UNITED STATES RESEARCH SURVEYS CONDUCTED IN 1988 AND SURVEYS PLANNED FOR 1989 IN THE EASTERN BERING SEA

by

Terrance M. Sample

Northwest and Alaska Fisheries Center
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
7600 Sand Point Way N.E.
Bin C15700
Seattle, Washington 98115

September 1988

THIS PAPER MAY BE CITED IN THE FOLLOWING MANNER:
Sample, Terrance M. 1988. United States research surveys conducted in 1988 and surveys planned for 1989 in the eastern Bering Sea. Unpubl. rep., 11 p. Northwest and Alaska Fish. Cent., Natl. Mar. Fish. Serv., NOAA, 7600 Sand Point Way N. E. Bin C15700, Seattle, WA 98115. (Submitted to the International North Pacific Fisheries Commission in October, 1988).

UNITED STATES RESEARCH SURVEYS CONDUCTED IN 1988 AND SURVEYS PLANNED FOR 1989 IN THE EASTERN BERING SEA

by

Terrance M. Sample*

1. Research Activities in the eastern Bering Sea during 1988.

The Resource Assessment and Conservation Engineering (RACE) Division of the Northwest and Alaska Fisheries Center (NWAFC) conducted 2 surveys in the eastern Bering Sea during 1988.

(a) Aleutian Basin Winter Survey

The preliminary echo integration-midwater trawl survey of spawning walleye pollock in the Aleutian Basin region was conducted during January-March, 1988. The primary objectives of this survey were to:

1. collect echo integrator and midwater trawl data to determine the distribution, biomass, and biological composition of spawning walleye pollock concentrations;
2. evaluate acoustic system using standard calibration and calibration sphere techniques and;
3. collect target strength data from walleye pollock.

The survey area included the region in the southwest corner

*National Marine Fisheries Service, Northwest and Alaska Fisheries Center, Seattle, Washington 98115

of the International Zone north to approximately 57°N in an area which is commonly referred to as "the donut hole". The survey region also encompassed the northwestern section around Bower's Ridge where extensive fishing operations targetting spawning walleye pollock have occurred in recent years.

Survey activies were conducted on a 24 hour per day basis aboard the NOAA Research Vessel Miller Freeman. A total of 1,655 nm of acoustical transects were completed in the donut hole portion of the survey (Figure 1) however no significant echo sign were observed. Walleye pollock densities were extremely low with overall catch rates ranging from 13 to 61 fish per hour trawled. Areas of reported foreign fishing vessel activity were more intensively surveyed although no large concentrations of walleye pollock were encountered.

An additional 1,169 nm of transects were completed in the southwest portion of the Aleutian Basin (Figure 2). A large concentration of spawning walleye pollock was observed near Bogoslof Island with densities as great as 20 kg per m^2.

In addition to fish density information, biological data including size composition by sex, weight, age, and maturity were also recorded. Specimens were collected and preserved for morphometric and meristic analysis, electrophoretic and mitochondrial DNA investigations, and for analysis of trace element content.

(b) Eastern Bering Sea Triennial Survey

The eastern Bering Sea crab-groundfish survey was conducted during May-September 1988 utilizing standard crab-groundfish

