

RESOURCE ASSESSMENT & CONSERVATION ENGINEERING (RACE) DIVISION

Groundfish Assessment

2002 Groundfish Assessment Survey, Aleutian Islands Region

The eighth comprehensive bottom trawl survey of the Aleutian Islands region was conducted from 13 May through 15 August. Previous major Aleutian Islands groundfish surveys occurred in 1980, '83, '86, '91, '94, '97, and 2000. This cruise marked the second in the series of biennial surveys. The 140 vessel-day survey period was divided among the chartered commercial trawlers Sea Storm, Vesteraalen, and Morning Star. The Morning Star participated in only a short leg of the survey between 25 May and 4 June. Cruise legs on the Sea Storm and Vesteraalen were generally 23-24 days each. Sampling operations began on the north side of the Aleutian Islands between Unimak Pass (long. 165°W) and the Islands of Four Mountains (long. 170°W) and extended westward throughout the Aleutian Archipelago to Stalemate Bank (long. 170°E).

The primary focus of these ongoing surveys is to build a standardized time series of data to assess, describe, and monitor the distribution,

abundance, and biological condition of various groundfish and invertebrate stocks that occur in the Aleutian Islands region. Standard RACE Division Polynortheastern high-opening bottom trawls, rigged with roller gear, were utilized by all three vessels. Steel V-doors with dimensions of 1.83 x 2.74 m and weighing 800 kg each were used to open the net.

The Aleutian Islands region is an extensive archipelago of volcanic origin typified by a relatively narrow continental shelf, which is crossed by numerous deep passes. Very strong currents flow through the passes and across the shelf, sometimes making productive fishing operations difficult or impossible. Commercially valuable roundfish such as Atka mackerel (*Pleurogrammus monopterygius*), Pacific cod (*Gadus macrocephalus*), walleye pollock (*Theragra chalcogramma*), sablefish (*Anoplopoma fimbria*); flatfish, most notably, Pacific halibut (*Hippoglossus stenolepis*) and Greenland turbot (*Reinhardtius hippoglossoides*); rockfish species including Pacific ocean perch (*Sebastes alutus*), northern rockfish (*S. polyspinis*), rougheye and shortraker rockfishes (*S. aleutianus* and *S. borealis*); and invertebrates including golden king crab (*Lithodes aequispina*) and scallops (*Chlamys* spp.) inhabit the area. Extensive areas of

rough, rocky bottom provide abundant substrate for many species of bryozoans, hydroids, sponges, and corals.

For survey purposes, the region was divided into four major sections based on geographic features and North Pacific Fishery Management Council (NPFMC) regulatory areas. Those sections were further divided into 45 area-depth strata to a depth of 500 m. A Neyman optimum allocation strategy drawing on data from previous surveys was used to develop a stratified random sampling distribution among the strata.

Tow tracklines were recorded using GPS output. Standard trawl hauls were 15 minutes in estimated on-bottom duration. Acoustic net mensuration devices continuously measured wingspread and headrope height above the bottom; tilt sensors attached to the fishing line monitored footrope contact with the bottom; and headrope-mounted bathythermographs collected surface-to-bottom water temperature profiles. After each tow, depth profile data were integrated with net mensuration data to help verify actual fishing time on bottom and net configuration.

Catches of fish and most invertebrates were sorted to species or species group, weighed, and enumerated according to standard RACE Division protocol. Extensive size composition data were collected, and a variety of bio-

Table 1. Biomass estimates for major groundfish species from AFSC Aleutian Islands trawl surveys, 1991-2002.

