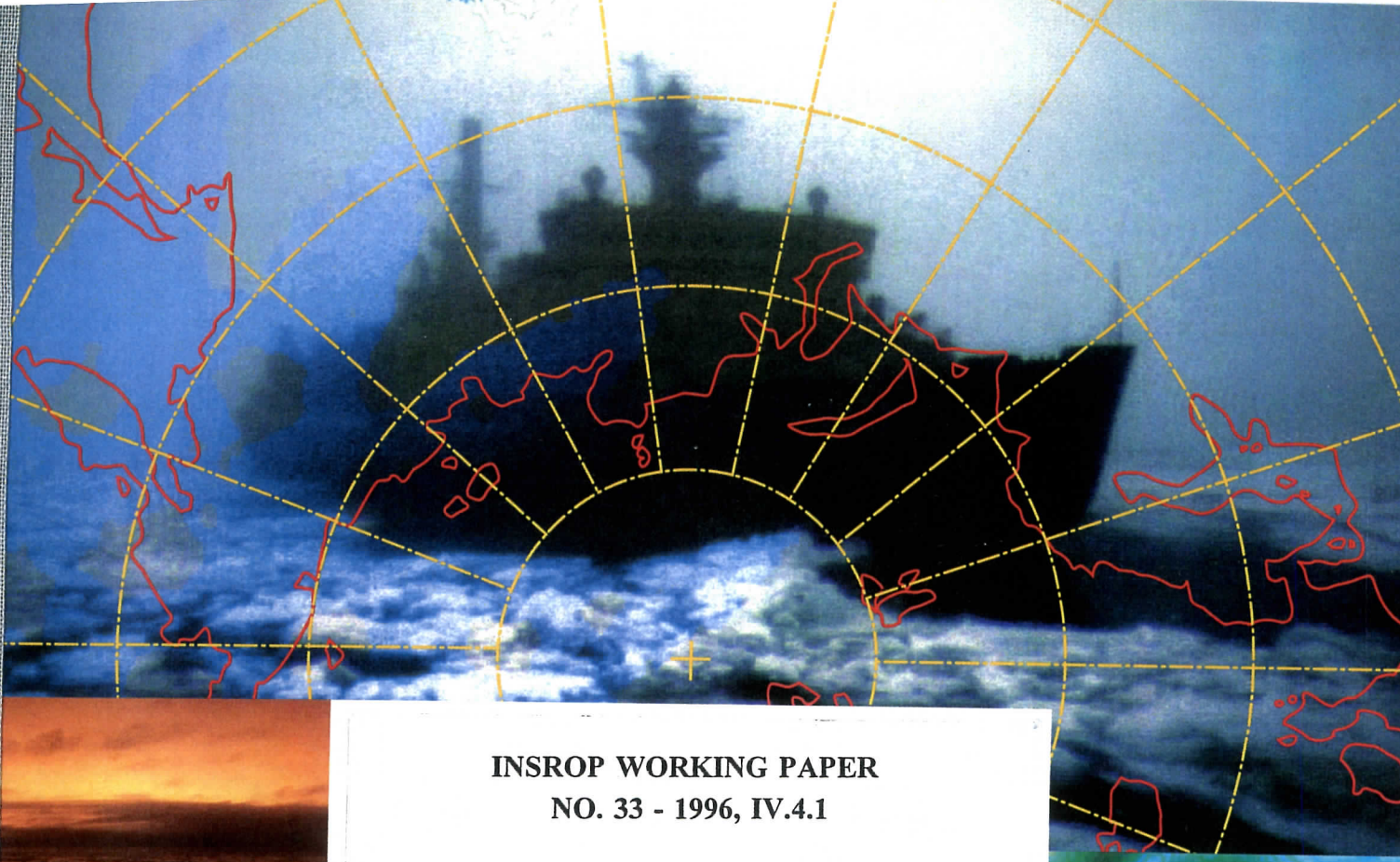
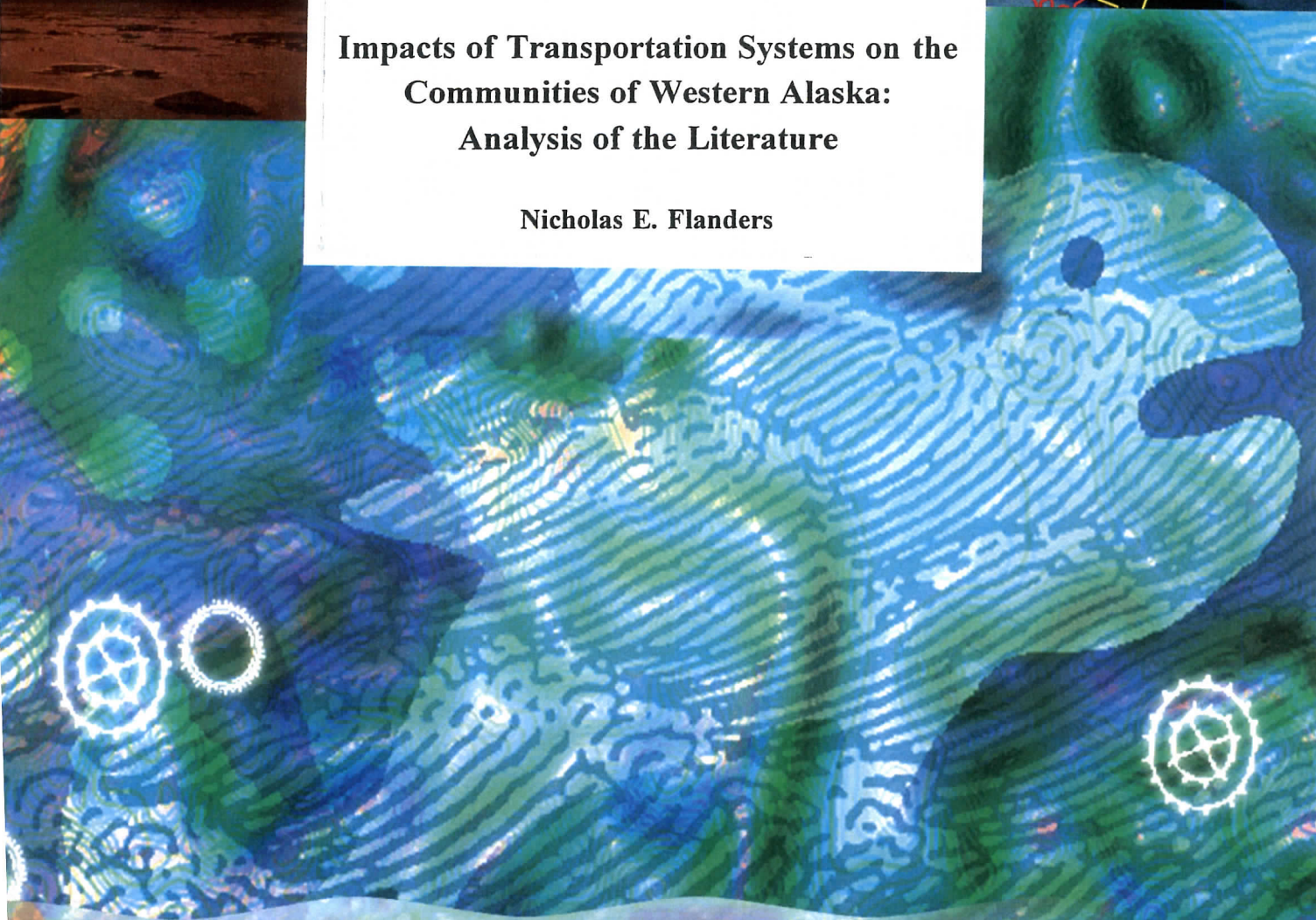


INSROP WORKING PAPER
NO. 33 - 1996, IV.4.1

Impacts of Transportation Systems on the Communities of Western Alaska: Analysis of the Literature

Nicholas E. Flanders



INSROP International Northern Sea Route Programme

Central Marine Research & Design Institute, Russia

The Fridtjof Nansen Institute, Norway

Ship and Ocean Foundation, Japan

International Northern Sea Route Programme (INSROP)

Central Marine Research & Design Institute, Russia

The Fridtjof Nansen Institute, Norway

Ship & Ocean Foundation, Japan

INSROP WORKING PAPER NO. 33-1996

Sub-programme IV: Political, Legal and Strategic Factors.

Project IV.4.1: Social and Cultural Impact on Indigenous Peoples of Expanded Use of the Northern Sea Route.

Title: **Impacts of Transportation Systems on the Communities of Western Alaska: Analysis of the Literature.**

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What is an INSROP Working Paper and how to handle it:

This publication forms part of a Working Paper series from the **International Northern Sea Route Programme - INSROP**. This Working Paper has been evaluated by a reviewer and can be circulated for comments both within and outside the INSROP team, as well as be published in parallel by the researching institution. A Working Paper will in some cases be the final documentation of a technical part of a project, and it can also sometimes be published as part of a more comprehensive INSROP Report. For any comments, please contact the authors of this Working Paper.