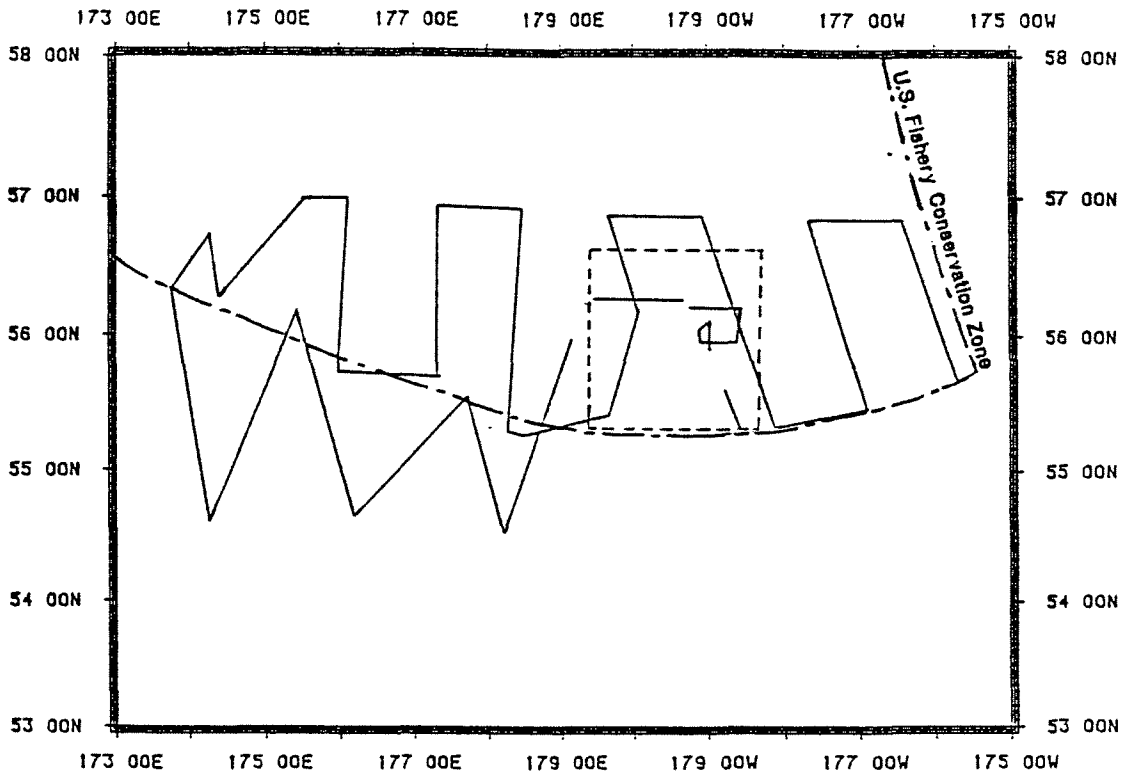

Figure 1.--Acoustic transects completed in the International Zone during the 1988 Aleutian Basin winter survey. Dashed line shows area of reported foreign vessel activity.

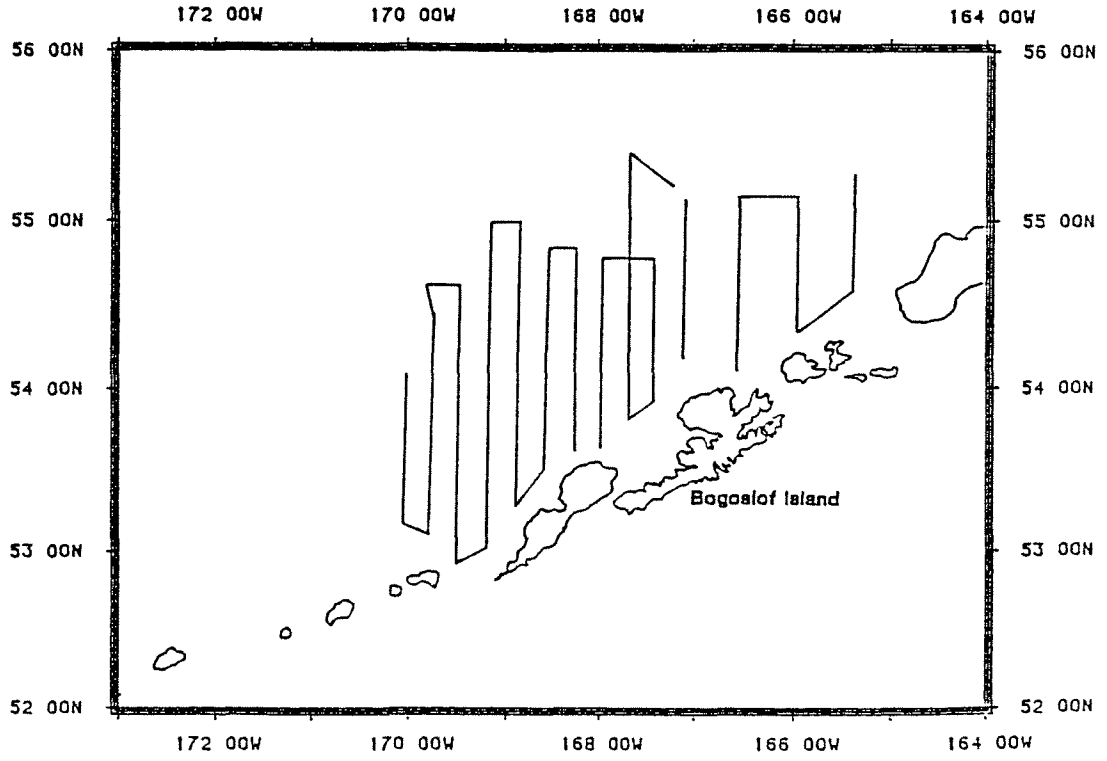

Figure 2.--Acoustic transects completed in the southwest portion of the Aleutian Basin during the 1988 Aleutian Basin winter survey.

