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# Results of the Echo Integration-trawl Survey of Walleye Pollock (*Theragra chalcogramma*) on the U. S. and Russian Bering Sea Shelf in June and July 2004

February 2005

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**Results of the Echo Integration-trawl Survey of Walleye Pollock (*Theragra chalcogramma*) on the U.S. and Russian Bering Sea Shelf in June and July 2004**

by

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# INTRODUCTION

Scientists from the Midwater Assessment and Conservation Engineering (MACE) Program of the Alaska Fisheries Science Center (AFSC) conduct biennial summer surveys of Bering Sea walleye pollock (*Theragra chalcogramma*). This year (2004) was the first time since 1994 that permission was granted to survey in the Russian Exclusive Economic Zone (EEZ). Results presented here are from the echo integration-trawl (EIT) survey carried out between 5 June and 1 August 2004 on the U.S. and Russian Bering Sea shelf (near Cape Navarin) aboard the NOAA ship *Miller Freeman*. The primary objective of the survey was to collect echo integration and trawl data to estimate midwater pollock abundance and distribution. Secondary objectives were to test an experimental multiple-opening-closing codend using the Aleutian wing trawl (AWT-MOC) and to conduct net-selectivity trial experiments. Scientists from the National Marine Mammal Laboratory (NMML) were aboard to census marine mammals along the EIT survey track during Leg 1. Russian scientists from TINRO, Vladivostok, and VNIRO, Moscow, participated aboard the *Miller Freeman*. Originally, TINRO scientists planned to conduct an EIT survey in the Cape Navarin area with the Russian R/V *TINRO,* thus an intership calibration between the *Miller Freeman* and the *TINRO* was conducted to allow comparison of survey results. In late July, TINRO priorities changed and they did not conduct an EIT survey.

This report summarizes observed pollock distribution, abundance, size composition and maturity information. It provides pollock biomass estimates, and summarizes acoustic system calibration and oceanographic results. Secondary projects are still in experimental stages and are not discussed.

# METHODS

<u>Itinerary</u>

Leg 1

| | |
|---|---|
| 4 Jun | Embark scientists in Kodiak, AK |
| 5-6 Jun | Depart Kodiak 1500; calibration of acoustic system in Three Saints Bay, Kodiak Island, AK. |

| | |
|---|---|
| 7-9 Jun | Transit to Bering Sea. |
| 10 Jun-2 Jul | Echo integration-trawl survey of the Bering Sea shelf through transect 17. |
| 2-3 Jul | Calibration of acoustic systems in Captains Bay, Unalaska Island, AK. |
| 4-5 Jul | Inport Dutch Harbor, AK. |
| | Leg 2 |
| 5 Jul | Depart Dutch Harbor 2000; transit to begin transect 18. |
| 6-27 Jul | Echo integration-trawl survey of the Bering Sea shelf through the southern section of transect 30; intership-calibration of scientific acoustic systems with the Russian R/V *TINRO* 25-26 July. |
| 27-29 Jul | Transit to Unalaska Island. |
| 29 Jul | Calibration of acoustic systems in Captains Bay. Debark scientists in Dutch Harbor. |
| 30-31 Jul | Transit to Kodiak. |
| 1 Aug | End of cruise. |

Acoustic Equipment

Acoustic data were collected with Simrad EK500[1] ROMS 5.30 (Bodholt et al. 1989, Bodholt and Solli 1992) and ER60 v. 2.0.0 (Simrad 2003) quantitative echo-sounding systems on the NOAA ship *Miller Freeman*, a 66-m stern trawler equipped for fisheries and oceanographic research. Four split-beam transducers (18 kHz, 38 kHz, 120 kHz and 200 kHz) were mounted on the bottom of the vessel's centerboard extending 9 m below the water surface. Acoustic data were collected using the EK500 echo sounder operating at 38 kHz and the ER60 echo sounder operating at 18 kHz, 120 kHz and 200 kHz frequencies. Acoustic system settings used during the collection were based on results from acoustic system calibrations and on experience from prior surveys (Table 1). Acoustic data were logged with SonarData Echolog v. 3.10.16.0 software. Results presented here are based on the EK500 38 kHz data.

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

Trawl Gear and Oceanographic Equipment

Midwater and near-bottom echosign were sampled using an Aleutian Wing 30/26 Trawl (AWT, midwater trawl) fitted with a 32 mm (1.25 in) codend liner. For field-testing purposes, midwater echosign was also sampled using the AWT with a multiple opening-closing (MOC) codend. The AWT-MOC was designed so that two layers can be sampled discretely with catches retained in separate codends. During Leg 2, a net selectivity experiment was conducted using the AWT equipped with removable gillnet panels. On or near bottom echosign was sampled with an 83/112 bottom trawl without roller gear and a 32-mm codend liner. A Methot and a Marinovich trawl were used to target age-0 pollock and macrozooplankton. For the AWT, bottom trawl, and Marinovich trawl, vertical net opening and depth were monitored with either a WESMAR third wire netsounder system or a Furuno acoustic link netsounder system attached to the headrope. For AWT hauls, net opening was 11 to 23 m and averaged 19 m. For bottom trawl hauls, net opening was 2 to 3 m. The Methot trawl depth was monitored using a Scanmar depth sensor attached to the top of the frame. All nets except for the Methot were fished with 5 $m^2$ Fishbuster trawl doors; a restrictor was used when fishing with the Marinovich trawl. Additional trawl gear details are described in Honkalehto et al. (2002).

Physical oceanographic data collected during the cruise included temperature/depth profiles obtained with a Sea-Bird Electronics temperature-depth probe (SBE-39) attached to the trawl headrope, and conductivity-temperature-depth (CTD) profiles collected with a Sea-Bird CTD system at calibration sites and other locations. Sea surface temperature, salinity, and other environmental data were collected continuously using the *Miller Freeman's* Scientific Computing System (SCS).

Survey Design

The planned survey design including the Russian EEZ consisted of 31 north-south transects spaced 20 nautical miles (nmi) apart over the Bering Sea shelf from Port Moller, Alaska, to Cape Navarin, Russia. However, due to the ship's mechanical difficulties, only the southern portion of transect 30 was completed (Fig. 1). Echo integration and trawl data were collected during daylight hours (typically between 0600 and 2400, depending on calendar date and location). Nighttime operations included additional trawling, target strength data collection, field-testing of the AWT-MOC, conducting net selectivity experiments, and acoustic system testing. Pollock were sampled to determine sex, fork length, body weight, age and maturity. For age determinations, pollock otoliths were collected and stored in individually marked vials containing a 50% ethanol-water solution. Maturity was determined by visual inspection and fish were categorized as immature, developing, pre-spawning, spawning, or post-spawning. Trawl station and biological data were recorded using a Fisheries Scientific Computer System (FSCS) designed and developed by NOAA's Office of Marine and Aviation Operations to digitally collect data aboard research vessels.

Standard sphere acoustic system calibrations (Foote et al. 1987) were made prior to the start of the Bering Sea shelf survey at the end of Leg 1, and at the end of Leg 2 to measure acoustic system performance. A tungsten carbide sphere (38.1 mm diameter) and a copper sphere (64 mm diameter) were suspended below the centerboard-mounted transducers. The tungsten carbide sphere was used to calibrate the 38, 120 and 200 kHz systems. The copper sphere was used to calibrate the 18 kHz system. After each sphere was centered on the acoustic axis, split beam target strength and echo integration data were collected. Transducer beam characteristics were modeled by moving each sphere through a grid of angular coordinates and collecting target strength data using Simrad EKLOBES software.

<u>Data Analysis</u>

Acoustic data were collected between 12 m from the surface (3 m below the centerboard-mounted transducer) and 0.5 m off the bottom. The depth limit of data collection was 500 m. Scientists scrutinized the 38 kHz data using Sonardata Echoview software (v. 3.10.129). Data were partitioned into pollock, non-pollock fish, rockfish, and an undifferentiated mixture thought to be primarily jellyfish, other macrozooplankton, and fish, and stored in a relational database.

Pollock backscatter was scaled to biomass by using pollock biological data from 91 trawl hauls. Length data were combined into 26 length strata based on geographic proximity, similarity of length composition, and echosign. Mean target strength (dB) was estimated for each stratum by using the pollock target strength (TS) to length relationship (TS = 20 log FL – 66, where FL is fork length (cm); Traynor 1996). Two average weight-at-length relationships were used, one for pollock east of 170°W and one for pollock west of 170°W. Biomass for each stratum was then estimated as:

$$\text{Biomass} = \frac{\bar{s}_A \times \frac{\overline{W}}{1000} \times A}{4 \times \pi \times 10^{\overline{TS}/10}} \text{ metric tons (t)},$$

where $\bar{s}_A$ (mean scattering area, $m^2/nmi^2$, also known as nautical area scattering coefficient, NASC; MacLennan et al. 2002) is return acoustic signal from pollock in the water column, A is survey area ($nmi^2$), $\overline{TS}$ is mean target strength (dB) of pollock, and $\overline{W}$ is mean weight of individual fish (kg). Estimated pollock distribution and abundance were then summarized into three areas: U.S.-east of 170°W, U.S.-west of 170°W, and Russia-Cape Navarin. Age data for the 2004 EIT survey were not available when this analysis was completed; age composition was estimated from the observed length data and the 2004 Bering Sea bottom trawl survey (BTS) age data.

Relative estimation errors associated with spatial structure observed in the acoustic data were derived using a one-dimensional (1D) geostatistical method (Petitgas 1993, Williamson and Traynor 1996). Relative estimation error is defined as the ratio of the square root of the estimation variance to the estimate of acoustic abundance--the average transect backscatter multiplied by transect area. Geostatistical methods were used for computation of error because they account for the observed spatial structure. These errors quantify only transect sampling variability. Other sources of error (e.g., target strength, trawl sampling, error associated with ageing) are not included.

## RESULTS

Calibration

Three acoustic system calibrations were conducted during the summer 2004 field season (Table 1). No significant differences in gain parameters or transducer beam characteristics were observed for the Simrad EK500 38 kHz system.

Oceanographic Conditions

With a few exceptions, sea surface temperatures warmed as the survey progressed towards the northwest. In June (transects 1-17), the coolest surface waters (< 7°C) were observed at the north and south ends of transects 1 through 3, near Unimak Pass, and at the north ends of transects 12 through 17. The warmest surface waters (> 8°C) were observed in the middle of transects 8 and 10, and south of the Pribilof Islands at about 56°N lat. (Fig. 2a). During July, (transects 18-30) the coolest surface waters (< 8.0°C) were observed southeast of St. Matthew Island, and the warmest surface waters (> 11°C) were observed along transects 29 and 30 south of Cape Navarin.

The average temperatures at 60 m (representing the water column below the thermocline; Fig. 2b) showed that water cooled gradually from southeast to northwest and offshore to inshore, from 6°C near Unimak Pass to 0°C in a small region northwest of St. Matthew Island. Below-thermocline water temperatures in the Cape Navarin area ranged between 1° and 3°C.

Biological Sampling

Biological data and specimens were collected from 154 trawl hauls (Table 2, Fig. 1), which included: 117 with the AWT midwater trawl, 20 with a bottom trawl, 9 with a Marinovich trawl, and 8 with a Methot trawl. Walleye pollock was the most abundant and jellyfish (Cnidaria) was the second most abundant taxon captured by weight in both midwater and bottom trawl hauls (Tables 3 and 4). Jellyfish were the most abundant species group by weight for both Marinovich and Methot trawls (Tables 5 and 6). Numerically, age-0 pollock dominated Marinovich catches and euphausiids dominated Methot catches. During the cruise, 35,827 pollock lengths were measured and 3,712 pairs of otoliths were collected from pollock captured in trawl hauls (Table 7). Pollock 38 to 50 cm FL that were caught in trawl hauls east of 170°W averaged 8% heavier than those caught west of 170°W (Fig. 3). Less than 1% of the pollock larger than 29 cm FL were actively spawning. Most pollock were either in the developing or post-spawning maturity stage (Fig. 4).