FOREWORD - INSROP WORKING PAPER

INSROP is a five-year multidisciplinary and multilateral research programme, the main phase of which commenced in June 1993. The three principal cooperating partners are **Central Marine Research & Design Institute (CNIIMF)**, St. Petersburg, Russia; **Ship and Ocean Foundation (SOF)**, Tokyo, Japan; and **Fridtjof Nansen Institute (FNI)**, Lysaker, Norway. The INSROP Secretariat is shared between CNIIMF and FNI and is located at FNI.

INSROP is split into four main projects: 1) Natural Conditions and Ice Navigation; 2) Environmental Factors; 3) Trade and Commercial Shipping Aspects of the NSR; and 4) Political, Legal and Strategic Factors. The aim of INSROP is to build up a knowledge base adequate to provide a foundation for long-term planning and decision-making by state agencies as well as private companies etc., for purposes of promoting rational decisionmaking concerning the use of the Northern Sea Route for transit and regional development.

INSROP is a direct result of the normalization of the international situation and the Murmansk initiatives of the former Soviet Union in 1987, when the readiness of the USSR to open the NSR for international shipping was officially declared. The Murmansk Initiatives enabled the continuation, expansion and intensification of traditional collaboration between the states in the Arctic, including safety and efficiency of shipping. Russia, being the successor state to the USSR, supports the Murmansk Initiatives. The initiatives stimulated contact and cooperation between CNIIMF and FNI in 1988 and resulted in a pilot study of the NSR in 1991. In 1992 SOF entered INSROP as a third partner on an equal basis with CNIIMF and FNI.

The complete series of publications may be obtained from the Fridtjof Nansen Institute.

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INSROP WORKING PAPER
FOR PROJECT IV.4.1

Impacts of Transportation Systems on the Communities of Western Alaska: Analysis of the Literature

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1. Introduction

This report examines the recent social impact literature associated with the Alaska Outer Continental Shelf (OCS) oil leasing program of the US government and other relevant impact studies done for resource development in Western Alaska. The OCS literature provides insights into the potential effects on the communities of the Bering and Chukchi Seas of opening the Northern Sea Route (NSR) to international traffic. Of particular interest is the literature on the transport system associated with oil development. Similarities between the NSR and the OCS transportation system are many, including use of Unalaska/Dutch Harbor as a major terminal and ship traffic through and around the Bering Sea. This review does not attempt a coherent profile of the sociocultural impacts of the NSR. Such a profile will require further information gathering, as detailed in the conclusions. Rather, it is part of the scoping and assessment process. 'Scoping' means a preliminary listing of possible impacts from a particular activity. That list may include items that the complete assessment later dismisses as unimportant. This report provides a pastiche of information found in previous analyses that may prove important in the assessment of INSROP.

An analysis of the petroleum transport literature helps two tasks. The literature is based upon extensive scoping for the possible impacts of increased marine transport activity in the area. Thus, the oil transportation literature can suggest the possible impacts of the NSR on Arctic coastal communities. The literature also looks at the possible cumulative effects of petroleum activities when combined with the development of a Bering Sea groundfish industry. The literature can thus suggest potential cumulative impacts from all three activities.

This report contains four main sections. The first describes and evaluates the literature. The second looks at the city of Unalaska. The community has been well studied as a potential base for petroleum-related activities in the Bering Sea (Han-Padron Associates, 1984; Louis Berger and Associates, 1983). Various scenarios for the expansion of this activity and its impact on the community have already been developed. The third part considers the other villages of the region.

The concluding section lays out the implications of this scoping exercise for studies in Russia and the information needed for a complete evaluation of the NSR's potential impacts. *Petroleum*-related activities are the basis for the literature reviewed. Extrapolating to an expanded cargo transportation system requires speculation since the type of cargo may influence the scenarios developed.

In preparing this report, the author reviewed more studies than this report discusses. Several studies provided baseline information about the sociocultural characteristics of this area. A subsequent report will consider this material. Others did not deal directly with transportation or sociocultural issues.

2. The Peoples of the Bering Sea in Brief

The communities of the Bering Sea are made up of at least five distinct language groups. The two major groups are the Yup'ik and Iñupiat.[1] The Yup'ik (with a geminated 'p') live from the Alaska Peninsula to just north of the Yukon River's mouth. The Iñupiat live from that point north along the coast to the Mackenzie River in Canada.[2] Yupik (without the geminated 'p') speakers live on St. Lawrence Island. Aluutiq inhabit parts of the Alaska Peninsula. They call themselves as Aleuts, though this designation is probably a remnant of the Russian presence. The Russians assumed that all the people of Alaska were Aleut and proceeded to call them such. In fact, the language is most closely related to Yup'ik. Finally, the Aleut proper live on the Aleutian Chain.

Villages of distinct cultures pursuing livelihoods dependent upon the ocean still dominate the Bering Sea coast. Those villages physically on the coast are heavily dependent upon marine resources. Cash income and western commodities will be found in most households of these communities, but marine resources remain an essential source of food. Anything that might affect those resources is of considerable concern. Even those villages located away from the coast use coastal resources, either through trade, a seasonal round that takes them to the coast at some point in the year, or the movement of anadromous fish from the ocean into river systems. The effects of changes in the coastal system may thus be felt far inland. Those changes can have an impact upon the cultures of the villages.

3. The Current Transportation System of Western Alaska

A brief description of the current transportation system in western Alaska will help readers unfamiliar with Western and Northern Alaska to perceive its particular characteristics. One must understand the current

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[1]'Yup'ik' is a singular term applied to both the language and the people. 'Iñupiat' refers to the people and is a plural term. The language is called 'Iñupiaq,' which is also the singular of Iñupiat. When the terms for people are used in English, they are considered plural and no plural 's' ending is added. Thus, one says, "The Iñupiat live in northern Alaska."

[2]Inuit speakers can understand each other from Barrow east to Greenland. From Barrow west, greater dialectical differences may be found. A speaker from Unalakleet may understand someone from Barrow, but not from Canada.

dominance of air transport in the region and the general lack of sea-borne transport infrastructure. With two exceptions, Dutch Harbor and Nome, new ports would require considerable development to accept oceangoing ships.[3]

Before World War II (WW II), the western coast of Alaska, indeed much of Alaska, was dependent upon water-going transport. Ocean-going transport was always a combination of public (federal) and private concerns. The federal government used its own ships to support its facilities. This system lasted into the 1980s when the federal government handed over its remaining Native schools to the state of Alaska.

WW II and the Cold War created a revolution in transportation. During WW II, the military built runways throughout western Alaska. At the end of the war, surplus airplanes formed the backbone of a new private system of air transportation. The US military built further flight facilities during the Cold War. Contracts with the US Postal Service provided financial stability and regularly scheduled service. The state of Alaska built and operates runways in most communities. During the 1980s, when the state had large amounts of money, it expanded airports throughout the states so that they could handle larger airplanes. Construction companies and food wholesalers in Anchorage supported these projects. Food wholesalers supported improved air transport because it allowed them to sell more goods in rural areas. Air service is now the main means of transport in rural Alaska.

Shipping is used primarily for construction materials, nonperishable foods, petroleum products, hazardous materials, and other bulky goods that cannot be flown because of cost or size restrictions. Airplanes without passengers can bring in hazardous material, but the cost is high. The current system of marine transport uses ocean-going barges bringing goods to the major communities, e.g., Bethel, Nome, Kotzebue and Barrow. Because most coastal villages are not located with good harbors, lightering from a ship anchored offshore is the norm. The number of barges depends on the length of the season.

Barges originate almost exclusively in Seattle. The Jones Act requires that all cargo shipped to Alaska come from a US port on a US-built ship. These requirements have added to the cost of shipping. This transportation system also leaves Anchorage out, except as a destination, which is why Anchorage-based businesses favor air transportation. Sometimes, a single private company serves a community. This monopoly

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[3]The port at Nome is a breakwater built of quarried stone. Traditionally, barges had to be lightered. The Red Dog mine port requires lightering, but has some developed shore facilities. Bethel can take oceangoing barges, but not ships.

may be considered natural because no legal barriers prevent other companies from sending barges. One limitation is that private companies generally provide their own port facilities. A competing company would need to develop its own or use an undeveloped public area. Most goods are stored in containers. Smaller barges, with shallower drafts, will be used to carry goods up surrounding rivers to other communities. In some years, low water and the late arrival of the ocean-going barge prevent any cargo from getting through to the more distant, up-river communities. Small communities do not have port facilities. The barges must provide their own means of off-loading.

Shipping activity within the Bering Sea, Bering Strait and Chukchi Seas has been fairly limited. The opening of the NSR could increase shipping in the region.

4. Basic Description of the NSR and Assumptions About Its Impacts on Alaska

The NSR was the major transportation route for the Soviet North. Most rivers in Russia flow north and empty into the Arctic Ocean. To take advantage of this geography, the Soviet Union had to develop its ability to transport through ice-covered waters during the short polar summer. With the end of the Cold War, Russia opened the route to international shipping The route shortens the distance between the Far East, e.g., Korea and Japan, and Europe.