survey methods. This was a comprehensive triennial survey which extended the standard survey area north to Norton Sound and into continental slope waters. These large scale triennial surveys are conducted on a rotating basis in the eastern Bering Sea, Gulf of Alaska, and the west coast regions. Smaller monitoring surveys are conducted in continental shelf waters of the eastern Bering Sea during intervening years. Previous triennial surveys have been conducted in 1979, 1982, and 1985. Although bottom trawls were used to sample most sites, acoustic-midwater trawling techniques were also used to assess midwater concentrations of walleye pollock. The 1988 triennial survey also involved cooperating vessels from Japan and the Soviet Union. The primary objectives of this survey were to;

1. collect catch and biological information on principal species of crab and groundfish using bottom trawl techniques to provide information for management purposes, the fishing industry, and for scientific studies;
2. collect hydrographic and environmental data in the study area and;
3. collect information on the midwater component of the walleye pollock stocks.

Secondary objectives were to;

1. examine crab and halibut by-catch rates in inshore trawling areas;
2. assess yellowfin sole spawning areas in Togiak Bay and Kuskokwim Bay;

3. conduct side-by-side comparative fishing experiments between U.S., Japanese, and Soviet Union fishing vessels and;
4. conduct comparative trawl experiments between U.S. vessels using past and current sampling gear.

Standard area: The standard survey area, sampled annually, included continental shelf waters north from Unimak Pass, along the 200 meter depth contour to approximately 60° N and east to the Alaska mainland. Standard sampling sites were established on the basis of a 20 x 20 nmi grid pattern used during previous surveys although more intensive sampling was carried out in the Pribilof Islands and St. Matthew Island regions to collect additional data on crab populations. Stations were also established in the Togiak Bay and Kuskokwim Bay areas to investigate reports of large spawning concentrations of yellowfin sole. Seven sampling locations were scheduled between 160°-162° W in response to a request from the North Pacific Management Council to investigate incidence of crab and halibut catches relative to the expansion of the inshore trawl fishery from 25 to 30 fm.

Survey activities in the standard area were coordinated between two U.S. vessels, the University of Washington research vessel Alaska and the chartered fishing vessel Ocean Hope 3, and the Soviet Union vessel Darvin. The Darvin begin its portion of the survey in mid-May, several weeks earlier than the U.S. vessels, and sampled alternate rows of stations throughout the standard survey area sampled latter by the U.S. vessels. The Alaska and Ocean Hope 3 sampled all standard survey stations with

the vessels fishing alternate rows of designated stations during June-August to facilitate the determination of relative fishing powers of the two vessels.

The Alaska and Ocean Hope 3 successfully completed 429 bottom hauls including 44 side-by-side comparative trawls to examine relative fishing efficiencies of the present and past standard sampling nets and accessories (Figure 3). The Ocean Hope 3 completed an additional 7 trawl hauls in the Port Moller region to collect information for crab and Pacific halibut by-catches. The Darvin completed 174 trawl hauls during the survey. The Darvin also conducted 18 side-by-side comparative hauls with the Alaska to assess trawling effectiveness between vessels.

The catch at each sampling site was sorted, weighed, and enumerated by species. Length and width measurements, shell condition, clutch size, and various tissue and organs were collected from major crab species. Red king crab were tagged and released to provide information for growth and movement studies. The two U.S. vessels recorded approximately 120,000 length measurements by sex/centimeter category from the major fish species and over 4,000 age structures were collected and preserved. Biological data collected from fish species on the Alaska and Ocean Hope 3 are summarized in Table 1. About 3,100 stomachs were preserved from various taxa for feeding habit analysis. Nearly 200 Pacific cod were tagged and released to provide information on stock movements. Individual length-weights were also recorded from the rock sole age sample. Approximately 500 whole specimens of various species were preserved for