Distribution and Abundance

Pollock were typically detected either as "salt and pepper" echosign (regularly distributed small dots throughout the middle to near bottom water column), or as midwater layers and schools. Occasionally they appeared as a near bottom "carpet". On the first three transects, few pollock were observed (Fig. 5). Between transects 3 and 6, most pollock were between 50 m in the water column and the bottom, along with a heavy layer of jellyfish-macrozooplankton-fish mixture (non-pollock species, Fig. 6) that sometimes filled the entire water column. Between transects 7 and 10, dense pollock aggregations were observed north of Unimak and Unalaska Islands, with some jellyfish-macrozooplankton-fish mixture present. From Unalaska Island to about 60 nmi west of St. Matthew (transects 10 through 22), pollock was the primary echosign detected in the southern half of the transects, but pollock overlapped with dense jellyfish-macrozooplankton-fish layers in the north. West of transect 22, pollock was the primary echosign (Fig. 7) and the jellyfish-macrozooplankton-fish layers were reduced but still present in the upper water column. In the U.S. EEZ, most pollock were observed west and south of St. Matthew Island (transects 20-26). In the Cape Navarin area, most pollock were observed near the north ends of transects 26 and 29.

Estimated abundance between 12 m from the surface and 3 m off the bottom in the U.S. EEZ was 6.83 billion pollock weighing 3.31 million t (Tables 8 and 9). The predominant lengths were 39 to 41 cm FL (Fig. 8a). About 30.7% of the estimated biomass was east of 170°W; of that, 15.1%

was found inside the Steller sea lion Conservation Area (SCA). East of 170°W, the predominant length mode was 44 cm FL and relatively few juveniles were observed (Fig. 8b). Pollock abundance and size composition inside and outside the SCA were nearly identical (Fig. 8c). West of 170°W to the U.S.-Russia border, the predominant length mode was 39 cm FL. Age-1 juveniles (< 20 cm FL) were rarely observed, however, a few were caught at night in experimental AWT-MOC trawl hauls between transects 20 and 21.

Estimated numbers at age from the 2002 EIT survey showed that 2 and 3 year olds, the 2000 and 1999 year classes, were most numerous, with the 1998, 1996 and 1992 year classes also well-represented (Table 10). In 2004, as age information was not yet available from the EIT survey, preliminary numbers at age were estimated using an age-length key from the 2004 BTS data. The results suggest that 4-year old pollock dominated the population observed by the EIT survey. Five year olds were next most numerous age group. Mean length at age for pollock sampled during the 2002 survey appeared to be slightly higher than that from either 1999 or 2000 (Fig. 9). Mean length at age for pollock sampled during the 2004 EIT survey also appeared to be higher than the other three survey years, especially for pollock age 6 and older. However, these 2004 results were preliminary and will be reanalyzed with EIT survey ages when they are available.

In the Russian EEZ, between Cape Navarin and the U.S.-Russia border, the estimated abundance between near surface and 0.5 m off bottom was 1.55 billion pollock weighing 0.40 million t (Table 11). (For comparison, from near surface to 3 m off bottom the estimated abundance was 1.41 billion pollock weighing 0.36 million t). The Russia EEZ biomass made up about 9% of the total estimate for the combined U.S.-Russia area surveyed in 2004. The predominant length mode was 31 cm FL (Fig. 8b) and relatively few adult pollock larger than 40 cm FL were observed. Most 2-year-old pollock (~20 to 29 cm FL) encountered in Russia were at the north end of transects 26 through 29.

## DISCUSSION

In 2004, midwater pollock biomass (near surface to 3 m off bottom) in the U.S. EEZ was slightly less than in 2002, but greater than in the previous five summer surveys starting in 1994 (Table 8). Together, pollock from the 2000, 1999 and 2001 year classes made up most of the population (Table 10). Four-year-old pollock (2000 year class) were estimated to number 2.9 billion and weigh 1.3 million t, about 42% and 40% of the total estimated numbers and biomass, respectively. Abundance results for juveniles from the current EIT survey showed that the estimate of age-1 pollock was the lowest since 1994. For age-2 pollock, the estimate was second lowest, above the 1996 estimate. EIT abundance estimates of age-0 pollock were not attempted because of both availability and trawl selectivity concerns. However, age-0 juveniles were frequently captured during the survey in Methot and Marinovich trawl hauls. Young-of-the-year catches from the 2004 Bering-Aleutian Salmon International Survey-Ocean Carrying Capacity (BASIS/OCC) cruise conducted between 11 August and 3 October also suggested that there might have been good recruitment from the 2004 year class[2].

For pollock ages 2 and 3, the relative year-class strength estimated from EIT surveys between 1982 and 2004 was compared with current stock assessment model estimates (Ianelli et al. 2004) (Fig.10). EIT estimates for each survey year were compared to the mean number of age 2 and 3 pollock across all survey years (1982 to 2004). The stock assessment (Model 1) estimates for age 2 and 3 pollock (from EIT survey years 1982 to 2004) were compared to the mean number of ages 2 and 3 across all modeled years (1964 to 2004). The EIT survey showed the same pattern of above- and below-average year classes as Model 1 estimates for 2 year olds (Figs. 10a,c). EIT survey estimates also showed the same pattern as Model 1 estimates for 3 year olds (Figs. 10b,d), with two exceptions. In 1988, the EIT survey estimated the 1985 year class to be above average, whereas the model estimated it as below average. In 1994, the EIT survey estimated a well-below average 1991 year class, and Model 1 estimated it to be only slightly below average.

[2] E. Farley, Auke Bay Laboratory, Juneau AK, pers. comm. November 2004.

Preliminary numbers of age 2 and 3 pollock from the 2004 EIT survey (Table 10), estimated using the 2004 BTS age data, suggested that the 2001 and 2002 year classes were below average (Figs.10a,b). This was consistent with the 2004 Model 1 estimates for those year classes. Agreement between EIT survey and Model 1 estimates for 2- and 3-year-old pollock suggests that the EIT survey alone provides a good indication of recruitment strength for these age groups. This is expected because 2-year-old pollock, and to a lesser degree, 3-year-old pollock, are more available to the EIT survey than to either the BTS or the commercial fishery.

Pollock distribution patterns in the northern edges of the U.S. EEZ across the U.S.-Russia Convention Line to Cape Navarin have varied since the AFSC's last EIT survey of Russian waters in 1994 (Figs. 11a-c). The percentage of pollock biomass inside the U.S. EEZ ranged from 85% in 1994 to 98% in 2002 (Table 11). In 2004, about 91% of the pollock were observed in the U.S. EEZ. The 2002 survey took place between 30 June and 19 July, the 2004 survey was between 16 and 27 July, and the 1994 survey was between 1 and 20 August. The early summer survey in 2002 observed the fewest pollock in the Russian EEZ, and the late summer survey in 1994 observed the most. Although these data might suggest that the surveys' sequential timing captured different stages of northward pollock migration from the U.S. EEZ into the Cape Navarin area, more information from and further collaboration with Russian scientists are required to better understand the summer distribution of cross-boundary pollock in the Bering Sea.

## ACKNOWLEDGMENTS

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## SCIENTIFIC PERSONNEL

Leg 1 (5 June-3 July)

| Name | Position | Organization | Nation |
|---|---|---|---|
| Neal Williamson | Chief Scientist | MACE | USA |
| Sarah Stienessen | Fishery Biologist | MACE | USA |
| Scott Furnish | Info. Tech. Specialist | MACE | USA |
| Tyler Yasenak | Fishery Biologist | MACE | USA |
| Robert L Self | Fishery Biologist | MACE | USA |
| Alexander Nikolayev | Acoustician | TINRO | Russia |
| Mikhail Stepanenko | Fishery Biologist | TINRO | Russia |
| Sergey Popov | Acoustician | VNIRO | Russia |
| Suzanne Yin | Biologist | NMML | USA |
| Laura Morse | Biologist | NMML | USA |
| Liz Mitchell | Biologist | NMML | USA |

Leg 2 (5 July-1 August*)

| Name | Position | Organization | Nation |
|---|---|---|---|
| Paul Walline* | Chief Scientist | MACE | USA |
| Taina Honkalehto* | Fishery Biologist | MACE | USA |
| Denise McKelvey* | Fishery Biologist | MACE | USA |
| Mike Brown* | Info. Tech. Specialist | MACE | USA |
| Tyler Yasenak* | Fishery Biologist | MACE | USA |
| Kresimir Williams* | Fishery Biologist | MACE | USA |
| Alexander Nikolayev* | Acoustician | TINRO | Russia |
| Mikhail Stepanenko* | Fishery Biologist | TINRO | Russia |
| Alexander Glubokov | Fishery Biologist | VNIRO | Russia |
| Jillian Worssam | Teacher-at-Sea | NOAA | USA |

* Disembarked the vessel 29-July.

MACE - Midwater Assessment and Conservation Engineering Program, Alaska Fisheries Science Center, Seattle, WA

NMML - National Marine Mammal Laboratory, AFSC, Seattle WA

NOAA - National Oceanic and Atmospheric Administration, Seattle WA

TINRO - Pacific Research Institute of Fisheries and Oceanography, Vladivostok, Russia

VNIRO - Russian Federal Research Institute of Fisheries and Oceanography, Moscow, Russia

Table 1.--Simrad EK500 38 kHz acoustic system settings during the summer 2004 echo integration-trawl survey of the Bering Sea shelf, and results from standard sphere acoustic system calibrations conducted before, during, and after the survey.

| | Survey System Settings | Calibrations 6-Jun Three Saint's Bay, Alaska | 2-Jul Captains Bay, Alaska | 29-Jul Captains Bay, Alaska |
|---|---|---|---|---|
| Echosounder: | Simrad EK 500 | -- | -- | -- |
| Transducer: | ES38B | -- | -- | -- |
| Frequency (kHz): | 38 | -- | -- | -- |
| Transducer depth (m): | 9.15 | -- | -- | -- |
| Absorption coefficient (dB/km): | 10 | -- | -- | -- |
| Pulse length (ms): | 1.0 (medium) | -- | -- | -- |
| Band width (kHz): | 3.8 (Wide) | -- | -- | -- |
| Transmitted power (W): | 2000 | -- | -- | -- |
| Angle sensitivity: | 21.9 | -- | -- | -- |
| 2-Way beam angle (dB): | -20.8 | -- | -- | -- |
| TS transducer gain (dB): | 25.5 | 25.5 | 25.5 | 25.4 |
| Sv transducer gain (dB): | 25.3 | 25.3 | 25.3 | 25.3 |
| 3 dB beamwidth (deg) | | | | |
| Along: | 7.10 | 7.13 | 6.86 | 6.83 |
| Athwart: | 6.80 | 6.93 | 6.83 | 6.84 |
| Angle offset (deg) | | | | |
| Along: | 0.00 | -0.35 | -0.34 | -0.34 |
| Athwart: | 0.00 | 0.06 | 0.04 | 0.05 |
| Range (m): | 500 | -- | -- | -- |
| Post-processing Sv threshold (dB): | -70 | -- | -- | -- |
| Standard sphere TS (dB) | -- | -42.25 | -42.25 | -42.25 |
| Sphere range from transducer (m): | -- | 21.6 | 21.0 | 20.9 |
| Water temp ($^{o}$C): | | | | |
| at transducer: | -- | 7.7 | 7.0 | 8.7 |
| at sphere: | -- | 7.1 | 5.3 | 5.7 |

Note: Gain and Beam pattern terms are defined in the "Operator Manual for Simrad EK500 Scientific Echo Sounder (1993)" available from Simrad Subsea A/S , Strandpromenaden 50, P.O. Box 111, N-3191 Horten, Norway.

