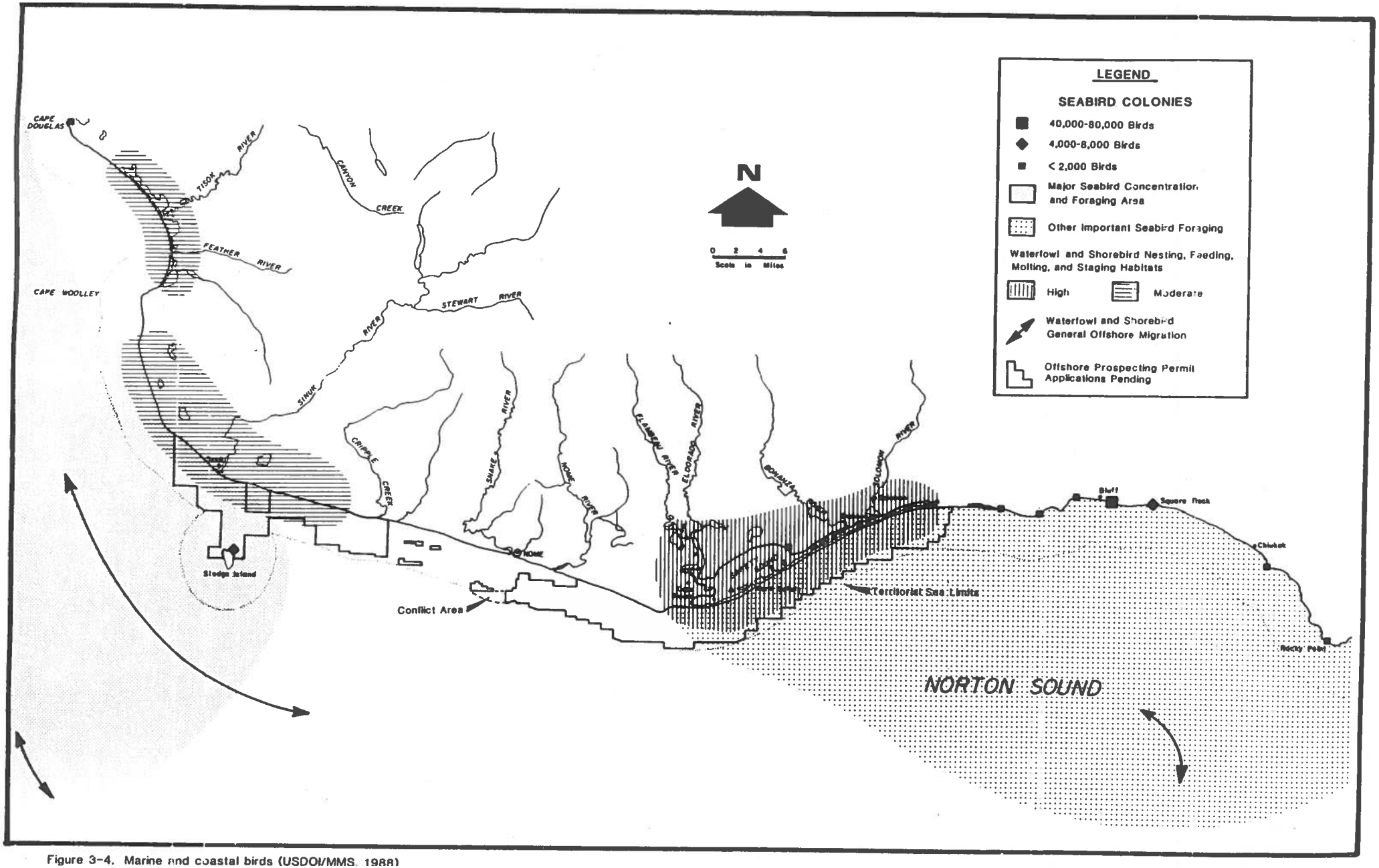


Figure 3-4. Marine and coastal birds (USDOI/MMS, 1988)

to the present; the decline is attributed to low reproductive success in recent years and low survival in wintering areas in the southeastern Bering Sea (Murphy et al., 1985).

Although studies continue to determine the cause for this decline, preliminary results suggest that competition between murres and the commercial fishery for pollack in the murres' wintering areas is most likely the primary cause for their low survival in these wintering areas (E. Murphy, University of Alaska Fairbanks, personal communication, 1989). The low reproductive success may be attributed to disturbance during egg-laying which occurs from about the second week in June through early July. Although disturbances from aircraft during egg-laying may cause a decrease in the bird's reproductive success, there is currently no data to either support or refute this (E. Murphy, University of Alaska Fairbanks, personal communication, 1989). Shooting of adult birds on cliffs has, however, caused up to a 10 percent loss of eggs (E. Murphy, University of Alaska Fairbanks, personal communication, 1989).

The most abundant waterfowl species occurring in Norton Sound include: pintail duck (17,000; 1.4 percent of the eastern Bering Sea population), American widgeon (7,900; 40 percent of the eastern Bering Sea population), Taverner's Canada goose (6,700; 13 percent of the eastern Bering Sea population), greater scaup (3,600; less than 1 percent of the eastern Bering Sea population), Pacific brant (several thousand; less than 10 percent of the eastern Bering Sea population), and whistling swan (3,350; 11 percent of the eastern Bering Sea population) as reported in Woodby and Divoky (1982). Safety Sound is an important area for waterfowl nesting, feeding, and staging (USDOI/MMS, 1989).

Thirty-one species of shorebirds use coastal habitats and wetlands of Norton Sound for feeding and/or nesting. The most abundant include semipalmated sandpiper (over 80,000 nesting population), northern phalarope (57,000 nesting population), western sandpiper

(over 15,000 post-breeding population), and dunlin (over 13,000) (Woodby and Divoky, 1982). Sandhill crane also are a common migrant species with over 20,000 occurring in Norton Sound. High-use, coastal wetland habitats adjacent to the study area include Golovnin Bay/Fish River Delta, and Safety Sound (Figures 1-1 and 3-3). Moderate-use wetlands adjacent to the study area include Woolley Lagoon, Port Clarence, and Brevig Lagoon. Waterfowl use of coastal wetlands for feeding and staging reaches its peak in August and September. High use of some coastal wetlands by shorebirds for feeding occurs in May. Migratory waterfowl also concentrate at coastal wetlands in the spring (May-June).

Common birds of prey present in the study area during the spring, summer, and fall include gyrfalcon, peregrine falcon, marsh hawk, merlin, snowy owl, common raven, and short-eared owl. The golden eagle, and rough-legged hawk also are present.

The threatened arctic peregrine falcon occupies coastal nesting sites near and adjacent to the study area generally from April to September (Figure 3-3). Nesting sites are usually associated with seabird-nesting colonies located on cliffs and bluffs, because peregrine falcons primarily prey on accessible avian populations. Consequently, most nest sites have been discovered in conjunction with seabird surveys. In a sampling of nest prey remains, Wright (1987) found a mixture of seabirds, shorebirds, and passerines. Wright (1987) conducted a limited raptor survey of the area during July 1987 and found an increase in peregrine falcon nesting activity from previous records. Six of the eleven historical nest sites along the northern shore of Norton Sound had nesting peregrine falcons and one new nest has been established in the area at Cape Nome in the rock quarry used to obtain rock for the Nome causeway (R. McLean, ADF&G, Fairbanks, personal communication, 1988). These seven nests represent 23 percent of the 30 nests occurring in the arctic peregrine falcon population from Cape Lisburne to Cape Denbigh in Norton Sound, including tributaries

(USDOI/MMS, 1989). Usually by September, the young have fledged and migration begins to their wintering areas in Central and South America.

4.0 COMMUNITY AND LAND USE CHARACTERISTICS

4.1 Socioeconomic Data

4.1.1 Setting and Population

Region

The study area lies in state waters off the northern shore of Norton Sound, stretching from Rocky Point to the east to Woolley Lagoon to the west. The City of Nome is the primary community that would be affected by the lease sale and has the base of operations of current and historic mining activities. The study area also includes waters and resources that are used by residents of other communities for commercial fishing and subsistence activities. These communities include Golovin, White Mountain, and Solomon, as well as several small Native enclaves from other villages that may live in Nome during part or all of the year.

Solomon is a community of six year-round residents located east of Nome on the Council highway. The community's population increases when relatives and former residents arrive during the summer and on weekends to subsistence hunt and fish. Because the permanent population is so small, however, Solomon is not addressed in this section as a major community, but is further addressed in the subsistence section. Nome's Native community is comprised of individuals from all of the region's villages; collectively they represent the region's Central Yupik, Siberian Yupik, Northern Inupiat and Southern Inupiat cultures (collectively referred to as Inuit). The characteristics of Nome's "subcommunities" are also addressed in this section.

Nome

Nome is the largest community on the Seward Peninsula and is the center for government, transportation, and commerce in the Norton Sound region. Nome was settled in 1898 after gold was discovered

on Anvil Creek, a tributary of the Snake River. Prior to 1898, there were several seasonal Native camps in the Nome area, but it was not the site of a permanent village due to the relatively limited availability of resources and unfavorable sea ice conditions. Nome is the only community on the Seward Peninsula organized as a first class municipality.

Nome was settled by people who came in search of fortune, and its history is characterized by a series of boom and bust cycles and by a fluctuating population. In 1900 there were 12,488 people living in Nome, but by 1920 the population had dropped to 852 due to waning gold discoveries, a major influenza epidemic, and the outbreak of World War I. Gold production stopped during World War I and did not resume until 1923. The gold industry came alive with renewed vigor between the two world wars, and Nome became the hub for transportation and government agencies in the region. During World War II, the headquarters of the Alaska Territorial Guard was located in Nome; arms, supplies and lend-lease aircraft on their way to the Soviet Union were routed through Nome's newly constructed air base. Many Natives came to Nome from nearby villages during the war because of the availability of work.

Nome's population increased steadily between 1920 and 1980 (Table 4-1). Between 1981 and 1985 it grew by 27.5 percent but has remained stable at 3,876 people between 1985 and 1987. Nome still has a relatively large non-Native population (Table 4-2) and is the center for interethnic contact in the region. There are many subcommunities within the city which are comprised of small populations from other villages (e.g., King Island). These people's ties to their natal communities remain strong today, and community of origin is important both in terms of one's identity and in terms of the harvest of subsistence resources. In general, members of Nome's subcommunities return each year to their natal communities to harvest the traditional subsistence resources of that area. For example King Islanders, who all live in Nome, return to the island every spring and summer to harvest.

Table 4-1. Nome population growth 1900 to 1987[1] (USDOI/MMS, 1988).

Year	Area	Population
1900	Nome, Town	12,488
1910	Nome, Town	2,600
1920	Nome, Town	852
1930	Nome Townsite, Inc.	1,213
1940	City of Nome	1,559
1950	City of Nome	1,876
1960	City of Nome	2,316
1970	City of Nome	2,488
1980	City of Nome	3,000
1981	City of Nome	3,039
1982	City of Nome	3,430
1983	City of Nome	3,620
1984	City of Nome	3,732
1985	City of Nome	3,876
1986	City of Nome	3,876
1987	City of Nome	3,876

[1] The population survey conducted by the Census Bureau in 1980 was seriously flawed and has been discarded by planners. The population figure of 3,000 for the year 1980 is approximate and based on discussions with local officials and a review of the information collected in the 1980 Census Bureau survey.

Table 4-2. 1986 population of Nome by age, sex, and race (USDOI/MMS, 1988).

	Age						
	0-4	5-14	15-19	20-34	35-64	65+	Total
Total	347	758	365	1,149	1,031	226	3,876
Male	184	396	192	605	546	128	2,050
Female	163	362	173	544	485	98	1,826
Native	232	542	249	578	509	175	2,286
Male	124	286	118	312	236	93	1,169
Female	108	256	131	266	273	82	1,117
Non-Native	114	216	116	571	522	50	1,590
Male	59	110	74	293	310	35	881
Female	55	106	42	278	212	15	709

Golovin

The village of Golovin is located on a point of land between Golovnin Bay and Golovnin Lagoon, 113 km east of Nome and 68 km east of Solomon. It is the original site of the Central Yupik village "Chinik". When gold was discovered in 1898, Golovin became a major supply point for the Council (Figure 1-1) gold fields. The population temporarily grew, only to shrink back close to its original size when the gold rush was over. The city of Golovin estimates that there are 158 people currently living in Golovin (H. Egelek, City of Golovin, personal communication, 1989). This population is almost exclusively Native Alaskan.

White Mountain

White Mountain is located near the mountain of the same name on the east bank of the Fish River near the head of Golovnin Lagoon. It is 24 km northwest of Golovin, 53 km east of Solomon, and 129 km east of Nome. White Mountain is the original site of the Inupiat village "Nutchirviq". Like Golovin, White Mountain experienced a sharp increase in population and activity when gold was discovered in 1898, followed by a decrease when the gold was played out. There are an estimated 87 people living in White Mountain today (C. Bronsin, City of White Mountain, personal communication, 1989); almost all are Native Alaskan.

4.1.2 Employment and Income

Nome

Nome is the center for wage employment in the Norton Sound region, and in 1983 provided 62-66 percent of regional employment and 70 percent of regional wages (Ellanna, 1983). Nome has a mixed economy based on industry, government, and subsistence. The three largest employers in Nome between 1980 and 1987 were the Norton Sound Health Corporation (NSHC), the Nome City School District, and

the Alaska Department of Transportation and Public Facilities (DOTPF) (Impact Assessment, 1987). Table 4-3 shows annual wage and salary employment in different sectors of the Nome economy from 1980 to 1986. The number of jobs available in Nome grew by 23 percent between 1980 and 1986; between 1982 and 1986 the number of available government jobs increased 38 percent (USDOI/MMS, 1988).

The percentage of Natives with wage and salary jobs is less than that of non-Natives. In 1980, the labor force participation rate was 50 percent for Native males and 56 percent for Native females. This is compared with 67 percent for non-Native males and 63 percent for non-Native females (USDOI/MMS, 1988).

There are distinct seasonal fluctuations in employment in Nome caused by a greater availability of work during the summer months. Summer employment is available with the Alaska Gold Company which hires an additional 40 to 110 persons, and with WestGold which operates the Bima, an offshore mining dredge. The Bima operates 24 hours a day between May and November and, as of November 1988, employs approximately 128 people, 79 percent of whom are hired locally, 86 percent of whom were hired from within the state of Alaska (P. Rusanowski, WestGold, Nome, personal communication, 1989). It should be noted that it is difficult to determine exact local hire rates due to different definitions of local hire and that WestGold has the best local hire record in the mining industry. WestGold also offers three college scholarships to Native high school students and guarantees summer employment to them. Other summer jobs frequently available include road construction and marine transport. Seasonal workers come from villages in the region and from elsewhere in Alaska and the lower 48 states. Seasonal fluctuations in employment are depicted in the graph in Figure 4-1.

Unemployment data for Nome are embedded in figures for the whole Nome Census Division, which includes Nome and the surrounding villages. When compared to Nome, there are relatively few wage

Table 4-3. Industry employment for the city of Nome (Alaska Department of Labor, 1986 cited in USDOI/MMS, 1988).

Industry Classification	1980	1981	1982	1983	1984	1985	1986
Mining	*	*	*	*	100[1]	62	87[2]
Construction	22[2]	36[2]	61	75	67[2]	41	31
Manufacturing	*	*	*	*	*	*	*
Transportation, Communication, and Public Utilities	120	120	120	124	100	74	77
Trade	148	176	196	195[2]	200	202	221
Finance, Insurance, and Real Estate	30	36	37	47	45	61	40
Services	540	517	406	432	446	471	456
Government	403	411	430	454	458	471	464
Federal	98	89	79	88	91	98	93
State	172	186	213	236	236	240	236
Local[3]	133	136	138	130	131	133	135
Miscellaneous	0	*	*	*	*	*	*
TOTAL	1,263	1,296	1,250	1,327	1,416	1,382	1,376

* Figures withheld to comply with disclosure regulations.

1 Prorated from six months of data.

2 Prorated from nine months of data.

3 Impact Assessment, 1987.

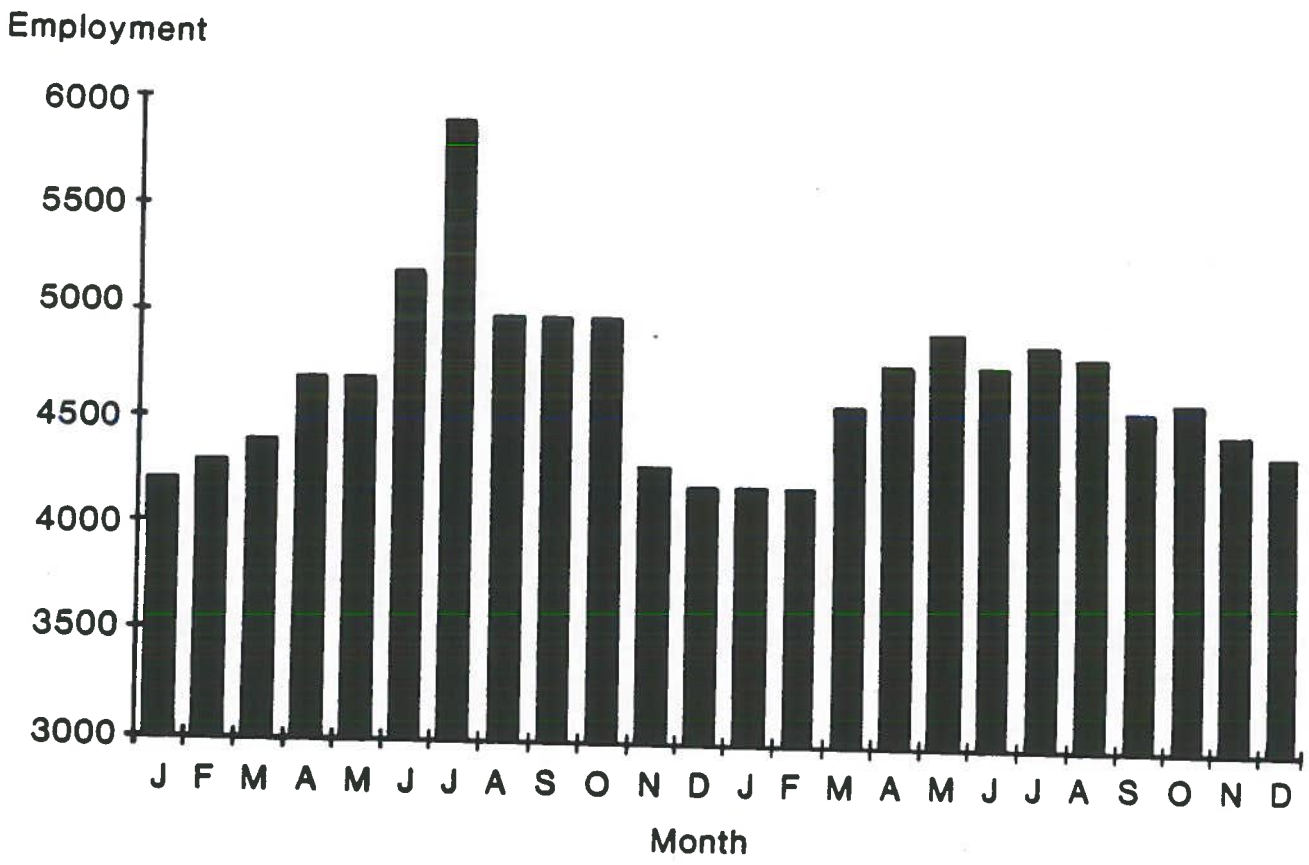


Figure 4-1. Seasonal variation in labor force, Nome Census Division, 1983-1984 (Impact Assessment, 1987).

and salary jobs in the villages; the census division figures may therefore overestimate the unemployment rate for Nome. Table 4-4 displays labor force and unemployment data for the Nome Census Division for 1983 and 1984. It should be noted that as a result of statewide economic decline, regional wages and employment have declined since 1984; as previously stated, the number of both private and public sector jobs available in Nome grew between 1980 and 1986.

In 1986, the total personal income per capita in Nome was $13,747 (ADL, 1988). This is 31 percent below the corresponding Anchorage income and 6 percent below the U.S. average with the cost of living not considered. A study conducted by the Alaska Department of Administration in 1985 estimated that the cost of living in Nome was 33 percent above Anchorage and 47 percent above Seattle (State Department of Administration, 1985). These figures do not account for subsistence activities.

Golovin

Golovin has a mixed economy based on subsistence harvests and wages. The City of Golovin provides jobs for approximately 15 people, including three to four power/utilities personnel, a public safety officer alternate, three to four maintenance persons, and two clerks. The city also hires seasonal employees for snow removal, trail staking, and capital improvement projects. Capital improvement projects for the summer of 1989 will, pending funding, include completion of the city's water and sewer system. The Bering Straits School District employs 11 people, including five teachers, three teacher's aids, two maintenance persons, and a cook. Other employers include the DOTPF which provides an airport manager; NSHC which employs a health aide and an alternate health aide; Kawerak, Inc. which provides the village public safety officer; Olsen's store; and Olsen Air. There are four airline agents working in Golovin.

Table 4-4. Labor force and unemployment of Nome Census Division, 1982-1984 (Impact Assessment, 1987).

	Labor	Unemployment Rate	
	Nome Census Div.	Nome Census Div.	State of Alaska
1982			
December	4,288	9.3	10.5
1983			
January	4,390	10.0	12.9
February	4,524	9.2	12.9
March	4,776	10.2	12.5
April	4,754	10.2	11.5
May	5,236	8.7	10.8
June	5,851	8.6	10.1
July	5,037	8.8	8.9
August	5,023	9.0	8.6
September	5,045	6.9	8.0
October	--	--	--
November	4,371	8.4	9.9
December	4,335	11.2	10.9
1984			
January	4,383	10.2	13.2
February	4,656	11.5	13.1
March	4,812	10.2	12.2
April	4,955	12.8	11.8
May	4,713	9.8	10.6
June	4,879	12.0	9.9
July	4,758	8.8	9.1
August	4,623	8.4	8.5
September	4,702	8.1	

-- Data not available.

There are 15 people in Golovin who hold limited entry permits for commercial salmon fishing. Each permit holder usually hires two or three additional people as crew. People from Golovin participate in both the Norton Sound commercial salmon fishery and herring fishery. It is difficult to determine how many fishermen participate in the commercial herring fishery because it is not yet a limited entry fishery and no permit will be required until the 1990 season. It is estimated, however, that more people fish for herring than for salmon.

Residents of Golovin rely heavily on subsistence harvests for economic, nutritional, and cultural reasons, and paid work often revolves around subsistence schedules. Subsistence is of added importance to Golovin residents since the 1985 closure of the Golovin Fish Cooperative, a local processing plant that had operated in the village since 1962 and had employed 20 to 30 people seasonally. It is difficult to attach a dollar value to subsistence resources. Current subsistence expenditure data are given in Section 4.2. Commercial fishermen and their crew members often retain a portion of their catch for subsistence purposes.

Native residents are shareholders in Golovin Native Corporation which is entitled to 92,160 acres of land under Section 12(a) of the Alaska Native Claims Settlement Act (ANCSA).

White Mountain

White Mountain has a subsistence and wage-based economy similar to Golovin's. The village employs eight people on a regular basis including three alternate health aides, two clerks, two maintenance persons, and an alternate public safety officer. The Bering Straits School District employs 10 people, including a principal, four teachers, three teacher aides, and two maintenance persons. The White Mountain Native Corporation owns the village's two commercial enterprises--the White Mountain store and the White Mountain Lodge. The village store employs two people full time,

and the lodge usually employs two or three plus additional help in the summer. NSHC employs one health aide. There is a reindeer herding operation in White Mountain which is run by one person who occasionally temporarily hires additional people. There are three airline agents working in White Mountain. The availability of seasonal work is variable. In 1988 no summer jobs were available in the village; the construction of 15 new HUD (Housing and Urban Development) homes should, however, create work during the summer of 1989.

People from White Mountain participate in the Norton Sound commercial salmon and herring fisheries. There are two people in White Mountain who hold limited entry commercial salmon fishing permits. These people fish in Golovnin Bay and typically each take on two or three crew members each season. It is difficult to determine exactly how many fishermen participate in the commercial herring fishery because it is not yet a limited entry fishery and a permit will not be required until the 1990 season; it is estimated, however, that more people fish for herring than for salmon (J. Banta, Bering Sea Fisherman's Association, Anchorage, personal communication, 1989).

Like Golovin residents, White Mountain residents depend on subsistence resources to make up a substantial portion of their diet. Many residents spend the bulk of their summer at family fish camps along local rivers. Current subsistence expenditure data are given in Section 4.2.

Native residents are shareholders in White Mountain Native Corporation which is entitled to 92,160 acres of land under Section 12(a) of ANCSA.

4.1.3 Community Infrastructure

Nome

Government - Nome was established as a first class municipality in 1901. It is governed by a mayor and a six member city council, but the daily administration of the city is handled by a City Manager. As a first class municipality, Nome has the power to tax and the responsibility to provide police protection, educational services, water, power, planning, street maintenance, and sewer and solid waste disposal.