Whether this shorter distance translates into lower costs depends upon the type of goods and the origin and destination. According to a US Army Corps of Engineers (Alaska District, 1995) report, the route would be best suited to general cargoes moving between Asia and Europe.[4] The same ships used to transport goods across the Pacific would be used to go through the Northeast Passage. The season is limited to 180 days and the shipping time is unpredictable. New, larger ships would create an advantage for containers and dry bulk cargoes. The improved economics from larger ships also appears in the results of an INSROP working paper (Buchan, 1995). Another INSROP working paper (Andersen, Heggli, and Wergeland, 1995) states that the cargo owners with the most interest in the route would be shipping dry cargoes irregularly. Finished consumer goods would most likely continue to be sent by traditional routes. Dutch Harbor would be used to assemble convoys and as a fueling and provisioning point. The NSR authority requires that all ships enter the sea route fully fueled and provisioned.

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[4]The report specifically uses Yokohama and Rotterdam as origin and destination points.

The Alaska District (1995: 77) report also suggests that the NSR could be used for shipping from an existing mine site, the Red Dog mine, with as-yet-unbuilt larger ships. Shipment through the NSR would lower shipment costs and raise the mine-site price for the ore. This in turn would not only increase profits, but allow the mine to operate at lower world market prices, thus lengthening its operation. The report also speculates about the shipment of coal, oil and gas from the North Slope. Finally, tourism can make use of the NSR as well. At least one tourism enterprise is using Nome as a base of operations to take people into the Arctic Ocean.

These other possible uses for the NSR are farther into the future since they require the construction of new capital equipment The potential use of Dutch Harbor is less speculative. It would probably be important to any NSR scheme. The use of the harbor for fueling and provisioning would require facilities with a large capacity, but only seasonal use. That is, the ships entering the NSR will only be using the harbor at the beginning of the approximately 180 day season. The scale and seasonality of the use are important to understanding potential impacts. For the purposes of this report, it is assumed that this use will require capacity and personnel above and beyond what is currently there. The use by the Red Dog mine would not require additional capacity, but the development of a coal mine in the same area would. Finally, tourism in Nome would probably require some additional port capacity.

5. Evaluation of the Literature

The origins of the OCS literature are important to an understanding of their limitations. The literature discussed in this report is based upon the Alaska OCS Social and Economic Studies Program (SESP) of the Minerals Management Service (MMS), the agency within the US Department of the Interior responsible for leasing on the outer continental shelf. The research has a very specific *raison d'etre* and a particular intellectual background.

The history of research in Western Alaska follows fluctuating national interests in the area. Though several anthropologists carried out independent research in the region, large blocks of activity developed around specific US initiatives. The Department of Defense funded research in the 1950s when military facilities were constructed in the area. A second wave of studies in the late 1970s through the mid-1980s was associated with the proposed leasing of OCS oil and gas fields. Under the terms of the National Environmental Policy Act (NEPA) of 1969, and other legislation, environmental impact studies must be carried out before any major federal activity. Thus, offshore oil activities required environmental impact studies. An extensive sociocultural

impact studies program that is unusual in the United Studies was developed to address impacts on the distinct Aleut, Yup'ik, Yupik and Iñupiat cultures along the Alaskan coast of the Bering and Chukchi Seas:

> The Alaska OCS Region SESP [Socio-economic Studies Program] is unique among the OCS regions administered by the MMS. This program was begun in 1976 at the urging of the State of Alaska and with recognition of USDOI [US Department of the Interior] that the societies of rural Alaska are especially vulnerable to the influences of western industrial development. (US Department of the Interior, 1990: Volume II, F-4.)

In the early 1980s, during the Reagan administration, the pace of OCS lease sales increased. The lease schedule drove the SESP research, not the logic of scientific discovery. The scoping process identified the issues to be researched. The SESP would then put out requests for proposals (RFPs) to conduct the research. Proposals were not peer reviewed. Rather, contracting officers, some without an extensive background in the discipline, selected contractors to carry out the work. MMS would then negotiate with these contractors over the data that were to be collected. Sometimes, SESP limited the kinds of analysis that the researcher ultimately carried out. A basic factor in the direction of these studies was a desire to avoid litigation over the adequacy of the environmental assessment (Susan Hanna, personal communication). The number of community studies began to trail off in the 1980s for two reasons: lower oil prices meant that the pace of leasing slowed and the emphasis switched to monitoring rather than baseline descriptions. The studies used for this working paper are thus 5-15 years old. They are the most recent. Some more recent studies contain small amounts of information, but are not as comprehensive. For instance, no updates have been made for Unalaska because oil in the development in the areas seems unlikely in the short term.

Contrary to the usual practices of anthropological research, these studies were done very rapidly. The researchers often made very short stays in the community. Standard survey techniques were avoided because survey forms require the approval of the US Office of Management and Budget. Obtaining the equivalent of survey data required subterfuges from the researchers.

Nevertheless, frequently the researchers had extensive experience with the cultures or communities involved. They came into the communities knowing what to look for. Furthermore, many researchers subsequently published articles in peer-reviewed journals based on their studies.

Part of the environmental research focused on the possible effects and needs of transportation especially on the problems of bringing oil exploration supplies into the Bering and Chukchi Seas and transporting oil out. The potential impacts are associated with shipwrecks, the spread of oil, and the impact of increased populations on community culture and social organization.

The transportation literature is sparse on the area to the north of the Bering Strait. In this area, the actual transport of oil is expected to take place through pipelines rather than shipping. Bringing supplies into the area for exploration and development will require shipping, but this activity is considered short-term and minor. The impacts of these activities are considered below.

6. Community Effects of Transportation Systems - Unalaska

The City of Unalaska, which incorporates Dutch Harbor, is a proposed port for the NSR. Unalaska is the largest community on the Aleutian Chain.

The Aleut, the indigenous population, were the very first people in Alaska to feel the effects of European contact. They suffered first from the initial thrust of the Russian fur trade. Eventually, however, under the protection of the Russian Orthodox Church and the need for a reliable work force, the Aleuts recovered as a people. They suffered again, however, under Americanization policies in the early 20th century and evacuation to southeast Alaska during World War II (Jones, 1980). They are considered to be more acculturated than other Alaska Native populations. Yet this perception may be overstated. Some traditional kinship relations exist and have been folded into the Orthodox Church. Aleuts continue to maintain a distinct identity from those around them and wish to maintain that relationship.

Unalaska is the subject of Impact Assessment, Inc.'s (1983) ethnographic study and impact analysis. Impact Assessment prepared this study for the MMS in the expectation that Unalaska would be the base for oil field development in the Bering Sea. A central concern was the consequences of such development in combination with an expanded groundfish industry based in the port. They developed four scenarios for their study:

1. The primary scenario expected growth in the groundfish (bottomfish) harvest with a concomitant growth in employment and population. The shellfish industry was expected to provide constant harvests and the crab fishery to decline.
2. The first alternate scenario looked at simultaneous growth in the groundfish industry and the development of OCS oil-fields. This scenario is the worst case: "Virtually all physical and support services are inadequate to meet the demands of this scenario."
3. In the second alternate scenario, the groundfish industry develops before the impacts of OCS oil development become apparent.

4. In the final scenario, oil development precedes groundfish development. The crab industry declines for a period, but eventually stages a minor recovery. The authors considered this the most likely scenario.

Scenario 1 reflects what has happened since the 1983 study: A large expansion in the ground fishery has occurred without any OCS development. Impact Assessment (1987) and Human Relations Area File (1992) contain updates on institutional changes through 1988. These reports did not evaluate the predictions of the original study and no other study has taken up the question. The fisheries based in Unalaska have varied considerably, however. It is entirely possible that oil or NSR development could take place at a time when fishing has declined again. Laying out all of the scenarios is still useful.

6.1 Scenario 1

The essential observations on the effects of the groundfish industry on the city's economy and population were:

- Groundfish industry growth may not result in population increases. At least some development will take place in Akutan, where taxes are lower and waste discharge permits are easier to obtain.
- When population growth does occur, it will increase the number of resident workers. At the time of their study, nonresident workers were 99% of the work force (p. 29). The nonresident population is large because the fish processing industry uses six month work contracts. As the groundfish industry expands, and a year-round processing industry develops, the contracts will become 12 month.
- Transportation, communications and public utilities are closely related to the development of the groundfishery.
- Employment may grow by 7 percent per year.
- Incomes will rise, but at different rates for different parts of the economy. Businesses that support the fishing industry (transportation, wholesale and ship repair) will benefit the most. The lowest increase will be for those receiving transfer payments.
- Community infrastructure will not meet the demand for services.
- Housing will become scarce. "This will result in an economic advantage for those who are already residents of the community, and particularly for the Aleut segment of the population, as their total assets increase with rising property and housing values." (Impact Assessment, 1983: 30) In its follow-up study, Impact Assessment (1987: 70) notes:

This point about the Ounalaska Corporation requires clarification. The Ounalaska Corporation is the Native village corporation for Unalaska. Native corporations derive from the Alaska Native Claims Settlement Act (ANCSA) of 1971. Villages with 25 or more Natives could form a corporation under Alaska state law and select land from the surrounding federal public domain. The amount of land that the corporation received was based on the number of its shareholders. Under current law, only Alaska Natives may be shareholders, unless the shareholders vote to take the corporation public in a special vote.