Table 2.--Midwater and bottom trawl stations and catch data summary from the summer 2004 Bering Sea shelf walleye pollock echo integration-trawl survey, MF2004-08.

| Haul | [1]Area | [2]Gear | Date (GMT) | Start time (GMT) | Transect | Duration (min) | [3]Start Position | | Depth (m) | | Temp. (deg C) | | [4]Pollock catch | | Other catch |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Latitude | Longitude | Foot-rope | Bottom | Head-rope | Surface | (kg) | number | (kg) |
| 1 | 1 | 30 | 11-Jun | 3:28 | 3 | 5 | 56.1302 | -162.2342 | 72 | 76 | 4.0 | 7.7 | 167.4 | 154 | 470.3 |
| 2 | 1 | 626 | 11-Jun | 8:05 | 3 | 30 | 56.0764 | -162.2375 | 7 | 75 | 7.4 | 7.6 | 0.0 | 350 | 2.7 |
| 3 | 1 | 30 | 11-Jun | 16:08 | 4 | 17 | 55.8987 | -162.8298 | 79 | 82 | 3.4 | 7.3 | 2096.5 | 2231 | 259.5 |
| 4 | 1 | 626 | 11-Jun | 23:02 | 4 | 19 | 56.8888 | -162.7837 | 17 | 65 | 5.8 | 7.5 | 0.6 | 1006 | 3.4 |
| 5 | 1 | 317 | 12-Jun | 23:37 | 6 | 12 | 55.5752 | -164.0122 | 85 | 95 | 3.9 | 7.6 | 3725.9 | 5672 | 362.1 |
| 6 | 1 | 626 | 13-Jun | 11:56 | 7 | 25 | 57.1346 | -164.6080 | 40 | 69 | 2.3 | 7.6 | 0.0 | 0 | 0.4 |
| 7 | 1 | 317 | 13-Jun | 21:55 | 7 | 25 | 56.0391 | -164.5766 | 84 | 92 | 3.3 | 7.8 | 639.9 | 848 | 56.9 |
| 8 | 1 | 317 | 14-Jun | 2:07 | 7 | 22 | 55.5814 | -164.5922 | 87 | 101 | 4.5 | 8.2 | 1046.3 | 1385 | 549.7 |
| 9 | 1 | 317 | 14-Jun | 8:21 | 7 | 7 | 55.1992 | -164.5878 | 78 | 100 | 5.0 | 7.0 | 1408.9 | 1845 | 37.1 |
| 10 | 1 | 317 | 14-Jun | 17:22 | 8 | 10 | 54.4794 | -165.1530 | 46 | 110 | 5.7 | 6.2 | 0.0 | 3 | 4.3 |
| 11 | 1 | 317 | 14-Jun | 22:11 | 8 | 23 | 54.8132 | -165.1574 | 102 | 117 | 5.3 | 7.3 | 220.6 | 251 | 61.3 |
| 12 | 1 | 317 | 15-Jun | 4:47 | 8 | 13 | 55.7947 | -165.1877 | 27 | 103 | 7.7 | 8.8 | 891.2 | 1293 | 253.8 |
| 13 | 1 | 30 | 15-Jun | 8:47 | 8 | 25 | 56.1070 | -165.2002 | 12 | 95 | 7.6 | 8.8 | 0.0 | 0 | 20.1 |
| 14 | 1 | 317 | 15-Jun | 12:43 | 8 | 52 | 56.0687 | -165.1967 | 73 | 96 | 3.0 | 8.5 | 861.2 | 1293 | 26.1 |
| 15 | 1 | 317 | 16-Jun | 12:20 | 9 | 9 | 54.9923 | -165.7634 | 98 | 131 | 4.6 | 7.4 | 867.0 | 1216 | 3.0 |
| 16 | 1 | 626 | 17-Jun | 2:35 | 9 | 9 | 54.2448 | -166.1786 | 172 | 426 | 4.3 | 8.0 | 0.0 | 0 | 2.1 |
| 17 | 1 | 317 | 17-Jun | 4:23 | 10 | 16 | 54.1950 | -166.2175 | 137 | 271 | 4.6 | 6.8 | 189.8 | 205 | 5.6 |
| 18 | 1 | 317 | 17-Jun | 22:22 | 10 | 9 | 55.8584 | -166.3934 | 119 | 128 | 4.0 | 8.7 | 2483.1 | 3533 | 2.7 |
| 19 | 1 | 30 | 18-Jun | 4:01 | 10 | 26 | 56.4513 | -166.4285 | 97 | 100 | 3.7 | 8.8 | 575.7 | 883 | 64.8 |
| 20 | 1 | 30 | 18-Jun | 8:28 | 10 | 32 | 56.8361 | -166.4492 | 77 | 77 | 0.0 | 8.5 | 15.8 | 26 | 36.7 |
| 21 | 1 | 317 | 18-Jun | 9:49 | 10 | 18 | 56.8976 | -166.4529 | 44 | 75 | 3.1 | 8.3 | 4.0 | 3 | 10.9 |
| 22 | 1 | 317 | 18-Jun | 13:21 | 10 | 21 | 56.9926 | -166.4378 | 59 | 74 | 3.0 | 8.1 | 7.3 | 8 | 11.0 |
| 23 | 1 | 317 | 19-Jun | 3:21 | 11 | 36 | 56.4593 | -167.0402 | 98 | 107 | 3.7 | 8.1 | 1644.0 | 2678 | 16.0 |
| 24 | 1 | 317 | 19-Jun | 17:17 | 11 | 10 | 55.6244 | -166.9714 | 122 | 135 | 4.0 | 8.2 | 1299.9 | 1672 | 1.4 |
| 25 | 1 | 626 | 20-Jun | 9:32 | 12 | 15 | 56.1411 | -167.4951 | 30 | 136 | 5.4 | 8.1 | 0.0 | 0 | 2.5 |
| 26 | 1 | 317 | 20-Jun | 17:55 | 12 | 11 | 56.5828 | -167.6781 | 102 | 110 | 3.9 | 7.7 | 534.4 | 893 | 30.7 |
| 27 | 1 | 30 | 20-Jun | 21:03 | 12 | 13 | 56.7892 | -167.6959 | 93 | 93 | 3.4 | 7.7 | 230.8 | 300 | 5.4 |
| 28 | 1 | 30 | 21-Jun | 2:14 | 12 | 26 | 57.3915 | -167.7591 | 69 | 73 | 2.7 | 7.2 | 1069.2 | 1095 | 24.1 |
| 29 | 1 | 30 | 21-Jun | 17:17 | 13 | 23 | 57.8394 | -168.4278 | 71 | 71 | 2.9 | 6.6 | 1030.9 | 1239 | 454.6 |

Table 2.--Continued.

| Haul | [1]Area | [2]Gear | Date (GMT) | Start time (GMT) | Transect | Duration (min) | [3]Start Position Latitude | Longitude | Depth (m) Foot-rope | Bottom | Temp. (deg C) Head-rope | Surface | [4]Pollock catch (kg) | number | Other catch (kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 | 1 | 317 | 22-Jun | 1:32 | 13 | 13 | 56.7843 | -168.3005 | 88 | 98 | 3.4 | 7.9 | 717.4 | 1170 | 24.0 |
| 31 | 1 | 317 | 22-Jun | 6:35 | 13 | 20 | 56.5110 | -168.2817 | 110 | 120 | 3.9 | 7.9 | 982.6 | 1576 | 62.7 |
| 32 | 1 | 317 | 23-Jun | 3:01 | 14 | 24 | 56.3196 | -168.8505 | 118 | 129 | 4.2 | 8.3 | 187.2 | 261 | 41.4 |
| 33 | 1 | 317 | 23-Jun | 7:29 | 14 | 30 | 56.7725 | -168.9098 | 82 | 96 | 3.6 | 7.9 | 1277.0 | 2316 | 23.0 |
| 34 | 1 | 305 | 23-Jun | 10:12 | 14 | 33 | 56.6780 | -168.8748 | 33 | 102 | 6.3 | 7.9 | 0.0 | 100 | 11.9 |
| 35 | 1 | 305 | aborted | - | - | - | - | - | - | - | - | - | - | - | - |
| 36 | 1 | 30 | 23-Jun | 17:40 | 14 | 31 | 57.2721 | -168.9677 | 74 | 74 | 3.8 | 7.6 | 231.2 | 341 | 94.3 |
| 37 | 1 | 305 | 24-Jun | 9:15 | 15 | 15 | 57.9722 | -169.6973 | 22 | 71 | 6.7 | 7.6 | 0.0 | 0 | 57.8 |
| 38 | 1 | 317 | 24-Jun | 16:12 | 15 | 24 | 57.8347 | -169.6634 | 62 | 70 | 3.3 | 7.6 | 884.4 | 1477 | 86.9 |
| 39 | 1 | 30 | 24-Jun | 21:01 | 15 | 20 | 57.2764 | -169.5844 | 62 | 62 | 3.4 | 6.8 | 1039.2 | 1576 | 95.8 |
| 40 | 1 | 30 | 25-Jun | 19:15 | 16 | 30 | 56.0042 | -169.9582 | 242 | 255 | 4.0 | 8.0 | 0.0 | 0 | 206.3 |
| 41 | 2 | 30 | 25-Jun | 23:24 | 16 | 21 | 56.3405 | -170.0661 | 108 | 110 | 4.1 | 8.2 | 445.3 | 584 | 8.4 |
| 42 | 2 | 317 | 26-Jun | 2:57 | 16 | 33 | 56.7007 | -170.1214 | 86 | 96 | 4.8 | 7.8 | 133.9 | 187 | 69.5 |
| 43 | 2 | 305 | 26-Jun | 10:50 | 16 | 15 | 57.6475 | -170.2732 | 19 | 74 | 7.5 | 8.2 | 0.0 | 0 | 96.7 |
| 44 | 2 | 317 | 28-Jun | 9:31 | 17 | 18 | 58.4267 | -171.0293 | 36 | 85 | 2.5 | 8.1 | 21.9 | 37 | 161.5 |
| 45 | 2 | 317 | 28-Jun | 13:17 | 17 | 46 | 58.4686 | -171.0585 | 76 | 85 | 0.8 | 7.6 | 384.3 | 837 | 19.0 |
| 46 | 2 | 317 | 28-Jun | 17:53 | 17 | 21 | 58.0541 | -170.9758 | 78 | 87 | 1.7 | 8.2 | 926.2 | 1939 | 33.8 |
| 47 | 2 | 305 | 28-Jun | 19:06 | 17 | 16 | 58.0494 | -170.9752 | 29 | 87 | 3.4 | 8.4 | 0.0 | 0 | 93.2 |
| 48 | 2 | 30 | 28-Jun | 23:31 | 17 | 18 | 57.5637 | -170.8890 | 82 | 85 | 3.9 | 8.6 | 7463.6 | 12457 | 284.6 |
| 49 | 2 | 317 | 29-Jun | 7:37 | 17 | 20 | 57.3384 | -170.8714 | 73 | 84 | 4.2 | 8.5 | 1928.8 | 3458 | 246.2 |
| 50 | 2 | 317 | 29-Jun | 17:55 | 17 | 26 | 56.8475 | -170.7661 | 95 | 104 | 4.5 | 8.6 | 181.6 | 269 | 106.5 |
| 51 | 2 | 317 | 29-Jun | 22:30 | 17 | 39 | 56.5169 | -170.7173 | 67 | 119 | 4.7 | 9.0 | 0.0 | 108 | 17.6 |
| 52 | 2 | 317 | 30-Jun | 2:11 | 17 | 16 | 56.3771 | -170.6958 | 111 | 119 | 4.4 | 8.6 | 494.5 | 710 | 18.9 |
| [5]53 | 2 | 317 | 30-Jun | 19:21 | 16 | 16 | 56.3282 | -170.0191 | 103 | 108 | 4.2 | 8.7 | 2.2 | 4 | - |
| [5]54 | 2 | 317 | 30-Jun | 19:44 | 16 | 15 | 56.3505 | -170.0029 | 102 | 106 | 4.6 | 8.5 | 4.3 | 6 | 0.3 |
| 55 | 2 | 317 | aborted | - | - | - | - | - | - | - | - | - | - | - | - |
| [5]56 | 2 | 317 | 30-Jun | 21:55 | 0 | 15 | 56.3514 | -170.0582 | 105 | 108 | 4.3 | 8.5 | 3.4 | 6 | 11.4 |
| [5]57 | 2 | 317 | 30-Jun | 22:14 | 16 | 15 | 56.3711 | -170.0475 | 107 | 107 | 4.5 | 8.5 | 4.8 | 5 | 0.2 |
| 58 | 1 | 317 | 1-Jul | 4:52 | 0 | 1 | 56.4162 | -169.0569 | - | 54 | - | - | 0.0 | 0 | - |
| [5]59 | 1 | 317 | 2-Jul | 9:02 | 0 | 15 | 54.3188 | -165.9638 | 261 | 380 | 4.0 | 8.9 | 23.9 | 16 | 0.1 |
| [5]60 | 1 | 317 | 2-Jul | 9:26 | 0 | 15 | 54.3018 | -165.9900 | 261 | 421 | 4.0 | 8.9 | 2.3 | 2 | 1.3 |
| [5]61 | 1 | 317 | 2-Jul | 15:57 | 0 | 15 | 54.2091 | -166.1785 | 96 | 172 | 5.0 | 9.2 | 213.1 | 214 | 2.7 |
| [5]62 | 1 | 317 | 2-Jul | 16:21 | 0 | 15 | 54.2229 | -166.1416 | 136 | 274 | 4.5 | 9.2 | 24.5 | 28 | 3.3 |
| 63 | 2 | 317 | 7-Jul | 2:25 | 18 | 15 | 57.0502 | -171.4052 | 99 | 107 | 4.1 | 9.3 | 287.5 | 471 | 34.0 |

