

UNITED STATES RESEARCH SURVEYS CONDUCTED IN 1984 AND
SURVEYS PLANNED FOR 1985 IN THE EASTERN BERING SEA

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UNITED STATES RESEARCH SURVEYS CONDUCTED IN 1984 AND
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by

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1. Research Activities in the Eastern Bering Sea During 1984.

The Resource Assessment and Conservation Engineering Division (RACE) of the Northwest and Alaska Fisheries Center (NAFAC) conducted three resource assessment surveys in the eastern Bering Sea during 1984.

(a) Eastern Bering Sea Crab-groundfish Survey

The eastern Bering Sea crab-groundfish survey was conducted during June-August 1984 following standard crab-groundfish survey methods. The primary objectives of this survey were to:

1. Collect catch and biological data on principal species of crab and groundfish to provide information for management purposes, the fishing industry, and for scientific studies and;
2. Collect hydrographic and environmental data in the study area.

This was a continuation of the annual series of eastern Bering Sea crab-groundfish assessment surveys. A secondary objective of the survey was to evaluate relative fishing efficiencies between current and historical standard sampling gear by comparative towing experiments.

The study region included continental shelf waters north from Unimak Pass, along the 200 meter depth contour to approximately 60° N and east to

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the Alaska mainland. Standard sampling sites were established on the basis of a 20 x 20 nmi grid although more intensive sampling was carried out in the Pribilof Islands and St. Matthew regions to collect additional data on blue king crab (Paralithodes platypus).

Survey activities were coordinated between the NOAA research vessel, Chapman, and the chartered University of Washington research vessel, Alaska. The two vessels sampled alternate rows of designated stations throughout most of the survey area to determine between vessel relative fishing powers through comparisons of catch rates.

The Chapman and Alaska sampled 357 standard stations in the eastern Bering Sea and 23 special sites in Bristol Bay to further assess the condition of red king crab (Paralithodes chamschatica) stocks (Figure 1).

The two vessels also completed 80 hauls to compare current and past standard sampling gear. The primary objective was of this experiment to determine relative fishing efficiencies between various standard sampling gear to provide continuity in eastern Bering Sea survey data sets.

The catch at each sampling site was sorted, weighed, and enumerated by species. Length/width measurements, shell condition, clutch size, and various tissues and organs for pathological and parasite studies were collected from major crab species. Approximately 157,000 length measurements were recorded by sex/centimeter category from the major fish species and nearly 5,700 age structures were collected. Biological data collected from fish species are summarized in Table 1. About 2,500 stomachs were preserved from various taxa for feeding habit analysis. In addition, nearly 500 whole specimens were frozen for genetic, flesh quality, and parasite studies. Approximately 1,000 Pacific cod (Gadus macrocephalus) and