Thus, in most Alaska Native villages, the village corporations own the land. Under section 14(c) of ANCSA, the village corporation is supposed to give title to people who own existing home sites. They are also supposed to give the city governments land for existing town sites and roads, and for the future growth of the community. The amount of land for further expansion of the community is usually a friction point between village corporations and city governments, even when both are in Native hands. Control of the land by Ounalaska Corporation has been important to land use patterning. This control, with the restrictions on the sale of the corporation's land mandated by ANCSA itself, acts as a check on private development in most parts of the community. The Ounalaska corporation owns the vast majority of land in the city and virtually all of the land adjacent to it. Only two private individuals own significant amounts of land suitable for residences. The Native corporation wants to maintain as much land in its own hands to control growth or to benefit from the sale of land. This desire may result in friction with the non-Native majority of the community. The Impact Assessment (1987: 68) report notes that the Aleut control over land is disproportionate to the size of the Aleut population.

The authors predicted that though the Aleut population will grow, it will decline as a percentage of the community's population. They suggested that increases in employment and income will not affect Aleut uniformly. As a result the following changes in the community might take place:

- Traditional kinship networks will be disrupted.
- Traditional patterns of social interaction will be impaired.
- Socioeconomic class differences will develop, bonds of community will be weakened.
- People will become more oriented toward networks based on social class and neighborhood.
- Aleut identity will be tied to subsistence and continuity with the past.
- Secondary social networks, churches and social clubs, will increase in importance.

- The traditional social ties with Seattle will continue to be strong among non-Aleut.
- Increased exposure to the outside world will further erode the traditional value system of the Aleut; Aleut will disappear as a language in the community.
- A conflict will arise between the city government, which non-Aleut dominate, and the Ounalaska Corporation, the major landholder.
- The Russian Orthodox Church will remain an important element of Aleut identity
- Pressure on health care and social services among all parts of the population are likely to increase, though declining state revenues may restrict their growth.

6.2 Scenario 2

The changes in this scenario were more a matter of quantity rather than quality. Many changes under this scenario affect the community as a whole rather than Aleuts in particular. The increased scale of development resulting from two separate industries arising simultaneously results in trends different from those of the first scenario. The differences between the first and second scenarios were:

- Support for oil field development is likely to increase the number of Euroamerican immigrants. Fisheries development includes many Americans of non-European origin and non-Americans.
- Overall, the increased population will heavily stress the public infrastructure.
- Rapid development will lead to "shortages, underplanning and exaggerated changes regarding profits and growth" (p. 41).
- Conflicts between newer residents and long-term residents may emerge over the use of subsistence resources.
- Oil industry workers, predominantly Euroamericans, are more likely to form a distinct social group.
- A hospital is more likely to be built in response to increased demands on health care.

6.3 Scenario 3

The earlier growth of groundfish under this scenario will provide an opportunity to plan for community needs. The community as a whole will have to adjust first to the year-round presence of fish processing employees, then to oil workers. Petroleum development will be perceived as threatening to the "traditional" groundfish industry. The community will see groundfish as a sustainable resource, whereas petroleum may be identified as a temporary boom. The authors suggest that this perception is likely to increase tensions between Euroamericans (oil workers) and Aleuts (natural resource users) in particular.

6.4 Scenario 4

The authors perceive this as the most likely scenario. In it, the community will court the petroleum industry because of a declining crab fishery. The groundfishery will come in after petroleum development.

- The nonresident population will remain high as the oil field development involves transient workers.
- The community economic multiplier will be smaller than for fisheries development.
- The effects of oil development will already have taken place before the groundfishery begins, with the consequence that the two will work together smoothly.
- The Aleut population will remain the same proportion of the community.
- Ethnic relations will be more peaceful than under other scenarios, and ethnic enclaves are less likely to develop.

6.5 Recent Developments

The authors of the Unalaska study point out that the impacts on Unalaska will be cumulative. The impacts can overwhelm the capacity of the city to absorb them. Clearly timing is extremely important. So are the cultural characteristics of those people who may become full-time residents as part of an economic activity. Finally, the ANCSA village corporation for Unalaska must be considered a key player, though its shareholders, the Aleut of the community, are a minority.

The scenarios for Unalaska could be extended to other possible port sites. Similar scenarios might be relevant where more than simple off-loading of cargo is to take place, e.g., further transportation, industrial activity.

As noted above, Unalaska has undergone a large growth spurt, a consequence of groundfish development (Glen Reid, personal communication). In the period from 1987 to 1990, approximately $350 million dollars were invested in new onshore facilities associated with fisheries and other development including supermarkets and hotels. Housing has been a problem, as Impact Assessment predicted. In 1985, housing had become more plentiful as the king crab fishery disappeared (Impact Assessment, 1987: 67). The shortage reappeared after this. However, this second housing shortage was caused by a lack of bank financing rather than reluctance on Ounalaska's part to develop house sites.[5] Community infrastructure has been improved.

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[5]In 1986, international oil prices collapsed. One effect on the Alaskan economy was a collapse in the urban house markets. Banks ended up with real estate that had dropped below the value of the mortgage made on

Thus, groundfishery development has already taken place. Oil development has not. The series of events that transpired follow Scenario 1, above, in which the groundfishery goes on without oil. Unalaska has apparently coped with the development, except for a housing shortage. The effects on the Aleut community are not known, but would be worthy of a follow-up study. Such a follow-up study would provide a new baseline for the development of the NSR and determine the accuracy of Impact Assessment's (1983) predictions about the impact of the groundfishery.

6.6 Significance for INSROP

These scenarios could equally well apply to the use of Dutch Harbor by NSR ships. The Alaska District report suggests that the port could be used for refueling and convoying. This use would have a large seasonal impact on the infrastructure of Unalaska/Dutch Harbor similar to oil exploration. The use of facilities by ship personnel, or people associated with onshore services, could increase pressure on them. The NSR activities could be cumulative with oil development. That is, if both were going on simultaneously, the impact would be a greater strain on community resources. Oil exploration activities would also be seasonal because of ice conditions in the Bering Sea. It also places strains on infrastructure and facilities. Current fisheries management efforts in the Bering Sea are aimed at reducing seasonality. If successful, they would not necessarily lead to cumulative impacts with NSR. On the other hand, as with oil development, local people might consider the fishery "normal" and NSR as a seasonal "boom." Fishing and NSR shipping could compete were the fisheries supported from Dutch Harbor to decline, then revive just as NSR convoying begins.

7. The Other Communities of the Bering and Chukchi Seas

7.1 NSR-Catalyzed Development

The plans for the NSR, as currently understood, do not include development of additional ports along the western coast of Alaska. Governor Hickel's administration (1990-94) in Alaska regarded the NSR as an opportunity to develop resources in Alaska that are currently unprofitable because of high transportation costs. These might include coal from the North Slope of Alaska and timber brought down the Kuskokwim and Yukon Rivers. These activities would increase both the population and the traffic along the coast of Western Alaska.

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it. The banks in turn went bankrupt or merged. They made few new loans. Even in places where a demand remained for housing, sales were slow because of the bank problems.

Increases in population could be handled through "dedicated" worker communities in which only workers connected with the development activities may reside.[6]

Increases in shipping traffic may have other consequences. The environmental impact statement for the Red Dog Mine suggests the onshore issues that arise (US Environmental Protection Agency, 1984). In particular, roads constructed to transport minerals can affect resources upon which local communities depend, even if the road is constructed away from the community. The annual caribou migration is the primary concern of road use associated with the Red Dog mine. The main point for the purposes of this report is that possible effects from NSR-catalyzed development could have impacts on land-based resources, but the importance of these impacts would depend upon local conditions. Thus, the developments would have to be considered case by case, not in an assessment of the NSR per se.

7.2 Concerns of Local People

Wolfe (1981: Chapter 9) relates the following concerns about oil development among the peoples of Norton Sound and the Yukon Delta. Residents of Bering Sea communities have become very well informed about the potential impacts of oil development because of concerns for their culture. These concerns are a good way to organize potential impacts from shipping or NSR-catalyzed development. By the time of Wolfe's study, much of Alaska had experience with the effects of the Trans-Alaska Pipeline construction. In many areas of the Bering Sea, they were also familiar with the long history of gold mining and its impact on Native communities. These concerns have remained stable, appearing in recent testimony. With a few exceptions, such as the Red Dog mine, little development has taken place in the area.[7] Their concerns thus broach several important long-term issues.

- Environmental problems
- Higher rates of inflation from economic developments in the region.
- Inadequate knowledge and technology on the part of oil companies and their support services, especially concerning ice conditions, flooding, ocean currents and cleanup.
- Risks assumed without benefit.

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[6] Prudhoe Bay, Alaska, is an example of a dedicated community.

[7] The introduction of community development quotas (CDQs) might be an exception. They are new and little research has been done on their impact. CDQs are described below.

- Negative cultural influences from contact with outside workers in local communities.
- Threats to cultural survival.