Table 2.--Continued.

| Haul | [1]Area | [2]Gear | Date (GMT) | Start time (GMT) | Transect | Duration (min) | [3]Start Position | | Depth (m) | | Temp. (deg C) | | [4]Pollock catch | | Other catch |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Latitude | Longitude | Foot-rope | Bottom | Head-rope | Surface | (kg) | number | (kg) |
| 64 | 2 | 317 | 7-Jul | 7:00 | 18 | 19 | 57.6177 | -171.5047 | 94 | 100 | 4.0 | 9.1 | 1576.8 | 2581 | 55.2 |
| 65 | 2 | 626 | 7-Jul | 9:26 | 18 | 10 | 57.6648 | -171.5055 | 23 | 100 | 8.4 | 9.0 | 0.1 | 51 | 6.3 |
| 66 | 2 | 626 | 8-Jul | 17:13 | 19 | 10 | 58.8692 | -172.3918 | 15 | 100 | 9.0 | 9.4 | 0.2 | 850 | 24.5 |
| 67 | 2 | 317 | 8-Jul | 19:43 | 19 | 30 | 58.6735 | -172.3522 | 86 | 102 | 2.8 | 9.6 | 1000.5 | 1977 | 125.3 |
| 68 | 2 | 317 | 9-Jul | 4:37 | 19 | 14 | 57.3396 | -172.1289 | 92 | 109 | 4.2 | 9.1 | 286.3 | 438 | 54.5 |
| 69 | 2 | 317 | 9-Jul | 17:47 | 19 | 20 | 56.5350 | -171.9246 | 137 | 158 | 4.3 | 9.0 | 28.0 | 32 | 0.4 |
| 70 | 2 | 317 | 10-Jul | 1:12 | 20 | 22 | 57.0029 | -172.6471 | 110 | 122 | 4.1 | 9.3 | 292.0 | 391 | 20.6 |
| 71 | 2 | 317 | 10-Jul | 5:53 | 20 | 20 | 57.5767 | -172.7612 | 110 | 120 | 3.8 | 9.4 | 330.5 | 514 | - |
| 72 | 2 | 317 | 10-Jul | 8:23 | 20 | 8 | 57.7629 | -172.8130 | 98 | 117 | 3.8 | 9.4 | 1700.0 | 3125 | - |
| [5]73 | 2 | 317 | 10-Jul | 11:41 | 20 | 5 | 57.7821 | -172.7144 | 100 | 115 | 3.8 | 9.4 | 95.7 | 187 | - |
| [5]74 | 2 | 317 | 10-Jul | 11:54 | 20 | 11 | 57.7855 | -172.6918 | 72 | 115 | 4.3 | 9.4 | 6.3 | 12 | - |
| 75 | 2 | 317 | 10-Jul | 17:04 | 20 | 5 | 58.0503 | -172.8632 | 93 | 107 | 3.6 | 9.4 | 2223.3 | 4081 | 24.7 |
| 76 | 2 | 317 | 10-Jul | 20:04 | 20 | 6 | 58.3222 | -172.9253 | 90 | 109 | 3.3 | 9.6 | 651.9 | 1299 | 2.0 |
| 77 | 2 | 317 | 11-Jul | 5:24 | 20 | 30 | 59.7127 | -173.2107 | 102 | 94 | - | 9.4 | 543.0 | 900 | 290.2 |
| 78 | 2 | 626 | 11-Jul | 7:04 | 20 | 15 | 59.7103 | -173.2162 | 17 | 94 | 8.2 | 9.4 | 0.1 | 840 | 9.9 |
| 79 | 2 | 305 | 11-Jul | 13:20 | 20 | 15 | 59.9901 | -173.2944 | 12 | 76 | 7.3 | 9.3 | 0.0 | 33 | 67.9 |
| 80 | 2 | 30 | 11-Jul | 23:27 | 21 | 25 | 61.0436 | -174.2402 | 80 | 84 | - | 9.4 | 1083.7 | 1325 | 171.7 |
| [5]81 | 2 | 317 | 12-Jul | 13:05 | 21 | 15 | 59.1277 | -174.0742 | 76 | 119 | 3.1 | 9.7 | 49.8 | 119 | 0.3 |
| [5]82 | 2 | 317 | 12-Jul | 13:27 | 21 | 15 | 59.1282 | -174.1161 | 55 | 120 | 4.4 | 9.6 | 124.1 | 383 | 2.8 |
| 83 | 2 | 317 | 12-Jul | 17:00 | 21 | 34 | 59.1719 | -173.7691 | 97 | 113 | 3.1 | 10.1 | 4579.9 | 9363 | 40.1 |
| 84 | 2 | 317 | 12-Jul | 21:28 | 21 | 18 | 58.8286 | -173.6846 | 83 | 123 | 3.5 | 9.7 | 85.0 | 165 | 9.1 |
| 85 | 2 | 317 | 13-Jul | 9:01 | 21 | 24 | 56.9047 | -173.2316 | 144 | 145 | 4.1 | 9.2 | 33.6 | 59 | - |
| 86 | 2 | 317 | 13-Jul | 10:32 | 21 | 45 | 56.9164 | -173.2345 | 159 | 145 | 4.0 | 9.1 | 183.8 | 342 | 0.0 |
| 87 | 2 | 30 | 13-Jul | 17:23 | 21 | 30 | 56.7034 | -173.1862 | 141 | 141 | 4.0 | 9.1 | 913.3 | 906 | 19.5 |
| 88 | 2 | 317 | 14-Jul | 6:52 | 22 | 10 | 58.9475 | -174.3604 | 102 | 131 | 3.4 | 10.1 | 1412.0 | 2865 | 6.0 |
| [5]89 | 2 | 317 | 14-Jul | 10:01 | 0 | 36 | 59.1255 | -174.4067 | - | 124 | - | - | 0.0 | 0 | - |
| [5]90 | 2 | 317 | 14-Jul | 10:49 | 0 | 27 | 59.0766 | -174.3944 | - | 125 | - | - | 0.0 | 0 | - |
| [5]91 | 2 | 317 | 14-Jul | 12:28 | 22 | 15 | 59.0579 | -174.3733 | 98 | 125 | 3.4 | 10.1 | 81.3 | 274 | - |
| [5]92 | 2 | 317 | 14-Jul | 14:25 | 22 | 15 | 59.0493 | -174.3744 | 74 | 125 | 3.5 | 10.0 | 0.0 | 0 | - |
| 93 | 2 | 317 | 14-Jul | 17:43 | 22 | 8 | 59.3219 | -174.4580 | 80 | 121 | 3.0 | 10.4 | 573.2 | 1390 | 6.1 |
| 94 | 2 | 317 | 14-Jul | 22:53 | 22 | 20 | 60.0654 | -174.6558 | 86 | 108 | 2.4 | 10.6 | 4832.5 | 10861 | 119.5 |
| 95 | 2 | 317 | 15-Jul | 5:10 | 22 | 35 | 60.9009 | -174.8897 | 85 | 95 | 1.3 | 10.1 | 692.0 | 1085 | 270.6 |

Table 2.--Continued.

| Haul | [1]Area | [2]Gear | Date (GMT) | Start time (GMT) | Transect | Duration (min) | [3]Start Position Latitude | Longitude | Depth (m) Foot-rope | Bottom | Temp. (deg C) Head-rope | Surface | [4]Pollock catch (kg) | number | Other catch (kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 96 | 2 | 317 | 15-Jul | 19:12 | 23 | 30 | 61.1707 | -175.6514 | 81 | 101 | 1.4 | 10.2 | 1054.5 | 2338 | 180.5 |
| 97 | 2 | 305 | 15-Jul | 21:07 | 23 | 16 | 61.1501 | -175.6453 | 19 | 101 | 7.3 | 9.8 | 0.6 | 2435 | 27.9 |
| 98 | 2 | 317 | 16-Jul | 2:27 | 23 | 31 | 60.4674 | -175.4430 | 102 | 111 | 2.2 | 10.9 | 135.5 | 856 | 55.6 |
| 99 | 2 | 317 | 16-Jul | 5:34 | 23 | 14 | 60.1681 | -175.3553 | 81 | 115 | 2.6 | 10.7 | 1016.3 | 2783 | 24.8 |
| 100 | 2 | 317 | 16-Jul | 6:48 | 23 | 22 | 60.2178 | -175.3910 | 86 | 114 | 2.9 | 10.6 | 774.8 | 1795 | 36.5 |
| [5]101 | 2 | 317 | 16-Jul | 11:23 | 23 | 19 | 59.8630 | -175.2575 | 98 | 122 | 2.9 | 10.5 | 664.8 | 1719 | 0.3 |
| [5]102 | 2 | 317 | 16-Jul | 13:25 | 23 | 5 | 59.8644 | -175.2441 | 115 | 122 | 2.9 | 10.5 | 0.0 | 0 | - |
| [5]103 | 2 | 317 | 16-Jul | 13:41 | 23 | 11 | 59.8700 | -175.2141 | 61 | 121 | 3.5 | 10.5 | 0.0 | 0 | - |
| 104 | 2 | 317 | 16-Jul | 18:17 | 23 | 4 | 59.5685 | -175.1879 | 99 | 131 | 3.0 | 10.4 | 187.3 | 525 | 6.0 |
| 105 | 2 | 317 | 17-Jul | 7:43 | 24 | 28 | 58.7509 | -175.5971 | 114 | 134 | 3.3 | 9.5 | 159.1 | 224 | 0.1 |
| [5]106 | 2 | 317 | 17-Jul | 10:35 | 24 | 15 | 58.7547 | -175.5946 | 97 | 134 | 3.3 | 9.5 | 0.0 | 0 | - |
| [5]107 | 2 | 317 | 17-Jul | 10:52 | 24 | 26 | 58.7703 | -175.6053 | 101 | 133 | 3.5 | 9.5 | 0.0 | 0 | - |
| [5]108 | 2 | 317 | 17-Jul | 13:12 | 24 | 19 | 58.7624 | -175.6014 | 116 | 134 | 3.4 | 9.5 | 0.0 | 0 | - |
| [5]109 | 2 | 317 | 17-Jul | 13:36 | 24 | 11 | 58.7851 | -175.6208 | 113 | 133 | 3.5 | 9.6 | 0.0 | 0 | - |
| 110 | 2 | 317 | 17-Jul | 17:07 | 24 | 3 | 58.9832 | -175.6567 | 110 | 133 | 2.8 | 10.0 | 501.8 | 1310 | - |
| 111 | 2 | 30 | 17-Jul | 19:48 | 24 | 21 | 59.2128 | -175.7241 | 135 | 137 | 2.5 | 10.3 | 180.8 | 206 | 28.7 |
| 112 | 2 | 317 | 17-Jul | 23:26 | 24 | 11 | 59.5540 | -175.8299 | 125 | 137 | 2.4 | 10.7 | 1235.7 | 3040 | 11.1 |
| 113 | 2 | 317 | 18-Jul | 3:17 | 24 | 7 | 60.0443 | -175.9710 | 122 | 129 | 2.7 | 10.7 | 1309.8 | 4206 | 12.6 |
| 114 | 2 | 317 | 18-Jul | 6:52 | 24 | 20 | 60.3547 | -176.0783 | 72 | 123 | 2.8 | 10.8 | 19.7 | 48 | 18.2 |
| 115 | 2 | 317 | 18-Jul | 9:26 | 24 | 9 | 60.5981 | -176.1420 | 62 | 120 | 4.2 | 11.0 | 764.7 | 1838 | 16.2 |
| 116 | 2 | 317 | 18-Jul | 20:06 | 24 | 30 | 61.3545 | -176.3610 | 93 | 108 | 1.5 | 10.6 | 1047.9 | 2608 | 38.9 |
| 117 | 2 | 305 | 18-Jul | 22:04 | 24 | 15 | 61.3393 | -176.4724 | 26 | 109 | 5.5 | 10.7 | 0.7 | 51090 | 72.8 |
| 118 | 2 | 305 | 18-Jul | 23:19 | 24 | 10 | 61.3552 | -176.3670 | 57 | 108 | 1.8 | 10.6 | 0.0 | 43 | 39.5 |
| 119 | 2 | 317 | 19-Jul | 6:45 | 25 | 15 | 61.4081 | -177.0888 | 105 | 119 | 1.8 | 10.8 | 995.7 | 3795 | 38.3 |
| [5]120 | 2 | 317 | 19-Jul | 11:45 | 25 | 16 | 61.1339 | -176.9982 | 115 | 122 | 2.4 | 11.1 | 336.7 | 1772 | - |
| [5]121 | 2 | 317 | 19-Jul | 12:03 | 25 | 15 | 61.1299 | -177.0358 | 134 | 123 | 2.1 | 11.1 | 149.1 | 711 | - |
| [5]122 | 2 | 317 | 19-Jul | 14:04 | 25 | 13 | 61.1337 | -177.0094 | 112 | 122 | 2.2 | 11.1 | 239.3 | 983 | 0.2 |
| [5]123 | 2 | 317 | 19-Jul | 14:24 | 25 | 18 | 61.1301 | -177.0512 | 68 | 123 | 2.7 | 11.1 | 6.7 | 19 | - |
| 124 | 2 | 317 | 19-Jul | 18:26 | 25 | 7 | 60.8416 | -176.9091 | 114 | 125 | 2.3 | 11.1 | 999.6 | 2678 | - |
| 125 | 2 | 317 | 19-Jul | 23:39 | 25 | 7 | 60.2690 | -176.7617 | 124 | 139 | 2.2 | 10.8 | 975.0 | 2503 | 1.7 |
| 126 | 2 | 30 | 20-Jul | 4:44 | 25 | 20 | 59.6823 | -176.5299 | 132 | 137 | 2.6 | 10.7 | 793.3 | 941 | 74.0 |
| 127 | 2 | 317 | 20-Jul | 10:35 | 25 | 26 | 59.2457 | -176.3777 | 114 | 138 | 2.9 | 10.4 | 350.5 | 569 | 0.6 |

