# Section 1

# INTRODUCTION

by

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In March 1982, in anticipation that portions of the southeastern Bering Sea adjacent to the Alaska Peninsula (designated the "North Aleutian Basin") were soon to be leased for petroleum exploration, the National Oceanic and Atmospheric Administration (NOAA) in Alaska convened a meeting to assess the status of environmental knowledge in the area. The synthesis resulting from this meeting was to be used to evaluate the environmental hazards to and potential environmental damages from future activities in the leased areas. In this meeting the participants characterized the ecological processes causing high biological productivity in coastal lagoons and in offshore areas beyond about 5 km. However, the participants could not define what caused the high biological utilization of the nearshore zone within about 5 km of the coast, partly because very little research had been conducted in this nearshore environment.

In March 1983 NOAA initiated a review of available data related to this nearshore environment. This review described, to the extent possible based on the data reviewed, the processes responsible for the observed biotic distributions in the nearshore zone. It identified remaining areas where additional data would be needed to provide an understanding of the important processes in the nearshore zone sufficient to enable managers to predict the ecological effects of man's activities in the area.

In March 1984 NOAA issued a solicitation (Number WASC-83-00-125) for proposals to conduct research to fill the important information gaps identified.

As a result of this solicitation, NOAA in May 1984 awarded LGL Ecological Research Associates, Inc. (LGL) a contract to conduct an environmental characterization and biological utilization study of Alaska's North Aleutian Shelf nearshore zone (Contract No. 84-ABC-00125).

The study resulting from this contract (hereafter called the North Aleutian Shelf study) commenced immediately after contract award. Short reports on the progress of the study were submitted in November 1984 and May 1985. A comprehensive Progress Report was submitted in September 1985. The following report is the Final Report for the project.

## 1.1 STUDY OBJECTIVES

The North Aleutian Shelf study has four objectives as follows:

(1) Test the hypothesis that the nutrients and/or organic materials transported from the lagoons to the adjacent North Aleutian Shelf nearshore zone contribute significantly to nutrient or carbon supplies in that zone and cause heightened utilization of the zone by higher trophic level organisms.

(2) Describe the relative roles that zooplankton, epibenthos, infauna and microbiota play in cycling organic material and making it available to higher levels.

(3) Determine the manner in which the dominant forage fish, anadromous fish, birds and marine mammals contribute to or utilize the nearshore zone and its organic resources.

(4) Determine the vulnerabilities of the dominant ecosystem components, or the processes on which they depend, to increased industrialization, releases of oil or other pollutants, or other environmental changes that might be brought about by OCS oil and gas activities.

Seven tasks have been identified in the contract to be necessary to meet these objectives. The tasks are as follows:

(1) Measure carbon and nutrient levels in, and transport mechanisms in and between, the nearshore environment and the adjacent lagoon systems.

(2) Determine the importance of lagoon-derived carbon to nearshore biota.

(3) Develop a schematic physical model of nutrient and carbon transport.

(4) Estimate the standing crop biomass, productivity, and consumption rates of invertebrates.

(5) Estimate the distributions, abundances, and diets of fishes.

(6) Estimate the distributions, abundances, and diets of birds and mammals.

(7) Develop a schematic model of energy flow in the nearshore ecosystem.

## 1.2 STUDY AREA

The contract defines the general "area of interest" to be the nearshore environment shoreward of the 50-m isobath between Unimak Pass and Cape Newenham in the southeastern Bering Sea (Fig. 1.1). The specific area of field research for this study (hereinafter called "study area") is restricted to the nearshore environment between Cape Mordvinof and Cape Seniavin. Special emphasis is placed on the Izembek Lagoon and Port Moller areas. Note that a few samples have been taken seaward of the 50-m depth contour for comparative purposes (Fig. 1.2).

The lagoons themselves are addressed mainly as contributors to the productivity of the nearshore zone outside the lagoons. Biota and food chains more or less restricted to the lagoons have already received a level of investigation (e.g. Tack 1970, Barsdate et al. 1974, Gill et al. 1978, McConnaughey 1978, Petersen 1980, and Smith and Paulson, n.d.) comparable to that of the shelf waters beyond the 50-m isobath, and for that reason are outside the major focus of this study.

## 1.3 RESEARCH APPROACH

The research approach for the project has been structured on the basis of several constraining factors. First, because the disciplinary scope and depth of investigation required to address the project objectives is relatively great, new research has focused on those issues judged to be most important in terms of oil and gas leasing rather than trying to address all issues. Second, because of the required interdisciplinary interpretations, coordination among participating scientists has been stressed. Third, because of limited time and funding, strong emphasis has been placed on interpreting new data in the context of existing data.