Environmental problems focused primarily on the potential for oil spills. The *higher rates of inflation* were a concern because during past periods of development, when many people came into a region, brought rapid price rises. Even today, the ability to respond rapidly to large increases in demand is limited particularly for larger items that can only be brought in by barge or large cargo plane. The classic examples have been the gold rushes in various parts of Alaska and, more recently, the construction of the Trans-Alaska Pipeline. These events can also pull away key support personnel: During the construction of the pipeline, all of the best, most experienced pilots were hired away. The result was a dramatic change in air safety for many rural areas of the state. Even a four-person construction crew staying in a village for a month can create disruptions, as this author observed in 1981. Because construction crews are trying to complete a job, they will often pay for housing, food and other goods at above normal village prices. The result, in a village with limited housing and a poorly-stocked store, is pressure to increase rents on housing and food shortages.

Longer term residents, arriving in smaller groups, can create pressures on available facilities. They do not, however, create dramatic price rises or personnel shortages. Most villages, for instance, absorb nonresident teachers for nine months of the year.

Inadequate knowledge is self-explanatory. Parallel concerns with the NSR about ice, tides and flooding relate to possible discharges of damaging materials, such as bunker oil or accidents with hazardous cargoes. An accident at a time when the coastal areas are flooded can damage vast areas of land. Accident recovery programs must be prepared to pursue more drastic remedies at those times.

Risks without benefits reflects the lack of benefits that villagers may receive from activities that may negatively affect them. With respect to oil development, the federal and state governments and the oil companies have argued that some risks must be taken in the name of national security. Through the 1970s and 80s, oil development was considered a matter of national interest. The NSR, to the extent that it poses risks to the local communities, cannot claim a balancing national interest. For the most part, increased international use of the NSR will be a purely commercial venture. Thus, those proposing it must evaluate all potential risks and provide villages with benefits.

Cultural influences have been a central theme in all OCS SESP studies. The usual way of mitigating these potential influences is to consider isolating any onshore development from local communities and

restricting activities, such as hunting, that could cause conflicts with local economic, social and cultural practices. Such activities are restricted in and around both the Prudhoe Bay oil complex and the Red Dog mine. If the NSR is used to improve transportation into western Alaskan communities, or leads to other development, then cultural influences may arise. Tourism, for instance, can bring in large groups of people who do not understand the local culture and may actively object to some aspects of it. When they arrive by ship in large numbers, the impact can be major. Preventing this kind of situation is a core concern of western Alaska communities.

The one exception to the general idea that shipping would not lead to any increase in shore-based personnel could be helicopter support crews, if such are developed. Such shore-based support crews would be used as part of OCS oil development (US Minerals Management Service 1991a). The NSR could use them for similar purposes: ice monitoring, crew changes, and emergencies. Helicopter noise may also affect birds and sea mammals. Mitigation of these effects is usually through rules governing flight paths, altitudes, travel times and frequency.

Threats to cultural survival represents a broader philosophical concern among the residents of the Yukon-Kuskokwim Delta. Wolfe notes that this concern has to do with a conflict between two ways of life at the level of their essential resources. "The petroleum which has helped perpetuate the historical development of one culture, in the process of extraction, could curtail the historical development of another" (Wolfe 1981: 263). Shipping *per se* does not represent a threat in this sense.

7.3 Bowhead Whale Migration

The working assumption of this working paper is that the NSR would more or less follow the northern coast of Russia. The EIS prepared for the Chukchi oil field development states that the bowhead whales, during their spring migration north, can follow the Russian coast beyond the Bering Strait before turning east and moving along the northern shore of Alaska (US Minerals Management Service, 1991b: III-35). Because both ships and whales use leads in the ice to find their way north, the NSR could have an effect on bowhead migration. The past operation of the route has probably already had an effect on the whales. The questions are what is or was that effect? Will the traffic through the NSR increase over past levels and increase the impact? These questions would have to be answered with Russian material; they lay outside the scope of this study. An INSROP (Gavrilo and Sirenko, 1995) working paper says that the Russian material may be inadequate.

MMS expects that oil development in waters off Alaska north of the Bering Strait will have a limited impact upon bowhead whales (US Minerals Management Service, 1991b: IV-C-36-38). The only major sources of disturbance may come from the transport of oil development supplies into the region. MMS expects pipelines to transport the oil to the shore, and from there to the Trans-Alaska Pipeline System. The transport of drilling rigs and construction materials may not cause significant disturbances and may be timed to avoid interference with the spring migration. On the other hand, a question may be raised regarding cumulative impact of shipping in association with expanded use of the NSR.

Bowhead whales are an extremely important subsistence food, with consequences for the human cultures of Western Alaska (see for example Braund, *et. al.*, 1988). Bowhead whaling is a major spring activity in a few communities. Beyond the food that it brings, the activity organizes social relationships, creates the basis for distribution networks beyond the community, and is a central element of cultural identity. Although the risks are said to be low, the consequences of an adverse impact are high and thus must be considered.

7.4 Impact of Growth on Norton Sound Communities

Several MMS SESP studies have considered the impact of growth on the communities of Norton Sound. The John Muir Institute, Inc. (1984) prepared a description of the socioeconomics of Norton Sound. The study provided a model with which to predict future changes in the villages of Norton Sound under economic expansion, inflation, and increased employment, Figure 1. Were the NSR to have direct effects upon individual communities, this model would help to predict the consequences.

This study shows, however, the difficulties in projecting the consequences of future community growth. A central problem is that the model is based upon statistical inference. All such inferences involve some unexplained variation. The equations used to develop the model, though significant, leave much of the variance unexplained. The independent variables predict between 10 and 90 percent of the variation in the dependent variables, but most equations fall below 30 percent. Such small explanatory power is not unusual in social science studies. The small sample size used for the study, a result of the US Office of Management and Budget restrictions mentioned in a previous section, probably contributed to these small numbers.

The variation implies that predictions about the consequences of external change may differ from actual results. These different results may be seen when the variability is added to the model through random variation that mimics the unexplained variance. Figures 2-4 show the consequences. These figures represent different runs of the model, with an underlying trend of population doubling over a period of 24 years. This rate of

increase would be more likely to portray natural population growth rather than a large sudden increase from a new development. The paths are very different because of the unexplained variance. In essence, the model cannot predict outcomes well. The outcomes of the multiple runs are denser in the middle and, thus, show a core tendency. The actual path resulting from a population increase could end up virtually anywhere.

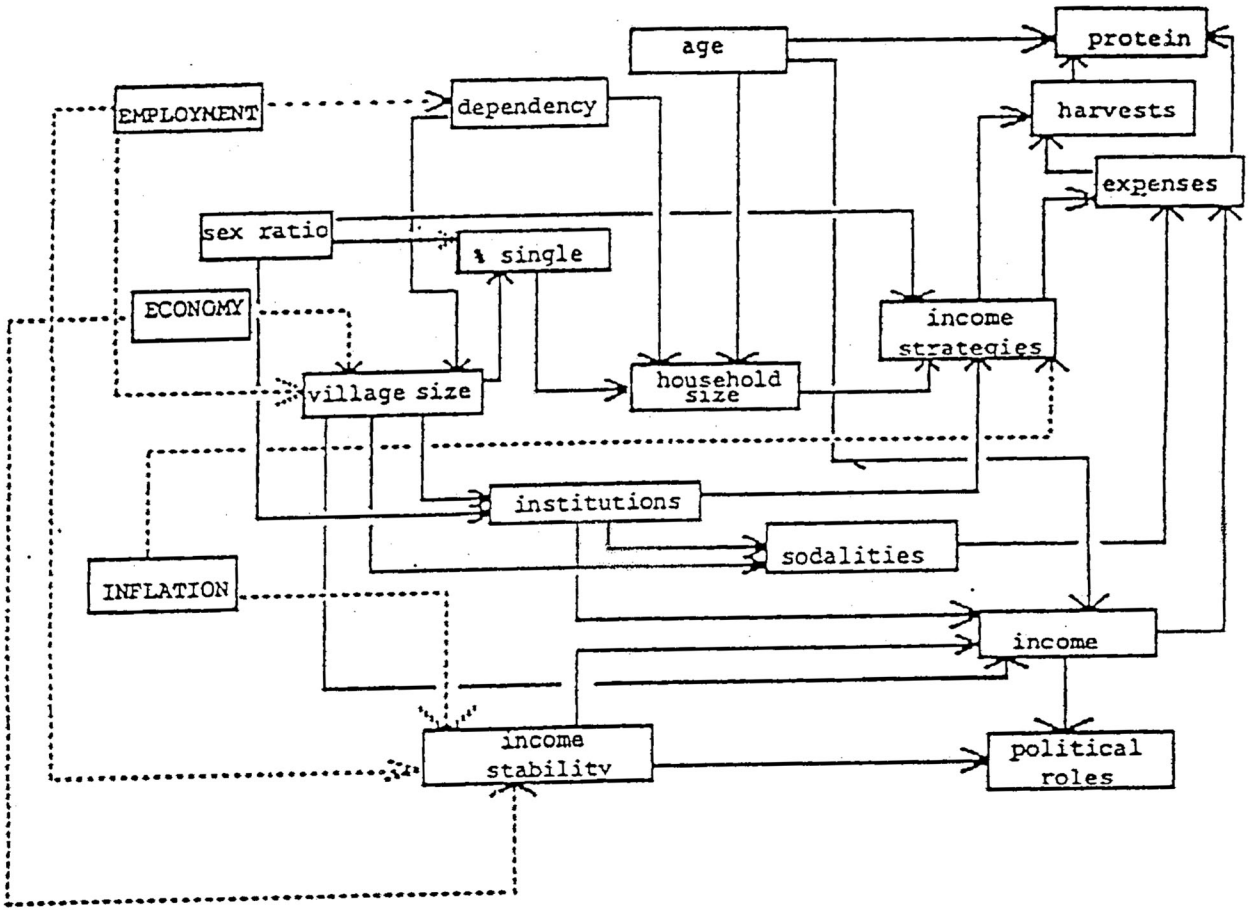

Fig. 1 Norton Sound Path Model (Source: John Muir Institute, Inc., 1984)

Consequently, monitoring may be a more appropriate way in which to deal with the potential changes. Monitoring still requires prior identification of significant variables and baseline studies. Under the US MMS a social indicators study has been carried out for most of the villages of the Bering Sea (Human Relations Area Files, 1992). The purpose of this study is impact monitoring.