Table 2.--Continued.

| Haul | [1]Area | [2]Gear | Date (GMT) | Start time (GMT) | Transect | Duration (min) | [3]Start Position Latitude | Longitude | Depth (m) Foot-rope | Bottom | Temp. (deg C) Head-rope | Surface | [4]Pollock catch (kg) | number | Other catch (kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 128 | 2 | 317 | 20-Jul | 13:10 | 25 | 3 | 59.3616 | -176.4152 | 62 | 137 | 3.2 | 10.5 | 86.5 | 249 | 1.4 |
| 129 | 2 | 317 | 21-Jul | 6:36 | 26 | 6 | 60.2251 | -177.3764 | 102 | 139 | 2.1 | 10.9 | 959.9 | 3488 | 0.6 |
| 130 | 2 | 317 | 21-Jul | 9:50 | 26 | 24 | 60.5722 | -177.5003 | 51 | 155 | 4.1 | 11.1 | 53.1 | 207 | 6.5 |
| [5]131 | 2 | 317 | 21-Jul | 11:51 | 26 | 17 | 60.5562 | -177.4932 | 136 | 155 | 1.7 | 11.0 | 221.1 | 1583 | - |
| [5]132 | 2 | 317 | 21-Jul | 12:18 | 26 | 31 | 60.5826 | -177.5020 | 60 | 153 | 4.6 | 11.0 | 1.6 | 7 | - |
| 133 | 2 | 317 | 21-Jul | 18:34 | 26 | 11 | 60.9257 | -177.6295 | 121 | 136 | 1.8 | 11.2 | 840.1 | 2989 | 1.7 |
| 134 | 2 | 30 | 21-Jul | 22:31 | 26 | 6 | 61.4083 | -177.8026 | 131 | 134 | 2.0 | 11.4 | 9.5 | 44 | 1.9 |
| 135 | 2 | 317 | 21-Jul | 23:26 | 26 | 6 | 61.4134 | -177.8045 | 123 | 134 | 2.0 | 11.4 | 1413.5 | 8635 | - |
| 136 | 3 | 317 | 22-Jul | 2:41 | 26 | 11 | 61.8156 | -177.9553 | 118 | 129 | 1.9 | 11.2 | 755.5 | 3497 | 2.8 |
| 137 | 3 | 317 | 22-Jul | 6:07 | 26 | 13 | 62.2031 | -178.0996 | 85 | 111 | 1.1 | 11.0 | 3249.4 | 20807 | 42.6 |
| 138 | 3 | 317 | 22-Jul | 20:12 | 27 | 12 | 61.8791 | -178.7012 | 109 | 124 | 1.7 | 10.7 | 809.3 | 2791 | 24.4 |
| 139 | 3 | 30 | 22-Jul | 23:16 | 27 | 14 | 61.6261 | -178.5993 | 140 | 142 | 1.6 | 10.9 | 67.7 | 223 | 18.6 |
| 140 | 3 | 317 | 23-Jul | 1:22 | 27 | 10 | 61.5798 | -178.5824 | 137 | 146 | 1.7 | 11.0 | 73.6 | 245 | - |
| [5]141 | 2 | 317 | 23-Jul | 10:44 | 26 | 37 | 60.1284 | -178.0237 | 106 | 146 | 3.1 | 10.8 | 735.7 | 2157 | 7.2 |
| [5]142 | 2 | 317 | 23-Jul | 11:23 | 26 | 25 | 60.1136 | -177.9484 | 123 | 145 | 2.2 | 10.8 | 0.0 | 0 | - |
| 143 | 2 | 317 | 24-Jul | 11:27 | 27 | 5 | 60.0391 | -178.6673 | 95 | 139 | 3.3 | 10.7 | 14.1 | 58 | 1.2 |
| 144 | 2 | 317 | 24-Jul | 12:58 | 28 | 13 | 60.0229 | -178.6563 | 138 | 139 | 3.3 | 10.6 | 308.5 | 1195 | 1.8 |
| 145 | 3 | 317 | 25-Jul | 0:32 | 28 | 10 | 61.6129 | -179.3103 | 129 | 136 | 1.7 | 11.1 | 844.0 | 2921 | 7.4 |
| 146 | 3 | 317 | 25-Jul | 3:48 | 28 | 24 | 61.9475 | -179.4694 | 119 | 128 | 1.7 | 10.9 | 1164.0 | 3000 | 11.9 |
| 147 | 3 | 30 | 25-Jul | 7:59 | 28 | 15 | 62.4257 | -179.6552 | 108 | 107 | 1.6 | 10.6 | 2511.7 | 4166 | 346.3 |
| 148 | 3 | 317 | 25-Jul | 10:32 | 28 | 15 | 62.3562 | -179.6966 | 112 | 122 | 1.6 | 10.7 | 841.1 | 2075 | 1.6 |
| 149 | 3 | 317 | 25-Jul | 15:08 | 29 | 10 | 62.2487 | 179.6700 | 89 | 96 | 3.1 | 10.1 | 135.0 | 346 | 8.6 |
| 150 | 3 | 317 | 25-Jul | 18:24 | 29 | 6 | 62.0775 | 179.7490 | 101 | 109 | 1.9 | 10.4 | 1472.9 | 4488 | 69.1 |
| 151 | 3 | 317 | 26-Jul | 22:43 | 29 | 12 | 61.3078 | -179.8870 | 143 | 150 | 1.4 | 11.3 | 75.9 | 317 | 6.5 |
| 152 | 3 | 317 | 27-Jul | 1:24 | 29 | 9 | 61.0951 | -179.8117 | 165 | 172 | 1.4 | 11.2 | 1366.5 | 5466 | 1.2 |
| 153 | 3 | 317 | 27-Jul | 7:18 | 30 | 2 | 61.0069 | 179.5352 | 159 | 178 | 1.5 | 11.2 | 909.2 | 2690 | 0.5 |
| 154 | 3 | 317 | 27-Jul | 11:23 | 30 | 8 | 61.0667 | 179.5053 | 140 | 162 | 1.4 | 11.1 | 511.0 | 1558 | - |

[1]Area: 1 = U.S.-east of 170$^{o}$W longitude, 2 = U.S.-west of 170$^{o}$W longitude, 3 = Russia-Cape Navarin.
[2]Gear type: 317 = Aleutian wing trawl, 30 = 83/112 bottom trawl, 626 = Methot trawl, 305 = Marinovich trawl.
[3]Start position: (+) latitude = degrees N, (-) longitude = degrees W, and (+) longitude = degrees E.
[4]Young of the year pollock were caught in Methot and Marinovich trawls where number > 0 and kg = 0.0 (pollock weighed less than 0.05 kg).
[5]Experimental trawl using a Multiple Opening-Closing (MOC) codend.

Table 3.--Catch by species from 87[1] of 117 Aleutian Wing trawl hauls conducted during the summer 2004 pollock echo integration-trawl survey of the Bering Sea Shelf, MF2004-08.

| Common name | Scientific name | Weight (kg) | Weight (%) | Number |
|---|---|---|---|---|
| walleye pollock | *Theragra chalcogramma* | 71,472.6 | 94.6 | 175,919 |
| jellyfish | Cnidaria | 3,535.5 | 4.7 | 3,635 |
| Pacific herring | *Clupea pallasi* | 171.6 | 0.2 | 667 |
| chum salmon | *Oncorhynchus keta* | 150.5 | 0.2 | 62 |
| Pacific sleeper shark | *Somniosus pacificus* | 90.1 | 0.1 | 4 |
| Pacific cod | *Gadus macrocephalus* | 22.2 | <0.1 | 6 |
| smooth lumpsucker | *Aptocyclus ventricosus* | 18.7 | <0.1 | 8 |
| lumpsucker | Cyclopteninae | 11.2 | <0.1 | 5 |
| flathead sole | *Hippoglossoides elassodon* | 10.0 | <0.1 | 25 |
| rock sole sp. [2] | *Lepidopsetta* sp. | 6.2 | <0.1 | 17 |
| longnose lancetfish | *Alepisaurus ferox* | 5.6 | <0.1 | 1 |
| chinook salmon | *Oncorhynchus tshawytscha* | 4.7 | <0.1 | 1 |
| Atka mackerel | *Pleurogrammus monopterygius* | 3.5 | <0.1 | 4 |
| arrowtooth flounder | *Atheresthes stomias* | 3.3 | <0.1 | 4 |
| prowfish | *Zaprora silenus* | 2.0 | <0.1 | 3 |
| Bering wolffish | *Anarhichas orientalis* | 1.6 | <0.1 | 1 |
| yellowfin sole | *Limanda aspera* | 1.4 | <0.1 | 3 |
| lamprey | *Lampetra* sp. | 1.3 | <0.1 | 5 |
| magistrate armhook squid | *Berryteuthis magister* | 0.5 | <0.1 | 1 |
| eulachon | *Thaleichthys pacificus* | 0.4 | <0.1 | 9 |
| sturgeon poacher | *Podothecus acipenserinus* | <0.1 | <0.1 | 1 |
| shrimp | *Pandalus* sp. | <0.1 | <0.1 | 2 |
| squid | Teuthoidea | <0.1 | <0.1 | 1 |
| Totals | | 75,512.9 | | 180,384 |

[1] Data from experimental and aborted trawl hauls were not used for catch composition.

[2] Within the rock sole species, one was a southern rock sole (*Lepidopsetta bilineata* ) and three were northern rock sole (*Lepidopsetta polyxystra* ).