Several state and federal agencies with regional jurisdiction are headquartered in Nome, and therefore significantly influence the local economy and government. Federal agencies represented in Nome include the Federal Aviation Administration (FAA), the National Weather Service (NWS), the Bureau of Indian Affairs (BIA), the U.S. Fish and Wildlife Service (USFWS), and the Bureau of Land Management (BLM). State agencies present in Nome include the Alaska Department of Transportation and Public Facilities (DOTPF), Northwest Community College (NWCC), the Department of Community and Regional Affairs (DCRA), the Anvil Mountain Correctional Center, the Alaska State Troopers, the Alaska Department of Fish and Game (ADF&G), the Alaska Department of Environmental Conservation (DEC), the Department of Health and Social Services, the Public Assistance office, and a district court. Together these federal and state agencies employed 329 people in Nome in 1986, while the city employed 135 (Table 4-3). Between 1980 and 1986, the City of Nome received approximately half of its operating budget from state and federal programs; state and federal agencies provided 22 percent of all the wage and salary jobs available in the city (Impact Assessment, 1987).

There are several Native organizations which play significant roles in the local and regional political systems. Nome's village corporation is Sitnasuak Corporation which has 2,147 living

shareholders, 1,500 to 1,600 of whom live in Nome. Sitnasuak is a for-profit corporation entitled to 161,280 acres of land under Section 12(a) of ANCSA. Nome Eskimo Community is the community's traditional council established under provisions of the Indian Reorganization Act (IRA) of 1934. Bering Straits Native Corporation and Kawerak, Inc. are, respectively, the regional profit and non-profit corporations established pursuant to ANCSA. Both corporations are headquartered in Nome.

Transportation - Nome is accessible from outside the region by air year-round or by sea between June and September. In addition to sea and air travel, regional access includes state highways which are maintained in summer only and overland travel in winter.

The sea is the primary route used to ship bulk food, fuel, and supplies. The City of Nome has completed the first phase of a new port and harbor facility that currently features a 762 m rubble mound causeway and will later also feature berthing space for one 122 m barge when all four phases of construction are completed. Phase I facilities are being operated by the City of Nome Port Authority. It has not yet been determined if the port will ultimately be run by the Port Authority or if a private firm or coalition will bid for control (Alaska Department of Community and Regional Affairs, Nome, personal communication, 1988).

Most passengers, mail, and fresh food traveling to the Bering Straits region by air arrive in Nome. The principal airport is Nome Field which is located 3.2 km east of downtown and is owned and operated by DOTPF. Nome Field has two paved runways, one with a complete instrument landing system and an FAA-operated flight service station. The runways are 1,830 m by 46 m east/west, and 1,700 m by 46 m north/south. Alaska Airlines provides two to three flights a day to and from Anchorage, and three flights a week to Golovin, White Mountain, and other villages in the Bering Straits region via Bering Air (an Alaska Airlines contract airline). Other local flight businesses providing passenger and freight

transportation to the Norton Sound area out of the airport are Cape Smythe Air, Olsen Air, and Ryan Air. In addition, MarkAir and Northern Air Cargo fly freight into Nome.

Nome also has a city airport which is mostly used by private pilots. It has one 976 m gravel airstrip, no navigation aids, and is not maintained in winter.

There are three state highways linking Nome to other communities: A 116-km gravel highway leading west to Teller, a 118 km gravel highway leading east to Solomon and Council, and the Taylor highway, a 211 m gravel road leading north toward Mary's Igloo. During the summer the DOTPF fully maintains the Teller and Council highways and the first 130 km of the Taylor highway.

Communications - Telephone service in Nome is provided by the privately-owned General Telephone Company. Television is provided by an Alascom ground station and by Nome Cablevision. The region's two radio stations, KNOM - AM and KICY - AM/FM, both operate out of Nome. The Nome Nugget is the local weekly newspaper. In addition, state agencies and the University of Alaska have direct access to the State's and University's electronic mail systems, and several public and private sector organizations are currently using facsimile machines.

Health and Social Services - All Bering Straits regional health and social services organizations are based in Nome. Health care to Nome residents is provided by the NSHC which offers both hospital and community health services. The Alaska Area Indian Health Service Regional Hospital, which is managed by NSHC, is comprised of two attached buildings with 50,000 ft^2 of combined space (S. Daniels, NSHC, Nome, personal communication, 1989). There are currently 157 full-time staff members at the hospital (NSHC, personal communication, 1989).

There are a wide variety of public and private social service organizations in Nome which are organized and funded at several different levels and which provide a variety of different programs. These organizations and programs include:

- The Nome Receiving Home, a private, non-profit institution which runs an emergency shelter for children;
- The Nome Community Center which runs a teen alcohol and drug intervention and prevention program and is funded by the State of Alaska;
- The Bering Sea Women's Group, a non-profit funded by the state to operate a regional women's shelter;
- The Nome Eskimo Community, Nome's Native non-profit corporation which provides housing and employment services;
- The State Division of Family and Youth Services which provides counseling and referral services and is charged with investigating all reports of child/adult abuse and neglect;
- Kawerak Social Services which, under contract from the State Department of Health and Human Services, is in charge of placing children in foster homes and provides counseling and management services;
- NSHC which provides a homemaker program and which, under a grant from the State of Alaska, conducts a child neglect/abuse prevention project; and
- The State Division of Public Assistance which provides Adult Public Assistance, Aid to Families with Dependent Children, and Food Stamps.

Housing and Education - In December 1988, there were 1,742 housing units in Nome; approximately half were single family homes. Most housing structures in Nome are of wood frame construction and are relatively small (600 to 1,200 ft^2). A single family, 800 to 1,200 ft^2 dwelling sold for $100,000 to $180,000 in 1986 (Impact Assessment, 1987). A 1981 field inventory of housing conditions in Nome revealed that only 23 percent of all housing units were structurally sound, while 60 percent were deteriorated and in need of minor repairs, and 17 percent were badly deteriorated and needed

major repairs (Environmental Services Limited, 1981). The remaining one percent was found to be deteriorated beyond repair. Most of these homes were located in the center of town.

Rental fees increase sharply during summer months when the availability of seasonal employment increases the demand for housing (Ellanna, 1980). In 1986, rental rates for a two-bedroom quality apartment or duplex ranged from $900 to $1,200 a month, with a vacancy rate of 3 to 10 percent. Rentals of lesser quality rented for $600 to $800 per month, with a vacancy rate of 15 to 20 percent (Impact Assessment, 1987). The housing market has been depressed during the past few years, increasing the number of houses available for rental. In addition, land is available that has been subdivided and connected to city water and sewer systems (T. Holder, USDOI/MMS, Anchorage, personal communication, 1988).

Government-subsidized housing in Nome includes a 21-unit senior citizen housing project, the 50-unit Bering View project, and the King Island community housing project built in 1975.

The Nome City School District operates two educational facilities, the Nome elementary school and the Nome/Beltz junior and senior high school. The new Nome elementary school, which accommodates children in kindergarten through sixth grade, opened in the fall of 1988 (D. Adams, City Office, Nome, personal communication, 1988). The Nome/Beltz high school is a 62,700-ft^2 building which includes eleven general classrooms, vocational facilities, an 11,700-ft^2 gymnasium, a dormitory, and district offices.

Kawerak, Inc. provides adult basic education and a general education degree (GED) program in Nome. Higher education is provided by NWCC which is part of the University of Alaska's rural college network. NWCC offers between 50 and 75 courses per term in a wide variety of subjects, ranging from liberal arts courses to applied and vocational education courses. NWCC also offers a for-credit health aide program which is funded by NSHC and

occasionally conducted staff development seminars for agencies and businesses in Nome. NWCC offers their courses in all Bering Straits communities through audio communications.

Utilities - The Nome Joint Utility Board (comprised of five elected members) has responsibility for city utilities that have been substantially upgraded since 1980.

Nome's electric power utility has an 11,150 kilowatt (KW) generating capacity. Cost per KW hour is currently $0.15. In December 1988, there were 1,349 customers being served by the city utility. The Alaska Gold Company owns and operates a separate generating and distribution system.

In November 1988, 753 out of 1,742 households were connected to Nome's central water and sewer system. The public water supply comes from a reservoir fed by Moonlight Springs. Residents who do not receive central water and sewer services have water trucked to their homes and use the Sani-Clean (honey bucket) collection service. Wastewater from FAA housing is treated by a small separate plant.

The city operates a 20 acre solid waste landfill within city limits. Included in this landfill is an open honey bucket lagoon. There is concern in the community that the landfill, which is not covered everyday, is not sanitary and may pose a health threat (City of Nome, personal communication, 1989).

Golovin

Government - The City of Golovin was incorporated in 1971 as a second class city. The city operates under the authority of a mayor elected from a seven-member city council and is a participant in the state's revenue sharing program. Golovin's Native population is represented by a seven-member combined IRA and Traditional Council. Due to a lack of funding at the community

level, many services generally provided by local government such as local health care, employment assistance, and tribal operations are provided by Kawerak, Inc. and the NSHC.

Transportation - Access to Golovin is limited to air, sea, and well-established routes on local rivers. During the summer, residents use the 5.6 km of roads surrounding the village and travel to neighboring villages and camps by boat. In winter, the roads in the village are not maintained, but people travel extensively by snowmachine, all terrain vehicle and dogsled overland and along the river corridors. Travel is influenced by ice conditions throughout the winter. Golovin Bay usually breaks up in mid-May and freezes in early November.

A 3,811 m by 152 m north/south insulated gravel airstrip was constructed in Golovin in 1987. A second 244 m long east/west, sandy airstrip also exists, but it is in poor condition and is very susceptible to flooding. There are three local flight services which provide passenger and freight transportation to Golovin: Ryan Air which flies five days a week; Olsen Air which flies twice daily, six days a week; and Cape Smythe Air which flies six days a week. In addition, Alaska Airlines provides passenger service to Golovin three days a week via Bering Air. All goods are currently brought into Golovin by private, local barge lines or air services.

Approximately 21,000 gallons of gasoline are sold at $2.00 per gallon in Golovin each year.

Communications - In addition to telephone and citizen's band radio communications, residents of Golovin receive both of Nome's two radio stations and are in audio contact with NWCC in Nome. Golovin Native Corporation plans to install cable television in the summer of 1989.

Health and Social Services - Health and social services in Golovin are provided by the NSHC and by Kawerak, Inc. The village health clinic (built in 1976) is staffed by one full-time health aide and an alternate health aide. The clinic receives an average of three patient visits a day (S. Daniels, NSHC, Nome, personal communication, 1989). Other health professionals who serve the community on a regular basis include:

- a public health nurse who visits four to six times during a school year;
- a general practitioner and a dentist who visit two weeks a year; and
- an optometrist who visits once each year.

A mental health clinician from NSHC in Nome goes to Golovin four times a year. Kawerak, Inc., under contract from the Alaska Division of Family and Youth Services, provides case workers assigned to each individual or family in need of social services. Case workers make quarterly visits to the village and coordinate with the health aide for interim services. Kawerak also authorizes homemaker services which are then provided by NSHC. The Northern Lights Recovery Center, NSHC's alcohol treatment center in Nome, also provides services in Golovin and other villages. The health clinic maintains daily radio and telephone contact with the regional hospital in Nome.

Housing and Education - The city of Golovin estimates that there are now approximately 60 inhabitable, single family homes in the community (H. Egelek, City of Golovin, personal communication, 1989).

Golovin's elementary school and high school are both administered by the Bering Straits School District which is based in Unalakleet. The buildings were constructed in 1978 and 1980, respectively. Kawerak, Inc. funds a headstart program in Golovin through the Job Training Partnership Act. The program operates three hours each

weekday. Kawerak also provides adult basic education courses and a GED program. Higher education is provided by NWCC which is based in Nome and is part of the University of Alaska's rural college program. NWCC offers between 50 and 75 courses a term on a wide variety of subjects ranging from liberal arts to applied and vocational education. Golovin residents, including some accelerated high school seniors, access these courses through audio terminals at the high school.

Utilities - Golovin has had a central electrical power system since 1982. The village water supply which comes from nearby Chinik Creek is stored in two 300,000-gallon tanks and is delivered to homes by truck. The water is filtered, chlorinated, and fluoridated. A central water and sewer system is now under construction and will be completed upon further funding. Approximately 88 percent of Golovin residents heat their homes with oil which currently costs $95 a barrel (Alaska Department of Community and Regional Affairs, Nome, personal communication, 1988); the remainder heat their homes with drift wood. Approximately 100,000 gallons of oil are consumed in Golovin each year.

White Mountain

Government - White Mountain is a second class municipality incorporated in 1969. It operates under the authority of a mayor elected from a seven-member city council. The Native population is also represented by a seven-member IRA Council. Due to a lack of funding at the municipal level, several services, including CETA (Federal Comprehensive Employment Training Act), adult basic education, and subsistence programs are provided by Kawerak, Inc. and the NSHC.

Transportation - Major access to White Mountain is limited to air travel and by sea via the Fish River. Residents also frequently travel overland to Nome in the winter. The Fish and Niukluk Rivers

serve as summer and winter transportation corridors to Golovin, Council, and the coast. Travel along these rivers is influenced by ice conditions; the Fish River typically breaks up in mid-May and freezes in late October.

There is one 457 m north/south gravel airstrip in White Mountain which is maintained by the city and cleared by a private resident in the winter. Three local flight agencies provide passenger and cargo transportation: Ryan Air flies five days a week; Olsen Air flies twice daily, six days a week; and Cape Smythe flies six days a week. In addition, Alaska Airlines offers a flight to White Mountain three days a week via Bering Air. All fuel and supplies are currently brought in White Mountain by local/private barge lines and air services.

Gasoline currently costs $2.00 a gallon in White Mountain. Approximately 20,000 gallons are sold in the village each year.

Communications - Thirty-eight out of 42 households in White Mountain have telephones. Residents receive both Nome radio stations and are hoping to receive cable television in the near future. In addition, audio contact with NWCC in Nome is available at the high school.

Health and Social Services - Health and social services are provided in White Mountain by NSHC and by Kawerak, Inc. The village health clinic, which is staffed by one full-time health aide and three alternate health aides, receives an average of two patient visits a day (S. Daniels, NSHC, Nome, personal communication, 1989). Other medical professionals who visit White Mountain on a regular basis include:

- a general practitioner and a dentist two weeks a year;
- a public health nurse four to six times a school year; and
- an optometrist one time a year.

NSHC sends a mental health clinician from Nome to White Mountain four times a year. Kawerak, Inc., under contract from the Alaska Division of Family and Youth Services, provides case workers assigned to every family or individual in need of social services. Case workers make quarterly visits to White Mountain and coordinate interim services with the health aide. Kawerak also authorizes homemaker services which are then provided by NSHC. The Northern Lights Recovery Center, NSHC's alcohol treatment center in Nome, also provides services in White Mountain and other villages. The health clinic maintains daily telephone and radio contact with the regional hospital in Nome.

Housing and Education - There are 42 single family houses in White Mountain (C. Brown, City of White Mountain, personal communication, 1989).

The White Mountain elementary and high schools are administered by the Bering Straits School District which is based in Unalakleet. Kawerak, Inc. sponsors a headstart program through the Job Training Partnership Act which operates three hours a day, five days a week. Kawerak also offers adult basic education courses and a GED program in White Mountain. Higher education is provided by NWCC in Nome which is part of the University of Alaska's rural college program. White Mountain residents can access any of the college's 50 to 75 courses offered each term through an audio terminal in the high school.

Utilities - All White Mountain homes are connected to central power and to a piped water distribution system. Water comes from a well run by the municipality. There is no central sewer system; residents use outhouses or honey buckets. Both schools have Bio-Pure package sewage treatment plants. Oil, which currently costs $1.70 a gallon (Department of Community and Regional Affairs, Nome, personal communication, 1988) is the primary source of heat; wood is the secondary source of heat. White Mountain consumes approximately 95,000 gallons of fuel oil per year.

4.2 Subsistence

4.2.1 Introduction

Subsistence is the customary and traditional use of natural resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles; and for barter or sharing among subsistence users. For residents of much of rural Alaska (including the study area), subsistence is the predominant way of life, and a continuation of a traditional way of life. It defines personal identity and shapes an individual's relationship with the physical, social, economic, and spiritual environments. Because wage employment and sources of cash in rural communities are limited and processed food is available but expensive, subsistence is a major component of the economy, putting food on the table and providing fuel, building material, and clothing. Subsistence harvests provide the bulk of the diet for the Invit of the region.

4.2.2 Communities Participating in Subsistence in the Study Area

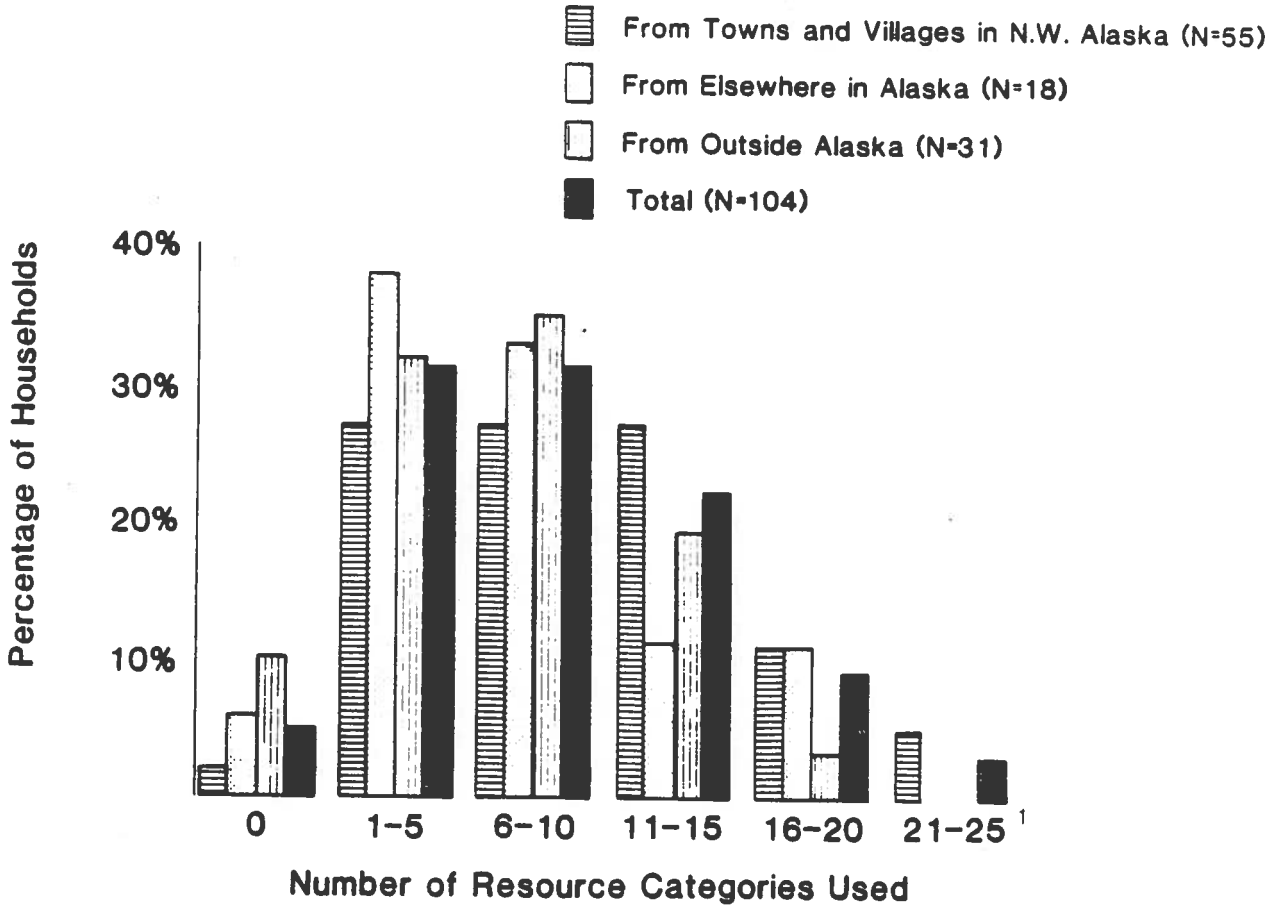
Communities within or close to the study area participating in subsistence activities include Nome, Golovin, Solomon, and White Mountain. Although virtually every inch of the coast is used for subsistence activities at one time or another, several areas of more concentrated use outside these communities are of particular importance in terms of subsistence harvests. Safety Sound is an extensive area of marshes and tideflats which provides protective habitat for large flocks of nesting and feeding waterfowl and for juvenile fish. Residents of Nome and Solomon maintain camps along the coast and rivers bordering Safety Sound and harvest seals, moose, waterfowl, bird eggs, and fish in the area. Bluff, a summer subsistence camp area to the east of the study area, is a particularly rich seabird nesting area [bird populations range between 40,000 and 90,000 (Drury, 1989)] and is a popular herring,

crab, and egg harvesting location. Other areas of concentrated subsistence activity include Fort Davis at the mouth of the Nome River, the Feather River near Cape Woolley, the seasonal community of Council which is on the Niukluk River, and the Fish River.

Subsistence may provide as much as 70 to 80 percent of the total protein consumed in the villages of the study area (Ellanna, 1980). While Nome residents are probably less dependent on subsistence foods than are residents of Golovin and White Mountain, subsistence foods still provide a large and important part of the diet--a portion that families cannot afford to replace with imported substitutes. Only five percent of Nome households use no local resources, and many Nome residents originally from outside Alaska, or from other parts of Alaska, participate in subsistence harvests (Figure 4-2) (Ellanna, 1983). The relative importance of subsistence harvests varies considerably within Nome. In 1985, the average Nome household spent $1,400 on subsistence activities (Alaska Department of Administration, 1985). Subsistence expenditures of residents of Golovin, Solomon or White Mountain are not known. They are presumably higher due to a higher participation rate and more dependence on snowmachines and boats in these villages (J. Magdanz, ADF&G, Kotzebue, personal communication, 1989).

The subsistence use patterns of Nome residents are significantly influenced by the subsistence use traditions of their natal communities. Nome residents originally from Teller and Brevig Mission (Figure 1-1) tend to follow the small sea mammal hunting pattern of that area, while those from King Island, St. Lawrence Island, and Diomede continue the large sea mammal hunting pattern (Ellanna, 1980).

Residents of Solomon, Golovin, and White Mountain are part of the Norton Sound fishing and coastal/inland-hunting pattern (as are some Nome residents). Virtually all residents of Golovin and White



[1] This number of categories must include marine mammal use.

Figure 4-2. Number of resource categories used per household by pla of previous residency (Ellanna, 1983).

Mountain are dependent on subsistence to some degree. The exact degree of dependence on subsistence harvests is difficult to measure, but the relatively few paid jobs available in the villages indicate that many residents lead a subsistence lifestyle and rely heavily on subsistence resources to put food on the table. Table 4-5 shows a rough estimate of the proportion of food derived from subsistence activities in Nome and villages of the Bering Straits region.

4.2.3 Subsistence Resources

Residents within the study area collectively use a wide variety of resources in their subsistence pursuits. Not all of these resources are harvested by all communities within the study area because of the ecological and cultural diversity of the region. Residents of communities in which certain resources are not accessible, however, may travel to other areas to hunt, fish, or gather desired resources or they may indirectly participate in fish, game or plant foods and raw materials obtained by another community through regional trade networks. According to Ellanna (1983), subsistence resources may include:

Primary Food and Raw Material Sources

Pacific walrus
bearded seal (ugruk or mukluk)
spotted or harbor seal
ringed seal
beluga whale
king salmon
silver salmon
chum salmon
humpback or pink salmon
sockeye salmon
moose
caribou or reindeer
broad whitefish
humpback whitefish
sheefish

Secondary Food and Raw Material Sources

ribbon seal
gray whale
polar bear
black bear
grizzly bear
beaver
arctic ground squirrel
porcupine
tanner crab
clams
blackfish
arctic char
saffron cod
Pacific tomcod
arctic flounder
arctic grayling

Table 4-5. Proportion of food sources from subsistence activities, Nome and village residents, Bering Straits Region, 1984 General Survey (Impact Assessment, 1987).

Proportion of Food Sources	Percent of Population*	
	Nome	Villages
All of it	3.0	14.0
Most of it	9.0	31.0
About half of it	20.0	22.0
Some of it	46.0	24.0
None of it	14.0	3.0
No Answer	9.0	5.0

* Percentages do not total 100 due to rounding.

arctic hare
snowshoe hare
least auklet
crested auklet
parakeet auklet
common eider
king eider
spectacled eider
Stellar's eider
oldsquaw
pintail
black brant
snow goose
white fronted goose
crane
common murre (particularly eggs)
thick billed murre (particularly eggs)
willow ptarmigan
rock ptarmigan
king crab
northern pike
lake herring
Pacific herring
Pacific halibut
rainbow smelt
mussels (several species)
sculpin
burbot
least cisco whitefish
arctic cisco whitefish
seaweed
greens
potato
willow leaves
sourdock
salmonberry (cloudberry)
crowberry
blueberry
cranberry
wortleberry

The following is a more in-depth discussion of the primary marine mammal, fish, waterfowl, and shellfish resources used by Nome, Golovin, and White Mountain residents. Marine resources and other resources dependent in part on a marine environment are the focus of this discussion because they are of most importance to this study. There are, however, several terrestrial resources important to residents of the area. These resources include moose, harvested by 93.5 percent of a sample of Nome subsistence participants in 1985, and small mammals, harvested by 69.6 percent of the same sample during the same year (Table 4-6). Salmon, berries, trout, ptarmigan, and moose (in that order) are harvested by the greatest number of Nome households across all residency categories (Magdanz, 1981; Ellanna, 1983). With the exception of some species of marine mammals, herring, brown and black bear, clams, and halibut (in that order), are harvested by the fewest of Nome households across all residency categories (Magdanz, 1981; Ellanna, 1983). It is important to note that although more residents may use berries than marine mammals, marine mammals may constitute a more important part of the diet of many Nome residents.