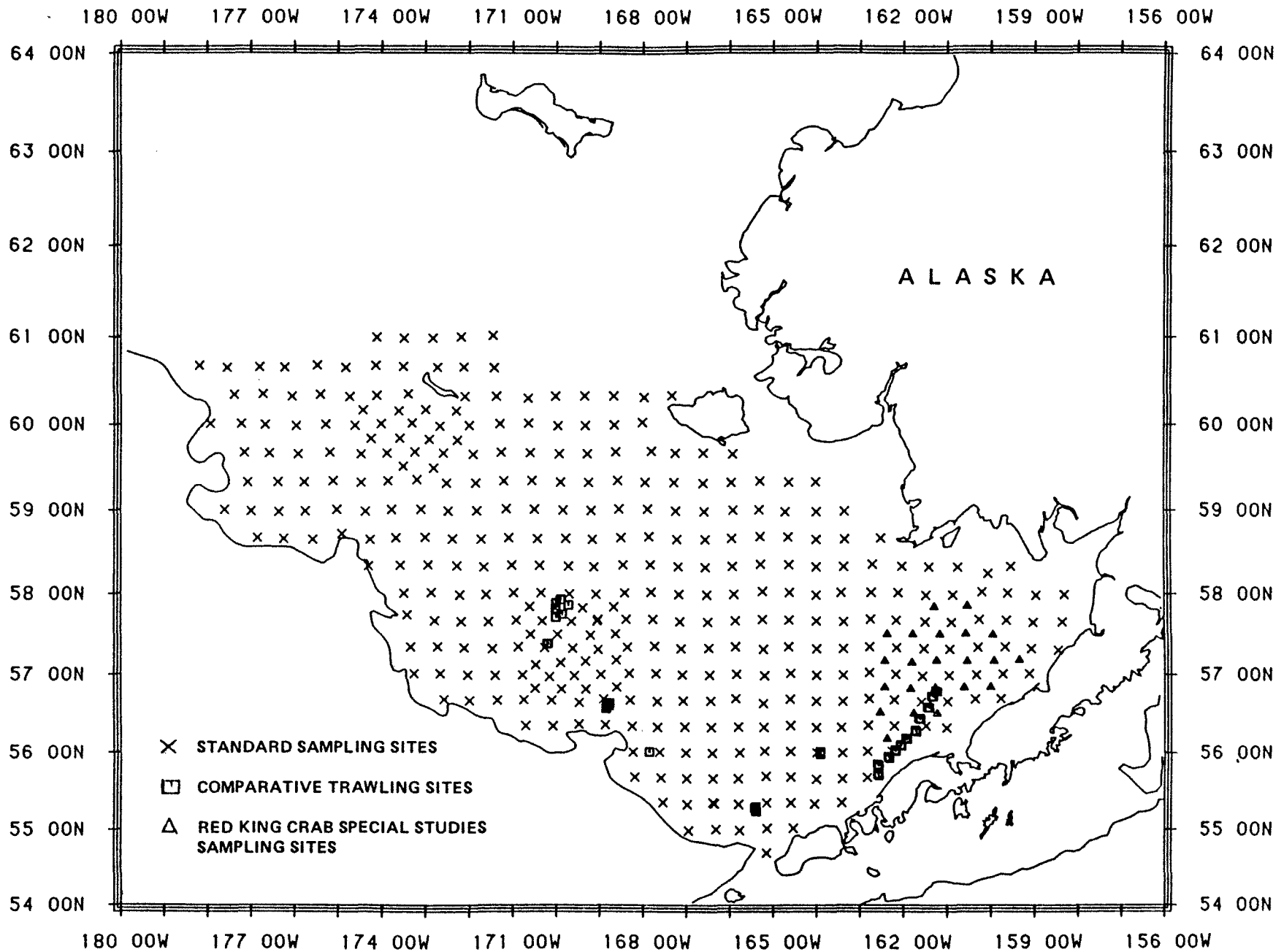


Figure 1.--Distribution of sampling effort during the 1984 eastern Bering Sea crab-groundfish survey.

Table 1.--Collections of biological data and samples during the 1984 eastern Bering Sea crab-groundfish survey.

Species	Length measurements	Length weight	Maturity	Stomach scans	Age structures ^{1/}	Whole specimens	Stomachs	Ovaries
Pollock	40,530		337	140	1,695			14
Pacific cod	13,733	33			689		564	
Sablefish	53							
Yellowfin sole	38,385				820		786	
Rock sole	22,261				462			
Flathead sole/ Bering flounder	17,735				573	200	611	
Pacific halibut	1,591					50		4
Alaska plaice	14,448				455			
Arrowtooth flounder/ Kamchatka flounder	7,510				355	200	566	
Greenland turbot	536				263	38	21	
Rex sole	96							
Pacific herring	296				302			
Arctic cod	51							
Northern rockfish	<u>117</u>	<u>—</u>	<u>117</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>
Total	157,342	33	454	140	5,614	488	2,548	14

^{1/}Dorsal spines were collected from Pacific cod and scales were collected from Pacific herring. Otoliths were collected from all other species.

Pacific halibut (Hippoglossus stenolepis) were tagged and released to provide information on stock movement. Other biological data included stomach scans, maturity observations, and individual length/weight measurements.

Seawater temperature profiles were collected at each station occupied by the Alaska using expendable bathythermograph (XBT) probes. Additional hydrographic data were collected aboard the Chapman with a conductivity-salinity-temperature-depth (CSTD) sonde-reader/recorder.