Table 4.--Catch by species from 20, 83/112 bottom trawl hauls conducted during the summer 2004 pollock echo integration-trawl survey of the Bering Sea shelf, MF2004-08.

| Common name | Scientific name | Weight (kg) | Weight (%) | Number |
|---|---|---|---|---|
| walleye pollock | *Theragra chalcogramma* | 19,925.6 | 88.1 | 28,697 |
| jellyfish sp. | Cnidaria | 698.9 | 3.1 | 839 |
| Pacific cod | *Gadus macrocephalus* | 425.1 | 1.9 | 153 |
| flathead sole | *Hippoglossoides elassodon* | 232.2 | 1.0 | 600 |
| Pacific ocean perch | *Sebastes alutus* | 206.3 | 0.9 | 235 |
| [1]rock sole sp. | *Lepidopsetta* sp. | 188.9 | 0.8 | 544 |
| yellowfin sole | *Limanda aspera* | 173.3 | 0.8 | 494 |
| Pacific sea lemon | *Anisodoris nobilis* | 172.6 | 0.8 | 481 |
| sponge sp. | Porifera | 113.8 | 0.5 | 1 |
| arrowtooth flounder | *Atheresthes stomias* | 103.6 | 0.5 | 207 |
| starfish sp. | Asteroidea | 58.5 | 0.3 | 467 |
| Alaska plaice | *Pleuronectes quadrituberculatus* | 42.6 | 0.2 | 41 |
| Tanner crab sp. | *Chionoecetes* sp. | 38.3 | 0.2 | 187 |
| hermit crab sp. | Paguridae | 34.5 | 0.2 | 563 |
| snail sp. | Gastropoda | 30.0 | 0.1 | 257 |
| sea anemone sp. | Actiniaria | 26.4 | 0.1 | 57 |
| Greenland turbot | *Reinhardtius hippoglossoides* | 16.8 | 0.1 | 5 |
| blue king crab | *Paralithodes platypus* | 16.7 | 0.1 | 25 |
| arrowtooth flounder | *Atheresthes stomias* | 9.0 | <0.1 | 10 |
| chum salmon | *Oncorhynchus keta* | 8.1 | <0.1 | 3 |
| shrimp sp. | Decapoda | 8.0 | <0.1 | 2,478 |
| Alaska skate | *Bathyraja parmifera* | 7.8 | <0.1 | 1 |
| longnose skate | *Raja rhina* | 6.5 | <0.1 | 1 |
| yellow Irish lord | *Hemilepidotus jordani* | 6.4 | <0.1 | 9 |
| roughshoulder skate | *Raja badia* | 6.0 | <0.1 | 5 |
| whelk sp. | Buccinidae | 5.8 | <0.1 | 112 |
| basketstar | *Gorgonocephalus eucnemis* | 5.7 | <0.1 | 16 |
| spinyhead sculpin | *Dasycottus setiger* | 5.2 | <0.1 | 1 |
| bigmouth sculpin | *Hemitripterus bolini* | 4.4 | <0.1 | 1 |
| threaded sculpin | *Gymnocanthus pistilliger* | 3.8 | <0.1 | 1 |
| red king crab | *Paralithodes camtschaticus* | 3.6 | <0.1 | 2 |
| Pacific staghorn sculpin | *Leptocottus armatus* | 3.5 | <0.1 | 2 |
| Pacific herring | *Clupea pallasi* | 3.2 | <0.1 | 16 |
| great sculpin | *Myoxocephalus polyacanthocephalus* | 2.6 | <0.1 | 3 |
| sculpin sp. | Cottidae | 2.5 | <0.1 | 4 |
| Pacific halibut | *Hippoglossus stenolepis* | 1.9 | <0.1 | 5 |
| wattled eelpout | *Lycodes palearis* | 1.8 | <0.1 | 21 |
| purple-orange sea star | *Asterias amurensis* | 1.7 | <0.1 | 10 |
| Pacific herring | *Clupea pallasi* | 1.7 | <0.1 | 7 |
| sea urchin sp. | Echinacea | 1.5 | <0.1 | 5 |

Table 4.--Continued.

| Common name | Scientific name | Weight (kg) | Weight (%) | Number |
|---|---|---|---|---|
| eelpout sp. | Zoarcidae | 1.4 | <0.1 | 14 |
| Kamchatka flounder | *Atheresthes evermanni* | 1.3 | <0.1 | 2 |
| Pribilof whelk | *Neptunea pribiloffensis* | 1.3 | <0.1 | 8 |
| sea potato | *Styela rustica* | 1.1 | <0.1 | 18 |
| big skate | *Raja binoculata* | 1.1 | <0.1 | 1 |
| tunicate sp. | Ascidiacea | 0.9 | <0.1 | 6 |
| Kamchatka flounder | *Atheresthes evermanni* | 0.6 | <0.1 | 2 |
| snow crab | *Chionoecetes opilio* | 0.6 | <0.1 | 3 |
| spinyhead sculpin | *Dasycottus setiger* | 0.4 | <0.1 | 1 |
| sturgeon poacher | *Podothecus acipenserinus* | 0.4 | <0.1 | 6 |
| scissortail sculpin | *Triglops forficata* | 0.3 | <0.1 | 11 |
| scallop sp. | Pectinidae | 0.3 | <0.1 | 1 |
| sea mouse sp. | Aphroditidae | 0.2 | <0.1 | 4 |
| Arctic shanny | *Stichaeus punctatus* | 0.2 | <0.1 | 1 |
| daubed shanny | *Lumpenus maculatus* | 0.1 | <0.1 | 7 |
| eulachon | *Thaleichthys pacificus* | 0.1 | <0.1 | 2 |
| thorny sculpin | *Icelus spiniger* | 0.1 | <0.1 | 4 |
| salmon snailfish | *Careproctus rastrinus* | 0.1 | <0.1 | 1 |
| spider crab sp. | Majidae | 0.1 | <0.1 | 3 |
| Pacific lyre crab | *Hyas lyratus* | 0.1 | <0.1 | 2 |
| spectacled sculpin | *Triglops scepticus* | 0.1 | <0.1 | 2 |
| crab sp. | Decapoda | 0.1 | <0.1 | 2 |
| thorny sculpin | *Icelus spiniger* | 0.1 | <0.1 | 3 |
| longnose poacher | *Leptagonus leptorhynchus* | <0.1 | <0.1 | 1 |
| brittlestarfish sp. | Ophiuroidea | <0.1 | <0.1 | 2 |
| lyre crab sp. | *Hyas* sp. | <0.1 | <0.1 | 1 |
| Totals | | 22,615.8 | | 36,674 |

[1] Within the rock sole species, 79 were northern rock sole (*Lepidopsetta polyxystra* ).

Table 5.--Catch by species from nine Marinovich pelagic trawl hauls conducted during the summer 2004 pollock echo integration-trawl survey of the Bering Sea shelf, MF2004-08.

| Common name | Scientific name | Weight (kg) | Weight (%) | Number |
|---|---|---|---|---|
| chrysaora jellyfish | *Chrysaora* sp. | 424.2 | 90.4 | 543 |
| jellyfish sp. | Scyphozoa | 28.8 | 6.1 | 35 |
| aequorea jellyfish | *Aequorea* sp. | 14.8 | 3.2 | 44 |
| walleye pollock | *Theragra chalcogramma* | 1.3 | 0.3 | 53,701 |
| euphausiid sp. | Euphausiacea | <0.1 | <0.1 | 110 |
| squid sp. | Teuthoida | <0.1 | <0.1 | 3 |
| flatfish larvae | Pleuronectidae | <0.1 | <0.1 | 4 |
| isopod sp. | Isopoda | <0.1 | <0.1 | 1 |
| Totals | | 469.1 | | 54,441 |

Table 6.--Catch by species from eight Methot pelagic trawl hauls conducted during the summer 2004 pollock echo integration-trawl survey of the Bering Sea shelf, MF2004-08.

| Common name | Scientific name | Weight (kg) | Weight (%) | Number |
|---|---|---|---|---|
| chrysaora jellyfish | *Chrysaora* sp. | 35.8 | 68.2 | 46 |
| jellyfish sp. | Scyphozoa | 7.3 | 13.8 | 23 |
| euphausiid sp. | Euphausiacea | 3.7 | 7.0 | 44,797 |
| aequorea jellyfish | *Aequorea* sp. | 2.8 | 5.4 | 9 |
| amphipod sp. | Amphipoda | 2.0 | 3.8 | 2 |
| walleye pollock | *Theragra chalcogramma* | 0.9 | 1.7 | 3,097 |
| sculpin sp. | Cottidae | <0.1 | <0.1 | 1 |
| prowfish | *Zaprora silenus* | <0.1 | <0.1 | 3 |
| Pacific sand lance | *Ammodytes hexapterus* | <0.1 | <0.1 | 2 |
| isopod sp. | Isopoda | <0.1 | <0.1 | 4 |
| flatfish larvae | Pleuronectidae | <0.1 | <0.1 | 15 |
| fish sp. | Pisces | <0.1 | <0.1 | 1 |
| eulachon | *Thaleichthys pacificus* | <0.1 | <0.1 | 1 |
| Totals | | 52.5 | | 48,001 |

Table 7.--Numbers of walleye pollock biological samples collected during the summer 2004 pollock echo integration-trawl survey of the Bering Sea shelf, MF2004-08.

| Haul | Length | Maturity | Weight | Age | Stomach | YOY | TINRO collection[1] | VNIRO collection[2] |
|---|---|---|---|---|---|---|---|---|
| 1 | 154 | 38 | 37 | 38 | - | - | - | - |
| 2 | - | - | - | - | - | 50 | - | - |
| 3 | 394 | 54 | 54 | 54 | - | - | - | - |
| 4 | - | - | - | - | - | 50 | - | - |
| 5 | 411 | 44 | 44 | 44 | - | - | 50 | - |
| 6 | - | - | - | - | - | - | - | - |
| 7 | 416 | 42 | 42 | 42 | - | - | 50 | - |
| 8 | 341 | 42 | 42 | 42 | - | - | - | - |
| 9 | 371 | 36 | 36 | 36 | - | - | - | - |
| 10 | - | - | - | - | - | - | - | - |
| 11 | 251 | 50 | 50 | 50 | - | - | - | - |
| 12 | 383 | 36 | 36 | 36 | - | - | 50 | - |
| 13 | - | - | - | - | - | - | - | - |
| 14 | 424 | 49 | 49 | 49 | - | - | - | - |
| 15 | 335 | 39 | 39 | 39 | - | - | - | - |
| 16 | - | - | - | - | - | - | - | - |
| 17 | 205 | 37 | 37 | 37 | - | - | 50 | - |
| 18 | 451 | 60 | 60 | 60 | - | - | 50 | 50 |
| 19 | 373 | 35 | 35 | 35 | - | - | - | - |
| 20 | 26 | - | - | - | - | - | - | - |
| 21 | 3 | - | - | - | - | - | - | - |
| 22 | 8 | 8 | 8 | 8 | - | - | - | - |
| 23 | 330 | 35 | 35 | 35 | - | - | 50 | 50 |
| 24 | 467 | 63 | 63 | 63 | - | - | - | 50 |
| 25 | - | - | - | - | - | - | - | - |
| 26 | 359 | 64 | 64 | 64 | - | - | - | 50 |
| 27 | 300 | 42 | 42 | 42 | - | - | - | - |
| 28 | 240 | 33 | 33 | 33 | - | - | 50 | - |
| 29 | 347 | 53 | 53 | 53 | - | - | - | 50 |
| 30 | 361 | 37 | 37 | 37 | - | - | - | - |
| 31 | 310 | 35 | 35 | 35 | - | - | - | - |
| 32 | 261 | 38 | 38 | 38 | - | - | - | - |
| 33 | 284 | 35 | 35 | 35 | - | - | - | - |
| 34 | - | - | - | - | - | - | - | - |
| 35 | - | - | - | - | - | - | - | - |
| 36 | 338 | 52 | 52 | 52 | - | - | - | - |
| 37 | - | - | - | - | - | - | - | - |
| 38 | 346 | 52 | 52 | 52 | - | - | - | 50 |
| 39 | 392 | 43 | 43 | 43 | - | - | 50 | - |
| 40 | - | - | - | - | - | - | - | - |
| 41 | 380 | 38 | 38 | 38 | - | - | 50 | 21 |
| 42 | 187 | 35 | 35 | 35 | - | - | - | - |
| 43 | - | - | - | - | - | - | - | - |
| 44 | 37 | 37 | 37 | 37 | - | - | - | - |

Table 7.--Continued.