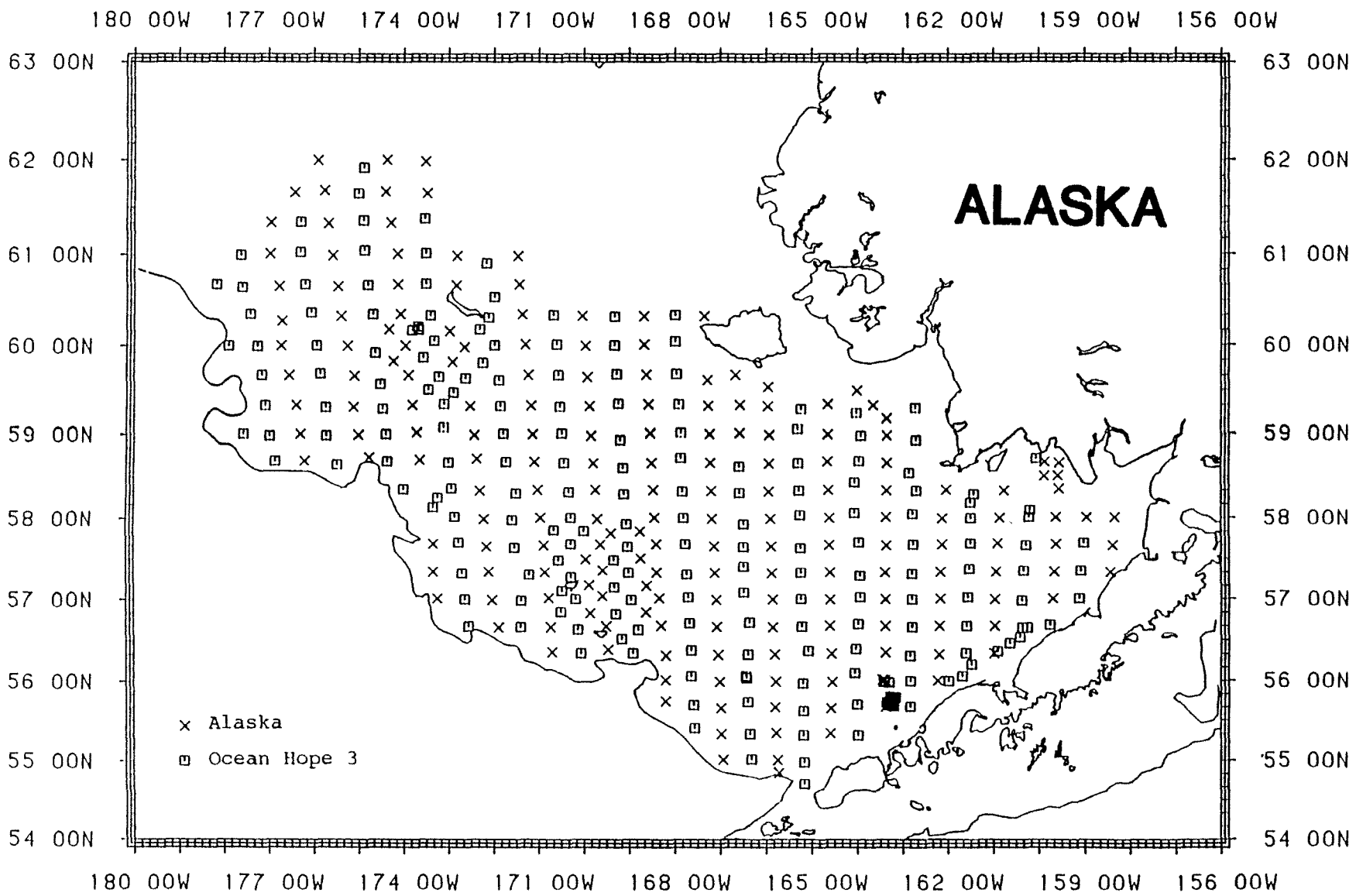

Figure 3.--Distribution of total sampling effort by the Alaska and Ocean Hope 3 during the 1988 eastern Bering Sea survey. The dense concentration of stations in the vicinity of 163°W and 55°30' N shows the locations of the side-by-side trawling by the two vessels to compare past and present standard survey trawls.

