Maritime Services to Support Polar Resource Development: An Interim Report on Antarctic Maritime Service Requirements (1981)

Pages
12

Size
8.5 x 11

ISBN
030933148X

Committee on Maritime Services to Support Polar Resource Development; Maritime Transportation Research Board; Commission on Sociotechnical Systems; National Research Council

964459 PB83-156562

Maritime Services to Support Polar Resource Development: Interim Report on Antarctic Maritime Service Requirements

National Research Council, Washington, DC.

Corp. Source Codes: 019026000

1979 12p

See also AD-A100530.

Languages: English

NTIS Prices: PC A02/MF A01

Country of Publication: United States

Journal Announcement: GRAI8310

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Descriptors: *Marine transportation; *Natural resources; *Polar regions; Services; Requirements; Mineral deposits; Antarctic regions; Seals(Mammals); Harvesting; Whales; Recreation; Fisheries; Ice breakers; Sea ice

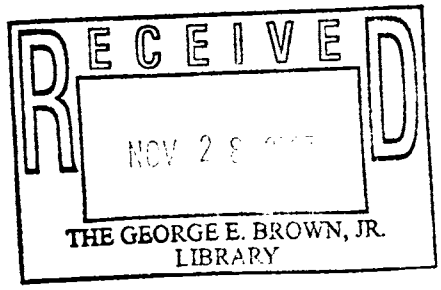
Identifiers: Tourism; Krill; NTISNASNRC

Section Headings: 13J (Mechanical, Industrial, Civil, and Marine Engineering--Marine Engineering); 6C (Biological and Medical Sciences--Biology); 85G (Transportation--Marine and Waterway Transportation); 98F (Agriculture and Food--Fisheries and Aquaculture); 47GE (Ocean Technology and Engineering--General)

MARITIME SERVICES TO SUPPORT POLAR RESOURCE DEVELOPMENT
INTERIM REPORT
ON
ANTARCTIC MARITIME SERVICE REQUIREMENTS

Prepared by the
Committee on Maritime Services
to Support Polar Resource Development
of the
Maritime Transportation Research Board
Commission on Sociotechnical Systems
National Research Council

National Academy of Sciences
Washington, D.C.
December 1979



FOREWORD

The purpose of this study is to examine maritime service requirements in the Arctic and Antarctic, with each area receiving such emphasis as its potential for development warrants. Arctic resources are being developed rapidly and plans are being made for further development. The committee expects that maritime services will expand in response to requirements generated by these developments.

On the other hand, needs for maritime services in the Antarctic, except for support of scientific research, appear to be considerably farther in the future. This interim report sets forth the committee's findings on the Antarctic. The final report will discuss the Arctic requirements in detail.

MARITIME TRANSPORTATION RESEARCH BOARD
COMMITTEE ON MARITIME SERVICES TO SUPPORT
POLAR RESOURCE DEVELOPMENT

INTERIM REPORT
ON

ANTARCTIC MARITIME SERVICE REQUIREMENTS

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INTRODUCTION

The study's objectives are:

- identify, to the extent possible, the polar areas and resources that may be commercially and strategically important in the 1980s and beyond and

- define marine transportation requirements for commercial, military, and scientific polar operations.

Arctic and Antarctic needs are to receive such emphasis as warranted by their potential for development in the time frame addressed in the report.

This interim report summarizes the committee's findings on the Antarctic. Potential marine transportation needs for the Southern Oceans examined by the committee were: support for scientific research, commercial development of both living and mineral resources, and tourism. Military needs were not examined because military measures are prohibited by treaty.

The final report will cover Arctic maritime service requirements in detail.

ANTARCTIC TREATY

The Antarctic Treaty of 1959, which has been in force since June 1961 and of which the United States is one of 13 Consultative Parties and original signatories, provides for only peaceful activities south of latitude 60° S. The treaty was conceived to provide a means for the nations that

conducted extensive research in Antarctica during the International Geophysical Year (IGY) to continue their activities in the atmosphere of cooperation and freedom of access that prevailed during the IGY. The treaty deals with territorial claims and sovereignty, exchange of scientific personnel and information, prohibition of military activities other than logistic support of expeditions, a ban on nuclear explosions and nuclear waste disposal, and access and inspection by observers of all treaty nations of all stations, equipment, and installations in Antarctica.

Other provisions of the treaty protect Antarctic flora and fauna and designate specially protected areas. The treaty does not cover mineral resources, however.

In 1977, the treaty nations adopted a statement endorsing responsibility on the parts of the parties toward mineral resources, protecting the unique Antarctic environment and ecosystems, and preserving the interests of all mankind in Antarctica. The subject of mineral resources was placed on the agenda for the Tenth Consultative Meeting, scheduled for September 1979.