Catch data from alternate row station transects were compared to determine differences in fishing efficiencies between vessels. Initial results indicated that the Alaska was more effective for capturing flathead sole (Hippoglossoides elassodon), Yellowfin sole (Limanda aspera), rock sole (Lepidopsetta bilineata) and shrimp while the Chapman had greater CPUE values for sablefish (Anoplopoma fimbria). No differences were observed for other species.

(b) Eastern Bering Sea Hydroacoustic Survey

A hydroacoustic-midwater trawl survey was conducted aboard the NOAA research vessel Miller Freeman during July 30-August 20, 1984. The primary objective of this survey was to assess the distribution, abundance, and biological characteristics of age 0 pollock (Theragra chalcogramma) in the eastern Bering Sea and to study the feasibility of monitoring the abundance of this age group. The survey area included most of the continental shelf and upper slope region from Unimak Pass to approximately 62° N latitude. Survey activities were conducted along a zig-zag trackline with transects running between the 15 and 250 fm isobaths.

A total of 65 midwater trawls were completed to identify sign and delineate aggregations of age 0 pollock. Seawater temperature and salinity profiles were collected at each trawling site with a CTD instrument or XBT's. Length composition data were recorded from approximately 15,000

age 0 pollock and about 1,200 age 0 Pacific cod and adult pollock. Stomachs from nearly 250 adult pollock and yellowfin sole were scanned or preserved for feeding habit studies.

The largest concentrations of age 0 pollock were encountered about 50-100 nmi north of the Pribilof Islands over depths of 40-52 fathoms and in temperatures greater than 3° C.

(c) Eastern Bering Sea Special Studies Survey

A special studies survey was conducted in the eastern Bering Sea during August 23-September 14, 1984. This was a three part investigation to:

1. Examine the distribution and trophic relationships of the demersal fish community in relation to the inner hydrographic front in the vicinity of the 50 fm isobath;
2. Study cannibalistic interactions between adult and juvenile pollock and;
3. Tag age 1-3 Pacific cod.

These activities were conducted aboard the NOAA research vessel Miller Freeman. The survey area primarily included the continental shelf waters of outer Bristol Bay and the region of the Pribilof Islands.

During the first phase of this survey, the structure of the inner front was initially identified through a series of XBT probes and CTD casts made along transects in outer Bristol Bay. A 45 x 75 nmi intensive sampling area encompassing the 2°-7° C bottom temperature isotherms was then delineated and 80 trawling locations uniformly established. Fishing operations were conducted on a 24 hour basis for a period of 10 days until all 80 inner front stations were sampled (Figure 2).