| Haul | Length | Maturity | Weight | Age | Stomach | YOY | TINRO collection[1] | VNIRO collection[2] |
|---|---|---|---|---|---|---|---|---|
| 45 | 414 | 44 | 44 | 44 | - | - | - | 71 |
| 46 | 377 | 66 | 66 | 66 | - | - | - | - |
| 47 | - | - | - | - | - | - | - | - |
| 48 | 337 | 35 | - | 35 | - | - | 50 | - |
| 49 | 329 | 36 | 36 | 36 | - | - | - | - |
| 50 | 269 | 48 | 48 | 48 | - | - | - | - |
| 51 | - | - | - | - | - | 51 | - | - |
| 52 | 322 | 42 | 42 | 42 | - | - | - | - |
| 53 | 4 | - | - | - | - | - | - | - |
| 54 | 6 | - | - | - | - | - | - | - |
| 55 | - | - | - | - | - | - | - | - |
| 56 | 6 | - | - | - | - | - | - | - |
| 57 | 5 | - | - | - | - | - | - | - |
| 58 | - | - | - | - | - | - | - | - |
| 59 | 16 | - | - | - | - | - | - | - |
| 60 | 2 | - | - | - | - | - | - | - |
| 61 | 214 | - | - | - | - | - | - | - |
| 62 | 28 | - | - | - | - | - | - | - |
| 63 | 269 | 40 | 40 | 40 | - | - | 50 | 30 |
| 64 | 285 | 44 | 44 | 44 | - | - | - | - |
| 65 | - | - | - | - | - | 49 | - | - |
| 66 | - | - | - | - | - | 47 | - | - |
| 67 | 399 | 58 | 58 | 58 | - | - | 50 | 50 |
| 68 | 310 | 46 | 46 | 46 | - | - | - | - |
| 69 | 32 | 32 | 32 | 32 | - | - | - | - |
| 70 | 277 | 40 | 40 | 40 | - | - | - | 30 |
| 71 | 514 | 39 | 39 | 39 | - | - | - | - |
| 72 | 314 | 30 | 30 | 30 | - | - | - | - |
| 73 | 187 | 63 | 63 | 63 | - | - | - | - |
| 74 | 12 | 12 | 12 | 12 | - | - | - | - |
| 75 | 385 | 50 | 50 | 50 | - | - | 50 | 50 |
| 76 | 394 | 41 | 41 | 41 | - | - | - | - |
| 77 | 299 | 38 | 38 | 38 | - | - | - | - |
| 78 | - | - | - | - | - | 63 | - | - |
| 79 | - | - | - | - | - | 32 | - | - |
| 80 | 284 | 38 | 38 | 38 | - | - | 50 | 73 |
| 81 | 119 | - | - | - | - | - | - | - |
| 82 | 383 | - | - | - | - | - | - | - |
| 83 | 376 | 47 | 47 | 47 | - | - | - | 50 |
| 84 | 165 | - | - | - | - | - | - | - |
| 85 | 59 | - | - | - | - | - | - | - |
| 86 | 310 | 35 | 35 | 35 | - | - | - | - |
| 87 | 340 | 43 | 43 | 43 | - | - | - | 50 |
| 88 | 320 | 35 | 35 | 35 | - | - | - | - |
| 89 | - | - | - | - | - | - | - | - |
| 90 | - | - | - | - | - | - | - | - |

Table 7.--Continued.

| Haul | Length | Maturity | Weight | Age | Stomach | YOY | TINRO collection[1] | VNIRO collection[2] |
|---|---|---|---|---|---|---|---|---|
| 91 | 175 | - | - | - | - | - | - | - |
| 92 | - | - | - | - | - | - | - | - |
| 93 | 421 | 53 | 53 | 53 | - | - | - | 50 |
| 94 | 508 | 65 | 65 | 65 | - | - | 50 | - |
| 95 | 300 | 29 | 29 | 29 | - | - | - | - |
| 96 | 363 | 45 | 45 | 45 | - | - | 50 | 40 |
| 97 | - | - | - | - | - | 124 | - | - |
| 98 | 199 | 27 | 27 | 27 | - | - | 50 | - |
| 99 | 441 | 41 | 41 | 41 | - | - | - | - |
| 100 | 383 | 25 | 25 | 25 | - | - | - | - |
| 101 | 273 | 36 | 36 | 36 | - | - | - | - |
| 102 | - | - | - | - | - | - | - | - |
| 103 | - | - | - | - | - | - | - | - |
| 104 | 525 | 57 | 57 | 57 | - | - | - | - |
| 105 | 224 | 22 | 22 | 22 | - | - | - | - |
| 106 | - | - | - | - | - | - | - | - |
| 107 | - | - | - | - | - | - | - | - |
| 108 | - | - | - | - | - | - | - | - |
| 109 | - | - | - | - | - | - | - | - |
| 110 | 407 | 29 | 29 | 29 | - | - | - | 19 |
| 111 | 140 | 29 | 29 | 29 | - | - | - | 43 |
| 112 | 397 | 29 | 29 | 29 | - | - | 50 | - |
| 113 | 448 | 28 | 28 | 28 | - | - | - | - |
| 114 | 48 | - | - | - | - | - | - | - |
| 115 | 316 | 24 | 24 | 24 | - | - | - | - |
| 116 | 382 | 28 | 28 | 28 | - | - | - | 40 |
| 117 | - | - | - | - | - | 115 | - | - |
| 118 | - | - | - | - | - | 44 | - | - |
| 119 | 388 | 57 | 57 | 57 | - | - | - | - |
| 120 | | | | | | | | |
| 121 | 278 | - | - | - | - | - | - | - |
| 122 | 605 | - | - | - | - | - | - | - |
| 123 | 19 | - | - | - | - | - | - | - |
| 124 | 393 | 29 | 29 | 29 | - | - | - | 50 |
| 125 | 387 | 29 | 29 | 29 | - | - | 50 | - |
| 126 | 377 | 20 | 20 | 20 | - | - | - | - |
| 127 | 292 | - | - | - | - | - | - | - |
| 128 | 249 | 21 | 21 | 21 | - | - | - | - |
| 129 | 392 | 64 | 64 | 64 | - | - | - | - |
| 130 | 207 | 32 | 32 | 32 | - | - | - | - |
| 131 | 346 | 40 | 40 | 40 | - | - | - | - |
| 132 | 7 | - | - | - | - | - | 50 | - |
| 133 | 551 | 38 | 38 | 38 | - | - | - | 37 |
| 134 | 44 | - | - | - | - | - | - | 11 |
| 135 | 841 | 55 | 55 | 55 | 44 | - | - | 35 |
| 136 | 567 | 41 | 41 | 41 | 20 | - | - | - |

Table 7.--Continued.

| Haul | Length | Maturity | Weight | Age | Stomach | YOY | TINRO collection[1] | VNIRO collection[2] |
|---|---|---|---|---|---|---|---|---|
| 137 | 433 | 40 | 40 | 40 | 20 | - | - | - |
| 138 | 535 | 48 | 48 | 48 | 19 | - | 50 | 43 |
| 139 | 223 | - | - | - | - | - | - | 7 |
| 140 | 245 | 30 | 30 | 30 | 5 | - | - | - |
| 141 | 349 | - | - | - | - | - | - | - |
| 142 | - | - | - | - | - | - | - | - |
| 143 | 58 | - | - | - | - | - | - | - |
| 144 | 354 | 35 | 35 | 35 | - | - | - | - |
| 145 | 508 | 32 | 32 | 32 | 24 | - | 50 | 39 |
| 146 | 350 | 26 | 26 | 26 | 25 | - | 50 | - |
| 147 | 525 | 29 | 29 | 29 | 24 | - | - | - |
| 148 | 308 | 23 | 23 | 23 | 23 | - | - | - |
| 149 | 346 | 30 | 30 | 30 | 17 | - | - | - |
| 150 | 457 | 36 | 36 | 36 | 18 | - | - | 50 |
| 151 | 317 | 36 | 36 | 36 | 21 | - | - | - |
| 152 | 451 | 35 | 35 | 35 | 25 | - | 50 | 28 |
| 153 | 312 | 25 | 25 | 25 | 23 | - | - | 30 |
| 154 | 316 | 30 | 30 | 30 | - | - | - | - |
| Totals | 35,827 | 3,712 | 3,676 | 3,787 | 308 | 625 | 1,200 | 1,247 |

[1] TINRO Center biological sampling includes length, weight, sex, maturity, otolith and stomach content sampling.

[2] VNIRO Institute biological sampling includes length, weight, sex, maturity, stomach content, liver weight, gonad weight, spleen weight, heart weight, and otolith collection

Table 8.--Abundance of pollock by area from summer echo integration-trawl surveys on the U.S. EEZ portion of the Bering Sea shelf, 1994-2004. Data are estimated pollock biomass between near surface and 3 m off bottom. Relative estimation error for the acoustic data is indicated.

| **Date** | | **Area** $(nmi)^2$ | **Biomass (million metric tons, top) and percent of total (bottom)** SCA | E170-SCA | W170 | **Total Biomass (million metric tons)** | **Relative estimation error** |
|---|---|---|---|---|---|---|---|
| **Summer** | 9 Jul-19 Aug | 78,251 | 0.312 | 0.399 | 2.18 | 2.89 | 0.047 |
| **1994** | | | 10.8 | 13.8 | 75.4 | | |
| **Summer** | 20 Jul-30 Aug | 93,810 | 0.215 | 0.269 | 1.83 | 2.31 | 0.039 |
| **1996** | | | 9.3 | 11.7 | 79.0 | | |
| **Summer** | 17 Jul-4 Sept | 102,770 | 0.246 | 0.527 | 1.82 | 2.59 | 0.037 |
| **1997** | | | 9.5 | 20.3 | 70.2 | | |
| **Summer** | 7 Jun-5 Aug | 103,670 | 0.299 | 0.579 | 2.41 | 3.29 | 0.055 |
| **1999** | | | 9.1 | 17.6 | 73.2 | | |
| **Summer** | 7 Jun-2 Aug | 106,140 | 0.393 | 0.498 | 2.16 | 3.05 | 0.032 |
| **2000** | | | 12.9 | 16.3 | 70.8 | | |
| **Summer** | 4 Jun -30 Jul | 99,526 | 0.647 | 0.797 | 2.18 | 3.62 | 0.031 |
| **2002** | | | 17.9 | 22.0 | 60.1 | | |
| **Summer** | 4 Jun -29 Jul | 99,659 | 0.498 | 0.516 | 2.29 | 3.31 | 0.037 |
| **2004** | | | 15.1 | 15.6 | 69.3 | | |

SCA = Sea lion Conservation Area
E170 - SCA = East of 170°W minus SCA
W170 = West of 170°W

Table 9.--Estimated length composition (numbers in millions, and biomass in metric tons) of pollock between near surface and 3 m off bottom from U.S. Bering Sea shelf echo integration-trawl surveys, 1994-2004. The 1999 estimates exclude fish from additional sampling in the "horseshoe area" between Unimak and 167°W.