COMMERCIAL POTENTIAL

Minerals

- No U.S. marine transportation needs for mineral resource development in Antarctic are presently seen.

A great variety of minerals has been found in Antarctica, but not in concentrations or accessbility that can be considered commercially exploitable. One sedimentary iron ore formation in the Prince Charles Mountains and one coal bed in the Transantarctic Mountains are large enough to be classified as deposits. Their inaccessibility makes them uneconomical for recovery. Discoveries of copper, chromium, gold, and other metals are so small in size or incompletely studied that they are termed occurrences.

Estimates of potential resources are statistical extrapolations of known resources on adjacent continents and the occurrences in Antarctica. A U.S. Geological Survey study, using these data, estimated that more than 900 major mineral deposits may be contained on the continent, but only about 20 are likely to be in ice-free areas.

Oil and gas appear to have the greatest economic potential of all Antarctic mineral resources, partly because they are more likely to be found offshore than under the continental ice. Estimates of 45 billion barrels of oil and 115 trillion cubic feet of natural gas have been made, but these are highly speculative extrapolations of worldwide

average concentrations in sedimentary basins. Exploitation of either land or sea oil deposits would be costly, due to the harsh climate, drifting ice, and huge icebergs.

Although the physical difficulties and economics of mineral exploitation in the Antarctic suggest that commercial development is some time away, the subject will undoubtedly have high priority on the agendas of the Consultative Meetings of the treaty signatories.

Living Resources

- U.S. fishermen have shown little interest in participating in Antarctic fisheries. No near-term needs for maritime support of U.S. commercial living resource development are foreseen.

Sealing was the first commercial enterprise in the Antarctic, starting in the late 1770s. Sealing was started by Britain and the United States, followed by Russia, France, and other European countries. Many of the islands within the Antarctic convergence were discovered by sealers searching for new seal rookeries. Uncontrolled slaughter decimated the fur seals so that by 1830 they were nearly extinct. After 1870 there was a revival of fur sealing when the herds began to recover, but the species was again brought near extinction within 10 years. The fur seal's numbers have since grown to about 200,000.

Soviet exploratory harvesting of crabeater seals in the early 1970s suggests a renewed interest in this resource. A revived sealing industry would be based on crabeater, leopard, and Weddell seals, rather than the elephant and fur seals that were nearly exterminated. It would also be regulated under the Convention for Conservation of Antarctic Seals.

Antarctic waters were the principal whaling areas for more than 50 years. Antarctic whale oil production exceeded that of all other whaling grounds combined, occasionally by as much as 10 to 1. The whaling fleet has dwindled from over 300 ships to a few dozen Japanese and Soviet vessels.

In 1946 delegates from the allied powers that had signed earlier whaling agreements produced an International Convention for the Regulation of Whaling, which is the present international law of whaling. The convention established the International Whaling Commission (IWC), which exercises oversight of the whaling industry.

In the late 1960s the IWC began to cut whaling quotas drastically. Japan and the USSR, which together have accounted for more than 80 percent of the world's whale

harvest, vigorously opposed a move by the United Nations to adopt a 10 year moratorium on whaling. The IWC did not adopt the moratorium, but has set more stringent quotas. Neither Japan nor the USSR has protested the quotas since the 1973-74 season. On July 9-13, 1979, the IWC met and set a total moratorium on factory ship whaling for all species except minke. The entire Indian Ocean north of latitude 55°S was declared a sanctuary for all whales for the next 10 years.

These restrictions on whaling imposed by the IWC at this, its 31st, meeting cast serious doubts on the economic feasibility of whaling in Antarctic waters. The United States, being one of the conservationist members of the IWC, has done no whaling in the Antarctic for many years and none is foreseen.

Fish and Krill

Although the Southern Oceans produce large amounts of plankton, correspondingly large populations of fish have not been found. Less than 100 of the earth's 20,000 or so fish species have been identified south of the Antarctic convergence. Antarctic cod and southern blue whiting have been caught in commercial concentrations. Several species of toothfish and ice fish have been caught on an exploratory basis. Squid may appear in large numbers, but their commercial potential is unstudied.

During the 1970s, the Japanese and Soviets have been harvesting krill. Ships from Chile, Poland, Taiwan, and West Germany have recently conducted pilot projects in the krill fishery.