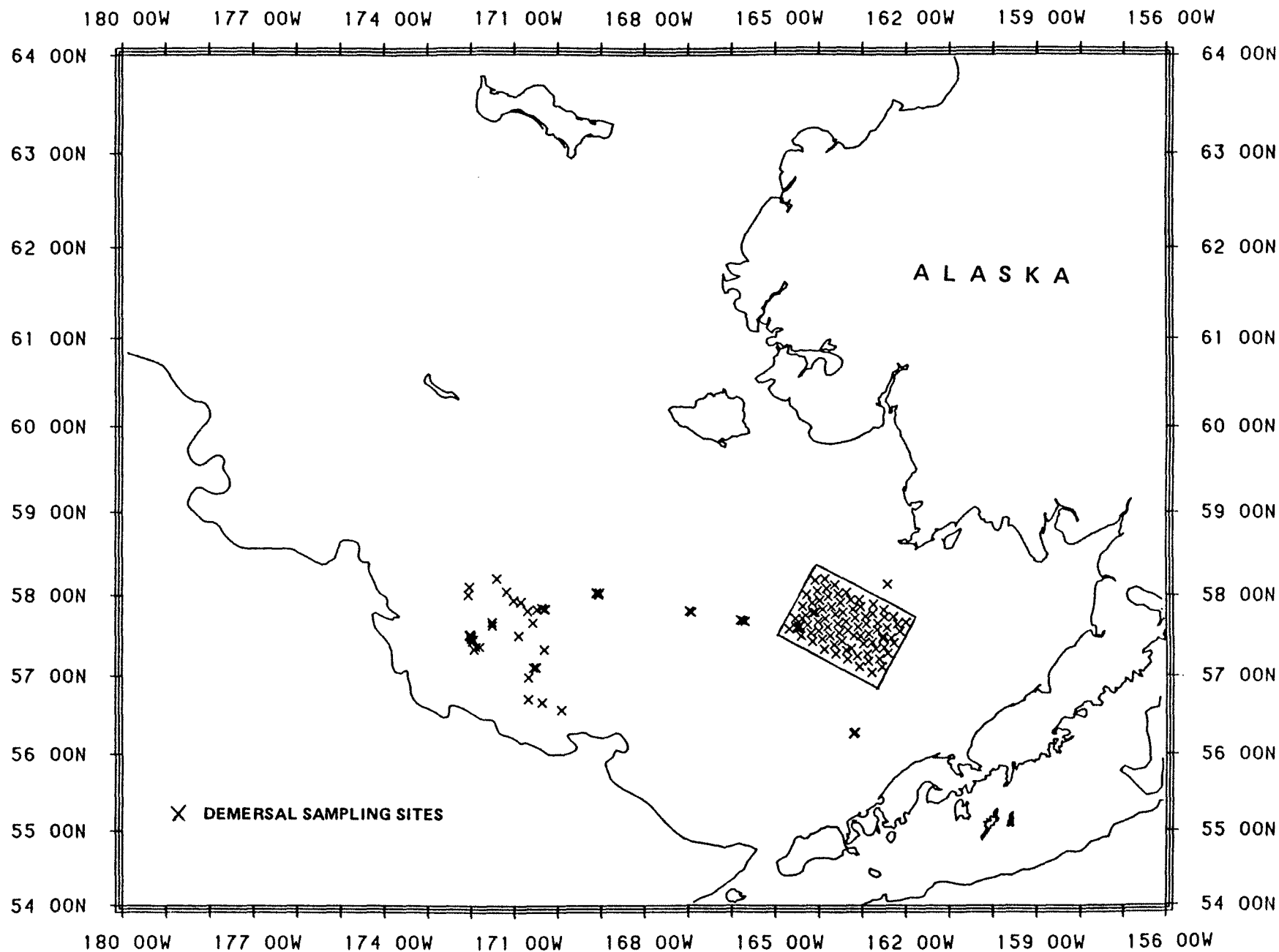


Figure 2.--Distribution of demersal sampling sites during the eastern Bering Sea special studies survey.
The solid line delineates the inner front sampling region.

The catch at each station was sorted, weighed, and enumerated. Approximately 15,000 length measurements by sex/cm category were recorded for yellowfin sole, Pacific cod, and pollock.

Over 1,900 stomachs were collected and preserved from six flatfish species and four roundfish species for subsequent feeding habit studies and daily ration analysis.

The second phase of the survey was designed to assess the dynamics of cannibalism between adult and juvenile pollock. A total of 17 ichthyoplankton tows, 25 midwater, and several bottom trawls were completed specifically for this portion of the study (Figures 3 and 4). Samples of pollock collected during other phases of this survey were also monitored for cannibalism. Additional hydrographic information including sonar observations and CTD casts were recorded at each station site.

Ichthyoplankton samples were preserved in formalin while catches from midwater trawls were completely processed at sea.

During the third phase of the species studies survey, 58 bottom trawls were completed to capture Pacific cod specimens for tagging. Pacific cod were also tagged and released on an opportunistic basis during other phases of the survey. Approximately one-half of the Pacific cod captured in the bottom trawls were viable enough to be tagged. The percent viability declined with specimen size. Nearly 1,100 Pacific cod were tagged and released throughout the survey period.

2. Research Activities Planned in the Eastern Bering Sea During 1985

A comprehensive triennial eastern Bering Sea crab-groundfish survey will be conducted around May-August, 1985. This will be a cooperative research effort between the United States and Japan and is a continuation of the series of eastern Bering Sea resource assessment surveys.