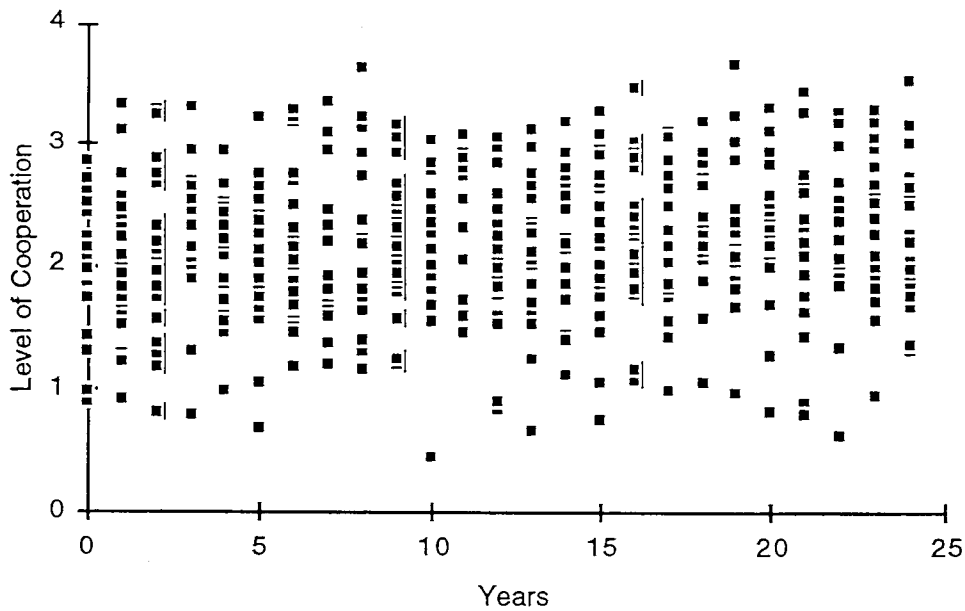

Fig. 2 Level of Institutional Cooperation and Coordination

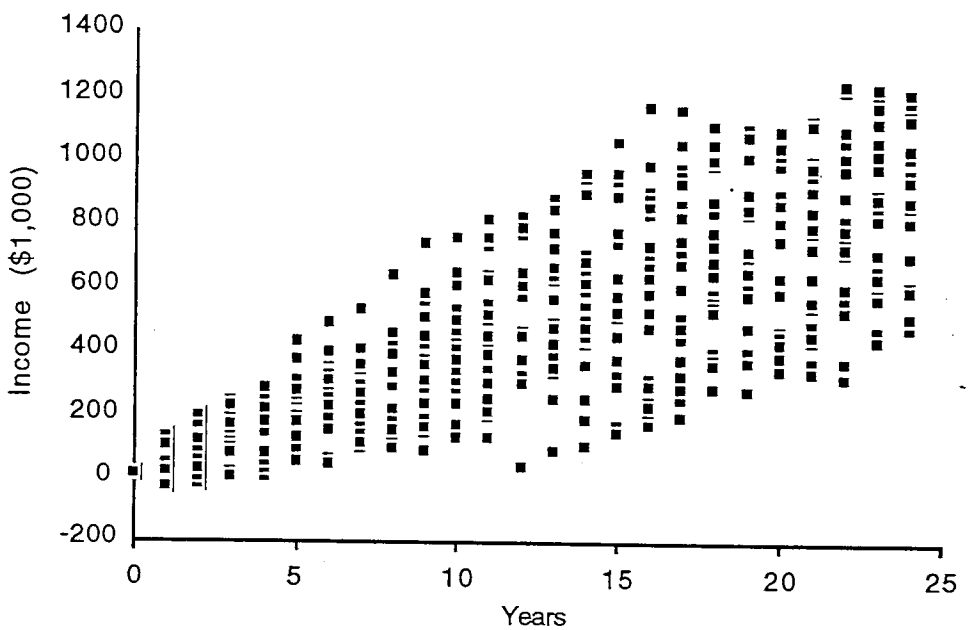

Fig. 3 Household Income

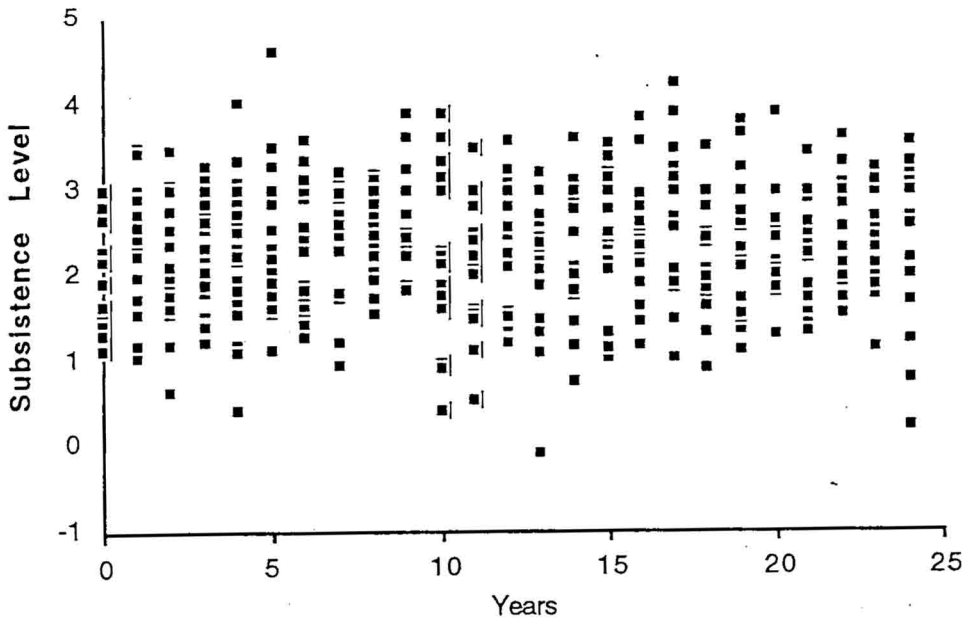

Fig. 4 Level of Harvested Protein in Diet

Figures 2-4 are based upon a model developed in John Muir Institute (1984). A population doubling was expected to occur over a 24-year period. The unexplained variance in the original model was added to the equations as random variables and the model was run 25 times. The dependent variables in Figures 2 and 4 are rankings categories. In Figure 2, '0' equals a community with neither institutional cooperation nor coordination; '3' equals a situation where both exist. In Figure 4, "1' equals less than 50 percent of the household diet comes from subsistence harvest protein, whereas "3" indicates that more than 75 percent came from subsistence. Apart from the great variety of outcomes that could result from the unexplained variance, the absurd outcomes are also worth noting. In Figures 2 and 4, outcomes result that fall outside the range of categories allowed by the underlying data. The US Minerals Management Service (MMS) required that the model developer use these categorical variables in regression analysis (S. McNabb, personal communication). Normally the contractor would have used statistics more appropriate to categorical dependent variables. The analysis used in the report is used here precisely because the MMS report used it.

7.5 Concluding Observations

Considered collectively, the analogs between OCS oil transportation and the NSR are few. Oil is considered a potentially dangerous cargo because it can spill and spread. The cargoes on the NSR are undefined.

The analogy may be valid to the extent that NSR ships discharge, intentionally or unintentionally, bunker oil or other harmful substances that the ocean can carry.

Most spilled oil in the world, in fact, comes not from accidents, but from illegal discharges such as the cleaning of bilges and tanks. If discharges are prevented through stringent enforcement, then many objections to oil transport may not apply to the NSR.

Development of mineral or other natural resources in the area could rapidly change the impact that the NSR will have on Alaska outside of Unalaska. Whereas using the NSR for shipping from Red Dog would have little or no additional impact, that might not be true of coal development using the same port. Because the regional Native corporation is co-operator of the mine, it has made policies that reduce impacts on local resources and communities. Were the road and port used for other purposes, that might change.