Table 4-6. Subsistence resources harvested in Nome during 1985[1] (Magdanz and Olanna, 1986).

Resource	Number of Households	Percent of Total Sample
Salmon	46	100.0
Freshwater Fish	42	91.3
Marine Fish	36	78.3
Shellfish	37	80.4
Walrus	31	67.4
Seals	37	80.4
Moose	43	93.5
Small Mammals	32	69.6
Bear	6	13.0
Plants	43	93.5
Wood	26	56.5
Waterfowl	30	65.2

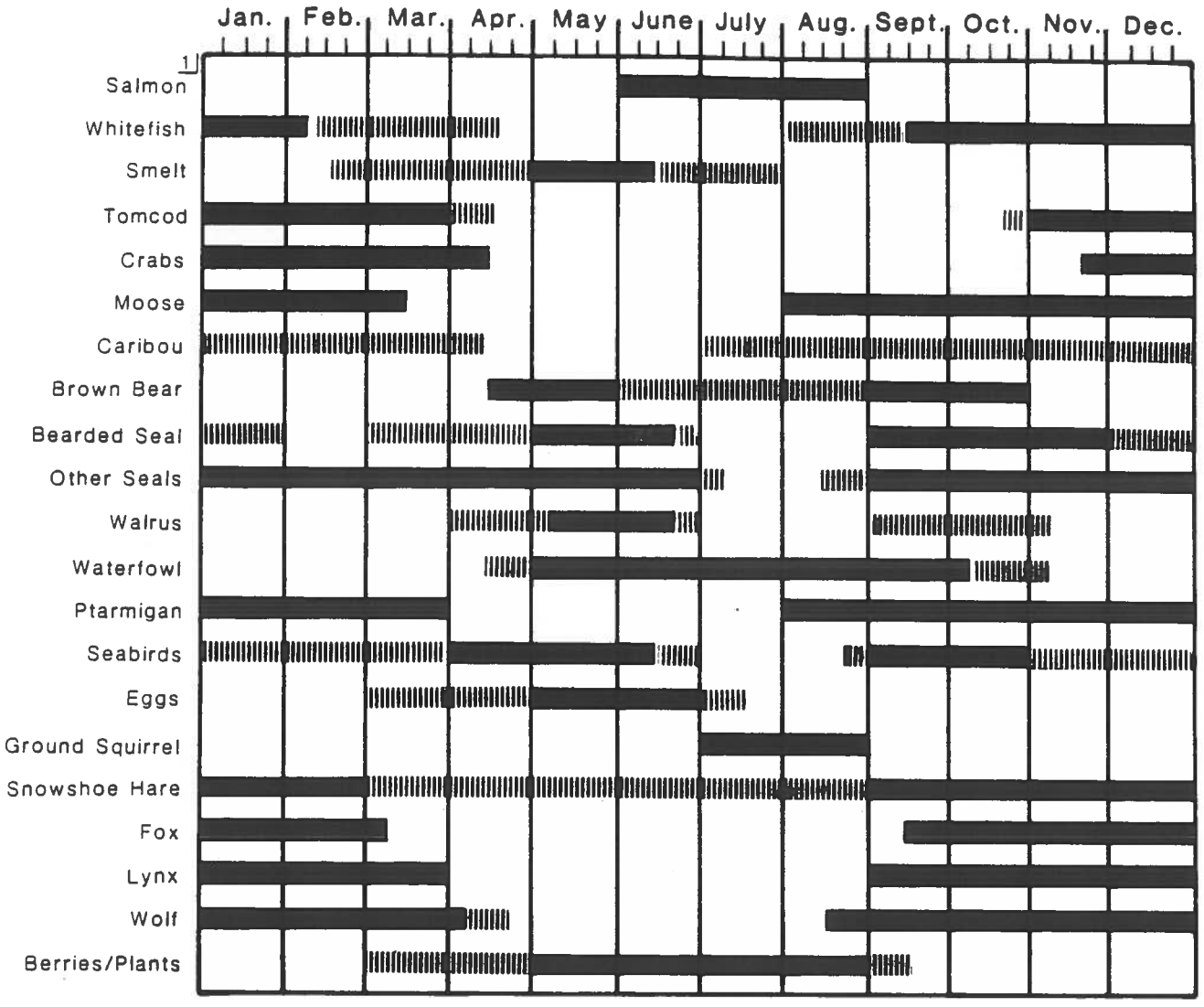
[1] This was not a random sample. Households were selected for their participation in subsistence harvests.

Marine Mammals

Seals are the focus of small sea mammal hunting, inland hunting, and fishing pattern (Ellanna, 1980) by residents of Nome, Solomon, Golovin, and White Mountain. Four species of seal (bearded, spotted, ringed, and occasionally ribbon seal) are found in the Bering Strait at various times of the year. Bearded seal (ugruk), ringed seal, and spotted seal are first, second, and third, respectively, in local preference (USDOI/MMS, 1988). Spotted seal are least desirable for human consumption and are harvested primarily for their hides and as a source of dog food.

One random survey of Nome Native households showed that 29 to 22 percent of those surveyed harvested bearded and spotted seal, respectively, and 11 percent harvested ringed seal (Ellanna, 1983). Another survey of Nome households, selected specifically because of their known active participation in subsistence harvests revealed that 80.4 percent of those surveyed harvested seal (Table 4-6) (Magdanz and Olanna, 1986). Seal are also an important subsistence resource for residents of Solomon, White Mountain and Golovin while seal are regularly harvested in Golovnin Bay and Golovnin Lagoon. No exact harvest data are available for that area.

Ringed seal are available throughout the year but are most commonly hunted in the winter at breathing holes and at leads in the ice. The other seal species are most intensively hunted during the spring (April to June) and fall (September to November) (Figure 4-3) at the pack-ice edge or near areas of broken ice. Spotted seal are especially abundant in the fall and are found near shore in brackish waters such as Safety Sound, Grantly Harbor, and the mouth of the Sinuk River (Figure 4-4). In open water, seal are hunted from boats, and in winter hunters travel up to 80 km along the coast by snowmachine in search of seal (Magdanz and Olanna, 1986).



1] Solid line indicates time when harvest usually takes place.
Broken line indicates occasional harvest effort.

Figure 4-3. Nome annual subsistence cycle (Ellanna, 1983).

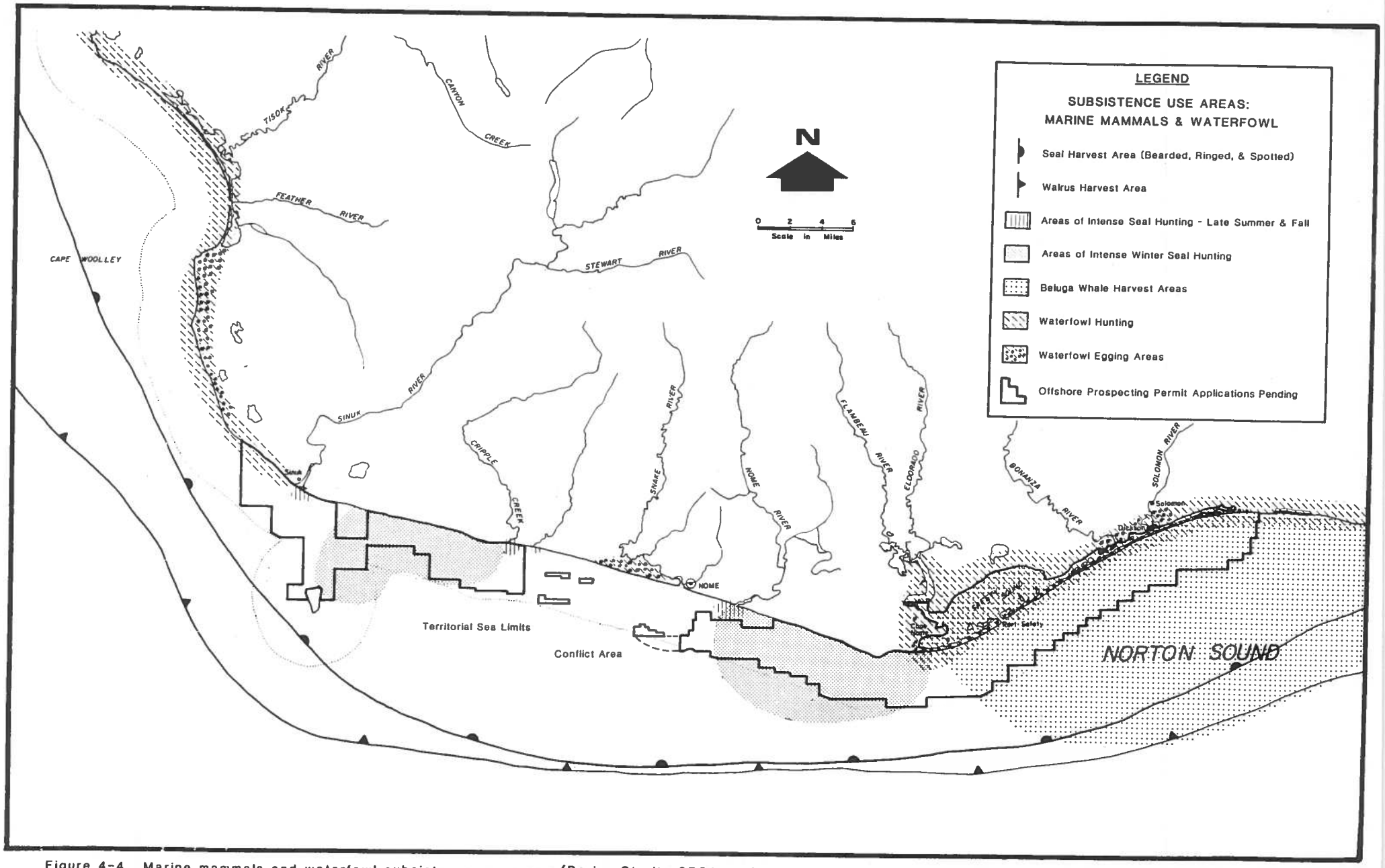


Figure 4-4. Marine mammals and waterfowl subsistence use areas (Bering Straits CRSA, 1984; Magdanz and Olanna, 1986; Environmental Services Limited, 1981)

Walrus are an important subsistence resource, particularly to those King Island, St. Lawrence Island, and Diomede Island residents now living in Nome. Walrus are used for food and their ivory is used for craft, an important cash income for many residents. Walrus are harvested by 25 percent of Native residents in Nome (Ellanna, 1983) and by 67.4 percent of known subsistence harvesters in Nome (Table 4-6) (Magdanz and Olanna, 1986). The average number of walrus harvested in Nome from 1980 to 1984 was 554. In 1985, 256 walrus were harvested (USDOI/MMS, 1988). No harvest data are available for Golovin and White Mountain residents. It is known, however, that Golovin residents regularly travel to harvest walrus and that fewer White Mountain residents participate in the harvest (C. Lean, ADF&G, Nome, personal communication, 1989).

Walrus are hunted primarily in the spring (early May to late June) (Figure 4-3) and are usually found in disintegrating ice pack 16 km or more offshore. King Islanders, who live in Nome but return to the island to hunt walrus each year, tend to have a longer hunting season. Walrus range over more territory than any other species used for subsistence. Hunters have been known to travel 120 km south and up to 200 km southwest of Nome while walrus hunting; however, most hunting occurs 15 to 50 km south and west of Nome. Sledge Island is sometimes used as a base camp for walrus hunting because the animals are known to haul out there. Walrus are also known to congregate near Cape Nome (Figure 4-4) (USDOI/MMS, 1988). In 1985, most walrus hunters from Nome were using 18-ft aluminum skiffs with 50 to 90 horsepower motors to gain access to this marine resource.

Beluga whale are an important subsistence resource for residents of Nome, White Mountain and Golovin. Belugas are common in the study area and are known to migrate in large pods along the coast in spring. Beluga whales also occur in Golovnin Bay. No harvest data are currently available for beluga in the study area.

Fish

Salmon are the resource most commonly harvested by all residents in the study area (Magdanz, 1981; Ellanna, 1983) (Table 4-6). In 1986, there were 17,750 salmon harvested by subsistence fishermen in the Nome Subdistrict (Table 4-7), approximately 97 percent of a recent five-year average. The majority of the salmon caught were pink salmon, followed by chum, coho and chinook. In 1988, 227 subsistence salmon permits were issued by the ADF&G; 213 of these permits were returned and 138 were actually fished (C. Lean, ADF&G, Nome, personal communication, 1989). Subsistence permits are required on all rivers between Topkok Head and the Penny River.

Salmon fishing occurs from early June through the end of August (Figure 4-3). The majority of the subsistence salmon fishing takes place in marine waters from the mouth of the Sinuk River east to Rocky Point (S. Merkouris, ADF&G, Nome, personal communication, 1989). In 1988, 6,600 out of 11,000 salmon harvested were taken in marine waters (C. Lean, ADF&G, Nome, personal communication, 1989). Set gill nets are used from beach sites and have a gear length limit of 91 m. Other popular subsistence fishing areas are the Nome River, the Sinuk River (where a rod and reel are often used), Norton Sound near Nome, the Penny River, and Cripple Creek. Safety Sound and the two main rivers that drain into it, the Eldorado and Flambeau Rivers, are also popular salmon fishing areas. Subsistence salmon fishing also occurs along most of the coast within the study area and in the Fish, Bonanza, and Solomon Rivers. Many Nome, Golovin, and White Mountain households spend much of the summer at their family fish camps. Golovin and White Mountain residents maintain subsistence fish camps along the Kachavik, Niukluk, and Fish Rivers and on Golovnin Bay and Golovnin Lagoon (Figure 4-5). Commercial fishermen from both villages who fish in Golovnin Bay often retain a portion of their catch for subsistence use (NORTEC, 1985).

Table 4-7. Commercial and subsistence salmon catches by species, Nome Subdistrict 1, Norton Sound District, 1964-1986 (ADF&G, 1986b).

Year	Commercial						Subsistence					Combined					
	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1964	5	--	--	1	1194	1200	--	--	--	--	--	5	--	--	1	1194	1200
1965	1	--	--	193	1941	2135	--	--	780	1825	2605	1	--	--	973	3766	4740
1966	1	--	32	1	581	615	12	192	1794	1762	3760	13	--	224	1795	2343	4375
1967	--	--	--	72	406	478	11	36	349	627	1023	11	--	36	421	1033	1501
1968	--	--	--	50	102	152	7	108	6507	621	7243	7	--	108	6557	723	7395
1969	--	--	63	330	601	994	2	27	3649	508	4186	2	--	90	3979	1109	5180
1970	--	--	6	55	960	1019	--	35	5001	458	5494	--	--	41	5056	1418	6513
1971	11	--	--	14	2315	2340	--	122	5457	2900	8479	11	--	122	5471	5215	10819
1972	15	--	--	12	2643	2670	19	52	4684	315	5070	34	--	52	4696	2958	7740
1973	--	--	--	321	1132	1453	14	120	5108	1863	7114	14	--	129	5429	2995	8567
1974	19	--	123	7722	10431	18295	8	5	3818	183	4014	27	--	128	11540	10614	22309
1975	2	--	319	2163	8364	10848	2	97	6267	2858	9224	4	--	416	8430	11222	20072
1976	2	10	26	1331	7620	8989	13	189	5492	1705	7399	15	10	215	6823	9325	16388
1977	8	--	58	65	15998	16129	35	498	2773	12192	15498	43	--	556	2838	28190	31627
1978	19	--	--	22869	8782	31670	35	225	13063	4295	17618	54	--	225	35932	13077	49288
1979	9	--	29	5860	5391	11289	11	1120	6353	3273	10757	20	--	1149	12213	8664	22046
1980	8	--	--	10007	13922	23937	129	2157	22246	5983	30515	137	--	2157	32253	19905	54452
1981	4	--	508	3202	18666	22380	35	1726	5584	8579	19538[3]	39	14	2234	8786	27245	38318
1982	20	--	1183	18512	13447	33162	21	1829	19202	4831	25889[4]	41	6	3012	37714	18278	59051
1983	23	--	261	308	11691	12283	74	1911	8086	7091	17215[5]	97	53	2172	8394	18782	29498
1984	7	--	820	--	3744	4571	83	1795	17182	4883	23949[6]	90	16	2615	17182	8627	28520
1985	21	--	356	--	6219	6596	56	1054	2117	5667	9008[7]	77	114	1410	2117	11886	15604
1986	6	--	50	--	8160	8216	150	688	8720	8085	17750[8]	156	107	738	8720	16245	25966
5-Year Average[1]	15	--	626	4404	10753	15798	54	1663	10434	6210	18400	69	41	2289	14839	16964	34198
10-Year Average[2]	12	1	324	6215	10548	17101	49	1250	10210	5850	17379	61	21	1575	16425	16398	34479

1 1981-1985
2 1976-1985
3 Total includes 14 sockeye.
4 Total includes 6 sockeye.
5 Total includes 53 sockeye.
6 Total includes 16 sockeye.

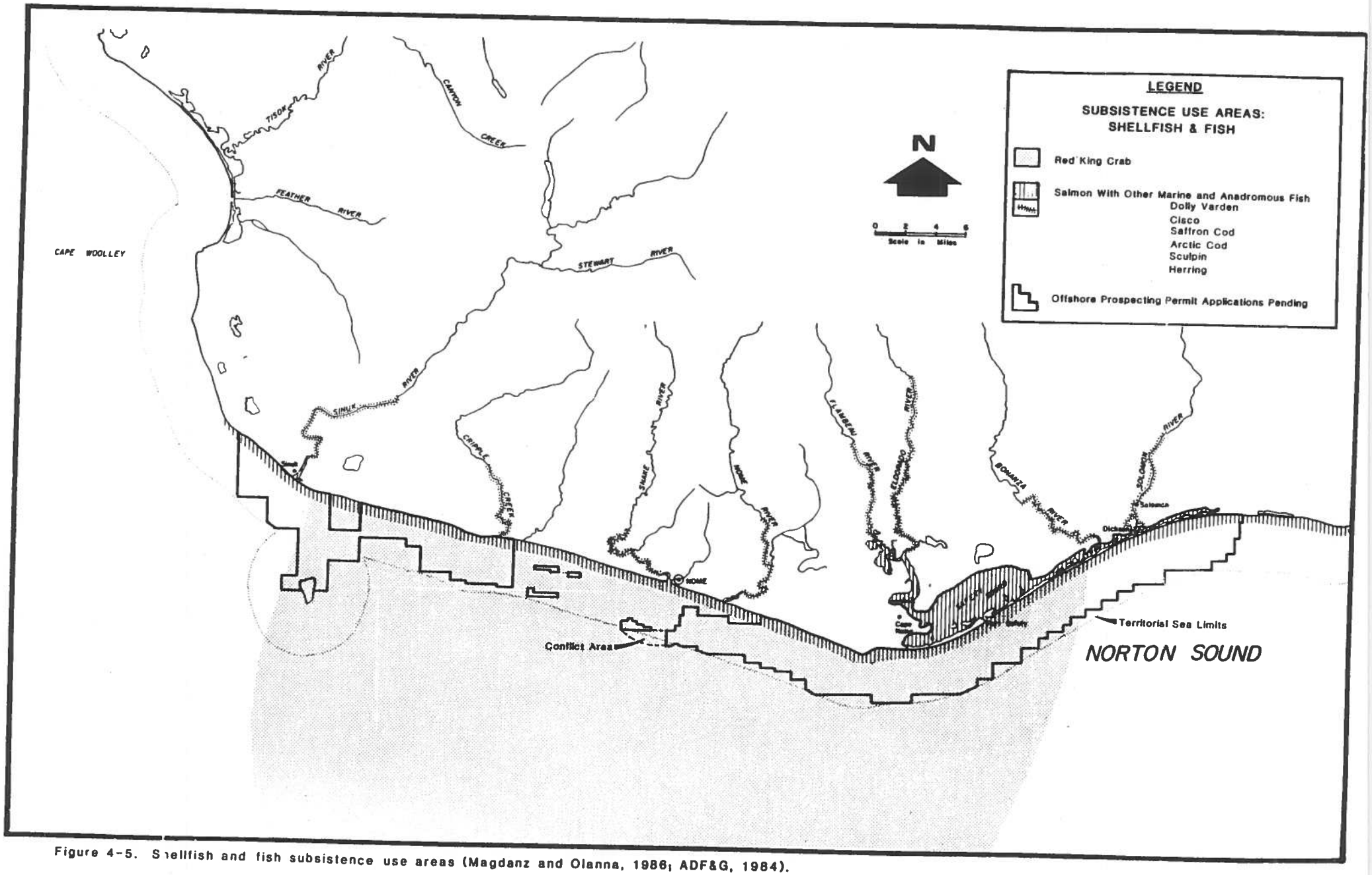


Figure 4-5. Shellfish and fish subsistence use areas (Magdanz and Olanna, 1986; ADF&G, 1984).

Other Fish commonly harvested include dolly varden (trout), cisco (whitefish), saffron cod (tomcod), arctic cod (blue cod), smelt, burbot, and sculpin. Some herring are seine and gill netted in the study area, but they tend to be more abundant in the southeastern portion of Norton Sound. The most commonly caught fish in the study area are saffron cod, arctic cod, and sculpin (Magdanz and Olanna, 1986). Fresh water and marine fishes are harvested by 78.3 percent and 91.3 percent, respectively, of subsistence participants in the study area (Table 4-6).

Most fishing occurs in Norton Sound between the Solomon River in the east and Cripple Creek in the west (Magdanz and Olanna, 1986). Saffron cod are primarily harvested at Safety Sound in the fall and through the ice close to Nome in winter. Tomcod are harvested in Safety Sound in the late fall either with nets in open water or with jigging lines after freeze-up (Figure 4-5). Whitefish are caught throughout the year, but the most intense harvest occurs between mid-September and early February. Subsistence harvests of dolly varden and whitefish generally occur in freshwater (B. MacLean, BSCMP, Unalakleet, personal communication, 1989). Harvest schedules are graphically depicted in Figure 4-3.

Shellfish harvested in the study area include red king crab, clams, and mussels. Red king crab are the most abundant shellfish in Norton Sound. Subsistence harvests dropped sharply in 1980, an occurrence many local residents blame on commercial crab harvests begun in 1977. The reason for this drop has not been determined, but it is known that crab distribution changes and sea ice conditions can influence the number of crab harvested. These factors may partially explain fluctuating harvest sizes (Magdanz and Olanna, 1984). Harvest data from 1978 to 1987 are shown in Table 4-8. Crab were harvested by 80.4 percent of a sample of Nome subsistence users in 1985 (Table 4-6). In 1988, 40 fisherman harvested 2,724 crabs which averaged 1.3 kg each. ADF&G issued 71 permits in 1988, 58 were returned and 40 were fished (C. Lean, ADF&G, Nome, personal communication, 1989).

Table 4-8. Winter commercial and subsistence red king crab harvests, Norton Sound, 1978-1987[1] (Lean and Merkouris, 1988).

Commercial			Subsistence						
Year[2]	Fishermen	Crab Harvested	Winter[3]	Permits Issued	Permits Returned	Permits Fished	Crab Caught[4]	Crab Harvested	Average Harvest/Fisherman
1978	37	9,625	1977-78	290	206	149	--	12,506	84
1979	1	221	1978-79	48	43	38	--	224	6
1980	1	22	1979-80	22	14	9	--	213	24
1981	0	0	1980-81	51	39	23	--	360	16
1982	1	17	1981-82	101	76	54	--	1,288	24
1983	5	549	1982-83	172	106	85	--	10,432	123
1984	8	856	1983-84	222	183	143	15,923	11,220	78
1985	9	1,168	1984-85	203	166	132	10,757	8,377	63
1986	5	2,168	1985-86	136	133	107	10,751	7,052	66
1987	7	1,040	1986-87	138	134	98	7,406	5,772	59

1 1977-1984 represents finalized data; 1985 data is preliminary.
2 Prior to 1985 the winter commercial fishery occurred from January 1 - April 30; as of March 1985, the winter commercial harvest may occur from November 15 - May 15.
3 The winter subsistence fishery occurs during months of two calendar years (as early as December through May).
4 The number of crab actually caught; some may have been returned.
5 The number of crab "harvested" is the number of crab caught and kept.
-- No data available.

Crabbing occurs between January and May, with the harvest reaching a peak in March and April (Figure 4-3). Occasional summer harvests also occur. The study area is on the periphery of favored red king crab habitat (S. Jewett, University of Alaska Fairbanks, personal communication, 1989). The area immediately south of Nome between Cape Nome and Sledge Islands especially accessible to winter crabbing (Magdanz and Olanna, 1986). Crab tend to move into shallower nearshore waters during winter and spring, and winter crabbing occurs from shorefast ice within 4.8 km of shore. While winter crabbing, Nome residents rarely travel further than 8 km from Nome before moving out onto the ice. Crab are caught with handlines and, more recently, with pots. The subsistence crab fishery has become increasingly more intensive. Where it was once concentrated off the community of Nome, the fishery now ranges up to 13 km east and west of the mouth of the Snake River and up to 8 km offshore (C. Lean, ADF&G, Nome, personal communication, 1988).