Name	Year	W. Aleutians	C. Aleutians	E. Aleutians	S. Bering Sea	Total
Atka mackerel	1991	320,500	273,955	70,037	72	664,564
	1994	326,922	87,725	215,517	89,605	719,769
	1997	111,050	194,289	42,669	128,032	476,039
	2000	155,949	377,059	974	2,709	536,691
	2002	255,115	326,866	190,817	59,883	832,680
Pacific ocean perch	1991	236,601	93,531	54,158	2,017	386,306
	1994	209,591	104,577	107,168	25,811	447,147
	1997	273,303	222,397	218,141	17,972	731,813
	2000	260,043	171,669	139,437	22,670	593,818
	2002	202,124	140,358	109,795	16,311	468,588
Northern rockfish	1991	128,030	58,830	3,717	703	191,280
	1994	60,039	15,371	5,949	1,143	82,501
	1997	59,781	17,718	3,207	293	80,998
	2000	146,902	39,482	23,921	62	210,368
	2002	134,519	38,189	3,242	290	176,240
Walleye pollock	1991	30,414	57,818	62,919	77,872	229,021
	1994	15,047	33,391	38,191	68,142	154,770
	1997	20,807	46,794	37,999	100,166	205,766
	2000	7,435	59,972	64,783	48,311	180,501
	2002	12,442	108,208	54,634	181,334	356,618
Pacific cod	1991	63,420	38,300	61,309	12,403	175,432
	1994	23,000	50,328	75,107	46,945	195,380
	1997	14,348	31,074	29,253	15,109	89,784
	2000	40,188	40,465	49,126	13,209	142,988
	2002	23,802	24,210	25,241	9,601	82,853
Pacific halibut	1991	5,306	7,220	18,141	8,958	39,625
	1994	6,093	10,706	28,470	17,479	62,748
	1997	9,951	11,456	25,997	21,479	68,883
	2000	9,192	5,868	26,008	9,922	50,989
	2002	7,809	6,519	18,472	7,857	40,657

logical data including age structures (otoliths), lengths, and weights of individual specimens were collected.

Relatively little time was lost to bad weather, but during periods of extreme tidal flow, heavy currents sometimes caused work to be postponed or tows to be aborted. When satisfactory bottom conditions could not be found at a preassigned station, a preselected alternate location, or in some cases a new location within the proper area-depth stratum, was sampled. Four hundred and eighty-three (483) tows were attempted during the survey. Successful tows were performed at 417 of 423 assigned assessment sites or alternates. Six preassigned stations could not be sampled

due to unsuitable bottom conditions and to concentrations of stored crab traps. One special tow was performed to collect deepwater snailfish. Stations ranged in depth from 20 to 470 m.

This year special collections included extensive samples of fish stomach contents, rockfish larvae, corals, sponges, and other invertebrates. Many whole fish of various species were frozen for studies of parasites, bioenergetics, and their possible contribution to sea lion diet.

Researchers from the California Academy of Sciences in San Francisco collected numerous samples of invertebrate fauna under an AFSC contract to identify and catalog Alas-