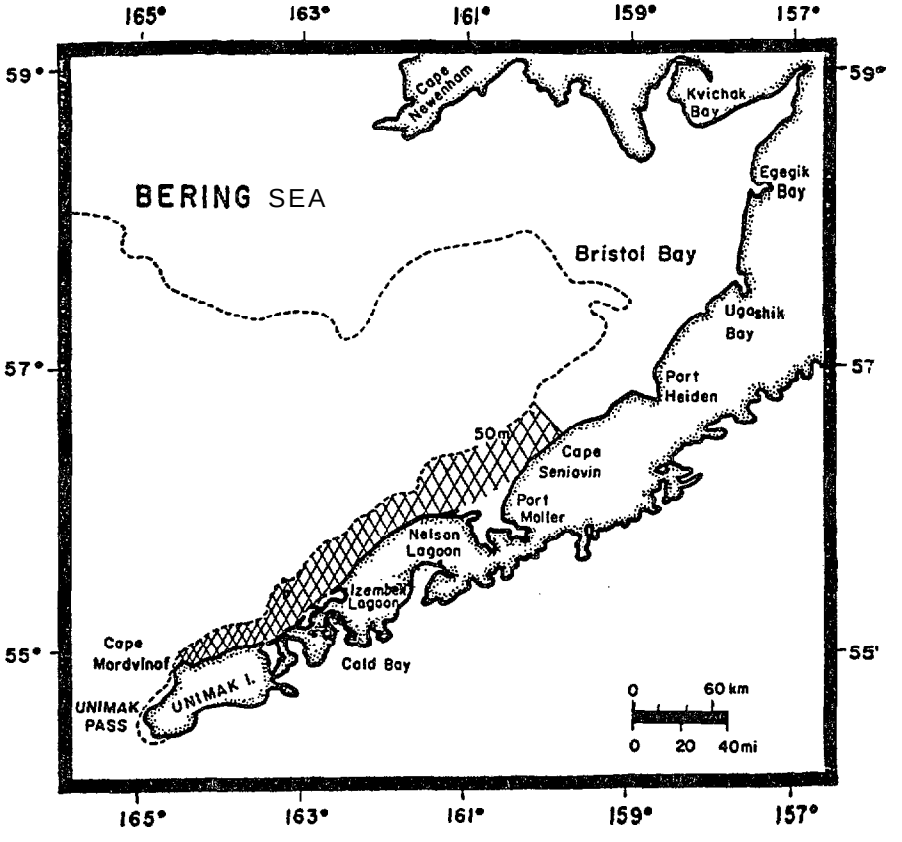


Figure 1.1. The area of research for the North Aleutian Shelf study in the Bering Sea, Alaska. The entire area of interest lies shoreward of the 50-m isobath between Unimak Pass and Cape Newenham; the area of new field research **(shaded) is** restricted to the nearshore zone north of the Alaska Peninsula.

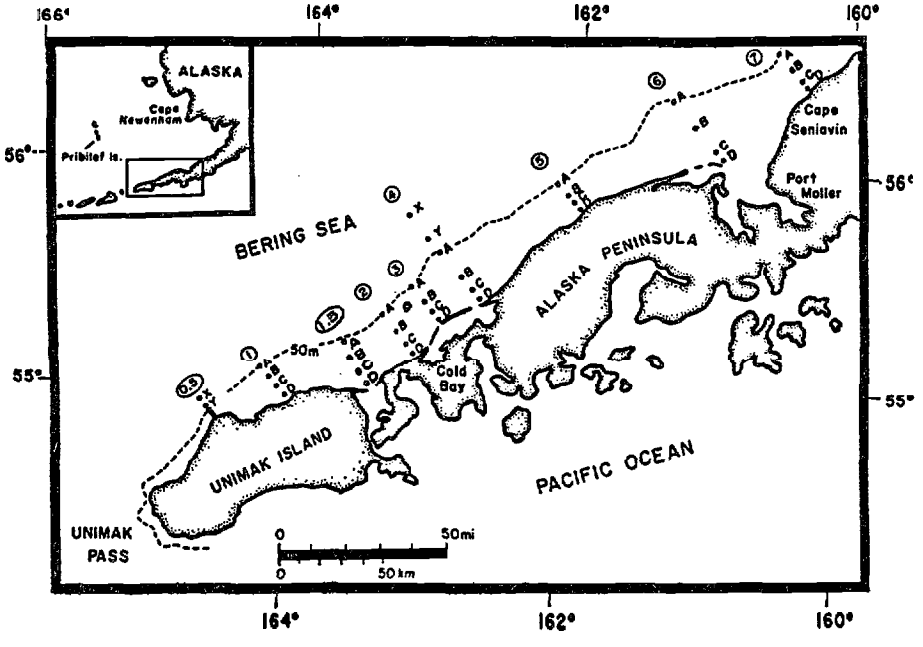


Figure 1.2. North Aleutian Shelf (NAS) study area showing locations of transects and sampling stations. Sampling station depths: X (100 m), Y (75 m), A (50 m), B (35 m), C (20 m), D (3-10 m).

## 1.4 CONTENT OF REPORT

The following report includes disciplinary sections on physical oceanography, primary production and carbon, invertebrates, fish resources, marine birds, and marine mammals. The most important and/or abundant species and processes have received emphasis. In each of the sections, pertinent background information is discussed, and new data analyzed are presented and compared with this background information. Conclusions and recommended areas of future research emphasis are presented for each of the sections.

A synthesis of information is presented in the final section. It draws upon both existing and *new* data to discuss the distributions and abundances of important species in the area of study and the physical and trophic factors that appear to influence these distributions and abundances. Vulnerabilities (both direct and indirect via food webs) of the important species to OCS oil and gas activities are addressed, and conclusions with respect to potential effects of OCS activities are drawn.

## 1.5 LITERATURE CITED


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