Marine and Coastal Birds are important subsistence resources, particularly in the early spring when fresh meat is scarce. Waterfowl are harvested by approximately 65 percent of Nome households participating in subsistence activities (Table 4-6). Both birds and eggs are harvested in the study area. Canada geese and eider ducks are the most commonly harvested species in the Nome area, but a much wider variety of waterfowl are hunted regularly, including cranes, brants, puddle ducks, pond ducks, and sea ducks.

Waterfowl are harvested throughout the spring and summer, but hunting is most intense in the fall when the birds are fat. Eggs are harvested in the late spring and during the summer (Figure 4-3). Eggs are harvested at seabird rookeries and waterfowl nesting areas. Nome residents gather eggs at Bluff and Sledge Island. Waterfowl are harvested primarily at Bluff, Safety Sound, Sledge Island, and along the coast between Topkok Head and Cape Douglas. Murres and cormorants are especially abundant at Bluff and Sledge Island (Figure 4-4).

4.3 Commercial Fishing

There are four commercial fisheries in Norton Sound: a salmon fishery, a herring fishery, a summer red king crab fishery, and a winter red king crab fishery. Only the salmon and the two crab fisheries take place within the study area. Fishermen based in study area villages do, however, participate in the herring fishery and do not participate in the summer crab fishery. The most lucrative of the four fisheries is the summer crab fishery which occurs 20 to 30 km offshore and is fished by catcher-processor vessels that are based outside of the study area. The fisheries have little significance in Nome's economy but are relatively more significant in the economies of Golovin and White Mountain. Income ranges from commercial fishing by Nome residents are reported in Table 4-9.

4.3.1 Salmon Fishery

The commercial salmon fishery in Norton Sound is a limited entry fishery which opens by emergency order between June 8 and June 20, depending on the timing of the run. While the season officially closes on August 31, most processors have usually terminated operations earlier in the month. During this time there are two 48-hour fishing periods each week unless changed by emergency order. The Nome Commercial Salmon Fishing Subdistrict, Subdistrict 1 of the Norton Sound Salmon Management District, stretches from the Penny River to Bluff (Figure 4-6). Commercial salmon fishing gear is restricted to set gill nets with a maximum aggregate length of 100 fathoms.

The ten-year (1976-1985) average commercial salmon catch for the Nome Subdistrict totals 17,000 salmon, 5 percent of the Norton Sound District total. This catch was comprised of 60 percent chum salmon (11,000 fish), 38 percent pink salmon (6,000 fish), and the balance being coho salmon (Table 4-7). In 1988, 5 commercial fishermen harvested 1,866 salmon in the Nome Subdistrict, valued

Table 4-9. Income ranges from commercial fishing for salmon and herring, Nome, 1981 (Ellanna, 1983).

Total Number of Commercial Fishermen	34
Number of Salmon and Herring Fishermen	29
Percent earning less than $ 1,000	24.1
Percent earning $ 1,000 - 9,999	75.9
Percent earning $10,000 - 19,999	*
Percent earning $20,000 - 29,999	*
Percent earning $30,000 - 49,999	*
Percent earning $50,000 - 74,999	0.0
Percent earning $75,000 - 99,999	*
Percent earning greater than $100,000	0.0
Total	100.0

* Less than four: due to confidentiality regulations, number cannot be disclosed.

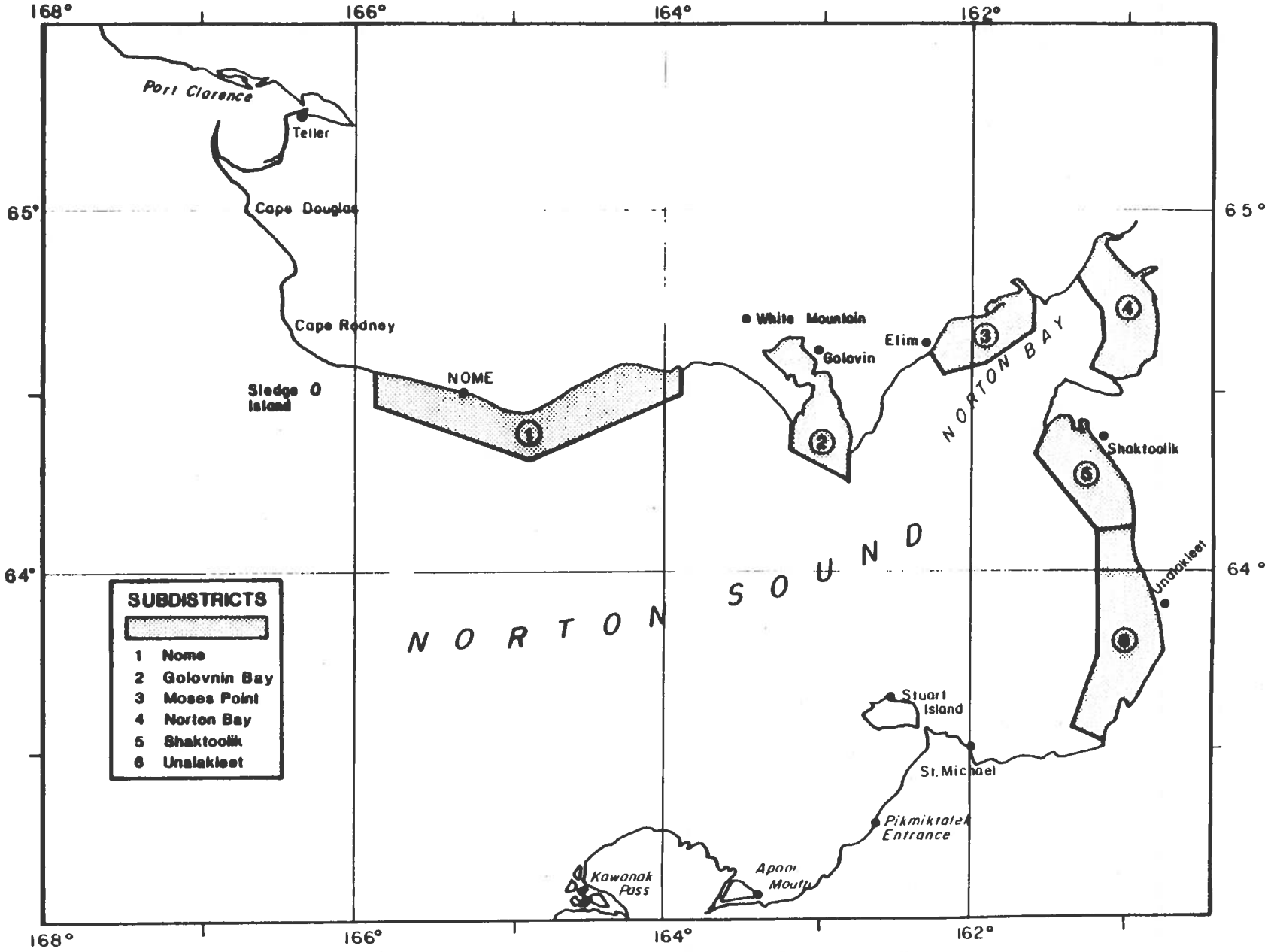


Figure 4-6. Norton Sound commercial salmon fishing subdistricts (ADF&G, 1986b).

at $5,010, and 21 fishermen harvested 6,885 salmon in the Golovnin Bay subdistrict valued at $38,846. Putting the Nome and Golovin catches in perspective, the total catch for the Norton Sound District was 225,166 salmon with an approximate value of $754,751 (C. Lean, ADF&G, Nome, personal communication, 1989). In 1988, there were a total of 204 commercial salmon limited entry permits renewed by the State for the Norton Sound District. Of these, 152 were actually fished. There are currently 32 Nome residents, 15 Golovin residents and 2 White Mountain residents who hold permits (J. Banta, Bering Sea Fisherman's Association, Anchorage, personal communication, 1989). All commercial fishing in the Nome Subdistrict takes place in marine waters east of Cape Nome using set gill nets from beach sites. During the 1988 season, there was one shore based fish buyer (who flew the fish to Anchorage to be processed) operating in the Nome Subdistrict. There was one floating processor operating in Subdistrict 2 until late July when a shore based fish buyer took over. Those fish were flown to Kenai to be processed.

4.3.2 Herring Fishery

The study area lies within Subdistrict 7 of the Norton Sound Herring District (Figure 4-7). Herring are harvested by gill net and beach seine gear only, unless the allowable harvest is not taken. In this case, the use of purse seine gear is allowed. The herring season officially opens April 15. Actual fishing, however, often does not occur until at least mid-May due to weather, sea ice conditions, lack of surplus fish over escapement, condition of roe and roe content, and the availability of fish processors who work their way up the coast as the herring fisheries open.

Virtually all commercial herring harvests in the Norton Sound District occur to the east of the study area in Subdistricts 1, 2, and 3 (Figure 4-7). Fishermen from Nome, White Mountain and Golovin travel to these subdistricts to fish for herring. In 1983, 98 percent of the herring harvest took place east and south of Cape

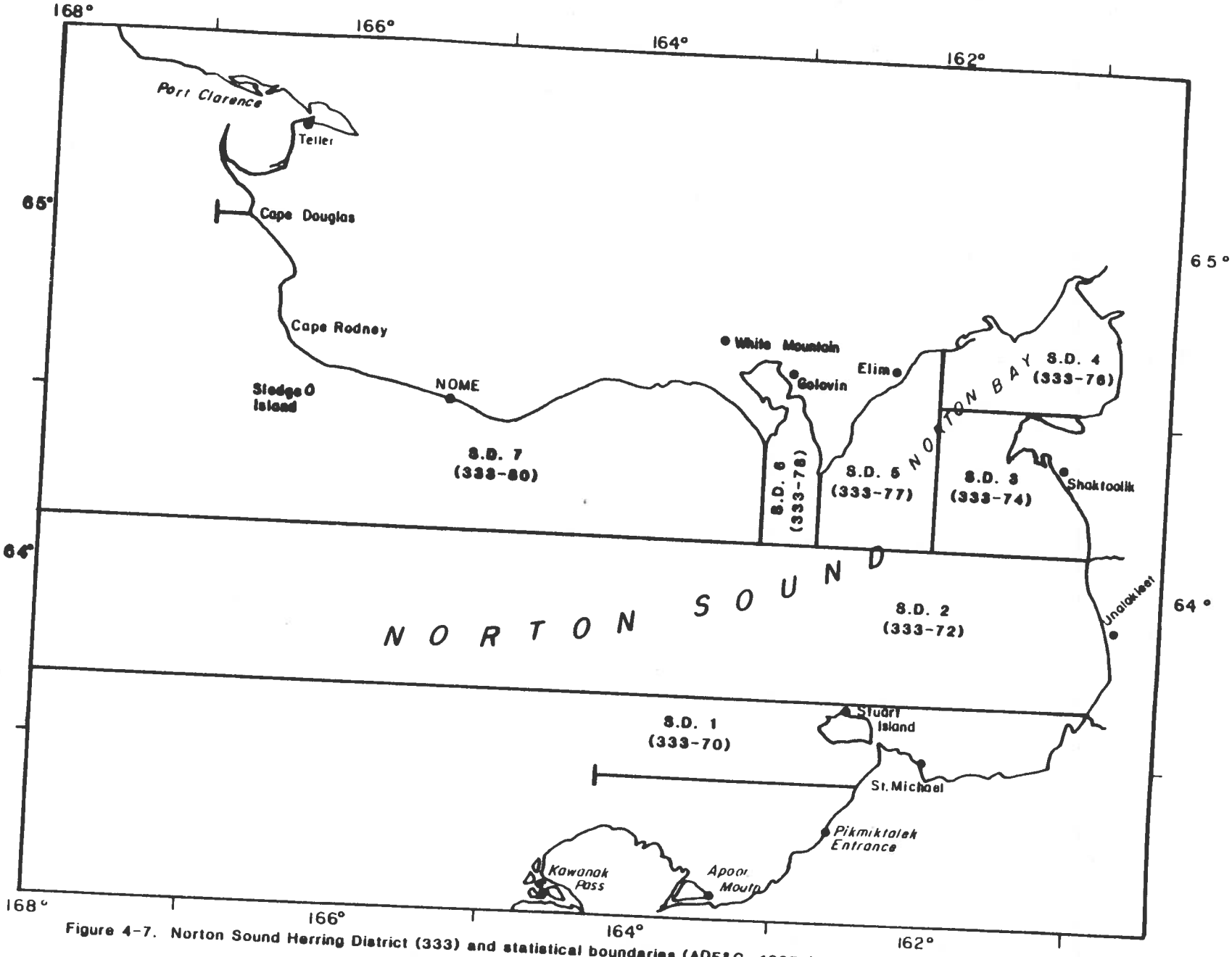


Figure 4-7. Norton Sound Herring District (333) and statistical boundaries (ADF&G, 1987b).

Darby (Figure 1-1), and no commercial harvest was recorded west of Rocky Point. Table 4-10 shows that only one small harvest occurred in the Nome Subdistrict between 1978 and 1984. In 1987 there were 20 openings in Subdistrict 7 (Figure 4-7); fishermen participated in three of these openings. In 1988 no harvests occurred in Subdistrict 7. The total Norton Sound catch in 1988 was 5,150.1 metric tons with a value to fishermen of $3,864,000. The Norton Sound commercial fishery will become a limited entry fishery as of the 1990 season.

4.3.3 Red King Crab Fishery

The only commercial shellfish fishery in Norton Sound is for red king crab. This commercial fishery has existed only since 1977. There are two distinct fisheries: one that occurs November 15 to May 15; and one that occurs from August 1 to September 3. The summer fishery is closed from shore to approximately 24 km offshore and is used exclusively by large, commercial-fishing vessels. The largest commercial harvests have occurred during the summer in the management area immediately south of Sledge Island (Figure 4-8). The winter fishery occurs primarily within 8 km of Nome and is influenced by ice conditions and abundance of crab in the nearshore waters. During the winter fishery crab are harvested with pots and handlines through the ice.

In 1988, ten winter commercial crab fishermen reported a total harvest of 425 crab. Each crab was worth approximately $5 to $6 or a total estimated value of approximately $5,376. Commercial and subsistence red king crab harvests for 1978 through 1987 are reported in Table 4-8. The winter commercial crab fishery occurs in the same area and time period as the subsistence crab fishery.

The summer commercial crab fishery yielded 237,000 pounds in 1988. This catch from the two boats participating was worth approximately $1.50 per pound making the total harvest worth about $350,000. The number of vessels taking part in the fishery is variable and has

Table 4-10. Commercial harvest of Pacific herring in metric tons and effort in number of vessels by subdistrict and year for the Norton Sound District, 1976-84[1] (ADF&G, 1986c).

Subdistrict	1976	1977	1978	1979	1980	1981	1982	1983	1984
1 St. Michael	--	--	0	289.4	1,066.4	2,782.5	1,870.0	394.0	0
2 Unalakleet	--	--	14.0	367.2	573.6	754.2	858.0	1,147.0	0
3 Cape Denbigh	--	--	0	503.8	573.6	427.8	839.0	2,479.0	3,240.0
4 Norton Bay	--	--	0	0	4.6	0.6	0	0	0
5 Elim	--	--	0	0	0	0	0	59.0	0
6 Golovin	--	--	0	0	6.4	0	0	77.0	0
7 Bluff/Nome	--	--	0	12.6	0	0	0	0	0
Management area total	7.7	9.5	14.0	1,173.0	2,224.6	3,956.1	3,567.0	4,156.0	3,240.0
Management area effort	--	--	11	67	294	332	237	272	199

-- No data available.

1 Includes herring harvested for both sac roe and bait product.

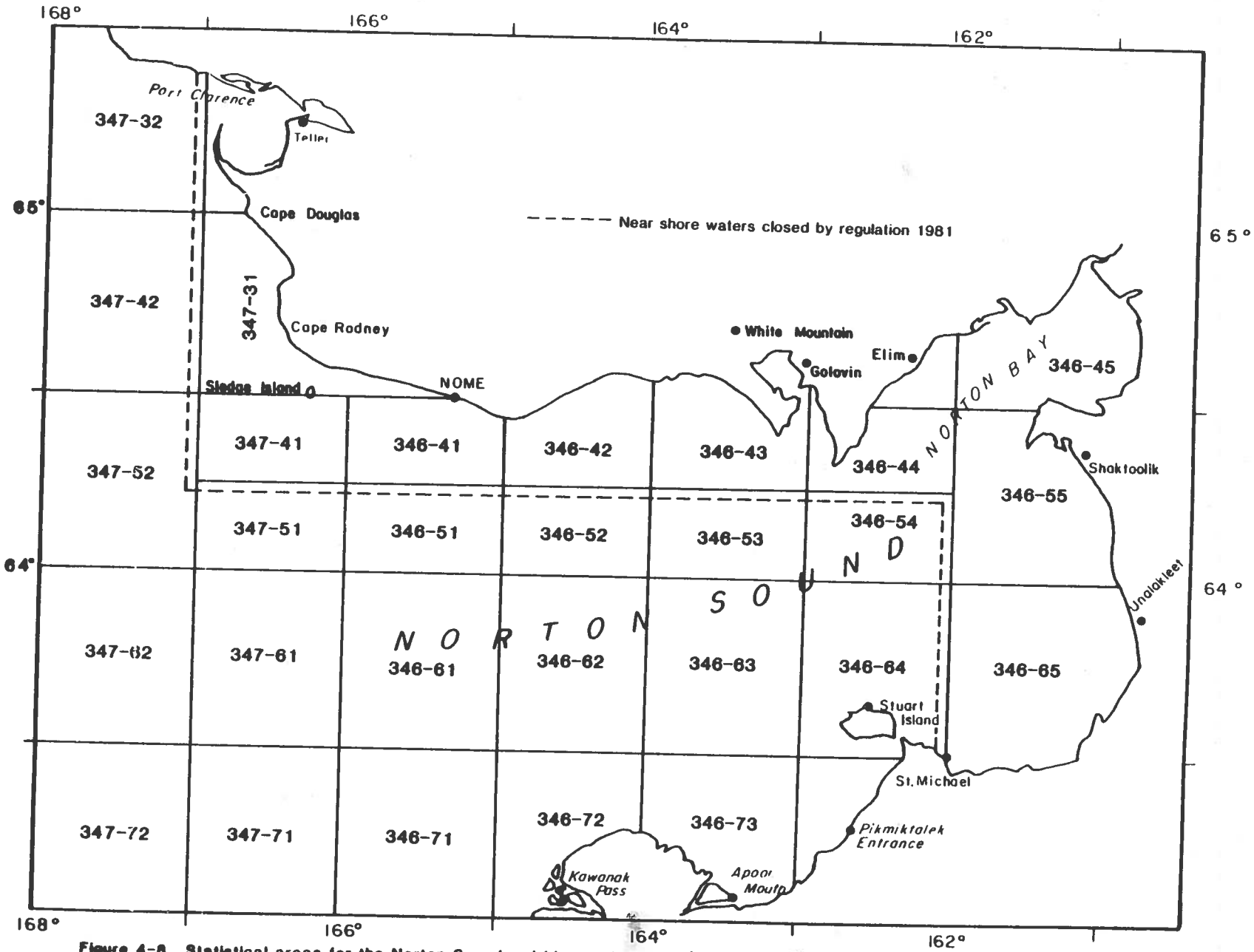


Figure 4-8. Statistical areas for the Norton Sound red king crab fishery (ADF&G, 1986a).

dropped since 1981. In 1981, 36 vessels participated, in 1988 2 vessels participated. These large vessels are usually based out of Dutch Harbor, Kodiak, or Seattle. Harvest data from the summer commercial crab fisheries of 1976 through 1987 are reported in Table 4-11.

4.4 Land Use and Management

4.4.1 Introduction

The area in the vicinity of the potential leases is affected by four land use plans: the Alaska Maritime National Wildlife Refuge (AMNWR) Comprehensive Conservation Plan; the State of Alaska's Northwest Area Plan (NAP); the Nome Coastal Management Program (CMP), a local district coastal management program that has received state and federal approval; and the Bering Straits CMP, a local district coastal management program that has received state approval. The first plan governs management of AMNWR lands in the study area. The second plan resulted in the classification of state lands and waters in the planning area; such classifications influence management of and disposal of state interest in area resources. Adopted as amendments to the Alaska Coastal Management Program (ACMP), the two local district coastal management programs provide regional refinement of the statewide coastal management standards. Activities requiring a state or federal permit or approval are reviewed for consistency with the ACMP, including the policies of the approved local district coastal management programs. The DNR Best Interest Finding (BIF) and subsequent exploration and mining activities are subject to a consistency review under the ACMP.

An OPP and subsequent lease leads to exploration and possible mining activities which are considered a disposal of state interest in tide-lands and coastal waters. As such, an application for an OPP and subsequent exploration and mining activities are subject to a review under the NAP and a coastal consistency determination under the Nome and Bering Straits CMPs.

Table 4-11. Commercial harvest of red king crab in the Norton Sound summer fishery, 1977-1987 (Lean and Merkouris, 1988).

Year	Legal Male Population Estimate[1]	Commercial Harvest[3]	Number of Vessels	Crab/ Pot	Average Weight	Exvessel Price	Fishery Value (millions $)
1976[2], [4]	8.1	NA	NA	NA	NA	NA	NA
1977[5]	10.0	0.52	7	36	2.7	0.75	0.229
1978[5]	11.0	2.09	8	64	3.0	0.95	1.897
1979[4]	5.4	2.93	34	28	3.0	0.75	1.878
1980	6.6	1.19	9	29	3.6	0.75	0.890
1981	4.7	1.38	36	11	3.7	0.85	1.172
1982	1.3	0.23	11	6	3.6	2.00	0.405
1983	2.1	0.37	23	12	2.8	1.50	0.537
1984	2.7	0.39	8	14	2.8	1.02	0.395
1985	2.4	0.43	6	11	2.9	1.00	0.427
1986[6]	2.8	0.48	3	38	2.9	1.25	0.600
1987	2.2	0.33	9	10	3.2	1.50	0.491

1 Population estimate prior to fishery in given year in millions of pounds.
2 No commercial fishery in 1976.
3 Millions of pounds.
4 Population estimate derived by National Marine Fisheries Service.
5 Population estimate derived from catch per pot from commercial fishery.
6 Population estimate derived from 1985 ADF&G assessment survey.

4.4.2 Land and Water Use

The principal uses of study area land and water by local residents are settlement, transportation, commercial fishing (refer to Section 4.3), mining, and subsistence (refer to Section 4.2). Settlement, transportation, and mining are briefly described below.

Settlement

In the immediate vicinity of the study area, established year-round settlements are the communities of Nome, Golovin, and White Mountain. Council and Solomon are generally seasonally occupied, although there is some year-round occupation of Council. There are also periods of seasonal occupation of subsistence hunting and fishing camps and of Native allotments throughout the area.

Transportation

In addition to fixed facilities such as airports and roads in the communities of Nome, Golovin, and White Mountain, coastal waters and surrounding shorelines are used extensively for transportation year-round. During the open water period, boat traffic is associated with commercial fishing, subsistence activities, fuel and freight delivery, economic and recreation purposes, and to visit other communities. Some of these activities also involve all terrain vehicle (ATV) use along beaches and shorelines. During the winter months, overland and over-ice ATV and snow machine traffic is associated with subsistence activities, economic and recreation reasons, and visiting. Both the Iditarod Sled Dog Race and the Iron Dog Classic snowmachine race pass through the study area.

Mining

Onshore and offshore mining are both historic and current land uses in the study area. Since the discovery of gold in Nome at the turn of the century, mining has continued to occur in

existing and abandoned stream drainages, beaches, and coastal waters. WestGold has used the dredge Bima to mine gold in state waters during the last three years.

4.4.3 Land Management

Alaska Maritime National Wildlife Refuge Comprehensive Conservation Plan

The Alaska Maritime National Wildlife Refuge was established by the Alaska National Interest Lands Conservation Act of 1980 (ANILCA), by adding land to and combining 11 previously existing refuges. It includes approximately 4.9 million acres of coastal lands in Alaska. The AMNWR is broken into five management units: the Chukchi Sea Unit, the Bering Sea Unit, the Aleutian Islands Unit, the Alaska Peninsula Unit, and the Gulf of Alaska Unit.

ANILCA sets forth five purposes for which the refuge will be managed:

1. to conserve fish and wildlife populations and habitats in their natural diversity;
2. to fulfill international treaty obligations of the United States with respect to fish and wildlife and their habitats;
3. to provide the opportunity for continued subsistence uses by local residents;
4. to provide a program of national and international scientific research on marine resources; and
5. to ensure, to the maximum extent practicable, water quality and necessary water quantity within the refuge.

A Final Comprehensive Conservation Plan/Environmental Impact Statement/Wilderness Review for AMNWR was released in August 1988 (USDOI, 1988). Section 304 of ANILCA requires comprehensive conservation planning for national wildlife refuges. Each comprehensive conservation plan must:

- (a)(i) designate areas within the refuge according to their respective resources and values;
- (a)(ii) specify the programs for conserving fish and wildlife and the program related to maintaining the identified values in designated areas;
- (a)(iii) specify the uses within designated areas which may be compatible with the major purposes of the refuge;
- (b) set forth opportunities which will be provided within the refuge for fish and wildlife oriented recreation, ecological research, environmental education, and interpretation of refuge resources and values.