Krill were grazed upon by the baleen whales. Since the decline in whale numbers, there has been an apparent increase in other krill predators, particularly penguins and seals. The largest of the krill species, Euphasia Superba, has qualities suiting it for harvest: large concentrations, adequate individual size, and high protein content. Krill food products are marketed in both Japan and the Soviet Union. Krill harvesting and processing are, however, expensive and difficult. Krill must be processed within hours of being caught. The remoteness of the Southern Oceans from northern hemisphere markets, storms and hazardous navigation, preservation of the krill on the long return voyage, and mediocre consumer acceptance of krill have all inhibited the growth of the fisheries. Estimates of the amount of krill that can be harvested on a sustained basis vary from 30 million to 150 million tons per year. To provide more comprehensive data, a 10-year international Biological Investigation of Marine Antarctic Systems and Stocks (BIOMASS) is being undertaken by the Scientific

Committee on Antarctic Research (SCAR) in cosponsorship with the Scientific Committee on Oceanic Research (SCOR), the International Association for Biological Oceanography (IABO), and the Advisory Committee on Marine Resources of FAO (ACMRR).

Tourism

- There is no reasonable basis for predicting a U.S. maritime transportation requirement to support tourism in the Antarctic.

Tourism in the Antarctic is developing on a very limited scale. Lindblad Travel, of New York, has run vacation tours to the Antarctic. These tours go by air to Montevideo and then by a Singapore registered ship to Antarctica. Occasional charter flights from Australia have flown over the South Pole but have not landed on the continent. The cost, the long voyage, and the forbidding climate of the Antarctic will certainly constrain all but a few tourists.

Science Support Requirements

- The most important Antarctic maritime service requirement for the United States appears to be an ice-strengthened scientific research vessel. This is particularly needed for biological studies in and adjacent to the pack ice. The Polar Research Board and the Ocean Science Board of the National Research Council are discussing this requirement.

The International Geophysical year (IGY) conducted in 1957-58 was the first major scientific effort that involved Antarctica. The Antarctic was termed "a region of almost unparalleled interest," which included the influence of its huge ice mass on global weather and oceans as well as the nature of the aurora australis and of the ionosphere over the ice during the long total-night season.

Scientific research and its associated logistics are the major activities in Antarctica. The amount of research in Antarctica has not changed much in the past 10 years, but the research objectives and methods have. The major change has been from reconnaissance studies to investigations of natural phenomena and large-scale processes, with emphasis on long-term, interdisciplinary, and international programs, such as the Polar Experiment (POLEX), an international project started in 1975 and planned as a 10 year program. Polex-South will integrate and expand national programs on the atmosphere, oceans, and ice in the Antarctic. The basic objective of Polex is to gain a higher level of

understanding of polar processes as an aid to explaining and predicting long term global processes.

There are currently 34 year-round stations in the Antarctic, of which the United States has four. McMurdo, the main U.S. base, is the largest multipurpose research and logistics center in Antarctica. Most of the 600 to 700 summer personnel operate the station's airfields and handle communications, weather forecasting, and maintenance and supply operations. The scale of McMurdo summer operations is the largest in Antarctica.

Marine research around Antarctica includes oceanographic, meteorologic, and biological observations. Most of the vessels used also provide logistics support to land research stations. Presently the U.S. operates HERO, a small motor-sailing vessel that operates in the Antarctic Peninsula area, a specialized oceanographic vessel, and Coast Guard icebreakers. Ships from the University-National Oceanographic Laboratory System (UNOLS) are available for open-water work, but none is ice-strengthened.

CONCLUSIONS

- There appears to be little incentive for U.S. commercial development of the Antarctic. No immediate marine transportation needs are foreseen for development of biological or mineral resources or for tourism.

- Transportation technologies for the Southern Oceans will be similar to those required for the Arctic because of the presence of pack ice and icebergs.

- Technology developed for Arctic marine transportation systems will mostly be transferable to the Antarctic should a requirement ever develop.

- An ice-strengthened scientific research vessel is needed to support the U.S. research programs in Antarctica, particularly for biological investigations in and near the pack ice.

Because there is no present need for commercial marine transportation systems in the Antarctic, emphasis in the Committee's final report will be on maritime services to support Arctic resource development.

Bibliography

Polar Regions Atlas - Central Intelligence Agency - May 1978.

Antarctic Myths and the Quality of Policy Discourse - Gerald S. Schatz. Antarctic Treaty Lecture, Northern Illinois University, September, 1977.

The Antarctic Oceans: Empty But International - Kurt Fleischman - Impact of Science on Society Vol. 29, No. 2; April-June, 1979.

The Whale Report - Center for Environmental Education, Vol. 3, No. 3 - Summer 1979.

A Preliminary Assessment of the Environmental Impact of Mineral Exploration/Exploitation in Antarctica - Scientific Committee on Antarctic Research - August, 1977.

Mineral Resources and Geopolitics in Antarctica - James H. Zumberge - American Scientist, Vol. 67 - January-February, 1979.

Final Impact Statement for Possible Regime for Conservation of Antarctic Living Marine Resources - State Department - June 1978.

Antarctic Transportation Requirements - Katherine A Green Hammond - Internal committee paper. April, 1979.