Tourism is also an industry for which few if any impact studies have been done. It can create cultural influences and inflation. No MMS SESP reviewed for this study considered it as a possible influence.[8]

8. Considerations in Determining Possible Sociocultural Impacts

The above analysis of the literature was based upon current proposals for NSR use and the present situation in the Bering Sea. Potential impacts could change with other proposals or developments in the region's economy. These changes may be divided into endogamous and exogamous factors. Endogamous factors are such things as routes and cargoes that are part or a result of the opening of the northeast passage. Exogamous factors are things such as other regional development that are not a result or part of NSR. For a complete scoping of the opening of the Northern Sea Route impacts, some additional information will be needed.

8.1 Endogamous Factors Influencing the Development of Scenarios

The development of scenarios for possible sociocultural impacts in Alaska depends upon at least two characteristics of the future use of the NSR.

- routes
- cargo

As presently understood, the NSR will use Dutch Harbor/Unalaska as a congregating and provisioning point. Presumably, NSR traffic will head directly toward the Bering Strait. This course will bring increased

[8]A report on St. Paul Island does consider the importance of tourism.

ship traffic into areas previously little used. During the Cold War, the NSR stayed on the Russian side of the international border. It is unclear what direct or indirect effect this additional ship traffic will have on the ice surrounding places such as St. Lawrence Island, Little Diomede, and Cape Prince of Wales. Ice conditions are an essential element in at least two types of marine mammal hunting: walrus, which stay near the edge of ice floes, and bowhead whales, which use open leads to migrate. These shipping routes may also increase the potential for accidents, if combined with oil development in the Bering and Chukchi Seas and with expanded fishing (see below). The MMS literature did not consider the impact of increased shipping through the Bering Strait because transportation scenarios for Chukchi and Beaufort Sea fields usually involve pipelines to the shore.

Cargo is important to the consequence of shipping accidents. The OCS Environmental Studies program has extensively assessed the possible effects of oil spills and developed risk analyses. Under some conditions, oil or other liquid cargo spills could be devastating to both the ocean and shore environments. Some cargoes might not have any effect. Other cargoes, such as hazardous wastes, might have uncertain effects. The Alaska District report suggested that general cargoes might be economically feasible now, with liquid and bulk cargoes becoming so with larger ships. Anderson, Heggeli, and Wergeland (1995) suggest that identifying cargoes may be premature. More needs to be known about schedules and costs. The scoping of possible sociocultural effects will require knowledge of the types of cargoes that might be carried, their potential effects on the environment, and the connection between those effects and the sociocultural systems of western Alaska.

8.2 Exogamous Factors Influencing the Development of Scenarios

Fishing. Over the past year, the federal government has made the people of Western Alaska eligible for Community Development Quotas (CDQs). The North Pacific Fishing Commission is setting up individual transferable quotas (ITQs) for the Bering Sea bottom fish. ITQs give a fisher the right to catch a prespecified percentage of the allowable catch in any particular year. They may be bought and sold. CDQs are ITQs granted to communities. They are an effort by the US Government to provide the communities of western Alaska with economic opportunities. The government has set aside 7.5% of the total quota set for the communities.

The development of CDQs has altered the relative perspective of Bering Sea villages. Before the CDQs, these villages were focused on marine mammals and fish that could be found near the coast. CDQs have broadened the species upon which villages depend directly and probably increased the dimensions of the ecosystem about which they should be concerned. The villages may have had some connections to these resources before, but now they are more obvious.

The introduction of CDQs will increase the possible risks to Bering Strait villages from the opening of the Northern Sea route. The increased use of the route may increase the likelihood of a fishing vessel/cargo ship collision. The risk of a collision between a fishing vessel and an oil tanker supporting a developed Bering Sea oil field is considered slight, one in every 150 years (US Minerals Management Service, 1991a). Increased NSR traffic could increase the risk of collision. In combination with oil development, the risk of collision could be higher. An accurate assessment of the independent and cumulative risk from NSR traffic and NSR traffic combined with oil developed can only be carried out once the level of traffic is known.

Also, depending upon the types of cargo carried, a risk to the commercial fishery may exist. Concerns have been raised that the wreck of the *Exxon Valdez* may have led to a collapse in the salmon runs coming into Prince William Sound (Kizzia 1993). Might possible impacts arise on the bottom fisheries from NSR shipping accidents? Again, the type of cargo to be carried must be known.

CDQs have resulted in a direct connection between village commercial fishing enterprises and Unalaska (Mary Pete, personal communication). Unalaska is the main port of call for boats associated with these ventures. It retains a frontier town ambience with many bars (Impact Assessment, 1987). Many CDQ enterprises have zero-tolerance alcohol and drug policies for people working on their boats. Villagers must avoid the alcohol-serving establishments. Thus, the social setting in Unalaska has become a problem. Unalaska does not have social services for people from the other villages of the Bering Sea.

Oil Development. This paper has considered the possible impacts of NSR development on the coastal villages based upon OCS literature. That NSR development could have impacts similar to oil exploration activities suggests that cumulative effects must be considered. Just as oil development could place demands on the same infrastructure and resources as fisheries expansion, NSR development could add another source of strain. The OCS literature did not consider NSR development because its authors were writing at a time before the end of the Cold War. They could not foresee the NSR as a possible additional factor in their calculations. To this author's knowledge, no recent OCS studies have considered the possible cumulative effects of NSR or other joint US-Russian developments on western Alaska villages.

At present, the federal government has leased several areas in the Bering Sea, but only exploration has taken place. The oil companies have not publicized their findings. Prices remain low, too low probably to develop any oil found. If petroleum has been found, development could take place in the future if prices rose sufficiently. 'Sufficiently' is difficult to determine because the nature of any find and the cost of extracting it are

not public information. The NSR should be considered together with potential oil development. The possible effects on Unalaska will be particularly important to pursue.

8.3 Summary

The review of the literature suggests six possible classes of effects on Alaska and the Bering Sea are possible from the initiation of the NSR:

1. The development of a provisioning and fueling point at Dutch Harbor.
2. The hiring or placement of personnel associated with the NSR support operations in Bering Sea communities, the Bering Strait and the Chukchi Sea. This placement of personnel would be separate from the development of ports for actual NSR shipping.
3. The potential for shipping accidents and the release of hazardous cargo or material into the Bering and Chukchi Seas. The release of materials could affect the marine ecosystems and the livelihood of the communities.
4. Direct interference with activities in the Bering Sea. The most likely interference would be with commercial fishing.
5. NSR-catalyzed development. The initiation of new or the expansion of old resource development projects as a result of access to better, e.g., lower cost or more direct, shipping. Effects could include increased shipping along the western Alaska coast, the development or expansion of new industrial communities, and onshore resource extraction.
6. Tourism development based in Alaska, but directed toward areas in Russia. This development would be more likely to use existing communities and facilities. It would also be highly seasonal. And,
7. Interference with the bowhead whale spring migration. Such interference could have an effect on the success of the Alaska bowhead whaling communities and on calving.

9. Discussion - Possible Lessons for Russia

The possible effects of opening the NSR on Russia are expected to be more extensive than in Alaska because more ports will be involved. Other differences between Alaska and Russia can be expected. Russia has had a very different history of development from Alaska. The large population centers found north of the Arctic Circle are one example. They embody the past Soviet policy of moving people, forcibly or through incentives, into the North. Extant large populations in the North have already brought the problems to some areas of the

Russian Arctic that Unalaska may yet experience in the future. On the other hand, the United States has developed legal principles that provide some protection to Alaska Native groups. Such protection is nearly nonexistent in Russia.

Still, several potential problems uncovered in this review could apply in Russia. These may be listed as follows:

- Inadequate infrastructure to handle expanding populations;
- Effect of combining expansion of the NSR with other new activities, particularly oil development and fishing;
- Inflation;
- Impact of oil and other discharges on local environments, particularly near ports;
- Ethnic conflicts resulting from the introduction of new economic activities, and populations to go with them;
- Differential effects within indigenous groups;
- Break up of traditional patterns of social interaction;
- Pressure to prevent recognition of indigenous peoples' rights; and
- NSR-catalyzed development, including tourism.

Inadequate infrastructure. A central concern for development in Unalaska is whether the town can cope with an expanding population. Problems of inadequate infrastructure development plagued Soviet development. Clearly the sociocultural consequences of inadequate infrastructure should be thoroughly scoped and assessed. This inadequacy may be an existing problem in Russia.

Effect of combined expansion. As with Unalaska, the development of different economic activities simultaneously can put an extraordinary burden onto a community or city. This burden may be particularly extraordinary where the activities conflict, such as with fishing and oil development. The effect may reach into the community or city, as people holding different types of employment, perhaps with different terms of residency and cultures, may conflict with each other.

Inflation. Inadequate infrastructure, combined with expanded populations or economic opportunities, may create inflation. Again, this problem already exists in Russia. It is a recent phenomenon resulting from the end of the command economy. Local inflation could, however, greatly exacerbate this already existing

difficulty. The result could be increased hunger, homelessness, overuse of local natural resources, and crime. Low transportation costs and higher employment may counter balance inflation.

Discharges. An important assumption of the above review is that most shipping activity will take place away from the coast of Alaska. This assumption will not be true for Russia. Many local communities depend upon localized, coastal resources. The possible impact of shipping discharges should be of concern.

