

CRUISE RESULTS

Cruise 96-1 Arcturus
Cruise 96-1 Aldebaran

1996 Eastern Bering Sea Crab and Groundfish Survey

June-August 1996

The Resource Assessment and Conservation Engineering (RACE) Division of the Alaska Fisheries Science Center (AFSC) conducted the annual crab and groundfish bottom trawl survey of the eastern Bering Sea shelf from June to August 1996. This was a continuation of the annual series of eastern Bering Sea crab-groundfish assessment surveys which began in 1971.

OBJECTIVES

The primary objective of this survey was to continue the annual series of assessment surveys of crab and groundfish of the eastern Bering Sea to provide information for:

1. the North Pacific Fishery Management Council on the distribution, abundance, and biological condition of important groundfish and crab species;
2. the U.S. fishing industry on catch per unit effort and size composition, and
3. the support of ongoing studies on the biology, behavior, and dynamics of key ecosystem components.

Secondary objectives were to:

1. conduct additional sampling in areas of high king crab and Tanner crab abundance to reduce variability in population

estimates;

2. collect maturity data from yellowfin sole for spawning studies;
3. evaluate bottom trawl performance and configuration with net mensuration equipment;
4. collect stomach samples for trophic interaction studies;
5. collect and preserve various whole specimens and tissue samples from both fish and invertebrates for special study requests;
6. record observations of pathological anomalies of various fish species to assess prevalence of infestations;
7. evaluate potential bias resulting from current methods of subsampling large trawl catches;
8. evaluate the effects of bottom trawls on the benthic community within and adjacent to the Bristol Bay crab protection zone;
9. evaluate bottom contact sensor devices to evaluate trawl performance in conjunction with mensuration equipment;

VESSELS AND GEAR

Sampling at the standard sites was coordinated between two chartered commercial vessels, the F/V Arcturus and F/V Aldebaran. Both vessels were 39.6 m (130 ft) in length.

The standard bottom trawl, used at all sampling stations, was an 83-112 eastern trawl. These nets have a 25.3 m (83 ft) headrope and a 34.1 m (112 ft) footrope (Fig. 1). They were towed behind 1,000 kg, 1.8 X 2.7 m, steel V-doors and 54.9 m (180.1 ft) paired dandyines. Each lower dandyine had a 0.61 m chain extension connected to the lower wing edge to improve bottom tending characteristics. The 83-112 eastern trawl has been the standard sampling net used during annual eastern Bering Sea surveys since 1982 when it replaced the 400 mesh eastern trawl, previously used since the 1970s.

Seawater temperature profiles were collected at most sampling

sites using a micro-bathythermograph attached to the head-rope of the net. Surface seawater temperatures were also collected with a bucket thermometer lowered over the side of the vessels.

Net mensuration systems and bottom contact sensors aboard both vessels were used to provide sampling net configuration and performance data to be used in area-swept and CPUE calculations.

ITINERARY

The Arcturus and Aldebaran began the survey in Dutch Harbor, Alaska on June 5. Both vessels returned to Dutch Harbor on August 8 upon the completion of the 1996 eastern Bering Sea crab-groundfish survey. Intervening port calls were made by both vessels in Akutan on June 15, Dutch Harbor on June 27, and July 19 to obtain supplies and/or exchange scientific personnel.

SURVEY DESIGN AND METHODS

The standard survey area is shown in Figure 2. Sampling sites were established on the basis of a 20 x 20 nm 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. Additional stations northwest of the standard survey area were established to estimate the abundance of Tanner crab (Chionoecetes opilio) in that area. Additional time was allocated to intensify sampling efforts near the standard station locations where large concentrations of king or Tanner crab were encountered.

The Arcturus and Aldebaran sampled alternate north/south columns of stations proceeding from Bristol Bay westward to the shelf edge. A tow, 30 minutes in duration, was made at most sampling sites. All catches were sorted to the lowest possible taxon, weighed, and enumerated. Station data including time, position, trawl performance, distance fished as well as catch information, were entered onto diskettes with shipboard computer systems. Collections of age samples (by sex-centimeter category), size composition, and other biological data were collected from the major fish species encountered. Length-width measurements, shell condition, clutch size, and tissues and organs for various studies were collected from the major crab species. Special study collections were stored in appropriate fixatives or were frozen.

The standard method of subsampling large catches (i.e. catches exceeding the holding capacity of the sorting table) may introduce bias. Subsequently, the subsampled portion of the catch may not be an accurate representative of the total catch due to species and size composition stratification in the 83-112 bottom trawl. As time permitted large catches (1,400 kg - 2,100 kg) were completely processed. These catches were subsampled as usual by placing the entire catch in a checker and removing a portion to the sorting table with a cargo net. This subsampled portion was completely processed for species composition and size distribution of the major species. The remaining portion of the catch was then processed to provide a comparative data set.

Upon completion of the standard survey, the Aldebaran and Arcturus conducted an experiment to evaluate the effect of bottom trawls on the benthic community. This study was conducted in the areas within and adjacent to the Bristol Bay crab protection zone. Epifauna was assessed through monitory net mounted cameras and sampled with the 83-112 bottom trawl.

RESULTS

The Arcturus and Aldebaran successfully conducted a total of 382 bottom trawls during the survey including 379 successfully completed trawls and 8 unsuccessful hauls.

Biological data collected from fish species during the standard survey are summarized in Table 1. The two vessels recorded over 129,000 length measurements from the major fish species and nearly 4,000 age structures were collected and preserved. Individual length-weight data were also recorded for yellowfin sole. Over 5,000 stomachs were preserved from various fish taxa for feeding habit analysis. Whole specimens and tissue samples of various fish and invertebrate species were preserved for identification, training, and other purposes.

The total standard survey area encompassed approximately 463,400 km². Catch rates of important fish and crab species, by depth zone, are shown in Table 2.

Walleye pollock (Theragra chalcogramma) was the most abundant fish species and had an overall CPUE of 116.7 kg/ha trawled. They were encountered at nearly all sampling sites, with largest mean catches (161.2 kg/ha) observed in outer shelf waters at depths of 100-200 m (Fig. 3). Mean catches were much lower at depths less than 50 m (26.4 kg/ha).