AFSC Aleutian groundfish surveys, mean bottom temperatures

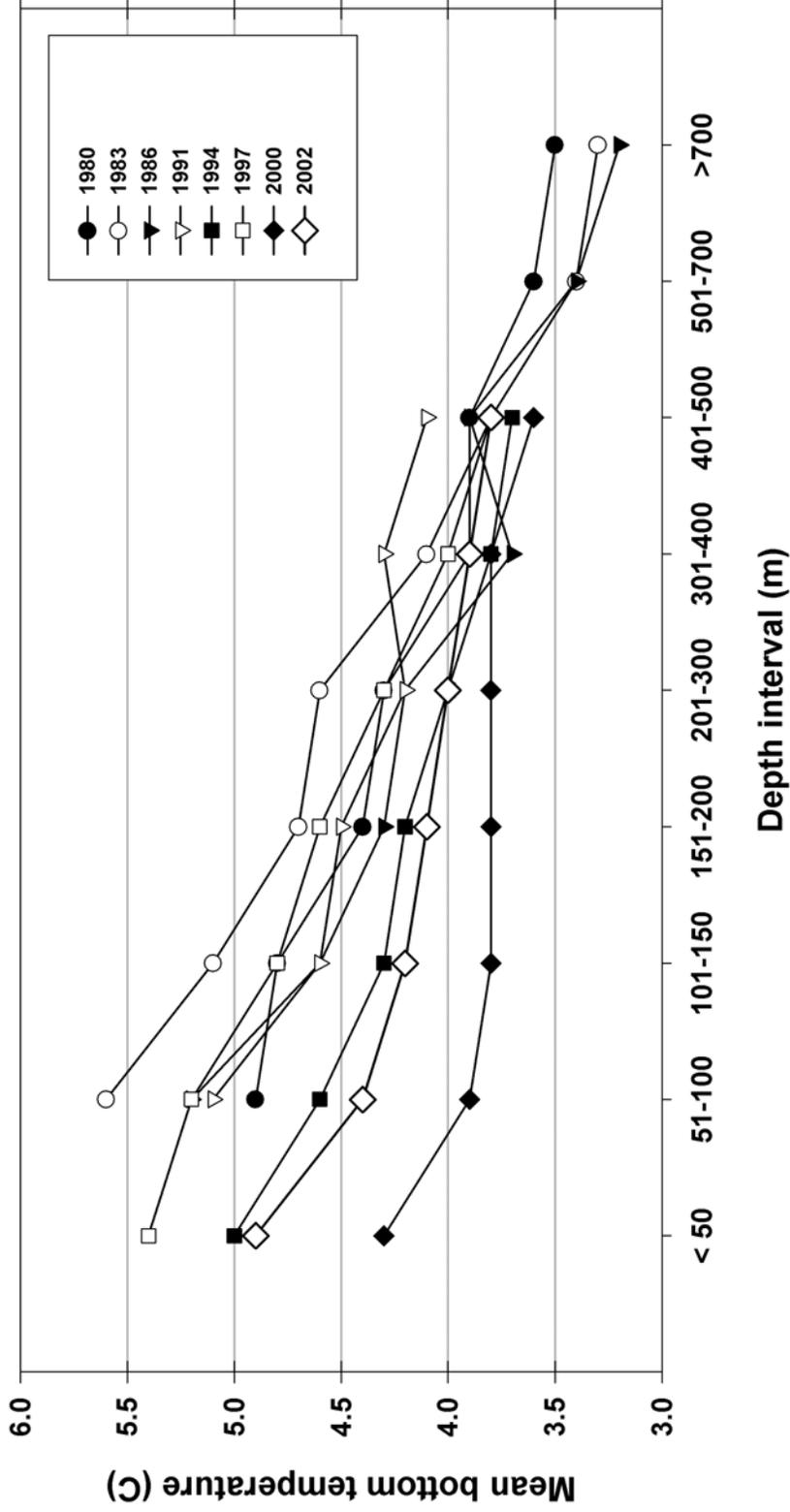


Figure 1. Mean bottom temperatures collected during groundfish surveys of the Aleutian Islands region, 1980-2002.

kan invertebrates. This research will permit AFSC field scientists to collect more accurate catch data in the future. Many whole fish were collected for later study or identification at the AFSC; at least one probable new species of snailfish was collected. Corals were collected for the Smithsonian Institution to support ongoing taxonomic studies. A collection of various mollusks was made as part of an ongoing study to document the distributions of Alaskan mollusk species.

Over 500 kg of whole fish of various species were collected from survey tows made near Steller sea lion rookeries. These fish will be used for studies of parasite content, fatty acids, and caloric content. Using the results of these studies, researchers at the AFSC and the University of Washington hope to clarify the relationships between Steller sea lions and their prey.

Juvenile Pacific halibut were collected and frozen for study by researchers at the International Pacific Halibut Commission. Walleye pollock otoliths and vertebrae (100 sets) were collected for the AFSC Age and Growth Unit. Sightings of shorttailed albatross were documented on a number of occasions. Records of those sightings were forwarded to the U.S. Fish and Wildlife Service (USFWS) in Anchorage.

Biomass estimates indicate that Atka mackerel was, overall, the predominant species in survey trawl catches, (Table 1). POP ranked second in overall total biomass in the Aleutian region. Northern rockfish was third overall in total biomass, followed by walleye pollock. In the southern Bering Sea area, walleye pollock ranked first in total biomass, followed by Atka mackerel and POP. Historically, biomass estimates for Atka mackerel and POP have varied considerably, but consistently have been the largest component of the groundfish biomass.

Bottom temperatures have been routinely collected in conjunction with survey bottom trawl hauls (Fig. 1). Of the eight survey years, all except 1991 had temperature samples from throughout the entire Aleutian Islands region. Tidal currents that flow across

the relatively narrow Aleutian shelf and upper slope are often very strong, as vast amounts of water are exchanged between the North Pacific Ocean and the Bering Sea. Bottom temperatures are most influenced by those large water masses.

The year 2000 produced the coldest bottom temperature profile yet detected during summer AFSC groundfish surveys in the Aleutian region. The warmest years tend to lag about a year behind El Niño events. The three coldest years thus far detected (1994, 2000, and 2002) have occurred within the last 8 years, with one of the warmest (1997) occurring in their midst. Generally, mean temperatures at depths shallower than 300 m vary more than those from waters deeper than 300 m. Perhaps the year 2000 temperatures are not as anomalous as they appear, but many individual fish were visibly thinner that year than during other surveys. Unfortunately, we have no data to compare for the intervening years.

The cruise report for this survey may be found on the RACE Division website at http://www.afsc.noaa.gov/race/surveys/cruise_results.htm By early next year the report to industry, a detailed fishing log, will appear on the same site.

By Harold Zenger.