CRUISE RESULTS

CRUISE 94-1, F/V *PACIFIC KNIGHT*
CRUISE 94-1, F/V *VESTERAALEN*
1994 ALEUTIAN ISLANDS TRIENNIAL GROUNDFISH ASSESSMENT SURVEY
JUNE 1-August 9, 1994

The fifth triennial bottom trawl survey of the Aleutian Islands region was completed during the summer of 1994 by the Resource Assessment Conservation Engineering (RACE) Division of the Alaska Fisheries Science Center (AFSC), Seattle, Washington. Previous surveys in this series were conducted in 1980, 1983, 1986, and 1991. This report summarizes the preliminary results of the 1994 survey.

ITINERARY

The survey was conducted in three 23-day legs aboard two chartered commercial trawlers, the F/V *Pacific Knight* and the F/V *Vesteraalen* from June 1 to August 9, 1994. The survey area covered a portion of the southern Bering Sea, from 165°W long. to 170°W long. and the Aleutian Islands from 170°W long. to Stalemate Bank 170°30'E long. (Fig. 1). Sampling proceeded from east to west at pre-selected stations at depths ranging from 9 fm to 285 fm (16-521 m).

OBJECTIVES

The triennial groundfish surveys are designed to describe and monitor the distribution, abundance, and biological condition of the important groundfish stocks in the Aleutian Islands area. The specific objectives of the 1994 survey were to:

1. define the distribution and relative abundance of the principal groundfish species inhabiting the Aleutian Islands area;

2. collect data to define selected biological parameters i.e., age, sex, size, growth, length-weight relationships, feeding habits, and population age structure; and

3. collect accurate mensuration data on the trawl nets used by each survey vessel.

VESSELS AND GEAR

The F/V *Pacific Knight* is 165 ft. (50.3 m) in overall length and powered by two main engines with 1,700 continuous horsepower each. Deck equipment included paired hydraulic winches with 900 fm (1,645 m) of 1" (2.2 cm) cable per drum, two hydraulic net reels (one mounted over the stern ramp and the other mounted forward on the working deck), and one crane mounted on the main deck for lifting. The F/V *Vesteraalen* is 127 ft. (38.7 m) in overall length and powered by a single main engine of 1,700 continuous horsepower. Deck equipment included paired hydraulic trawl winches with 800 fm (1,463 m) of 3/4" (1.91 cm) cable per drum, two hydraulic net reels (one mounted over the stern ramp and the other mounted forward on the working deck), and one stationary crane mounted on the main deck for lifting. Electronic equipment on both vessels consisted of Global Positioning Systems (GPS) and Loran C receivers with converters for geodetic positions, Loran C video-plotters, two radars, single band and VHF radios, color video fish finders, and auto-pilots.

Both vessels used standard RACE Division Poly-Nor'eastern high opening bottom trawls rigged with roller gear. Gear specifications included: an 89'-1" (27.2 m) headrope with twenty-one 12" (30 cm) diameter floats, and a 79'-7" (24.3 m) 1/2" longlink alloy chain "fishing line" attached to an 81'-7" (24.9 m), 3/8" (.95 cm) diameter 6 X 19 galvanized wire footrope. The roller gear was 79'-6" (24.2 m) long and constructed of 3/4" (1.91 cm) diameter 6 X 19 galvanized wire rope, 14" (36 cm) rubber bobbins separated by a solid string of 4" (10 cm) rubber disks. In addition, 19'-6" (5.9 m) wire rope extensions with 4" (10 cm) and 8" (20 cm) rubber disks were used to span each lower flying wing section.

Trawls were constructed of 5" (12.7 cm) stretched-mesh polyethylene web with a 1-1/4" (3.2 cm) mesh nylon liner in the codend. Net rigging consisted of triple 180' (54.9 m), 5/8" (1.6 cm) diameter galvanized wire rope dandylines. The dandylines were rigged with 18" and 9" chain extensions to the headrope and side panel attachments, respectively. Steel V-doors with dimensions of, 6'x 9'(1.83 x 2.74 m), and weighing approximately 1,700 lbs.

(800 kg) each, were used.

DESCRIPTION OF SURVEY AREA

The Aleutian archipelago consists of 47 major islands extending westward in a nearly 1,500 km arc from the Alaska Peninsula to Attu Island. Located among the westernmost islands are several prominent banks and reefs including Petrel Bank located north of the island chain at approximately 180°W, Buldir Reef and adjacent Tahoma reef (176°E), and Stalemate Bank, west of Attu Island (171°E). The bathymetry of the sea floor in the Aleutian region reflects the volcanic origin of the islands and is characterized by an irregular bottom, narrow continental shelf, and abrupt continental slope. The Aleutian Trench, approximately 120 km south of the chain, with depths from 4,000 to 7,000 m defines the southern limit of the continental shelf and slope. The northern continental shelf and slope varies from 30 to 75 km in width and is bounded by Bowers Basin in the west and the Aleutian Basin in the east.