The study area falls within the Bering Sea Unit of AMNWR; refuge lands include Sledge Island (700 acres) and Safety Sound (1,110 acres) within the study area, and areas near Bluff (8,700 acres) and Topkok Head (1,100 acres). These areas were not considered for wilderness designation because they did not meet the minimum/manageable size or naturalness criteria. ANILCA withdraws AMNWR lands from mineral entry, with the exception of existing claims. Figure 2 of the Title Report for the Nome Area Preliminary Best Interest Finding shows federal withdrawals related to AMNWR. In evaluating future activity in the vicinity of refuge lands, the plan recognizes that offshore mining activity will continue to occur between Nome and Sledge Island, and potentially on state leases off of Bluff.

Three management alternatives have been identified in the AMNWR Comprehensive Conservation Plan for the refuge. For Sledge Island, Safety Sound, Topkok Head, and Bluff, all three alternatives call for "current situation" management, which include:

- protect seabird colonies and marine mammal haulout areas,
- emphasize protection of existing fish and wildlife habitats and populations,
- provide for continued subsistence uses of refuge resources, and
- maintain traditional access opportunities.

Northwest Area Plan

The NAP is part of a statewide area planning process conducted by the Alaska Department of Natural Resources (DNR), for the management of state lands under Title 38 of the Alaska Statutes. It includes development of land use designations and management guidelines for state lands and tidelands in the Northwest Planning Area. The planning process began in 1985, and the NAP is in the process of final approval.

Preparation of NAP consisted of the following steps:

- Identification of Issues of Concern - Issues were grouped under eleven categories of resources and land use: fish and wildlife, oil and gas, minerals, recreation, cultural, reindeer grazing, land ownership and selections, subsistence, transportation and trails, settlement, and forestry.

- Designation of Management Units - The region was divided into seven management units for the purposes of land use recommendations and management. The study area is included in Management Unit 5, Southwest Seward Peninsula, which extends from Cape Woolley eastward to Cape Darby east of Golovnin Bay. While blocks of state lands along the shoreline are relatively limited, state tidelands and waters out to the three-mile limit are included.

- Collection of Resource Data - Data collected on each of the resource categories were used to establish development potential and to develop plan alternatives and policies.

- Development of Policies - Goals and guidelines were developed for each resource. They indicate what the plan is to achieve, ensure that development activities are conducted in an environmentally sound manner, and provide direction to land managers for land management.

- Implementation of the Plan - The guidelines of the plan are to be implemented at the time a permit, lease sale, or other pertinent state decision is made.

NAP Management Unit 5 - Southwest Seward Peninsula

This unit is broken into 10 subunits, four of which apply to this study: Subunit 5a, habitat and harvest tidelands; 5b, general use uplands; 5f, general use tidelands; and 5g, harvest and habitat uplands. A key component of the management unit designation is the classification of state lands and waters within the unit. Unit 5 is to be managed for a variety of uses. With the exception of the tidelands and uplands within 1/4 mile of six important seabird colonies between Safety Sound and Rocky Point and proposed disposal (residential) areas, the unit shall be open to mineral entry, and mining shall be allowed if consistent with the unit and plan management guidelines.

There are several guidelines applicable to the management unit. Of these, the following guidelines are worth noting:

- Fish and Wildlife Habitat Management Guideline (J) - Mouths of Anadromous Streams and Enclosed Estuaries. Mining within one mile offshore of the ordinary high water mark of anadromous fish streams or from within enclosed estuaries may be allowed only after the project applicant provides information to DNR, ADF&G, the Department of Environmental Conservation (DEC), and the appropriate coastal district that mining and related activities will avoid significant adverse impacts to anadromous fish and their habitats.

- Subsistence Activities and Traditional Uses Guidelines (A) - Avoid or minimize significant conflicts with traditional uses through project design, siting, timing, and other management options; and (D) - DNR observance of Bering Straits CMP coastal policy (A-1) thereby taking steps to mitigate adverse impacts to subsistence resources and their use.

- Guidelines for Resource Values that may be in Conflict with Coal or Mineral Development (A-1) - Retained Lands with Significant Commercial, Industrial, or Public Use Values. Evaluation of lands and waters that contribute significantly to a community economy to determine if prohibition of leasing or another management option is needed to protect the continued productivity and availability of the resource in conflict.

- Coordination and Public Notice Guidelines - (B) Coastal Plan Coordination. DNR will comply with the requirements in the Bering Straits, Northwest Arctic Borough, North Slope Borough and City of Nome coastal management plans where they apply to state lands (and waters).

With regard to this last guideline, primary requirements of the Bering Straits coastal management program that would affect the NAP are located in the Special Use Area, policy, and implementation chapters of the program. In addition to NAP guidelines, policies A-4, A-5, and F-2 of the Bering Straits coastal management program also address mitigation of adverse impacts.

NAP Implementation

As implied above, the guidelines of the plan are to be implemented at the time a permit, lease sale, or other pertinent state decision is made. This means that they will be applied as part of the OPP review and Best Interest Finding process, and during subsequent permits required or issued by DNR.

Nome and Bering Straits CMPs

The Nome CMP is the coastal management program of the City of Nome covering the municipal boundaries. The Bering Straits CMP, which includes the study area, is the coastal management program of the Bering Straits area (not including the city of Nome). Nome coastal management district participation in consistency review is directed by the city of Nome. Bering Straits Coastal Resource Service Area (CRSA) coastal management district participation in consistency reviews is directed by a locally elected CRSA Board. A program coordinator who is staff to the board and assists with their consistency reviews and other coastal management matters is located in Unalakleet. A major objective of the Alaska CMP is to provide local people with a participatory role in coastal management decision making.

Certain types of activities that require federal or state approvals and occur within the programs' coastal boundaries are subject to a coastal consistency determination procedure to determine if they are consistent with the policies of both the Nome and Bering Straits CMPs. As a disposal of interest in state lands and waters, a decision to offer an OPP is subject to a coastal consistency determination. The consistency review is conducted concurrently with the DNR Best Interest Finding for disposal of interest in state lands and waters.

Program Elements

Both the Nome and Bering Straits CMPs contain the following elements:

- a statement of issues, goals and objectives;
- a description of the coastal boundary;
- a resource inventory;
- a resource analysis;
- a description of the subject uses and activities subject to the CMP, including special use areas;
- the policies of the CMP;
- implementation of the CMP; and
- designation of any areas meriting special attention.

For the purposes of this report, the coastal boundaries, policies, and implementation are the most important elements of the CMP. The coastal boundaries are used to determine if a proposed action falls within the coastal zone or significantly affects resources within the coastal zone and is therefore subject to a consistency determination. Policies are the enforceable rules of a CMP and are used by permitting agencies and the City of Nome/CRSA as the basis for consistency with the CMP. Implementation describes how the

program will be implemented during permit/approval review, the timeframe for the consistency review, and who has what role in the review process.

A proposed action within the Nome or Bering Straits CMP areas must be consistent with the statewide standards of the ACMP and the district specific policies contained in the Nome and Bering Straits CRSA CMPs. For the most part, the policies are "performance" standards, as compared to prohibitions. This means that as long as a proposed action meets the requirements of a proposed policy (e.g., not causing significant adverse impact to anadromous fish habitat), the action is consistent with that policy. If not initially consistent, permit conditions or stipulations may be required to make it consistent. Some actions cannot be made consistent with a CMP; however, the statewide average for finding projects consistent with CMPs is 97 percent.

Some specific details of each CMP as it applies to the proposed offshore prospecting permit/mining lease are presented below:

Nome Coastal Management Program - The issues, goals and objectives encourage mining and mineral processing in a manner consistent with economic needs and natural resource protection. The area within the coastal boundaries is divided into six districts. The coastal management standards apply either to some or all of the districts. Coastal waters are in the Resource Development District; the port area is classified industrial. Three regional recommendations for areas meriting special attention that have been identified for consideration in the Nome CMP in the vicinity of the study area include Cape Nome, Safety Sound, and the Nome River. All three are located outside of the city boundaries, and were included in the Bering Straits CMP.

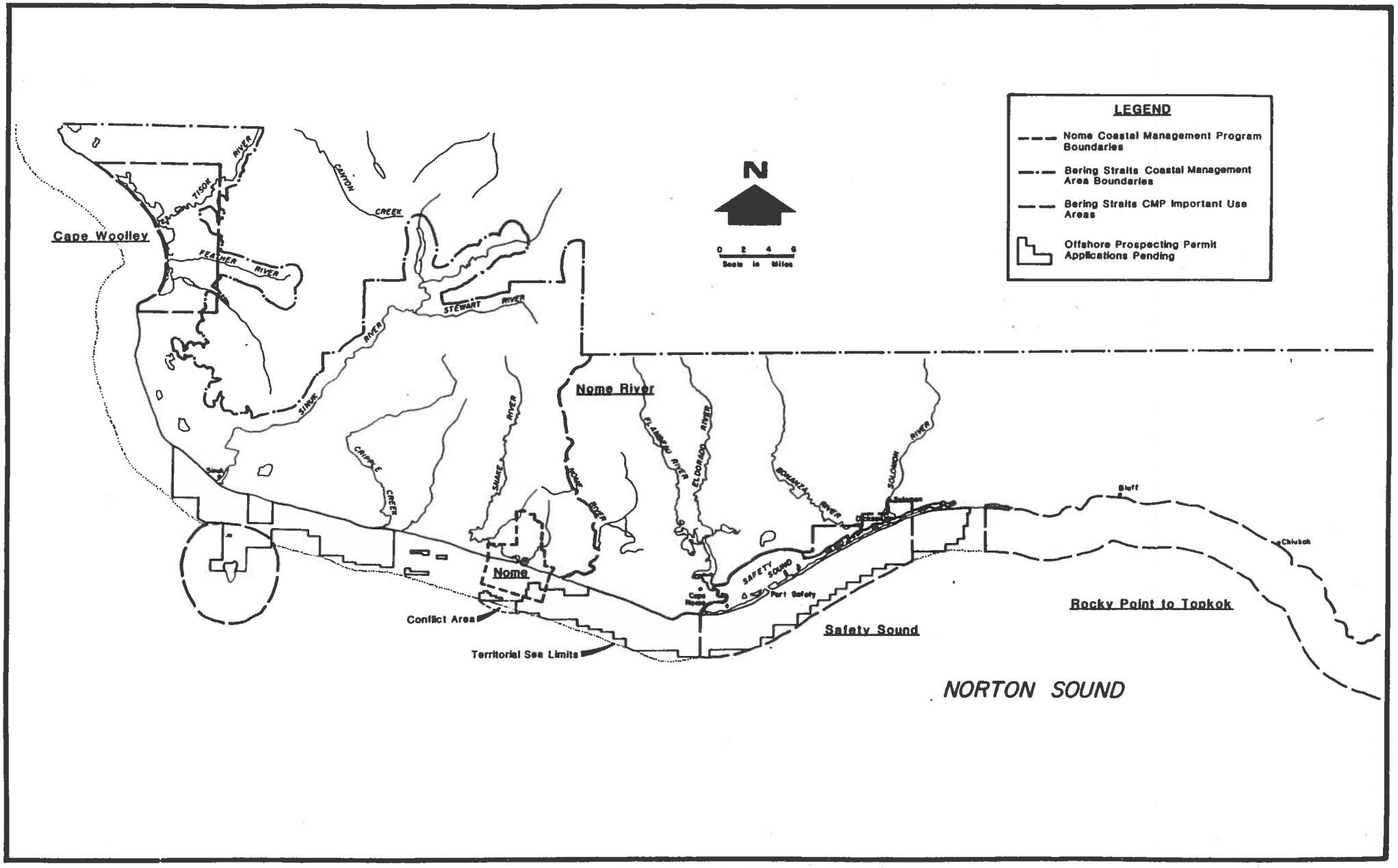
Bering Straits Coastal Management Program - The issues, goals, and objectives provide guidance for mineral exploration and extraction that does not adversely impact traditional Inuit ways

of life or the environment, and that does maximize benefits to Bering Straits residents. The coastal boundaries of the Bering Straits CMP include all state waters within the study area. Inland boundaries vary significantly, depending on topography (particularly the 200-ft elevation) and the presence of anadromous fish (Figure 4-9).

Five important use areas are located in the study area: Sledge Island, Cape Woolley, Nome River, Safety Sound, and Rocky Point to Topkok Head. Important use areas are identified based on the presence of highly productive wildlife habitat, subsistence values, important fisheries, historical sites, resource potential, and/or geophysical hazards. There is one specific policy that has been developed for these important use areas. The intent was to provide notice that these areas are of particular concern to residents of the region and allow for future development of a limited number of specific policies to provide guidance for activities taking place in those areas.

Specific program policies for mineral development stress local participation in planning processes and specific offshore mining policies (Section G-8.1 through G-8.4 of the Bering Straits CMP). The Section G-8 policies stress: avoidance of significant adverse impacts to habitats, commercial fishing activities, subsistence harvest activities, and navigation; exclusion of mining at the confluence of anadromous fish streams and marine waters; discharge of dredge spoils at the sea bottom where they were extracted; and avoidance of discharge or resuspension of toxic materials.

Five Areas Meriting Special Attention (AMSA) that have been identified for consideration in the Bering Straits CMP in the vicinity of the study area include Safety Sound, Rocky Point, Cape Nome, the Nome River, and Golovnin Bay. These AMSAs have not been formally proposed or subjected to the formal planning process; their identification is an indication of importance and a desire to prepare AMSA plans in the future.


LEGEND
Nome Coastal Management Program Boundaries
Bering Straits Coastal Management Area Boundaries
Bering Straits CMP Important Use Areas
Offshore Prospecting Permit Applications Pending
N
0 2 4 6
Scale in Miles
Cape Wooley
TISUK RIVER
CANYON CREEK
FEATHER RIVER
STEWART RIVER
SINUK RIVER
CRIPPLE CREEK
SNAKE RIVER
NOME RIVER
Nome River
ELAMEKNU RIVER
ELDORADO RIVER
BONANZA RIVER
SOLOMON RIVER
Solomon
Bluff
Chukok
Nome
Port Safety
SAFETY SOUND
Rocky Point to Topkok
Conflict Area
Territorial Sea Limits
Safety Sound
NORTON SOUND

The Consistency Process (the process for reaching a consistency determination) is spelled out in 6 AAC 50 of the Alaska Administrative Code. It follows specific timelines and procedural steps and defines the roles that state resource agencies and the local coastal management district (the CRSA) play in the process. Table 4-12 shows the timelines for the consistency determination process. As indicated in the table, permits are reviewed on either a 30-day (for minor activities) or 50-day (for major activities) schedule. In the unorganized borough, these timelines can be extended to 40 and 60 days, respectively, upon request by the coastal district; the Bering Straits CRSA has requested a 10-day extension for this review. In the case of a Best Interest Finding, the consistency determination is conducted concurrently with the Best Interest Finding process. The DNR is required to provide public notice 30 days prior to the intent to issue preliminary and final Best Interest Findings. The consistency review will start no later than the point of providing public notice.

The DNR will be the coordinating agency for the consistency of the OPP review; they will take the lead and issue the consistency determination. The City of Nome and Bering Straits CRSA, ADF&G, and the DEC are review agencies. They will evaluate the consistency of the proposed OPP and will submit formal consistency recommendations, which have a defined legal weight relating to their respective management jurisdiction, to DNR.

Where DNR disagrees with review agency consistency recommendations in areas where the review agency has expertise, DNR is required to prepare a written finding as part of the consistency determination.

During the review period, the review may be stopped to request additional information, hold a public hearing, or to request an extension. A preliminary consistency determination is issued and sent to the applicant and review agencies; any of these parties

Table 4-12. Major procedures under the 30/50-day schedule.

Step	30 Day Schedule (by day)	50 Day Schedule (by day)
1. Early contact with district about projects	-	-
2. Applicant submits completed packet, coordinating agency distributes packet and schedule	1-2	1-2
3. Review period (upon request)	3-17	3-34
4. Last day for information request via coordinating agency	15	32
5. Last day for request for public hearing	17*	34*
6. Deadline for comments to coordinating agency (verbal comments must be followed up in writing within five days)	17	34
7. Coordinating agency develops preliminary position, notifies applicant and districts with approved programs	24	44
8. Last day for written statement requesting elevation to director level	29	49
9. If a consensus is reached, consistency determination sent to reviewers; permit decision issued within five days	30**	50**
10. If project is elevated, issue paper sent	30***	50***

* Coordinating agency must decide within seven days whether to hold hearing. If so, agency must provide 15-30 days of notice and provide summary of hearing five days afterwards. Parties also have the same seven days after receipt of summary to provide additional comments.

** Agency permit decision to be issued five days after consistency determination received unless statutorily impossible.

*** Elevation can take up to 15 days at each level. If no consensus reached during elevation to directors, then elevated to commissioner for policy direction.

may appeal the preliminary determination through the "elevation process". If there is no appeal, or after the appeal is resolved, a final consistency determination is issued.

A project or action may be found consistent, consistent with conditions, or not consistent with a CMP. A finding of consistent with conditions can have two results:

1) a set of standard stipulations, developed for specific types of actions, attached to the state permits or leases that are issued; and/or

2) a set of specific stipulations, designed to bring the proposed action into compliance with CMP policies, attached to the state permits or leases that are issued. These may include modifications to project area and schedule.

If a project cannot be found consistent, even with conditions, the project as submitted will not be approved.

In the case of a large project that may involve several phases (e.g., prospecting permits, exploration, leasing, and actual mining), each phase will likely require a separate consistency determination, depending on the permits involved. However, if major issues are addressed and resolved during the initial consistency review, subsequent consistency reviews should be relatively simple.

5.0 POTENTIAL BIOLOGICAL IMPACTS OF EXPLORATION AND MINING

5.1 Introduction

This section summarizes information related to the impacts of exploration and mining on the biological components of the study area. Material in this section draws heavily from Ocean Discharge Criteria Evaluation (ODCE) Information Database for Lease Sale 45, Nome Gold Project (ENSR, 1989), the Draft Final Environmental Impact Statement for the Outer Continental Shelf (OCS) Mining Program Norton Sound Lease Sale (USDOI/MMS, 1988), and the Nome Offshore Placer Project Annual Report, Volume I (Jewett et al., 1989).

5.2 Impacts on Marine Water Quality

Exploration activities would have little or no impact on marine water quality. There is insufficient data at this time to project what level of impact exploratory activity within Safety Sound would have on the sensitive Safety Sound environment.

Mining activities may potentially impact water quality through increased turbidity (discussed in Section 5.3.2) and trace metal levels in the water column. Trace metal analyses of water samples were carried out in Norton Sound as part of the 1986, 1987, and 1988 environmental NPDES monitoring program for WestGold. Effluent and influent monitoring was carried out while the Bima mining vessel was in operation. Parameters measured included temperature, salinity, dissolved oxygen, turbidity, and eight priority trace metals.

The range of trace metal concentrations found in 1986, 1987, and 1988 seawater samples for Bima influent and effluent were:

	Influent	Effluent
Arsenic	<0.001 - 0.061	<0.008 - 0.112
Cadmium	<0.003 - 0.015	<0.002 - 0.059
Chromium	<0.010 - 0.064	<0.010 - 0.064
Copper	<0.005 - 0.120	<0.002 - 0.110
Lead	<0.001 - 0.220	<0.001 - 0.048
Nickel	<0.007 - 0.317	<0.007 - 0.321
Zinc	<0.001 - 0.520	<0.001 - 0.393
Mercury	<0.0002 - 0.0208	<0.0002 - 0.0051

In general, water column trace metals criteria were met for all elements during 1988 with the exception of copper and mercury (Jewett et al., 1989). It is relevant to note that where effluent values exceeded the permit limitations, so did the influent values. Since influent and effluent values for copper were almost identical, it may be interpreted that mining activity neither improved the situation nor had significant detrimental effects. All 1988 mercury data with respect to water quality are suspect due to contamination problems in the WestGold laboratory facility, however, values for all other metals are believed to be reliable. Statistical tests of influent and effluent trace metal concentrations for 1988 indicated that arsenic and nickel concentrations were significantly greater in effluent than influent, while lead and zinc concentrations were significantly lower in effluent than influent. The decreases in lead and zinc may be a result of sediment particle adsorption.

5.3 Impacts on Plankton, Benthos, and Fish Resources

Exploration activities would have little or no impact on plankton, benthos, and fish resources. There is insufficient data at this time to project what level of impact exploratory activity would have on the sensitive Safety Sound environment.

Dredging-induced effects on marine plankton, benthos, and fish have been described recently in several reports and studies. The most notable are a series of studies from the Dredged Material Research Program (DMRP) directed by the U.S. Army Corps of Engineers (EPA/COE, 1977). Additionally, another group of reports and studies concerning effects of dredging and gravel island construction in both the Canadian and Alaskan Beaufort Sea regions has emerged (Poulin, 1975; Morton, 1977; Beak Consultants, Ltd., 1978; Hirsch et al., 1978; ESL, 1980; Pelletier and Wilson, 1981; NORTEC, 1981a and 1981b; Pessah, 1982; Toimil and England, 1982; Canada, Fisheries and Marine Service, 1977 as cited in USDOI/MMS, 1983; EPA, 1985; Cruikshank et al., 1987).

These reports generally concluded that effects on marine biota from dredging and disposal operations would be restricted to the immediate vicinity of the operation and the resultant turbidity plume (Neff, 1981; Muench et al., 1981). Effects on marine biota would result from disturbance (mechanical agitation) or destruction of habitat in the dredge area, increased turbidity or suspended sediments in the water column, smothering of organisms, alteration of habitat downcurrent from the dredge site, and entrainment of aquatic organisms in the dredging device. (Pratt and Campbell, 1956; Davis, 1960; Davis and Hidu, 1969; Stanley, 1970; Masse, 1972; Kranz, 1972; Oliver and Slattery, 1973; Stone et al., 1974; Feder and Schamel, 1976; Menzie et al., 1980; Turk and Risk, 1981; Maurer et al., 1981).

Results of the Nome Offshore Placer Project studies indicate that numbers and kinds of benthic organisms are initially reduced in mined areas, but two years after mining activity occurs, these areas have organism density values similar to non-mined areas in sand substrate. Although the long-term impacts upon the benthic communities have not been demonstrated yet, it is apparent that mined areas do respond by recolonization of benthic organisms.

5.3.1 Habitat Disturbance

Exploration should have little or no impact on the area's habitat. Disturbance of habitat during mining would result from both the actual excavation or mechanical removal of bottom substrate, and the deposition of overburden and tailings during dredging (Jorgensen, 1966).

The most obvious and direct effect would be the alteration or destruction of benthic habitat resulting from the mechanical removal of bottom substrate during the dredging operation. Most, if not all, benthic organisms reside either on top of or within the top 5 to 15 cm of the sea bottom. The removal of this top layer is a certainty during dredging and will ultimately lead to removal and death of benthic organisms (fish and invertebrates) and loss of habitat (Oliver and Slattery, 1976).

The rate of recolonization and the new community composition would depend on the degree of change in the substrate type (grain size of the predominant sediments), the changes in local physical and chemical oceanographic regimes (currents, depth, salinity, dissolved oxygen, etc.), and the tolerance of the recolonizing organisms to these changes (Doan, 1941 and 1942). The nearshore benthic populations (fish and invertebrates) found in this region are seemingly adapted to withstand changes of this type because of natural processes (e.g., strudel scour, ice-gouging, and storms) which cause unstable bottom sediment conditions (Poulin, 1975; Rousefell, 1975; Byers and Kachino, 1980; Salo et al., 1980; Craig and Haldorson, 1981).

As a result of these adaptations, it is anticipated that recolonization would be complete in less than five years. Heath et al. (1981, as cited in USDOI/MMS, 1983) concluded that in dredged areas near Herschel Island in the Canadian Beaufort Sea, recolonization was nearly immediate by mobile macrobenthos and by sessile benthos brought in by water movement. They also found that

species diversity was lower after dredging operations but that biomass was higher. They predicted that recolonization would be relatively complete in about two years. A conservative estimate for complete recolonization of benthic fauna in this area would be two to five years (also see Thorson, 1950; Ellis, 1960; Chia, 1970; Mileikovsky, 1971; Leatham et al., 1973; Cronin et al., 1978; Rhoads et al., 1978; Armstrong, 1983).

Results of the Nome Offshore Placer Project studies indicate that numbers and kinds of benthic organisms are initially reduced in mined areas, but two years after mining activity occurs these areas have organism density values similar to non-mined areas in sand substrate. Although the long-term impacts upon the benthic communities have not been demonstrated yet, it is apparent that mined areas do respond by recolonization of benthic organisms.

5.3.2 Turbidity

Exploration activities are expected to cause little or no change in current turbidity levels. Increased turbidity or suspended sediment concentrations resulting from dredging would produce some adverse effects to marine biota in the vicinity of the plume and deposition zone. Deposition would generally occur within the range of the plume with significant portions settling out within 100 m of the source (Rusanowski et al., 1987). Effects from turbidity in these zones are generally short-term with recovery of organisms occurring in a matter of hours or days after operations cease. Organisms affected by these plumes include phytoplankton, zooplankton, filter-feeding infaunal invertebrates, epibenthic invertebrates, and fish (Loosanoff and Davis, 1963; Stern and Stickle, 1978).