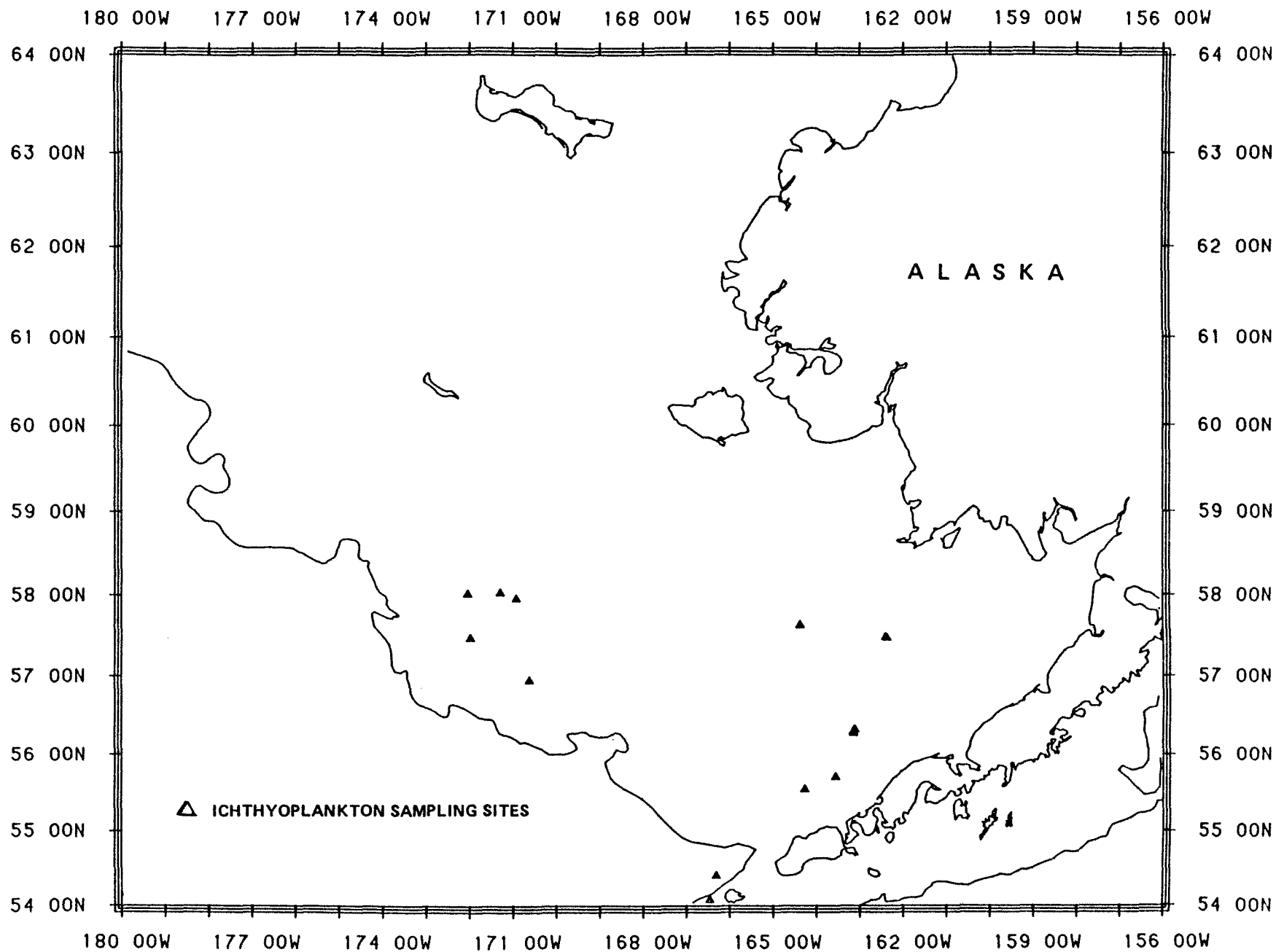


Figure 3.--Distribution of ichthyoplankton sampling sites during the eastern Bering Sea special studies survey.