Table 1.--Biological data collected by the Alaska and Ocean Hope 3 during the 1988 Bering Sea triennial crab-groundfish survey.

Species	Length measurements	Age structures[1]	Stomach samples	Number tagged
Walleye pollock	40,408	1,125	805	--
Pacific cod	8,004	649	586	198
Sablefish	3	--	--	--
Yellowfin sole	31,695	598	657	--
Rock sole	30,350	471[2]	209	--
Flathead sole/ Bering flounder	19,558	375	380	--
Pacific halibut	992	--	--	--
Alaska Plaice	8,036	348	116	--
Arrowtooth flounder/ Kamchatka flounder	8,480	263	201	--
Greenland turbot	414	105	152	--
Rex sole	394	--	--	--
Pacific ocean perch	27	--	--	--
Northern rockfish	121	--	--	--
Saffron cod	418	--	--	--
Arctic cod	199	--	--	--
Longhead dab	18	--	--	--
Misc. species	32	--	--	--
Total	119,146	4,034	3,106	198

[1] Scale scrape samples, in addition to otoliths, were collected from Pacific cod. Only otoliths were taken from all other species.

[2] Individual length-weight data were also recorded for rock sole.

identification, training, and other purposes. All marine debris were identified and documented from each catch in an initial attempt to determine the extent and magnitude of discarded plastics and other pollutants.

Sea water temperature profiles were collected at each station using expendable bathythermograph (XBT) probes. Additional meteorlogical data were collected aboard the Alaska and transmitted to shore-based users via the Geostationary Operational Environmental Satellite (GOES) network.

Net mensuration systems aboard both vessels provided gear configuration and performance data to be used in area swept calculations.

Hydroacoustic survey area: The U.S. chartered fishing vessel Pelagos conducted an echo integration/midwater survey of walleye pollock on the continental shelf and slope during June-August. The primary region surveyed included eastern Bering Sea waters between 160° W and 180° W and south of 62° N over depths of 50 to 250 fms. In addition to fish density information, size composition, weight, and maturity data were collected. Environmental data such as water temperature and salinity profiles were also documented. The Japanese fishing vessel Seiju maru No. 28 participated with the Pelagos during intercalabration experiments.

Northern shelf and Norton Sound: The research vessel Miller Freeman completed the bottom trawl survey of the north shelf area from approximately 60° N through Norton Sound during August. A total of 126 tows were completed. Length measurements were recorded from 25,625 fish of various species and 8,891 size

measurements were taken from the commercially important crab species encountered. Approximately 1,800 specimens were retained and preserved for meristics, special pathology, and biological studies.

Continental slope: Upon completion of the northern shelf and Norton Sound study areas the Miller Freeman conducted the slope portion of the survey in September. Survey stations were sampled along the continental slope from the U.S.-U.S.S.R. Convention Line to Unimak pass at depths ranging from 200 m to 800 m. The nor'eastern bottom trawl with roller gear was the standard sampling net used although a shrimp trawl was also used on an opportunistic basis to better sample areas where shrimp sign was pronounced. The catches were sorted, weighed, and enumerated by species. Size composition by sex, otoliths, whole specimens, and other biological data were collected from species of interest. The Japanese vessel Tomi maru No. 51 also surveyed the slope area by conducting side-by-side comparative trawling experiments with the Miller Freeman in order to relate abundance estimated from the Miller Freeman survey with those from past slope surveys conducted by Japanese vessels.

2. Research Activities Planned in the Eastern Bering Sea during 1989.

(a) Aleutian Basin Winter Survey

A hydroacoustic survey to examine spawning concentrations of walleye pollock in the Aleutian Basin region will be conducted by the NOAA research vessel Miller Freeman during January-February

1989. The primary purpose of this survey is to obtain abundance estimates of pollock at selected locations and collect biological data on the spawning concentrations.

(b) Eastern Bering Sea Crab-Groundfish Survey

The standard eastern Bering Sea bottom trawl survey will be conducted around May-August, 1989. This is a continuation of the series of eastern Bering Sea crab-groundfish assessment surveys. 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 by relating the results of the 1989 survey to the results of earlier surveys; and
2. measure selected oceanographic parameters which may affect the abundance and distribution of these populations.

The survey area will extend north from Unimak Pass along the 200 m depth contour to approximately 62° N and east to the Alaska mainland. It is anticipated that 2 vessels will participate in this survey.