The expected increases in turbidity from mining operations have been studied to help assess effects in organisms. During the 1988 season, turbidity was measured by two instrument arrays positioned near the Bima. Data were recorded every 10 minutes from August 18

to October 10. At various times both arrays were exposed to the downcurrent plume due to localized reversal of tidal flows in the area. During the period from August 18 to September 17, however, currents were predominantly to the west and data are representative of upcurrent (control) and downcurrent (plume) conditions. These data indicate that approximately 95 percent of the time background turbidity is below 25 NTU, and in the downcurrent plume near the edge of the mixing zone, turbidity is below 25 NTU 80 percent of the time.

Phytoplankton would be affected by turbidity induced light attenuation, which would result in a reduction in carbon assimilation (photosynthesis). This would lead to a decrease in growth and reproduction, and hence a decrease in primary productivity in the area of the sediment plume (Dunbar, 1968; Lee, 1970; Livingston et al., 1972; Horner et al., 1974; Hufford, 1974; Sherk et al., 1976). Considering the relatively small area and duration of the plume, such an impact would be minor.

Zooplankton and filter-feeding benthic invertebrates could suffer a reduction in feeding efficiency through ingestion of sediment particles. While some organisms can metabolize ingested sediment, such particles would displace more nutritious food particles (e.g., organic detritus and other plankton) and lead to a decline in growth and reproduction. Again, considering the relatively small area and duration of the plume, this would be a minor impact (Loosanoff and Tommers, 1948; Loosanoff, 1961; Reeve, 1963; Jorgensen, 1966; Cairns, 1968; Sherk et al., 1976; Neff, 1981; Carls and Rice, 1984).

Fish and some mobile epibenthic invertebrates caught in a sediment plume could suffer some respiratory malfunctions by sediment particles clogging or abrading gill surfaces. Research conducted through the U.S. Army Corps of Engineers' DMRP (O'Connor et al., 1976) has shown that fishes could succumb if sufficient damage to gill surfaces occurs (Wallen, 1951; Flemer et al., 1968; Ritchie,

1970; Sherk, 1972; Sherk et al., 1974; McDonald, 1975; Morton, 1977; EPA/COE, 1977; Davis et al., 1979; Byers and Kachino, 1980; ESL, 1982). However, mortality generally occurs at concentrations considerably higher (Sherk, 1971) than those expected in the study area.

For the most part, significant adverse impacts to fish and epibenthic invertebrates are not expected from turbidity. Given that most fish and certain epibenthic invertebrates (mysids, amphipods, and decapods) are mobile, it is reasonable to assume that some of these organisms could escape the relatively small, turbid area created by a dredging operation. Also, these organisms, especially the immobile epibenthic forms, are occasionally exposed to naturally occurring suspended sediment concentrations approaching or above those expected from a dredging operation (Flemer et al., 1968; Flemer, 1970; Peddicord et al., 1975). In addition, Peddicord (1980) found that "ecological degradation due to the direct or indirect effects of typical suspended sediment conditions created in the water column by most dredging or disposal operations is unlikely."

5.3.3 Entrainment

Exploration activities would have little or no impacts on organisms from entrainment. Insufficient data currently exist to demonstrate adverse effects of exploration activities on nearshore environments critical for the fry and smolt of anadromous fish.

Entrainment of organisms in a dredging device would likely result in direct mortality for most of the organisms entrained. Benthic organisms entrained from the area of excavation would suffer the greatest mortality, while fish mortalities would be minor (Slotta et al., 1973; Pelletier and Wilson, 1981). Although observations on the Bima have shown that many tunicates and echinoderms survive passage through the trommel screens and can be returned to the

water with the oversize sediment material, overall survival of benthic organisms is low due to predation, burial, or landing in unsuitable habitat.

There are two possible scenarios for the effects of entrainment on fish. Under the first scenario, the noise and turbidity created by an operation could cause fish to avoid the dredging site, thus minimizing fish entrainment mortalities (Ingle, 1952; Stickney, 1972). The second possibility is that the introduction of benthic organisms into the water column with the sediment plume created by the mechanical agitation of sediments could attract fish that are feeding on these organisms, thereby increasing fish mortalities (Thomas, 1979).

5.3.4 Other Impacts

Resuspension of trace metals and other pollutants in toxic proportions is not anticipated. No effects to the biotic community from metal assimilation is expected (Saila et al., 1968; Fay, 1978; EPA, 1980). Due to the high energy coastal environment, there is a very low probability that toxic materials would be present. Data from the 1989 season may provide more information since this program includes the monitoring of organisms (i.e., mussels) more susceptible to trace metals in the environment.

Nutrients may be released into the water column from the dredging operation and result in a beneficial side effect by countering any decline in primary productivity induced by turbidity (Wilson, 1953; Quirk et al., 1974; Feder and Schamel, 1976; Duval, 1977; Envirocon, 1977; Menzie et al., 1980; Maurer et al., 1981). Detrimental effects of nutrient release are not expected.

5.4 Impacts on Marine Mammals and Birds

5.4.1 Mammals

Five species of non-endangered marine mammals--ringed, spotted, and bearded seal; Pacific walrus; and beluga whale--occur in the study area and are likely to have some interaction with exploration and mining activities. Noise and movement from boats or the dredge and habitat alteration from mining activities would affect marine mammals found in this area, particularly in the vicinity of Sledge Island and Safety Sound.

During exploratory activities, the movement of boats and noise from marine traffic and aircraft support traffic may disturb marine mammals in the study area. The noise and movement of the seismic vessel may briefly (a few minutes) disturb marine mammals within about 1 km of the vessel, while core drilling operations could disturb and temporarily displace (for a few days) those within a few kilometers of the drillship.

Mining activities would have a larger impact on marine mammals due to additional underwater noise from operating the dredge and increased marine and aircraft support traffic.

Low-flying aircraft and high-speed motorboats which produce high-frequency sound would be more likely to interfere with beluga whale communication or echolocation signals than would the dredge frequency (USDOI/MMS, 1989). Observations of beluga whales encountering barge and boat traffic in the MacKenzie River estuary indicated that whales within 2.5 km of the vessels were disturbed (Fraker et al., 1978). Disturbance of beluga whales from flyovers and from high-speed motorboats, however, is generally very transient, with events not lasting more than a few seconds (USDOI/MMS, 1989).

According to a report published by the Marine Mammals Commission (Lentfer, 1988), beluga whales may abandon areas of disturbance or they may exhibit high site tenacity. Although belugas in northern Quebec, Kotzebue Sound, and Mackenzie Delta are intensely hunted and exposed to dramatic increases in vessel traffic and industrial noise, they return each year. Belugas have left other areas where vessel traffic has increased.

Helicopter flights between Nome and the dredge would most likely be the primary noise and disturbance sources to spotted seal hauled out on beaches along Cape Nome and Safety Sound, to walrus hauled out on Sledge Island, and to bearded and ringed seal hauled out on remnant ice floes in the spring. Each disturbance event would be brief, lasting only a few minutes, and individuals would likely return to haulout areas within an hour to a few hours or within a few days. Since mining operations would begin after the seal pupping season and would occur far from the walrus nursery herds, injury, death, or abandonment of young would not likely occur from air traffic disturbance.

Noises from the dredge could mask some of the lower-frequency sounds of walrus or some sounds of bearded seal several kilometers or more from dredging operations. Theoretically, very noisy dredges could slightly mask low-frequency whale sounds out to a range of 56 km, but a 5 km range would be more likely.

Behavioral observations of beluga whales in the vicinity of active dredging and artificial island construction in the MacKenzie River estuary and Canadian Beaufort Sea indicated that whales react to such operations by avoiding the immediate area near the site. The sounds of dredging operations possibly could displace some seal, walrus, and beluga whale from habitats within a few to several kilometers of the dredge.

There are some indications that whales may be more sensitive to underwater noise in shallow and confined water bodies than in deeper and open-water areas (Fraker et al., 1981). Although beluga

whales rarely enter into Safety Sound, they are often present at its mouth. While the reason for their presence in this area is largely unknown, several hypotheses exist. Whales may be attracted to the area for its abundant supply of fish, a primary food source; they may prefer the warmer water for their calves; or they may favor the area during their summer molt because of the lower salinity, warmer water, or rocky substrate (L. Lowry, ADF&G, Fairbanks, personal communication, 1989). Recent scientific observations indicate that noise from dredging may alter marine mammal behavior patterns near the activity sites. However, the level of disturbance apparently depends on water depth, location, weather conditions, species of concern, and other environmental factors.

5.4.2 Birds

As with marine mammals, marine and coastal birds in the study area may be temporarily displaced by noise from marine traffic and aircraft support traffic associated with exploratory activities.

Mining activities would have a larger impact on marine and coastal birds than would exploration activities due to increased traffic and noise with dredging. An additional impact may be habitat alteration from dredging activities.

Helicopter flights between Nome and the dredges would likely be the primary source of noise and disturbance that could affect local populations of marine and coastal birds in the Nome area. Some feeding flocks of seabirds would be unavoidably disturbed from offshore air traffic, but these events would be very brief (a few minutes) and would not likely affect seabird feeding success. Disturbance of molting and feeding birds could reduce migration fitness and contribute to migration mortality.

Mining activity and support traffic in the nearshore, particularly in the vicinity of Sledge Island and Safety Sound, could displace nesting birds and disturb others in important feeding and molting areas. Displacement of nesting birds would reduce nesting success. Egg-laying, occurring from the second week in June through early July, is the critical period for birds nesting in the study area; disturbance during this time would have the biggest impact to nesting success (E. Murphy, University of Alaska Fairbanks, personal communication, 1989). Once eggs are laid, birds are less likely to abandon nests and are more tolerant of disturbances.

Dredging and deposition of bottom sediments would disrupt benthic habitat and remove and bury epibenthic prey (such as mysids) of marine and coastal birds. Such activities could also temporarily displace or reduce local pelagic prey (arctic cod) of seabirds at or adjacent to the sites of the activities. However, nearshore benthic disturbance levels, sedimentation, and turbidity would probably be as comparable in intensity and effects upon epibenthic biota as natural disturbances such as ice gouging, resuspension of sediments during storm surges, and excavation by strudel scour at river mouths during spring breakup (NOAA, 1981). Effects of sedimentation and turbidity on pelagic and epibenthic prey for marine and coastal birds would be short-term due to recruitment of epibenthic fauna from adjacent areas.

5.5 Impacts on Endangered and Threatened Species

5.5.1 Endangered Whales

The study area is near summer feeding grounds of gray whales, and an occasional sighting occurs near the study area.

It is likely that exploration activities will have little or no impact on gray whales. It is also likely that most gray whales will avoid the activity occurring in dredging areas, and thus avoid

contact with more concentrated portions of the plume during discharge. Any impact caused by physical disturbance of sediments would likely be food related. The degree to which food supplies would be impacted would depend on the area affected. Based on the limited area of heavy impact in relation to the total area of available food and the mobility of whales and their prey, the impact is considered to be minimal.

5.5.2 Threatened Birds

Exploration activities involving seismic testing and drilling would have little or no impact on arctic peregrine falcon in the study area.

The arctic peregrine falcon feeds primarily on birds. Nesting peregrines could be indirectly affected by any reduction or dislocation of prey-species populations within the peregrine feeding territories (24 km of nest sites). Although alteration of benthic and pelagic habitat from mining could reduce availability of seabird prey species, this impact would be confined to the vicinity of the dredging operations and overall seabird populations are not expected to decline.

The nearest nest site is 5 km from the study area. Since the U.S. Fish and Wildlife Service's Peregrine Recovery Plan recommends prohibition of high noise level activities within 2 km of nest sites, impacts from noise are not expected.

5.6 Human Health Impacts

For an in-depth review of the effects of mercury on human health, refer to Section IV.B.15 of the draft environmental impact statement for the OCS Mining Program, Norton Sound Lease Sale (USDOI/MMS, 1989).

According to the Preliminary Site Assessment for the City of Nome (EPA, 1987), normal background levels of mercury measured throughout Nome were between 0.02 and 0.05 parts per million (ppm). According to WestGold data (Jewett et al., 1989), average mercury levels in offshore sediments were 0.034 ppm. Mercury levels on portions of Nome's Steadman playground were between 10 and 85 ppm (EPA, 1987). These high mercury concentrations in playground soils are thought to be due to earlier mining activities on land (mercury is not used in WestGold's offshore mining activities). While mining in offshore waters is not expected to add to existing mercury problems, adequate monitoring of mining activities would be prudent to ensure no additional problems arise.

6.0 COMMUNITY, LAND USE, AND ECONOMIC BENEFITS AND IMPACTS

This chapter provides a brief assessment of potential community and land use impacts. Activities associated with exploration and mining in the project area have a potential to affect the communities and residents of Nome, Golovin, and White Mountain. Solomon and other communities or camps that are seasonally occupied could also be affected. The following topics are addressed:

- Exploration and Mining Characteristics
- Community Impacts
- Subsistence Impacts
- Commercial Fishing Impacts
- Land Use Impacts

6.1 Exploration and Mining Characteristics

6.1.1 Exploration

Table 6-1 presents some of the activities and impact considerations associated with exploration. The two major activities would be seismic testing and drilling. Seismic testing would involve towing a water gun or bubble-pulse device behind a boat over a grid pattern at areas to be explored. Drilling would consist of drilling core holes from a boat or over the ice using a Rolligon or other vehicles. The exploration effort would also require certain types of support activities, such as providing housing for the exploration crew, an area to unload and store supplies, fuel and other supplies for the exploration effort, and transportation from the support site to wherever seismic testing and drilling were taking place. Activities associated with the current WestGold operation are representative of the type of exploration that could occur. In 1987, three exploration programs were completed (Rusanowski et al., 1988):

Table 6-1. Potential dredging activities with associated impacts.

Activities with Potential Impacts	Characteristics
Exploration Phase	
Geophysical testing	boat noise, navigation interference, gear damage[1]
Drilling	noise, vibration, interference
Transportation	noise, navigation interference
Personnel	competition with local residents (hunting, fish)
Logistical support requirements	
housing	social impact
fuel	competition with local residents
	spill potential
equipment, supplies storage	competition with local residents
Activities with Potential Benefits	
Local hire (wages)	provides income
Job training	provides skills
Equipment leasing/supplies	provides revenue
Lodging/rent	provides revenue
Boat and plane charters	provides revenue
Mining Phase	
Potential Impacts	
Offshore	
vessel presence	noise, interference
dredging	habitat destruction, avoidance, mortality, gear damage[1]
seawater intake	mortality, gear damage
material disposal	habitat destruction, avoidance, mortality, gear damage[1]
	navigation restrictions
water discharge	avoidance
winter dredge storage	habitat destruction
Support Activities	
transportation to site	noise, interference
housing	social impact, competition
fuel	competition with local residents, spill potential
equipment, supplies storage	competition with local residents

Table 6-1. Potential dredging activities with associated impacts (Cont'd).

Mining Phase (Cont'd)	
	Characteristics
Potential Benefits	
Local hire (wages)	provides income
Job training	provides skills
Equipment leasing/supplies	provides revenue
Lodging/rent	provides revenue
Boat and plane charters	provides revenue
Land and facility leasing	provides revenue
Indirect Impacts	
Interference/exclusion	redistribution/concentration of effort
commercial fishing	increased effort and associated costs
subsistence	loss of harvest time and potential income

[1] Gear damage would result from accidently running over commercial fishing/ subsistence gear.

- a 16-day winter drilling program during late March to early April resulted in 91 holes completed to an average depth of 7.5 m;
- a high resolution geophysical survey was completed over a 32-day period from mid-July to mid-August; and
- a summer drilling program from late July to mid-August resulted in 548 holes completed to an average depth of 10 m.

In 1988, the following WestGold exploration operations were conducted:

- the winter drilling program consisted of 528 holes completed at an average depth of 10 m;
- the summer drilling program resulted in 905 holes completed at an average depth of 10 m.

A summer drill program of approximately three months in duration and consisting of 500 to 900 holes is anticipated for 1989.

6.1.2 Mining Operations

If exploration resulted in the discovery of mineral resources, and it was determined economically feasible to mine them, a mining plan would be prepared. The mining methods used would depend on the location of the mineral deposit and its characteristics (e.g., amount and nature of overburden and size of gold particles). Table 6-1 presents some of the activities and impact considerations associated with operations. Activities associated with the current WestGold operation are representative of the type of mining that could occur. In 1987, operations characteristics were as follows (Rusanowski et al., 1988):

- operations began in mid-June and continued until mid-November;
- of the 148 day operating period, 34 percent was downtime;

- the area dredged was 54 acres; maximum digging depth was never more than 18 m, with water depths varying from 7 to 12 m.

In 1988, the following WestGold mining operations were conducted:

- operations began in late May and continued until early November;
- of the 170 day season, 24 percent was downtime; and
- the area dredged was approximately 144 acres.

The 1989 mining season is anticipated to be 168 days, beginning in late May or early June and ending in late October or early November.

6.2 Community Impacts

6.2.1 Primary Location of Impacts

It is likely that exploration and mining activities would be based out of the community of Nome given the proximity to potential lease areas, the availability of existing infrastructure, and its support of current mining activities. Potential community impacts resulting from the exploration activities include:

- a temporary increase in local employment;
- a temporary increase in community population;
- creation of new revenue associated with the purchase of supplies, housing, city services, and storage area rental;
- and temporary increased demand on community infrastructure from personnel and service (e.g., water, fuel, and power) needs.

Those impacts would be seasonal (spring and summer for exploration activities and summer for mining activities) and would occur over the life of mining activities in the lease area. Table 6-2 presents a summary of the sensitivity of community characteristics to impacts. There would be no community infrastructure or population impacts in Golovin, White Mountain, or Solomon because there would not be additional work forces locating in any of these communities.

6.2.2 Employment and Economy

In 1987, the Bima mining operation employed up to 124 people during the year, with a typical work force of 94. Of total employment, 71 of those positions (57 percent) were locally hired in Nome. In addition to wage income, the project generated an average of $600,000 a month to the local economy (Rusanowski et al., 1988).

During the 1988 operating season, total employment was 128, with 79 percent being locally hired in Nome and 86 percent hired in Alaska. Expenditures by the WestGold operation were as follows:

- hourly wages, $3.4 million;
- services, $1.4 million;
- office salaries, $1.2 million;
- local vendors, $1.2 million;
- local construction contractors, $0.6 million;
- rents, $0.4 million; and
- miscellaneous, $0.1 million.

A further breakdown of expenditures and employment, including indirect employment and distribution to the region's residents and communities outside Nome, is not publicly available. As the level of Nome based mining increases, there is some concern about effects

Table 6-2. Sensitivity of community characteristics to impacts.

Characteristic	Sensitivity	Period of Sensitivity	Sensitivity
Subsistence			
salmon	biological*(2) & (3) interference**, gear damage increased effort and costs	June 1 - Sept. 15	high (nearshore waters***)
seals	biological*(1) & (3) interference** increased effort and costs	Sept. 1 - July 1	moderate
walrus	biological*(1) & (3) interference** increased effort and costs	April 1 - June 30	moderate
waterfowl	biological*(1) & (3) increased effort and costs	April 15 - Oct. 30	low
seabird eggs	biological*(3)	March 1 - July 15	high
smelt	biological*(1) & (3) interference**	Feb. 15 - July 30	moderate (nearshore waters***)
tomcod	biological*(1) & (3) interference**	Oct. 15 - April 15	moderate (nearshore waters***)
crab	biological*(2) & (3) interference**, gear damage	Nov. 15 - May 15	high
Commercial Fishing			
crab	biological*(2) & (3) interference**, gear damage economic impact	Nov. 15 - May 15	high
salmon	biological*(2) & (3) interference**, gear damage economic impact	June 1 - Sept. 15	high

Table 6-2. Sensitivity of community characteristics to impacts (Cont'd).

Characteristic	Sensitivity	Period of Sensitivity	Sensitivity
Community Infrastructure			
housing	competition with residents, other outside users	year-round	low
fuel supply	competition with residents, other outside users	year-round	low
water supply	competition with residents, other outside users	year-round	low
electric	competition with residents, other outside users	year-round	low
Transportation			
air	increased traffic levels, competition with residents	year-round	low
marine	interference with navigation	open water season	moderate
road	increased traffic levels	snow-free months	low
Employment/Income			
	competition with fishing, subsistence	May 15 - Sept. 30	moderate
Social Characteristics			
	influx of new residents increased activity levels	year-round	moderate

* Biological impacts include (1) habitat destruction, (2) mortality, and (3) avoidance of areas during mining activities.

** Interference/exclusion impacts for commercial fishing and subsistence include redistribution/concentration of increased effort and associated costs and loss of harvest time and potential income.

*** Enclosed nearshore waters such as Safety Sound are generally more sensitive to impacts, particularly from turbidity and redeposition of tailings.

Table 6-2. Sensitivity of community characteristics to impacts (Cont'd).

A general definition of the terms used to describe sensitivity of community characteristics to impacts is described below:

Subsistence and commercial fishing resources and activities:

high - the resource or activity occurs during a seasonally limited time (in conjunction with mining activities) where impact can result in a significant loss of annual harvest; the resource or activity occurs in a geographically limited area (in conjunction with mining activities) where impact can result in a significant loss of annual harvest; the resource or activity is very important to a community or regional economy or sociocultural system; and/or the resource or activity is very susceptible to potential biological or interference impacts created by exploration or mining activities.

moderate - the activity occurs during a seasonally limited time but either occurs over a wide geographic area or is not likely to occur during the mining season; and/or the resource or activity to be potentially impacted is available in other locations but may require an increase and redistribution of effort.

low - the resource or activity does not occur during a seasonally limited time (particularly in conjunction with mining activities) where impact can result in a significant loss of annual harvest; the resource or activity is available/occurs in a broad geographic area (in conjunction with mining activities) where impact is not likely to result in a significant loss of annual harvest; the resource or activity is not particularly important to a community or regional economy or sociocultural system; and/or the resource or activity is not particularly susceptible to potential biological or interference impacts created by exploration or mining activities.

Community infrastructure and transportation systems
(assumes that project activities will be staged out of the City of Nome)

high - community infrastructure is inadequate for current demands or near operating capacity and is not capable of meeting the project level of service/use demands entailed by proposed exploration and mining activities; and/or traffic levels are of a nature or timing that project induced traffic will significantly strain transportation systems or create significant safety hazards.

moderate - community infrastructure is adequate for current demands and is capable of meeting the projected level of service/use demands entailed by proposed exploration and mining activities; and/or traffic levels are of a nature or timing that project induced traffic will potentially strain transportation systems or create some safety hazards.

Table 6-2. Sensitivity of community characteristics to impacts (Cont'd).

low - community infrastructure is adequate for current demands and is capable of meeting the projected level of service/use demands entailed by proposed exploration and mining activities; and/or traffic levels are of a nature or timing that project induced traffic is not likely to strain transportation systems or create safety hazards.

Employment/income and social characteristics
(assumes that project activities will be staged out of the City of Nome)

high - the potential increase in Nome population resulting from direct and indirect employment opportunities will create significant additional competition for sport hunting and fishing and subsistence resources.

moderate - the potential increase in Nome population resulting from direct and indirect employment opportunities will create some additional competition for sport hunting and fishing and subsistence resources.

low - the potential increase in Nome population resulting from direct and indirect employment opportunities will create insignificant additional competition for sport hunting and fishing and subsistence resources.

of inflation on wage rates and prices for goods and services in outlying villages (B. MacLean, BSCMP, Unalakleet, personal communication, 1989). However, there are no data available to assess this potential impact.

6.2.3 Infrastructure and Services

The non-resident employment would result in a temporary but insignificant increase in Nome's population. This would not be enough to cause significant infrastructure and service impacts. The available housing should handle increased demand. If not, additional housing could be constructed on subdivided land tied into city services. Infrastructure capacity should be adequate to meet demand for exploration activities.

Mining and exploration activities will result in increased air and marine transportation activities. Additional air traffic at Nome will be associated with bringing in supplies and moving personnel. Daily helicopter flights between the dredge and support camp would probably occur. Storage and staging areas at the airport and dock area would be required. Existing facilities and infrastructure will be adequate to support project related activities.

Marine operations will continue to use the port facilities. This proposed operation will result in one additional dredge operating out of the port. Cumulative impacts are discussed in Section 6.6. Geophysical exploration and drilling will involve boats towing seismic arrays over areas to be explored and drilling from vessels. There is also a likelihood of boat traffic between the onshore support area and exploration or mining vessels ferrying crew, fuel, and supplies. During the winter, Rolligon and snow machine traffic would be associated with exploration drilling through the ice. During recent operations, the Bima dredge was overwintered at the port causeway; it is expected that any additional dredges associated with this project would be similarly overwintered. Potential navigation hazards from dredge tailings piles is a local

concern particularly for activities in shallow waters (S. Merkouris, ADF&G, Nome, personal communication, 1988). However, present dredging practices by WestGold do not produce navigation hazards to vessels with a draft less than 10 ft.

6.2.4 Sociocultural Impacts

There is the potential for sociocultural impacts on the Native population of Nome, Golovin, and White Mountain from potential effects on subsistence harvest activities. Subsistence is a core value of Native culture, providing a sense of cultural identity and strengthening family values and kinship ties. Disruption of subsistence harvests, (i.e., animals avoiding areas historically harvested) particularly to salmon and marine mammals, can create economic and social stress in Native populations (USDOI/MMS, 1988). An indirect impact of such stress would be increased demands and costs to local health and social service systems.