Historically, the Aleutian Islands have been important fishing grounds for a variety of groundfish species including Pacific ocean perch (Sebastes alutus), Atka mackerel (Pleurogrammus monopterygius), walleye pollock (Theragra chalcogramma), Pacific cod (Gadus macrocephalus), Pacific halibut (Hippoglossus stenolepis), sablefish (Anaplopoma fimbria), rockfishes (Sebastes spp.) and several invertebrate groups including crabs and squid.

SURVEY DESIGN AND METHODS

The stratified random survey design used since 1983 was modified to conform to a redefinition of management areas by the North Pacific Fisheries Management Council. The 1994 survey area was divided into the Eastern, Central, and Western Aleutian management areas and the Southern Bering Sea (Fig. 1). Further subdivision by geographical areas and depth intervals within these four areas resulted in 52 sampling strata.

Standard trawl hauls were 30-minutes in duration, allowing for sinking time between setting the winch brakes and beginning the tow. Efforts were made to maintain each tow at a constant depth. In cases where depths increased during a tow, trawl warps increased accordingly. Catches were sorted to species, weighed and enumerated according to standard AFSC and RACE Division protocol. A variety of biological data (age structures, length, sex, weight, and maturity of individual specimens) were taken.

Special requests were also fulfilled for stomach, tissue, and whole fish samples.

Oceanographic data were collected throughout the cruise. Temperature profiles of the water column were gathered using Richard Branker Research Ltd.[1] MicroBT profilers. Sea surface temperature observations were taken with bucket thermometers.

[1]Reference to trade names and/or commercial firms does not constitute endorsement by the U.S. Government.

The fishing dimensions of the trawls were measured aboard each vessel using Scanmar acoustic net mensuration systems.

RESULTS

Time lost to bad weather and gear repair was minimal. Sampling proceeded from east to west at pre-selected stations at depths ranging from 16-476 m. Successful trawls were achieved at 387 of the 436 sites attempted, an increase of 14% over the 340 successful stations completed during the 1991 survey. An additional 13 non-quantitative tows were completed for additional projects. During the survey, some strata were poorly sampled, due primarily to bad bottom or preemption by commercial crab pots, and were subsequently combined with adjacent strata, resulting in 45 strata being used for the final analysis instead of the 52 originally planned.

A total of 107 fish species were identified in survey catches. In addition to the groundfish species, catches also contained representatives from numerous invertebrate orders. The types and numbers of biological data collected from fish are summarized in Table 1. The age structures collected will be read by the age determination unit of the AFSC.

Dominant fish species ranked by catch per unit of effort, expressed as kilograms of catch per hectare trawled, (kg/ha) for the three Aleutian management areas and the Southern Bering Sea are listed in Table 2. Atka mackerel, Pacific ocean perch, northern rockfish (Sebastes polyspinis) dominated the catches in most areas in the Aleutian Islands (west of long. 170°)(Table 2). As in 1991, the highest fish densities encountered during the survey were generally in the western Aleutian Islands (west of long. 177°E) where catches were composed primarily of Atka mackerel, Pacific ocean perch and northern rockfish. The most abundant species in the central Aleutian region, including Petrel Bank (long. 177°W-177°E), were Pacific ocean perch, Pacific cod and walleye pollock while catches in the eastern Aleutian Islands (long. 170°W-177°W) were represented mainly by Atka mackerel, Pacific ocean perch, Pacific cod and walleye pollock. Important components of catches from the Southern Bering Sea portion of the survey area (long. 165°W-170°W, north of the Aleutian chain) were Atka mackerel, walleye pollock and Pacific cod.

Atka mackerel had, by far, the highest abundance of any species, 688,000 t, up slightly (+4%) from the 1991 triennial survey. Pacific ocean perch with 448,000 t was second in overall abundance, up nearly 10% from 1991. Other important species

exhibiting positive biomass trends were Pacific cod, 194,000 t (+6%), shortraker rockfish, 29,000 t (+7%), rougheye rockfish,

14,000 t (+9%) and shortspine thornyheads, 7,000 t (+15%). Major species exhibiting apparent decreases in abundance from 1991 were northern rockfish, 82,000 t, down 55%, and walleye pollock, 151,000 t, down 43%.

Sea surface and bottom temperatures were recorded at most stations where trawling was attempted. Bottom temperatures, ranging from 3.3°C to 6.2°C, were obtained at 436 stations trawled and 434 sea surface temperatures ranging from 4.1°C to 8.9°C were collected by the vessels. Preliminary examination of the net mensuration data revealed that the nets towed by the F/V *Pacific Knight* had a mean path width of 53.8' (16.4 m) as measured between the wing tips, while those towed by the F/V *Vesteraalen* had a mean path width of 53.2' (16.2 m).