New economic activities. New activities can bring in people of distinctly different cultures. The conflicts concerning these can cover several areas. For instance, newcomers may start to use natural resources traditionally harvested by the long-term residents. New social hierarchies may develop among social and cultural institutions, hierarchies carried over into schools, courts, or other public institutions.

Differential effect within indigenous groups. Perhaps the most important suggestion made in the Alaskan material is that indigenous groups will not be affected uniformly. Elites may be able to capture benefits that the rest of their group cannot. Indigenous groups should not be treated as a single mass, all affected in the same way. In carrying out an assessment, this possibility should be considered.

Breaking up of traditional social patterns. Between conflicts with newcomers and potential rifts with traditional communities, a potential exists for the desolation of traditional social patterns. This potential is, of course, well known and the reason for conducting studies under INSROP. The point is that pressure on social relations can result from more than population increases or the polluting of subsistence resources. The question is how to allow indigenous people the control they need to prevent social disruption from happening.

Preventing recognition of indigenous claims. This pressure may be particularly acute in situations of rapid development where recognition of those claims is perceived to throw impediments in the way of growth. Such rights are the core of indigenous peoples gaining control over their own situation.

NSR-catalyzed development. Finally, the development of infrastructure and an effective transportation system is likely to lead to other economic activities. In fact, it is probably the hope of NSR promoters that such activities will result. Many of these will carry their own impacts on sociocultural systems of the areas. Because these activities cannot all be foreseen, an *a priori* analysis of them combined with NSR is impossible. They will have to be considered as they appear. Thus, efforts to assess social impacts cannot end with the opening of the NSR. Tourism may be one area that deserves special study.

9.1 The Limits of Assessment

One final point must be made about the Alaska studies that is of relevance to impact studies in Russia. As the evaluation of the Norton Sound study suggested, no assessment can determine the future completely. One may do considerable research beforehand and make detailed predictions based on it, but enough variance usually remains to make the actual outcome of an activity uncertain. All of the needed mitigation cannot be determined *a priori*. Mid-course corrections are often needed. Social impact studies cannot substitute for participation in the political process and continued monitoring of sociocultural systems.

10. Recommendations for Research

From the above survey, it is clear that additional information is needed to complete an impact assessment for Alaska. The following is a list of recommendations for research. Their numbers reflect their priority, but all will eventually need to be done:

1. A follow-up study of Unalaska.
2. Research on the existing and potential impact of tourism.
3. An integrated assessment study combining fisheries, oil, tourism and NSR development
4. The impact of the Northern Sea Route and community use on bowhead whales in Russia.
5. Baseline descriptions of the communities and cultures of the Bering Sea.
6. A feasibility study on using the NSR for supplying the smaller communities of western and northern Alaska.

Unalaska. Given the possible importance of Unalaska to the Northern Sea Route and the length of time since the Impact Assessment report, a follow-up study would be in order. The Human Relations Area Files (1992) report does carry desultory anecdotal information, but even this is from 1988. A follow-up study could also look at the predictions made in the Impact Assessment report and assess their accuracy. A new study should look particularly at whether Ounalaska Corporation has benefitted from the expansion of Dutch Harbor as a fishing port. The success of Alaska Native corporations in benefitting or suffering from the effects of growth is important not just to Alaska, but also to the question of indigenous peoples in Russia benefitting from the use of the NSR.

Tourism. From this author's experience and observations in the region, tourism does have significant effects on the communities, such as Nome and Kotzebue, where it has been established for some time. Access

to the northeast passage could increase that impact. No current INSROP study is looking at tourism as a possible use of the NSR. Only one INSROP study has considered the potential impact of tourism (Anderson, 1995). In addition to providing information for a complete impact assessment in Alaska, a tourism study could provide information for Russia as well.

Integrated assessment. The need for tourism impact studies also points out the need for an integrated assessment for all of the potential impacts upon the Bering Sea villages. The MMS studies usually considered the simultaneous development of oil and fisheries. Now the assessment should consider those things, along with tourism and the Northern Sea Route as possible impacts.

Bowhead whales. The impact of the NSR on bowhead whale populations that migrate past Russia is unknown. Clearly it needs to be investigated.

Baseline cultural study. A baseline study could be completed using existing materials. Given present scenarios for NSR development, widespread impacts seem unlikely. Still, this assumption can change. A baseline study of the communities would benefit future monitoring of unexpected impacts.

Smaller communities. One benefit of the NSR that has not been considered in the studies is the development of a lower cost shipping service to the small communities of the Bering Sea. Were the NSR to be used for general cargoes, particularly in containers, it might be possible to develop such an alternative. This development could mean lowering the cost of important goods that are now brought in on barges. If this were developed under an international shipping regime, it would necessitate a change in the Jones Act. The Jones Act requires that goods shipped to Alaska come from US ports on US-built ships.

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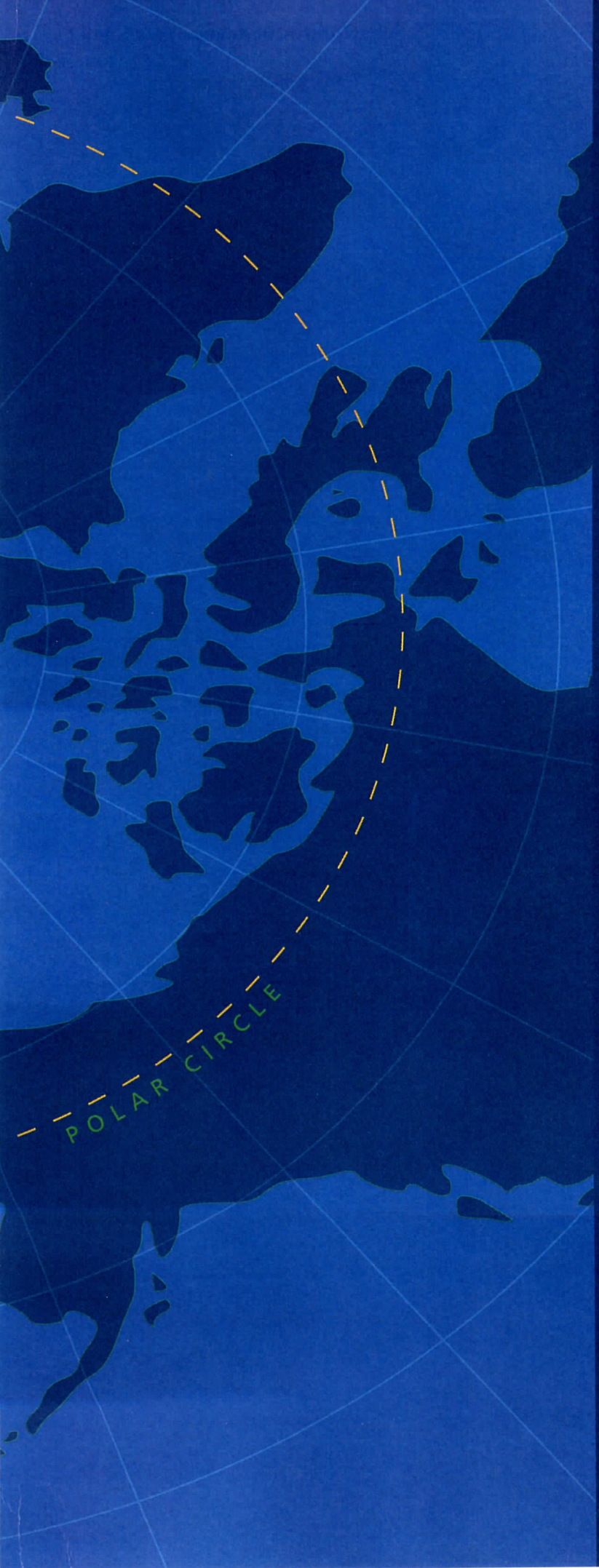

The three main cooperating institutions of INSROP

Ship & Ocean Foundation (SOF), Tokyo, Japan.

SOF was established in 1975 as a non-profit organization to advance modernization and rationalization of Japan's shipbuilding and related industries, and to give assistance to non-profit organizations associated with these industries. SOF is provided with operation funds by the Sasakawa Foundation, the world's largest foundation operated with revenue from motorboat racing. An integral part of SOF, the Tsukuba Institute, carries out experimental research into ocean environment protection and ocean development.

Central Marine Research & Design Institute (CNIIMF), St. Petersburg, Russia.

CNIIMF was founded in 1929. The institute's research focus is applied and technological with four main goals: the improvment of merchant fleet efficiency; shipping safety; technical development of the merchant fleet; and design support for future fleet development. CNIIMF was a Russian state institution up to 1993, when it was converted into a stock-holding company.

The Fridtjof Nansen Institute (FNI), Lysaker, Norway.

FNI was founded in 1958 and is based at Polhøgda, the home of Fridtjof Nansen, famous Norwegian polar explorer, scientist, humanist and statesman. The institute spesializes in applied social science research, with special focus on international resource and environmental management. In addition to INSROP, the research is organized in six integrated programmes. Typical of FNI research is a multi-disciplinary approach, entailing extensive cooperation with other research institutions both at home and abroad. The INSROP Secretariat is located at FNI.