There is some concern over potential effect of mining on mercury levels in resources used for subsistence, primarily red king crab and marine mammals (USDOI/MMS, 1988). Monitoring of trace metals in red king crab have shown no accumulation in mercury or other trace metals but this is not unexpected since red king crab are not a good indicator of trace metals accumulation (Jewett et al., 1989). Marine mammals have shown an accumulation of mercury in certain tissues. There is currently insufficient information to assess the effect of mercury; baseline monitoring is required before any conclusive determinations can be reached. Potential for other impacts to subsistence are negligible to moderate (USDOI/MMS, 1988).

As long as significant impacts to salmon, marine mammal, and crab harvests are avoided, subsistence related sociocultural impacts should be negligible. Local hire would further mitigate the potential for impact by reducing the potential population increase in Nome and related impacts from increased demands on services and competition for fish and wildlife resources.

6.3 Subsistence Impacts

6.3.1 General Impacts

There is generally a low potential for biological impacts to subsistence resources (refer to Chapter 5.0). Other impacts may include interference with access to and harvest of those resources, and additional competition for resources through sport fishing and hunting. These types of impacts can result in increased efforts and costs to make up for "lost" resources, or cause cost increases resulting from making up harvest shortfalls by purchasing store-bought goods. Interference impacts include: mining equipment physically occupying an area used for subsistence; preventing access to traditional harvest areas or making access more difficult; and accidental damage to gear (e.g., boats, nets, and crab pots) used to harvest resources. Competition may be increased by bringing in workers and their families who may sport hunt and fish or qualify as local rural residents able to harvest subsistence resources. Using the WestGold 1988 employment figures of 128 with 79 percent being locally hired, an estimated 27 non-residents would be employed.

6.3.2 Salmon

Table 6-2 presents a summary of the sensitivity of community characteristics, including subsistence, to impacts. In general, with the exception of egg gathering and salmon fishing at set net sites, shoreline and offshore subsistence activities are relatively dispersed through the study area but are somewhat concentrated in the Safety Sound area and in the Nome River. The importance of salmon and marine mammals, in terms of household participation in the subsistence harvest, make them sensitive to impacts. The subsistence salmon harvest takes place at the same time as the commercial fishing harvest (June 15 to September 15) using the same gear. The majority of the fishing efforts occurs adjacent to or in rivers. Because fishing pressure on subsistence salmon

resources is high, they would also be susceptible to impacts from increased harvests by non-resident workers who became resident and qualified for rural subsistence harvest, or participated in sport hunting and fishing.

6.3.3 Marine Mammals

Marine mammals are generally harvested when they are available, and most effort is expended from early April to late June. Walrus are hunted primarily from early May to late June; ringed seal are hunted primarily in winter; all other seal species are hunted in spring (April to June) and fall (September to November); and beluga whales migrate through the study area in late March to May. The subsistence harvest effort is relatively dispersed along leads and breathing holes in the pack ice, although walrus are also hunted at Sledge Island and Cape Nome where they are known to haul out, and seal are also hunted in the brackish waters of Safety Sound and the mouth of the Sinuk River. Sledge Island is also a staging area for offshore hunting. Beluga whales move throughout the Norton Basin while migrating, but are known to concentrate in the nearshore waters off Cape Nome and at the mouths of rivers and estuaries near Nome where they feed on fish. Marine mammal hunting would be sensitive to avoidance and interference impacts. However, because hunting is relatively dispersed and takes place primarily over several months in the spring, properly timed and placed exploration and mining activities (i.e., activities that avoided sensitive areas during the months of April through June) would not significantly interfere with marine mammal hunting.

6.3.4 Other Resources

Of the remaining subsistence resources, fishing for whitefish and tomcod could potentially be sensitive to avoidance and interference impacts. Whitefish are harvested through holes in the ice using handlines or setnets from mid-September to the end of January. Cod are fished through the ice on Norton Sound off of Nome during the

winter. Properly timed exploration activities are not likely to interfere with subsistence harvests. Disturbance to nesting birds from mid-May through June could potentially affect egg gathering activities; Northwest Area Plan (NAP) guidelines specifically address closure of areas in a 1/4 mi radius around bird colonies which would minimize any potential impact to them.

6.4 Commercial Fishing

General impacts to commercial fishing resources are described previously in Section 6.3.1. Table 6-2 presents a summary of the sensitivity of community characteristics, including commercial fishing, to impacts. Interference impacts include:

- mining equipment physically occupying an area used for subsistence;
- preventing access to traditional harvest areas or making access more difficult;
- potential navigation hazards posed by tailings piles; and
- accidental damage to gear (boats, nets, crab pots) used to harvest resources.

Because commercial fishing currently contributes $15,000 to the local economy, any significant interference impacts from mining could affect the local economy. In general, impacts from the proposed exploration and mining are not likely to be significant due to several factors:

- the limited annual areal extent of mining;
- from a regional perspective, the limited economic importance of the affected subdistrict's salmon and herring fisheries;
- the dispersed nature of fishing activities or reliance on areas not subject to mining (such as summer crabbing in waters ten or more miles offshore); and

- limited mining activity in extremely shallow waters during the fishing season.

Commercial salmon fishing activities are most sensitive to impacts, particularly interference, in the nearshore area east of Cape Nome during the period of June 1 through September 15. Enclosed areas such as Safety Sound would be particularly sensitive. Exploration activities taking place after September 15 or through the ice would have little or no impact on commercial salmon fishing.

The winter crab fishery is not as sensitive to interference, due to the relatively low level of activity associated with exploration through the ice. There is some evidence of crabbers using holes drilled for exploration activities (C. Lean, ADF&G, Nome, personal communication, 1988). The area of greatest sensitivity is the stretch of coastline eight miles either side of Nome.

6.5 Land Use Impacts

Mining is an historical and existing offshore use in the study area; exploration and mining activities offshore would not constitute a new category of land use. Potential conflicts with other land uses (e.g., subsistence and commercial fishing) are described in the previous sections of Chapter 6.0.

The Alaska Maritime National Wildlife Refuge (AMNWR) Comprehensive Conservation Plan recognizes offshore mining as an existing use, and there is no conflict with this plan. Exploration and mining are activities that are compatible with the NAP and both the Nome and Bering Straits Coastal Management Programs (CMPs), if they comply with the applicable land management guidelines and policies. This determination will be made as part of the Best Interest and Consistency Determination processes and under consistency determinations required for permits for other aspects of exploration and mining.

6.6 Cumulative Impacts

There are several other existing and potential offshore resource extraction activities in the study area, in addition to this proposed action, that have the potential to create cumulative impacts. These include:

- annual Nome harbor dredging;
- current WestGold operations using the Bima dredge;
- proposed WestGold shallow water dredging activities;
- mining activities that may result from the proposed federal offshore mineral leases;
- future oil and gas activities in Norton Sound; and
- increased onshore gold mining activity.

Potential cumulative impacts of concern include demand on community housing and infrastructure and cumulative subsistence impacts. It should be stressed that the likelihood of all these actions occurring simultaneously, particularly oil and gas related activities, is remote. Potential impacts to community, infrastructure, and subsistence are discussed in the following sections.

6.6.1 Community and Infrastructure Impacts

Concurrent dredging and oil and gas exploration/development activities would create a significant number of new jobs. In the most optimistic case scenario, it would not be inconceivable to have 700 new mining and oil and gas jobs based out of Nome. While some of these would be filled by local residents, some outside workers would be brought in, resulting in additional demands for housing and city services.

In the case of housing, there is subdivided land with city services available for development. It is also possible that companies participating in development activities could construct their own housing or contract with private parties to provide housing.

Demand on other infrastructure is harder to assess. Passenger and cargo traffic at the airport would increase but would be within the capacity of the facility. The maximum potential, cumulative increase in employment represents a 13 percent increase in Nome's population not including workers' families. Between the possibility of local hire and the possibility of resource developers providing their own housing, power, and water supplies, this potential increase should be within the capacity of Nome's infrastructure systems. A concern for cumulative impacts would be socioeconomic and sociocultural disruption within Nome resulting from an influx of a non-resident workforce (USDOI/MMS, 1988). Further information is not available on the magnitude of cumulative impacts to communities and infrastructure.

6.6.2 Subsistence Impacts

Cumulative impacts on subsistence related activities would stem from the increased level of resource development activity in the Norton Sound area and potential competition for fish and game resources from the larger work force. The increased level of resource development activity in the Norton Sound area would raise concerns about increased biological impacts (marine mammal avoidance, increased mercury levels, and nearshore salmon movement) and interference with access to and harvest of those resources. Employees who relocated to the Nome area could qualify as rural community residents for the purposes of sport and subsistence fishing and hunting, providing potential additional competition for fish and game resources. The MMS projected cumulative subsistence impacts to be major,but this was primarily based on uncertainty over background mercury levels and potential for accumulation (USDOI/MMS, 1988). Additional study is required to accurately assess cumulative impacts.

6.7 Contribution to the Local, Regional, and State Economy

Exploration and mining activities on state leases in the project area can contribute to the local, regional, and state economy in several ways:

- creation of employment and income opportunities for local and state residents;
- generation of local and Alaskan revenues associated with purchase or rental of supplies and services; and
- payment of lease rental and tax revenues to the State of Alaska.

While it is likely the majority of contribution to the local and regional economy occurs in Nome, there are no data to assess what degree of contribution to other communities in the region will occur.

6.7.1 Employment and Income

As discussed earlier, exploration and other activities might employ up to 124 people, with a potential for 79 percent of those positions being local hire. The 1988 estimates of payroll for the current WestGold operation are $4.6 million with additional estimated expenditures of $3.7 million.

Besides the direct employment created by exploration and mining, additional indirect employment could be generated in support services. Studies of placer mining operations have indicated an indirect employment multiplier effect of 1.25 (Berger, 1983). This multiplier would result in the creation of 155 indirect jobs for mining operations.

Revenues From Supplies and Services

Exploration and mining activities will require supplies and services, generating revenue for residents of Nome and other parts of Alaska. Supplies and services include housing, equipment purchase and rental, transportation, fuel, and lease of facilities and storage areas. The Bima project generated an average of $600,000 a month to the local economy in 1987 (Rusanowski et al., 1988). In 1988, $3.7 million was spent on services, local vendors, rent, and other expenditures.

State Lease Rental and Tax Revenues

If the State of Alaska decides to issue offshore leases for the purposes of mining, the lessee must pay the State of Alaska an annual rental fee of $3.00 an acre. Using an estimated acreage of 150,000 acres, a maximum revenue of $450,000 could be generated. However, under current regulations aimed at encouraging mining, improvements and work on the leased area can be credited against the rental fee.

Mining operations are subject to state taxes. The tax rates applicable to mining operations are shown below:

Gross Income	Rate
$40,000 or less	no tax
$40,000 - $50,000	3 percent of taxable income

Gross Income	Rate
$50,000 - $100,000	$1,500 plus 5 percent of taxable income over $50,000
$100,000 or more	$4,000 plus 7 percent of taxable income over $50,000

Under current regulations, new mining operations are exempt from state income tax for the first three years of operation.

7.0 MITIGATION MEASURES

There are several measures that should be considered as means of mitigating potential community, subsistence, commercial fishing, land use, and biological resources impacts associated with exploration and mining activities. Some address avoiding impacts; other mitigation measures maximize benefits to local residents or limit the area available to exploration and mining activities.

Exploration and mining activities are likely to require subsequent permits that will be subject to consistency determinations and permit approvals. Detailed plans for both types of activities will be worked out at that time, and mitigation measures should be made more specific to address particular impacts and concerns.

7.1 Coordination with Agencies and Local Communities

Coordination of exploration and mining activities with state agencies, local governments, Coastal Resource Service Area (CRSA) Boards, and other groups that represent local residents and state concerns is a primary mitigation measure. Table 7-1 presents a list of potential human use mitigation measures. Coordination accomplishes several objectives:

- provides information on project activities and scheduling, which can reduce local and state concerns;
- identifies information on sensitive local biological and socioeconomic resources and harvest periods, providing an opportunity to modify exploration and mining activities accordingly;
- allows local communities to provide for changes in service, housing, and public facility demands; and
- exemplifies a commitment to work with state agencies and local residents.

Table 7-1. Potential community impact mitigation measures.

Mitigation Measure	Considerations/Effect
Coordination with villages	Work with village residents to schedule activities to avoid use areas and activities, and maximize local participation
Schedule of Activities	
Exploration Activities	Avoid intensive use areas, fishing openings in nearshore waters Maximize local participation
Mining Activities	Avoid intensive use areas, fishing openings in nearshore waters Maximize local participation
Limitations on Areas Mined	
Size of Area Mined	Minimize interference and habitat destruction; avoid heavily used, sensitive areas
Exclusion of Areas	
Target Specific Areas	Minimal use areas
Local Hire	Maximize local benefit and support of project
Job Training	Maximize local benefit and support of project
Purchase of Supplies Locally	Maximize local benefit and support of project
Rental Local Equipment Boats Vehicles	Maximize local benefit and support of project
Compensation	
Gear Damage	Compensation for gear damage resulting from exploration and mining
Personnel Polices	Prohibit hunting and fishing by non-residents reducing competition for fish and wildlife
Upgrade Community Infrastructure	Improve community infrastructure (e.g., water, sewer, power, transportation, and waste treatment) to meet project and community needs

At a minimum, groups that should be kept informed of exploration and mining plans include the City of Nome, the Bering Straits CRSA, Kawerak, Inc., villages of Golovin and White Mountain, and representatives of the communities of King Island and Solomon.

7.2 Scheduling Activities

Scheduling exploration and mining activities to avoid impacts or conflicts during periods of particular sensitivity or use is an important and practical mitigation measure. To the extent feasible, exploration and mining activities can be scheduled to avoid the commercial fishing and subsistence activities in nearshore waters. For example, some exploration activities will be scheduled during the winter and will avoid fish spawning and rearing activity as well as commercial and subsistence fishing. Scheduling activities for the fall and winter will also maximize local Native participation in employment activities, increasing the potential for local support of the project. For mining, which must be conducted during a relatively short open water season, scheduling options may be more limited. If it cannot be avoided, mining in nearshore waters could be scheduled after the commercial salmon season. Scheduling considerations should include another recommended mitigation measure, coordination of the annual exploration and mining plan with the villages in the study area.

7.3 Mining Limitations

Limiting the exploration and mining activity areas is another method of avoiding or mitigating impacts. These include:

- exclusion of particularly sensitive areas from exploration and mining;
- limiting the size of the area mined in sensitive or intensively used areas; and
- targeting low impact areas for mining.

Possible limitations on exploration and mining activities in the study area to mitigate potential impacts to biological resources include:

- avoiding dredging in intertidal spawning areas for smelt and capelin;
- avoiding seabird colonies during exploration and mining, maintaining a reasonable distance from them, particularly during the nesting season when sea and air traffic could impact these areas;
- keeping dredging activities at a reasonable distance offshore from the confluence of anadromous fish streams and marine waters when appropriate; and
- avoiding enclosed estuaries where appropriate.

Further mitigation alternatives should include using a dredging discharge configuration that will minimize the turbidity plume in the water column and discharging dredge spoils on the sea bottom where they were extracted.

Limitations can be used in addition to mitigation through other means, such as scheduling.

7.4 Maximizing Local Benefits

A third general area of mitigation is to maximize benefits to local residents from exploration and mining activities. This includes:

- maximizing local hire;
- providing job training to increase local hire potential;
- purchasing supplies and renting equipment or storage areas locally; and
- making improvements to community infrastructure (power, water, and waste disposal systems) so that in addition to meeting project needs, the communities are left with the improvements.

It is most appropriate to develop specific measures for this mitigation category during subsequent permitting, based on the details of proposed activities.

7.5. Gear Damage Compensation and Navigation Hazards

Should subsistence or commercial fishing gear be accidentally damaged during exploration or mining activities, compensation for damages is an appropriate mitigation measure.

Managing tailings disposal to minimize navigation hazards (usually addressed by stipulation during the permit process) and avoidance of important site specific areas during the fishing (set net sites) and marine mammal harvest (Sledge Island and Cape Nome) season could be used to mitigate impacts. Regular coordination with community residents regarding subsistence use patterns will also help avoid and mitigate impacts.

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ATTACHMENT 8

STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF MINING AND WATER MANAGEMENT

TONY KNOWLES, GOVERNOR

3601 C STREET, SUITE 800
ANCHORAGE, ALASKA 99503-5935
PHONE: (907) 269-8600
Fax: (907) 269-1853

May 18, 1999

NOTICE

Final Best Interest Finding (as required under AS 38.05.035(e))
and Consistency Determination (as required under AS 46.40.096)
for re-issuing through competitive bid, 28 lease tracts
ranging in size from 80 to 1,440 acres.

Final Best Interest Finding.

The Alaska Department of Natural Resources, Division of Mining & Water Management, hereby gives notice under AS 38.05.945(a)(4) of the publication of a Final Best Interest Finding issued pursuant to AS 38.05.035(e) regarding re-issuing through competitive bid 28 lease tracts ranging in size from 80 acres to 1,440 acres within previous Lease ADL's 17867, 17929, 17968, and 57918. See map at back for location of new lease tracts.

A preliminary best interest finding and coastal consistency determination was issued for public comment on July 31, 1998. This preliminary finding addressed the background of the previous leases which had been issued in 1966, and the reason for re-issuing through competitive bid, 28 lease tracts within the areas previously leased. The preliminary finding also addressed consistency with the Alaska Coastal Management Program which included the City of Nome Coastal Management Program and the Bering Straits Coastal Management Program. The preliminary finding addressed concerns and mitigation measures from past work with other agencies and local residents with concerns about the effects of mining and exploration in the lease areas. As a result, the division proposed stipulations to mitigate concerns of consistency with coastal management programs, subsistence, habitat protection and fishery issues, environmental monitoring, public access and navigation, historic and archaeological resources, air, land and water quality, local hire and bonding.

As a result of the preliminary finding issued last July, the division received 8 letters supporting re-issuing through competitive bid, the 28 lease tracts, plus several other supportive telephone contacts. No comments about changing, postponing or canceling the lease sale were received. The lease sale was supposed to occur in October 1998, but due to other higher priority work, the sale was postponed until now, and just recently included in Nome's *Midnight Sun Festival 1999: The Alaskan Gold Rush Begins*. The offshore lease sale will be the first event featured in the festival.

Objectives of the State's Offshore Mining Program:

1. To offer the state's promising offshore areas for exploration and development by private industry.

2. To develop an offshore mining industry that could provide stable and diverse job opportunities for Alaska's local communities.

3. To develop offshore resources that could contribute to the industrial needs and strategic mineral base of Alaska and the United States.

4. To increase the knowledge of Alaska's offshore resources by the collection of geologic, geochemical, and geophysical data collected in relation to mining activity.

5. To minimize negative effects upon the environment through permit and lease stipulations, plans of operations, and comprehensive monitoring of operations.

6. To consider and incorporate the views of the general public, government agencies, the mining industry, local residents, and other resource users when selecting and refining particular areas for offshore leasing and mining.

7. To establish and broaden the stable long-term economic and revenue base to the state and local government.

8. To stimulate the growth of other industries through the support of mining operations.

Background:

The beaches at Nome have been mined for 100 years. Since the State took title to the tide and submerged lands at Nome, the inter-tidal beach and offshore have been under lease since 1966. The inter-tidal beach and shallow submerged areas have been worked and re-worked for the past 100 years. Some of the deeper water areas were dredged from 1988 to 1990 using the BIMA bucket line dredge. This dredge was big, and unable to selectively mine and control digging depth accurately to be able to mine the best deposit material. No mining in the deeper water areas of the lease sale area has occurred since 1990. Over the years there has always been interest from small scale miners to be able to obtain mining rights to the inter-tidal and shallow submerged areas adjacent to Nome's coastal plain. Since 1966, 23,850 acres have been under lease (7 leases) until 1998, when 12,292 acres were relinquished and became available for re-issuance of leases. It was upon relinquishment of this acreage that the state considered to re-issue through competitive bid, 28 lease tracts ranging in size from 80 acres to 1,440 acres for the relinquished lease areas previously part of 4 leases. With the continual interest in the offshore acreage, primarily from small-scale miners, and with relinquishment of the 12,292 acres, the department determined it would be in the State's best interest to create a public beach mining area and offer smaller lease tracts for miners to lease. Water depth is the main factor affecting the type of mining operations that may occur. Hand-operated suction dredge miners typically operate in shallower waters close to shore, while larger mechanized mining operations operate in deeper water which is farther from shore. The department proposed to offer all of the relinquished and abandoned lease areas for re-leasing so that small-scale miners could bid on acreage in shallow water areas, and larger mining companies, if they were interested, could bid on the leases in deeper water. Tract sizes vary with the smallest near the shore in shallow water, and the larger ones further from shore in deeper water.

Based on receiving only favorable comments for re-issuing 28 lease tracts to cover the relinquished acreage, the department has determined it is in the State's best interest to offer these formerly leased areas on a competitive bid basis. The proposed re-issuance of leases for the same lands leased since 1966 extends about 16 miles along the Nome coastline. (see map), and are certain tide and submerged land located within:

Township 11 South, Ranges 33-35 West, Kateel River Meridian;
Township 12 South, Range 33-35 West, Kateel River Meridian;

Containing 12,292 acres, more or less.

Before issuing an offshore lease, under authorities delegated to me as director of the Division of Mining & Water Management (DOMWM), I must comply with laws applicable to the "disposal of an interest in state land" (transferring state-owned property rights). One of those laws is AS 38.05.035(e), which requires that I prepare a written finding that the state's interests will best be served by issuance of these leases. Under that same statute, I am authorized to attach stipulations and conditions to the leases that I find are necessary to serve the state's interests; these stipulations are also described in this finding. In addition, this document must discuss the facts and applicable laws upon which the finding is based. I must also explain why the issuance of the new leases is consistent with the Alaska Coastal Management Program. The lease area is located within the Nome and Bering Straits Coastal Management Districts. This document constitutes my final best interest finding and a determination of consistency with the standards of the Alaska Coastal Management Programs.

The legislature has fixed the rent payable on offshore mining leases under AS 38.05.211. The current rental amount for new leases is $0.50/acre per year for the first five years. Starting September 1, 1999, rental will increase due to a consumer price index increase to $0.66/acre per year.

The main benefit from offering the lease tracts will be the lease sale bonus bids and rentals received over the years, and any royalties received from mining. As a result of the lease sale, the state will receive $324,508 in lease rentals over a 20 year period, and 3% of net profits from any mineral production. The lease sale will also contribute to more mining operations that will be able to occur during the operating season which provides jobs and an economic impact on the community of Nome. It is also Nome's Gold Rush Centennial this year, and an appropriate time to have a gold lease sale of the historic submerged beach deposits along the Nome coastal plain.

In accordance with the law, I will issue the new leases for a primary term of 10 years. The leases will be extended so long as paying quantities of minerals are produced from the leased area. If mineral production is not taking place at the end of the primary term, the leases will expire, unless the DOMWM has approved a suspension or extension for a period that may not exceed two years. The bid on each tract will include the first year's rental (calculated at $0.66/acre) and a minimum bonus bid equal to the first year's rental. Rental will be $0.66/acre for the first five years, $1.32/acre for the second five years, and if the leases are renewed, $3.30/acre after renewal. The qualified bidder with the highest bid for a tract will be issued the lease for the tract. If no bids are received for a tract, the tract will be available for over-the-counter leasing at the department on a first come first served basis.

As indicated in the preliminary finding and shown on the attached map, previous lease areas assigned to Arctic Whitney and Al Johnson, and approved by the department have been extended for two years until August 1, 2000. If the leases are in production in paying quantities at that time, they will be renewed for a term of 10 years. The current rental on these two leased areas is currently $1.00/acre, but beginning September 1, 1999, the rental will be $3.30/acre. If these lease areas, or a portion of the lease areas are not renewed, or any of the areas become abandoned or relinquished before August 1, 2000, the department will either hold another sealed bid competitive lease sale, or over-the-counter lease sale of the lease areas that become available without any further finding by the department as to whether it is in the State's best interest to re-lease the areas. The department will do a newspaper notice under AS 38.05.945 if additional lease acreage is made available for new leasing.

Successful bidders on the 28 lease tracts will be issued leases effective July 1, 1999. The rental year under regulation for leases like mining claims is September 1 each year to the following September 1 of the next year. The minimum bids required for each tract were calculated requiring twice the rental/acre for each lease tract to account for rent that would be owed for the months of July and August, 1999.

Consistency with Alaska Coastal Management Program

The lease area is within Alaska's coastal zone and is therefore subject to the 1977 Act establishing the Alaska Coastal Management Program (ACMP). The Act established Coastal Resource Service areas (CRSA's) and allowed them to prepare local coastal management plans to better reflect local issues, goals and objectives. Residents in the CRSA's help develop guidelines and policies that state agencies utilize in making consistency determinations. The proposed lease area lies within two different coastal districts: that of the City of Nome and, surrounding it, that of the Bering Straits Coastal Resource Service Area. The Division of Mining & Water Management may issue permits and leases for uses within the coastal zone only if the uses have been determined to be consistent with the applicable ACMP standards. The consistency process conducted under 6 AAC 50 plays a major role in project activities. Under 6 AAC 50, the DNR Division of Mining and Water Management is required to make a determination of consistency with ACMP as amended by the Nome Coastal Management Program (NCMP) and the Bering Straits Coastal Management Plan (BSCMP). A lease grants the property right to mine, but is only one of the many authorizations needed before mining can begin. The other authorizations include the division's approval of the lessee's plan of operation, and authorizations issued by the Alaska Department of Fish and Game, the U.S. Army Corps of Engineers, and the U.S. Environmental Protection Agency. These other authorizations (operating permits) must be obtained separately and require their own ACMP consistency determination. Because several state and federal agency permits are involved at the operating permit stage, that consistency determination is coordinated by the Division of Governmental Coordination within the Office of the Governor. Such comprehensive consistency determinations are based on the specific details of the proposed mining operation as set out in the permit applications.