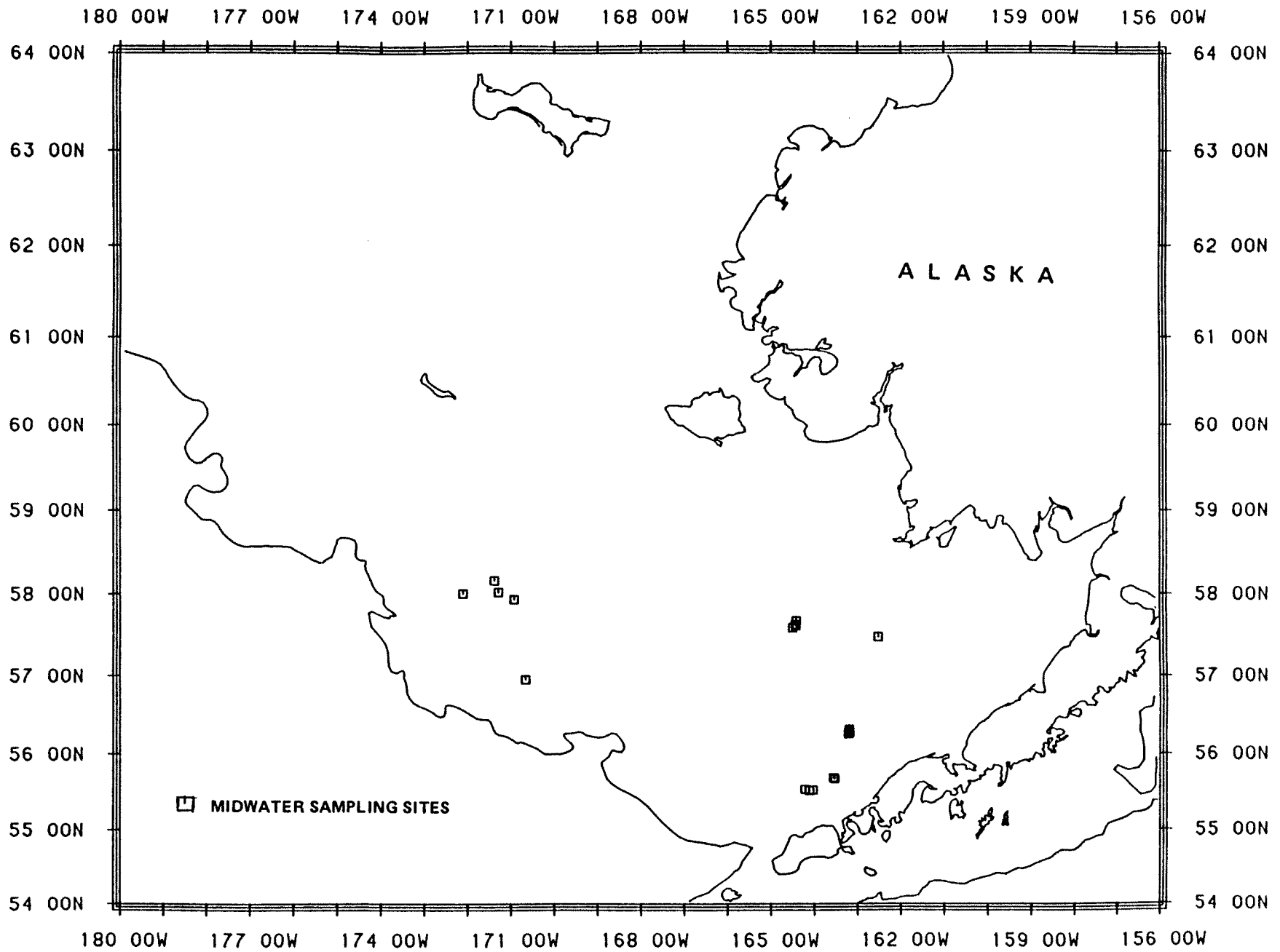


Figure 4.--Distribution of midwater sampling sites during the eastern Bering Sea special studies survey.

The primary objectives of this survey are to:

1. Study annual and long-term changes in the demersal fish and invertebrate community of the eastern Bering Sea shelf and slope by relating the results of the 1985 survey to the results of the large-scale surveys conducted in 1975 and 1979-84; and
2. Measure selected oceanographic parameters which may affect the abundance and distribution of these populations.

The survey area will extend from Unimak Pass and the Alaska Peninsula north to the latitude of St. Lawrence Island and from nearshore waters of the Alaska mainland to depths of 600 fm on the continental slope. The study area may be extended northward to include the Norton Sound region. The United States initially plans to have three research vessels available for this survey, two vessels fishing bottom trawls and the third vessel using hydroacoustic and midwater trawling techniques to assess off bottom concentrations of pollock.

No other surveys are planned at this time.

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