An offshore mining lease does not require the lessee to mine, however it is expected the lessee will mine since that is the basis for re-issuing the lease area. Although the division fully expects that mining plans of operation for suction dredge operations and cutter suction dredge operations will be submitted, there is also the possibility that the lessee or another operator may request to use different mining apparatus later. This means that the mining operations that might take place

on the leased areas can only be discussed in generalities at this time, and the merits or drawbacks of future operations will be evaluated on a case by case basis. A known assumption is, the lease area has been mined over the years by suction dredge miners near shore and the world's largest bucket line dredge further offshore without any known significant adverse impact to the environment by any of the previous operations. Therefore this consistency determination to re-issue the lease area is based on past mining experiences which were non-detrimental and had minimal impact on the offshore environment. The division believes the stipulations after these sections address the protection of subsistence resources and habitats indicated in the NCMP and BSCMP policies and standards.

City of Nome Coastal Management Program. This program covers the area adjacent to the Nome town front located within Township 11 South and Range 34 West, and extends from one mile west of the airport to Beam Road. The NCMP has been in effect since March 15, 1985, so the standards of that plan apply to the portion of the leased area within the Nome coastal district boundary. The Nome NCMP has divided its jurisdiction into six districts. A very narrow portion of the leased area (tidelands) is designated as Open Space, where mining is not listed as a permitted use. The remainder is either Resource Development or Industrial, where the following standards apply to offshore mining activities:

A. Dredge and Fill (20.080). Typically an offshore gold mining operation mines placer deposits from the ocean floor using a dredge, with the initial washing, separation and concentration of the dredged materials taking place on the dredge. This standard requires any dredging at the shoreline to be designed so that significant current alteration, sediment drift, etc., do not unduly endanger adjacent resources and property. The DOMWM believes stipulations 2., 3., 4., and 7. address and mitigate deep dredging or discharge of large amounts of sediment into the water column near shore.

B. Mining (20.110). The NCMP prohibits offshore mining within 100 feet of the mean lower low water line, specifies how dredge spoils are to be discharged, and bars mining in commercial and subsistence fishing areas during open fishing periods. Subsistence hunting of marine mammals, crabbing, and gill netting or seining of salmon are also important uses in this area. The DOMWM believes stipulations 1., 2., 3., and 4. mitigate mining activity concerns within this zone or area, and all mining activities from the smallest hand held suction dredging to the larger mechanical dredges will be required to be reviewed and approved by the City of Nome, and state and federal permitting agencies including the DNR if applicable, Department of Fish and Game, Dept. of Environmental Conservation, Corp of Engineers, and Environmental Protection Agency. A permit or letter stating no permit is necessary, or a letter of non-objection will be necessary from each of the agencies listed.

C. Water Dependency (20.240). Under this standard, water-dependent uses have priority over non-water-dependent uses. A water-dependent use is one that must be sited in or adjacent to the water because it requires access to a water body. Because all lease activities will require access to tidewater, the proposed leases qualify as water dependent. No mitigation measures of this standard were deemed necessary by the DOMWM.

D. Subsistence (25.050). The NCMP emphasizes the value of subsistence activities as a priority use within and outside its coastal jurisdiction. The NCMP provides that, "Before a potentially conflicting use or activity may be authorized within its area of jurisdiction, a study of the possible adverse impacts of the proposed potentially conflicting use or activity upon subsistence

usage must be conducted and appropriate safeguards to assure subsistence usage must be provided." If mineral development is found to be a potentially conflicting use, a study of its impacts on subsistence will be necessary. The DOMWM believes that stipulations 1., 2., 3., and 4. mitigate this standard.

Several broad policy issues identified in the NCMP is to encourage mining and mineral processing in a manner that is consistent with economic needs and natural resource protection. The plan states that mining and mineral processing in coastal areas must be regulated and conducted so as to be compatible with ACMP standards, adjacent uses and activities, statewide and national needs, and district programs. Mining companies are encouraged to work with local planning organizations in identifying future development areas.

Another broad goal of the NCMP is to protect important habitat areas from incompatible uses. Offshore areas must be managed so as to conserve fishery habitat for commercial and subsistence use, and estuaries, lagoons, wetlands, tidelands, barrier islands, rocky islands, and sea cliffs must be managed so as to protect habitat.

The DOMWM believes that stipulations 1., 2., 3., 4. mitigate these concerns.

Bering Straits Coastal Management Program. All of the lease area is within the BSCMP area. Not all of the policy performance standards within the BSCMP apply to the lease area.

Policy A. Subsistence: Traditional subsistence use has the highest priority. Access to these subsistence use areas is a concern, and activities that may cause adverse impacts to resources, habitats and users is a concern. The DOMWM believes stipulations 2. and 3. mitigate the concerns of this policy.

Policy B. Habitat and Biological Resource Protection: This policy requires that offshore areas be managed to maintain or enhance fisheries and marine mammal subsistence harvesting. This policy also requires that rocky islands and bird nesting sea bluffs be managed to avoid harassment of wildlife. In the lease area there are no bird nesting or marine mammal haul-out sites. The DOMWM believes that stipulation 3. addresses this policy: fish passage and subsistence harvesting of fish will be protected so as not to impede or interfere with migratory access to spawning streams by adult anadromous fish or movements of juvenile anadromous fish or subsistence fishing activity. The plan of operation will be reviewed by the state, and particularly the Department of Fish and Game, and restrictions imposed which mitigate the concerns expressed in this policy.

Policy C. Air Land and Water Quality: Oil spill contingency plans, and water quality plus siltation and sedimentation resulting from discharge of production waters are the applicable concerns under this policy. These concerns are addressed stipulations 4. and 7. and will be reviewed under the plan of operations and future NPDES permitting process.

Policy D. Historic, Prehistoric and Archaeological Sites: The primary concerns identified under this policy involve mining or exploration activities with the potential to adversely affect cultural resources. Prehistoric and archaeological finds in the offshore lease area have not occurred since the leases were first issued, however stipulation 6. addressing the reporting of these as well as historic finds will be included in the leases as well as any department permits issued.

Policy E. Geophysical Hazards: The primary concern under this policy that has to do with coastal processes involves resource extraction activities. The policy recommends that such activities should be located so as to minimize accelerated coastal erosion or impacts to coastal processes. These concerns are only applicable for larger mechanized mining operations and will be dealt with under stipulation 6. in the permitting of these operations.

Policy F. Coastal Development: This policy contains several concerns which apply to offshore exploration and mining. All water use activities shall be conducted with appropriate planning and implementation to mitigate potentially adverse effects which could affect fish and wildlife populations and their habitats, as well as subsistence and cultural resources. Another concern has to do with dredge and fill. Stipulations addressing this policy are 2., 3., 4., and 7. The DOMWM believes these stipulations address this policy as well as dredge and fill. Another concern is timing of offshore exploration and development so they do not coincide or interfere with subsistence activities. Also under this policy is the requirement that large operations conduct preliminary baseline research and operational monitoring in order to measure mitigation impacts upon resources. The above stipulations effectively mitigate all of the above concerns.

Policy G. Mining and Mineral Processing: This policy was established to involve local affected communities and the Bering Straits Coastal Resource Service Area Board with the planning of operations involving dredge spoils and toxic metals. The reason for the communities involvement is because of concerns relating to essential biologic habitats, subsistence harvest activities, and navigation. The DOMWM believes stipulations 2., 3., 4., and 5. address and mitigate these concerns.

The remaining BSCMP policies do not relate to this lease area.

Statewide Alaska Coastal-Management Program (ACMP) Standards. The applicable ACMP standards are:

A. Coastal Development (6 AAC 80.040). This land use standard centers on water dependency and is the same as that in the NCMP. As discussed above, all lease activities will qualify as water-dependent.

B. Mining and Mineral Processing (6 AAC 80.110). Mining and mineral processing in the coastal area must be regulated, designed and conducted to be compatible with the standards of the Alaska Coastal Management Program, adjacent uses and activities, statewide and national needs, and district programs. Thus the lessee's mining operation must be planned and implemented in a manner consistent with the ACMP and district programs in effect at the time its operating permits are approved. As a land use, mining that occurs under the new leases will be consistent with dredging that is already taking place there under the present leases; with future development that may take place on an adjacent offshore lease; and with Nome's past history and continuing status as a mining center. New mineral production should also help to meet statewide and national needs for economic development and increased employment. Stipulation 1. addresses this standard plus stipulation 8. is proposed to encourage the hiring of Alaskans, especially local residents, for lease operations.

C. Subsistence (6 AAC 80.120). The ACMP requires state agencies to recognize and assure opportunities for subsistence usage of coastal areas and resources. Districts may identify subsistence zones within which subsistence uses have priority over other resources. The BSCMP

does not designate the proposed leased area as a specific subsistence use zone, but the area does support some subsistence hunting and fishing and, under stipulation 2. will remain open to such uses.

D. Habitats (6 AAC 80.130). This ACMP standard requires that coastal habitats be managed to maintain or enhance the biological, physical, and chemical characteristics of the habitat that contribute to its capacity to support living resources. Offshore areas must be managed as a fisheries conservation zone so as to maintain or enhance the state's sport, commercial and subsistence fisheries. Under this standard, lessee's plan of operations for exploration and mining must be designed and implemented so as not to impair fish and wildlife habitat. Stipulation 3. is proposed to ensure that this standard will be met.

E. Air, Land, and Water Quality (6 AAC 80.140). To meet this ACMP standard, under the stipulation 7. the operator(s) will be legally obligated to adhere to applicable state and federal laws, regulations, and permit requirements for pollutants that may be discharged into water and air.

F. Historic, Prehistoric, and Archaeological Resources (6 AAC 80.150). Districts and state agencies are required to identify areas that are important to the study, understanding, or illustration of national, state, or local history or prehistory. No historic, prehistoric, or archaeological resources have been identified within the lease area. However, stipulation 6. is included to protect any such sites if they are discovered during exploration or mining.

Concerns and Mitigation Measures of The Division of Mining & Water Management. Past work with other agencies and local residents has revealed the following concerns that may arise from mining and exploration of the leased area.

Habitat. The leased area provides habitat for marine mammals, shellfish, herring, and both anadromous and non-anadromous fish. The Snake River, an anadromous fish stream that flows into the leased area (within the NCMP district), provides spawning habitat for king, chum, pink, and coho salmon. The Penny River, located near the western lease boundary (within the Bering Straits coastal management area), is spawning habitat for coho, pink, and chum salmon. King crab use the shallow waters offshore from the city of Nome as winter habitat. There are concerns that mining would affect the habitats of these species. Potential cumulative impacts could also occur, because the leased area is large enough that two or more dredging operations could take place simultaneously. Stipulation 3. is included to ensure that the lessee minimizes the impact of mining on the habitat of important marine species and does not interfere with fish migration through the leased area. In addition, this stipulation will allow the state to require an analysis of cumulative impacts on habitat if offshore mining operations begin taking place at several sites simultaneously, including operations on adjacent leases.

Heavy Metals. Before mining ever began in the leased area in 1988, there were concerns that the dredging would disturb heavy metals, especially mercury, that might be present in the bottom sediments and might cause them to be introduced into the food chain. This potential problem was addressed with WestGold in their previous operating permit stage by requiring an environmental monitoring program to detect levels of mercury and other heavy metals that are above legally allowable limits. If the monitoring program indicated that excessive amounts of heavy metals were present, operational changes would have been required to bring the problem under control. Fortunately, results of the WestGold monitoring program showed that heavy

metals were not present in high concentrations. In addition, the U.S. Department of Interior, Minerals Management Service conducted heavy metal and mercury studies in the Nome region as part of their Environmental Impact Statement for an offshore lease sale planned 8 years ago. Results from these studies, some conducted by the Public Health Service found no evidence of bio-accumulation of methylated mercury in Nome residents participating in subsistence activities in the offshore area. Stipulation 4. is included however to maintain the state's legal right to require such a monitoring program in future years should the need arise, as well as a stipulation to ensure compliance with state and federal water quality laws.

Subsistence. The most productive subsistence use area within the leased area is located at its east side. The subsistence use area is also within the boundary of the Nome CMP. The subsistence activities that occur here seasonally are the harvesting of capelin, cod, and anadromous fish during the ice-free months, and crab during the winter months. The other subsistence use areas are the Snake River and the Penny River. Subsistence netting of salmon typically occurs in the fresh water areas of the Penny and Snake Rivers. Seal hunting occurs in the offshore areas during the winter as well as the ice-free months of the year. The abundance of species used for subsistence and their proximity to the city, coupled with the road accessibility of the Nome and Snake Rivers, increases the subsistence value of the area.

The following measures are proposed to safeguard subsistence resources and uses. First, stipulation 1. will require all lease activities to be consistent with approved district coastal programs. In turn, the NCMP protects traditional subsistence activities as a priority use. Stipulations 2., 3., and 4. will give the State the right to require a cumulative impact study of the effects of mining on subsistence; it also requires that the lessee's plan of operations be designed to ensure that subsistence use activities will not be curtailed. Stipulation 3. will indirectly protect subsistence users by protecting the marine habitat that sustains fish and marine mammals used for subsistence. Stipulation 4. will give the state a means to monitor changes in that marine environment, including the rate at which marine species recolonize a dredged area. Stipulation 5. will ensure that the leased area remains open to public access, including subsistence hunting and fishing.

Commercial Fishing. If a lessee proposes to mine in commercial fishing areas during open fishing periods, stipulation 3. will allow the Department of Fish and Game to require a study of the effects of mining on commercial fishing; it will also require that the lessee's plan of operations be designed to prevent curtailment of commercial fishing activities.

Conflicts with District Programs. The NCMP and BSCMP contain provisions that prohibit mining operations within one mile of anadromous streams, within 100 feet seaward of mean lower low water, and in commercial and subsistence fishing areas during open fishing periods. These policies could severely restrict mining on the leased area, and thus may be in conflict with ACMP's protection of "uses of state concern." (Mining on state-owned land is defined as a use of state concern, which cannot arbitrarily or unreasonably be excluded or restricted by a district program.) Prohibiting mining during commercial and subsistence fishery openings is reasonable if fishing actually occurs when and where it is permitted. Sometimes permitted commercial and subsistence fishing activity never occurs in the lease area in which case it might be arbitrary and unreasonable to exclude mining activity. The DOMWM proposes two stipulations to handle this problem. First, if the lessee wishes to mine next to the shore, near anadromous streams, or during commercial or subsistence fishery openings, stipulation 3. authorizes the Department of Fish and Game to require that the plan of operations show the effects of the proposed operations

on anadromous fish movements, anadromous fish generally, or on the fishery in question. This will provide the necessary data on impacts so that agencies and coastal districts can make an informed decision whether to permit the proposed activity.

In addition, the department decided not to offer for releasing the area offshore east of the Causeway and on both sides of where the Snake River meets the beach which is where the boat harbor is located and dredge tailings from the harbor are deposited.

Local Hire. Depending on whether the operator hires local personnel, mining can be an important source of new jobs in the Nome community. To date, lessees have a good record of hiring seasonal employees from the local labor force. Stipulation 8. will encourage the lessee to continue this practice. The Department of Natural Resources does not have the authority to go beyond that point and actually require local hire, but the department encourages it.

Effect on Other Property Rights. Local property owners are sometimes concerned that mining might adversely affect property rights in or near the leased area. "Third-party interests" that can be issued by the State of Alaska on tide and submerged lands include shore fishery leases (set net sites), tideland leases for uses such as docks, harbors or canneries, and grants to municipalities. For instance, the City of Nome has received title to tide and submerged lands immediately off its shores. Whenever the State of Alaska leases or grants such lands, it retains the mineral estate (oil and gas, coal, locatable minerals, etc.) and the right to develop the minerals. Surface owners or lessees cannot veto the mineral development, but their property rights are protected by law (AS 38.05.130): before entering onto the land, the mineral developer must contact the surface owners or lessees and make arrangements (typically by posting a bond with the department) to pay for any damages that the development might cause. To ensure that the lessee complies with this law, it is specifically required as a term of the standard lease form. As for adjacent (upland) property owners, most such shoreline property within the NCMP is further protected by rip-rap- and will be indirectly protected by stipulations.

Control Over Mining Operations. A mineral lease includes the property right to explore for, develop, and produce the minerals for which it is granted. The concern is sometimes expressed that, once the State issues a mineral lease that includes these development rights, it will have given up any authority over how mineral exploration and development take place. To alleviate this concern, the Department of Natural Resources retains long-term control over the activities of its mineral lessees by requiring, as a standard condition of state mineral leases, that the lessee file a "plan of operations"' for approval before any development takes place. The plan of operations requirement is the best long-term method of limiting potential adverse impacts upon other natural resources while maximizing the benefits to the state from mineral development on the leased area.

The plan of operations must provide a comprehensive view of how the lessee proposes to develop the leased area. It can cover up to a ten-year period. If the period chosen is less than the intended mine life (the total period over which the deposits will be mined), the lessee must show how the proposed operations relate to those that will take place in the future.

The plan of operations must include a detailed description of the proposed activities, as well as any additional information requested. It must show how the operator proposes to comply with performance standards, stipulations, and conditions applicable to the lease. It must address, but is not limited to, the following: (1) the sequence, schedule, and duration of the operations; (2)

size and purpose of the operations; (3) number of pieces of equipment and people working on the project; (4) amount of material to be handled, processed, or removed and how the material will be processed; (5) how the tailings will be disposed of; (6) overland access routes to be used (if any), and whether new roads, landing strips, or other new transportation facilities will be needed; (7) measures to ensure that all debris is disposed of in a sound manner; (8) the actions to be taken to avoid or minimize detrimental effects on fish and wildlife and their habitats; (9) amount and source of water to be used; (10) location and size of camp facilities; and (11) any site the operator wants the division to close to public access in order to protect public safety or to prevent unreasonable interference with the rights of the operator.

Lease activities cannot begin until the Department of Natural Resources has approved the plan in writing, after consulting with the Department of Fish and Game, the Department of Environmental Conservation, and other affected agencies such as the Environmental Protection Agency and Corp of Engineers. If the proposed plan is unacceptable as written, the lessee must modify it. Because all offshore operations take place in the state's coastal zone, an ACMP consistency determination must be done before the plan is accepted; protective stipulations are often added at this stage. Once the plan is approved, subsequent changes require a formal amendment that must go through the same approval process.

The DOMWM recognizes that even a well-written plan of operations would not serve its purpose of reducing or eliminating conflicts with other resources if it is not followed. I propose to assure compliance with the plan through several means, in addition to relying on the lessee's good faith. First, compliance will be specifically mandated as a condition of the lease. This will give the DOMWM the legal means to enforce the requirement: the State has the right to suspend operations and even terminate a lease if lease conditions are breached and the lessee has not corrected the problem.

The DOMWM also reserves the right to inspect lease operations and will monitor them to the extent that it has personnel and travel funds available. The division's ability to carry out field inspections has improved over the last year, although declining state revenues may mean that this trend will not continue. But even without an expansion of its own field enforcement program, the DOMWM will not be left without the ability to enforce lease terms. To counteract the inevitable reduction in staff and travel funding, state and federal agencies have begun to work together and "share" field personnel, assigning one employee to monitor several agencies' permits during a single inspection.

Finally, the DOMWM must depend to some extent on local knowledge of what is taking place on the leases. Local residents who are concerned about possibly unauthorized activities, or who observe a problem developing in spite of precautions that have been taken, are urged to contact the DOMWM so that the problem can be promptly resolved.

Proposed Stipulations to Mitigate Concerns

As a supplement to the requirements of the offshore mining statute and regulations that are incorporated into the basic lease form, some of which are discussed above, I propose to attach the following stipulations to the leases:

1. Consistency with Coastal Management Programs. All lease activities within the Nome Coastal Management Boundary must be consistent with enforceable provisions of the Nome

Coastal Management Program. All lease activities within the Bering Straits Coastal Resource Service Area must be consistent with the enforceable standards of the Bering Straits Coastal Management Program. In addition, all activities must be consistent with standards of the Alaska Coastal Management Program.

2. Subsistence. The state reserves the right to require a pre- and post-operational study of the cumulative impacts of mining, both within and adjacent to the leased area, on subsistence uses. Whether or not a study is required, the plan of operations must describe how the mining operation will ensure that subsistence use and resources such as shellfish, anadromous and non-anadromous fish, marine mammals and sea birds are protected.

3. Habitat Protection and Fishery. The plan of operations must include provisions to ensure that habitats for shellfish, anadromous fish, marine mammals, and sea birds are protected and that commercial and subsistence fishing activities are not curtailed. It must specifically address the following, where applicable:

A. The effects that offshore mining operations proposed to take place within one mile of an anadromous fish stream will have on the movement of juvenile and adult anadromous fish.

B. The effects that offshore mining operations proposed to take place within 100 feet of mean lower low water will have on anadromous fish.

C. The effects that mining operations proposed to take place during open commercial and subsistence periods will have on actual commercial and subsistence fishing activities.

In addition, the state reserves the right to require an analysis of the cumulative impacts of existing and proposed mining operations within and adjacent to the leased area on marine habitat.

4. Environmental Monitoring. The state reserves the right to require the lessee to design and carry out an environmental monitoring program to measure parameters such as heavy metals concentrations, turbidity, salinity, sediments, rates of recolonization, and pre- and post-mining bottom contours. Results of the monitoring program would be used in determining the safeguards deemed necessary to protect the biological community of the leased area. The safeguards would be reviewed by concerned public agencies and approved by the Alaska Department of Fish and Game; Department of Environmental Conservation; and Department of Natural Resources, Division of Mining & Water Management.

5. Public Access and Navigation. No facilities or activities may be located where they would block public access to navigable public waters, as defined in AS 38.05.965(12) and (16). Public access to and within the leased area may not be restricted, except for safety reasons and only if approved by the Director of the Division of Mining & Water Management. All activities must be conducted so as not to interfere with shipping lanes, navigational channels, and navigational devices. It is the lessee's responsibility to inform itself as to the location of shipping lanes, navigational channels, and navigational devices.

6. Historic, Prehistoric, and Archaeological Resources. If any site, structure, or object of historical or archaeological significance is discovered during operations on the leased area, the lessee shall report the discovery immediately to the director of the Division of Mining & Water

Management and shall make every reasonable effort to protect the site, structure, or object against damage until the director, after consultation with the State Historic Preservation Officer, has given directions as to its preservation.

7. Air, Land, and Water Quality. The lessee shall comply with all applicable state and federal air and water quality standards during all lease operations.

8. Local Hire. The lessee is encouraged to hire Alaska residents, especially residents from the local area, if they are available and qualified to do the required work. If a law requiring local hire for resource development projects on state-owned land is enacted during this legislative session, this proposed stipulation will be amended to conform to its terms.

9. Bond. A bond in an amount to be determined by the division, conditioned on compliance with the rental and other provisions of the lease, may be required within 120 days after lease issuance. Based on the scale and scope of the activities proposed in the plan of operations, the state reserves the right to alter the amount of the bond. This lease bond would be used for such things as fuel spills, sinking and abandoning a vessel, etc. A separate mining reclamation bond will also be required.

Environmental Impacts from Previous Mining Activity

WestGold's "Bima" bucket line dredge which was the largest in the world was a large scale heavily regulated and monitored mining operation on the leased area for three operating seasons. The dredging was done without significant adverse impact to the environment. Further, the impacts from the "Bima" operation in state waters was carefully considered by the U.S. Department of Interior, Minerals Management Service, Alaska OCS Region in deciding to offer federal mining leases in the OCS area adjacent to the state's lease area. (see OCS Mining Program, Norton Sound Lease Sale, Final Environmental Impact Statement: OCS EIS/EA, MMS 90-0009, March 1991)

Resumption of a large scale mining operation such as the "Bima" is expected to have no significant adverse impacts. There is potential that there will be several concurrent small scale dredging operations along with numerous suction dredge operations in the proposed lease area. The cumulative impact from all of these potential operations is expected to have no significant adverse impacts so long as all operations are consistent with the existing coastal management policies and standards for the NCMP, BSCRSA, and ACMP.

Classification Order for Offshore Leasing Only within Existing Lease ADL's 17867, 17911, 17921, and Previous Lease ADL's 57918 and 57959

While reviewing comments to the preliminary best interest finding and proposed disposal, I decided to issue a departmental classification order under AS 38.05.250 restricting the acquiring of the state's mineral rights on tide and submerged land in the area of the above leases to offshore mining leases only. This classification will preclude mining claims being staked with two corners on the beach as allowed under AS 38.05.275, but will allow the acquisition of locatable mineral rights under the offshore mining law AS 38.05.250. This classification will remain in effect until revoked.

Conclusions

In my opinion, the department's decision to re-issue through competitive bid the 28 lease tracts in the upcoming lease sale is in the best interest of the state. Mining activity that may occur on the lease tracts can be conducted in a manner that is environmentally safe, and beneficial to the Nome community and State of Alaska. I also find the re-issuance of the leases to be consistent with the ACMP, BSCMP and NCMP standards.

Bob Loeffler, Director
Division of Mining and Water Management

5/17/99
Date

I concur:

for John Shively, Commissioner
Department of Natural Resources

5/18/99
Date