| Length | 1994 | | 1996 | | 1997 | | 1999 | | 2000 | | 2002 | | 2004 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| cm | numbers | biomass | numbers | biomass | numbers | biomass | numbers | biomass | numbers | biomass | numbers | biomass | numbers | biomass |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.03 | <1 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0.01 | <1 | 0.03 | <1 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 0 | 0 | 2.04 | 14 | 0.12 | 1 | 0.76 | 8 | 0.01 | 0 | 0.24 | 2 |
| 11 | 0.40 | 4 | 0 | 0 | 0.19 | 2 | 4.78 | 59 | 2.30 | 30 | 0.77 | 9 | 0.20 | 2 |
| 12 | 5.44 | 71 | 0.47 | 6 | 30.13 | 394 | 14.43 | 227 | 5.50 | 88 | 4.70 | 75 | 2.56 | 30 |
| 13 | 44.79 | 744 | 5.44 | 92 | 238.10 | 4,148 | 22.71 | 445 | 19.26 | 370 | 21.36 | 428 | 2.38 | 36 |
| 14 | 94.23 | 1,937 | 38.20 | 804 | 1,416.21 | 31,282 | 22.35 | 538 | 36.70 | 859 | 100.48 | 2,488 | 4.08 | 81 |
| 15 | 179.82 | 4,520 | 131.29 | 3,384 | 2,949.25 | 81,544 | 16.20 | 472 | 56.69 | 1,613 | 194.98 | 5,841 | 1.84 | 48 |
| 16 | 166.05 | 5,040 | 227.77 | 7,098 | 3,364.00 | 111,182 | 5.20 | 181 | 79.57 | 2,713 | 178.72 | 6,393 | 1.80 | 57 |
| 17 | 105.16 | 3,817 | 317.31 | 11,818 | 2,207.83 | 84,460 | 5.20 | 214 | 50.81 | 2,055 | 99.74 | 4,231 | 1.76 | 67 |
| 18 | 129.71 | 5,553 | 215.26 | 9,485 | 1,309.13 | 58,223 | 12.92 | 623 | 22.39 | 1,064 | 33.47 | 1,664 | 1.12 | 50 |
| 19 | 212.54 | 10,655 | 115.39 | 5,960 | 569.51 | 28,768 | 44.60 | 2,499 | 30.27 | 1,677 | 40.07 | 2,284 | 4.34 | 210 |
| 20 | 381.96 | 22,244 | 64.79 | 3,892 | 181.06 | 10,677 | 152.57 | 9,852 | 47.16 | 3,017 | 61.90 | 4,072 | 8.40 | 498 |
| 21 | 589.69 | 39,601 | 37.20 | 2,579 | 74.90 | 4,900 | 251.49 | 18,587 | 92.37 | 6,782 | 162.63 | 12,242 | 23.15 | 1,595 |
| 22 | 794.28 | 61,100 | 64.41 | 5,121 | 81.07 | 6,101 | 314.31 | 26,421 | 136.41 | 11,419 | 289.69 | 24,828 | 34.90 | 2,730 |
| 23 | 788.35 | 69,048 | 60.24 | 5,458 | 150.80 | 12,962 | 288.90 | 27,464 | 185.76 | 17,629 | 485.72 | 47,351 | 47.06 | 4,265 |
| 24 | 772.58 | 76,622 | 70.32 | 7,221 | 255.93 | 24,999 | 220.31 | 23,562 | 186.04 | 19,911 | 734.73 | 81,309 | 48.21 | 4,887 |
| 25 | 581.45 | 64,967 | 47.68 | 5,520 | 408.07 | 45,081 | 164.37 | 19,681 | 207.95 | 24,970 | 859.82 | 107,760 | 39.35 | 4,475 |
| 26 | 372.26 | 46,652 | 38.32 | 4,979 | 458.83 | 56,998 | 188.58 | 25,168 | 186.91 | 25,070 | 832.36 | 117,666 | 32.49 | 4,347 |
| 27 | 198.97 | 27,847 | 33.63 | 4,884 | 519.67 | 72,339 | 256.04 | 37,933 | 187.68 | 28,002 | 718.04 | 113,478 | 25.99 | 3,876 |
| 28 | 122.07 | 19,028 | 60.16 | 9,721 | 422.68 | 65,700 | 302.47 | 49,557 | 168.93 | 27,927 | 516.42 | 89,827 | 29.43 | 4,813 |
| 29 | 135.90 | 23,550 | 85.07 | 15,240 | 296.50 | 51,328 | 419.16 | 75,679 | 164.76 | 30,072 | 491.26 | 92,941 | 69.82 | 12,745 |
| 30 | 138.25 | 26,437 | 122.81 | 24,307 | 175.36 | 33,691 | 435.28 | 86,321 | 167.17 | 33,574 | 507.57 | 104,158 | 90.09 | 17,942 |
| 31 | 178.83 | 37,756 | 183.98 | 40,104 | 115.83 | 24,685 | 417.13 | 90,579 | 169.72 | 37,396 | 592.86 | 132,640 | 148.82 | 32,663 |
| 32 | 234.80 | 54,180 | 240.98 | 57,669 | 79.12 | 18,522 | 410.19 | 97,251 | 167.23 | 40,301 | 539.68 | 131,538 | 151.19 | 36,257 |
| 33 | 239.39 | 60,378 | 341.56 | 89,480 | 69.15 | 17,709 | 372.65 | 96,204 | 188.70 | 49,614 | 533.40 | 141,718 | 180.25 | 48,265 |
| 34 | 291.50 | 80,001 | 408.41 | 116,812 | 68.83 | 19,201 | 393.58 | 110,357 | 221.59 | 63,403 | 421.17 | 122,045 | 185.43 | 53,459 |
| 35 | 296.57 | 88,546 | 458.38 | 142,771 | 89.48 | 27,148 | 415.94 | 126,368 | 332.90 | 103,387 | 291.90 | 92,414 | 237.90 | 74,135 |
| 36 | 326.66 | 105,903 | 477.95 | 161,724 | 146.28 | 48,272 | 433.11 | 142,256 | 360.41 | 121,237 | 239.36 | 82,291 | 302.68 | 103,401 |
| 37 | 343.99 | 120,806 | 400.98 | 147,067 | 220.62 | 79,075 | 393.54 | 139,441 | 414.22 | 150,552 | 218.57 | 81,503 | 430.24 | 156,813 |
| 38 | 305.79 | 116,110 | 333.42 | 132,264 | 321.35 | 124,841 | 403.47 | 153,908 | 369.24 | 144,826 | 222.31 | 88,680 | 476.40 | 188,084 |
| 39 | 294.82 | 121,143 | 253.70 | 108,629 | 397.12 | 166,999 | 359.07 | 147,178 | 344.63 | 145,465 | 218.51 | 93,405 | 539.43 | 229,225 |
| 40 | 311.31 | 137,651 | 214.24 | 98,825 | 397.83 | 180,668 | 304.48 | 133,859 | 297.14 | 135,080 | 209.21 | 95,675 | 499.73 | 230,733 |

Table 9.--Continued.

| Length | 1994 | | 1996 | | 1997 | | 1999 | | 2000 | | 2002 | | 2004 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| cm | numbers | biomass | numbers | biomass | numbers | biomass | numbers | biomass | numbers | biomass | numbers | biomass | numbers | biomass |
| 41 | 271.09 | 129,335 | 168.18 | 83,422 | 350.37 | 171,750 | 243.06 | 114,415 | 331.55 | 161,884 | 200.43 | 98,165 | 511.11 | 252,339 |
| 42 | 289.53 | 149,294 | 154.99 | 82,523 | 292.97 | 154,670 | 240.38 | 120,957 | 316.41 | 165,982 | 179.46 | 94,168 | 475.59 | 253,443 |
| 43 | 273.09 | 152,526 | 149.27 | 85,177 | 222.05 | 125,886 | 265.33 | 142,492 | 331.24 | 185,961 | 186.32 | 104,975 | 453.93 | 261,967 |
| 44 | 243.93 | 147,017 | 133.46 | 81,478 | 172.49 | 104,750 | 321.32 | 183,897 | 302.44 | 181,482 | 185.26 | 110,994 | 388.07 | 239,860 |
| 45 | 256.58 | 166,444 | 117.96 | 76,937 | 125.08 | 81,320 | 328.57 | 200,114 | 290.08 | 185,345 | 197.15 | 125,772 | 339.54 | 222,131 |
| 46 | 216.09 | 149,720 | 103.48 | 71,999 | 93.20 | 64,736 | 304.97 | 197,389 | 249.82 | 169,854 | 183.59 | 124,740 | 247.30 | 171,216 |
| 47 | 177.93 | 131,130 | 98.39 | 72,930 | 74.75 | 55,323 | 238.84 | 164,067 | 235.52 | 170,024 | 182.87 | 132,267 | 196.13 | 142,845 |
| 48 | 148.15 | 115,921 | 94.29 | 74,352 | 59.37 | 46,750 | 182.91 | 133,183 | 176.81 | 135,575 | 168.36 | 129,623 | 150.84 | 115,709 |
| 49 | 73.11 | 60,566 | 83.67 | 70,102 | 45.51 | 38,100 | 122.90 | 94,742 | 143.24 | 116,332 | 154.43 | 126,481 | 113.57 | 92,215 |
| 50 | 66.74 | 58,531 | 79.87 | 71,016 | 40.23 | 35,728 | 88.16 | 71,872 | 106.27 | 91,389 | 133.48 | 115,778 | 78.29 | 67,512 |
| 51 | 33.15 | 30,462 | 72.52 | 68,346 | 33.10 | 31,145 | 60.42 | 52,026 | 78.54 | 71,352 | 117.74 | 108,641 | 64.53 | 58,478 |
| 52 | 30.35 | 29,789 | 60.21 | 60,080 | 31.72 | 31,560 | 42.15 | 38,303 | 48.15 | 46,186 | 91.92 | 89,753 | 56.33 | 53,394 |
| 53 | 18.15 | 18,463 | 50.89 | 53,710 | 29.59 | 31,087 | 33.02 | 31,630 | 35.75 | 36,163 | 88.43 | 91,552 | 41.08 | 41,489 |
| 54 | 15.68 | 16,856 | 38.44 | 42,859 | 23.91 | 26,500 | 26.90 | 27,130 | 22.09 | 23,496 | 62.98 | 68,832 | 30.20 | 31,998 |
| 55 | 18.57 | 21,296 | 25.63 | 30,163 | 19.77 | 23,075 | 16.14 | 17,129 | 16.58 | 18,562 | 44.34 | 51,122 | 19.12 | 21,285 |
| 56 | 11.05 | 13,207 | 14.07 | 17,456 | 14.58 | 17,914 | 9.26 | 10,327 | 12.58 | 14,788 | 40.16 | 48,961 | 14.43 | 17,136 |
| 57 | 9.52 | 11,943 | 7.65 | 9,998 | 10.61 | 13,712 | 9.40 | 11,013 | 8.92 | 11,004 | 24.16 | 30,986 | 8.83 | 11,453 |
| 58 | 4.85 | 6,368 | 7.68 | 10,573 | 8.60 | 11,671 | 5.68 | 6,984 | 6.41 | 8,300 | 18.77 | 25,335 | 5.83 | 7,517 |
| 59 | 2.96 | 4,167 | 3.02 | 4,365 | 5.98 | 8,530 | 3.24 | 4,174 | 5.13 | 6,962 | 11.26 | 15,953 | 6.16 | 8,825 |
| 60 | 3.47 | 5,001 | 4.71 | 7,163 | 3.45 | 5,155 | 3.04 | 4,104 | 1.87 | 2,656 | 10.58 | 15,550 | 4.00 | 6,038 |
| 61 | 6.63 | 10,199 | 2.88 | 4,591 | 4.58 | 7,172 | 2.40 | 3,394 | 2.30 | 3,421 | 7.11 | 11,003 | 2.89 | 4,574 |
| 62 | 1.39 | 2,285 | 1.79 | 2,998 | 1.55 | 2,550 | 2.12 | 3,135 | 1.72 | 2,679 | 3.92 | 6,415 | 1.95 | 3,214 |
| 63 | 0.71 | 1,196 | 0.28 | 498 | 2.01 | 3,448 | 0.62 | 953 | 1.57 | 2,551 | 2.18 | 3,683 | 2.07 | 3,585 |
| 64 | 0.49 | 844 | 0.59 | 1,084 | 0.47 | 843 | 0.57 | 925 | 0.98 | 1,660 | 1.74 | 3,109 | 0.08 | 139 |
| 65 | 1.86 | 3,382 | 0.85 | 1,637 | 0.81 | 1,531 | 0.93 | 1,562 | 0.64 | 1,122 | 1.74 | 3,223 | 0.30 | 562 |
| 66 | 0.77 | 1,467 | 0.35 | 704 | 0.32 | 617 | 1.42 | 2,497 | 0.70 | 1,296 | 1.16 | 2,202 | 0.55 | 1,097 |
| 67 | 0.97 | 1,929 | 0.66 | 1,386 | 1.27 | 2,622 | 0.48 | 876 | 0.03 | 52 | 0.27 | 505 | 0.35 | 717 |
| 68 | 1.46 | 3,021 | 0 | 0 | 0.19 | 413 | 0.30 | 567 | 0.27 | 551 | 0.17 | 352 | 0.19 | 406 |
| 69 | 0 | 0 | 0 | 0 | 0.59 | 1,351 | 0.29 | 585 | 0.59 | 1,244 | 0 | 0 | 0 | 0 |
| 70 | 1.93 | 4,349 | 0 | 0 | 0.10 | 230 | 0 | 0 | 0 | 0 | 0.43 | 945 | 0 | 0 |
| 71 | 0.49 | 1,142 | 0.11 | 267 | 0 | 0 | <0.01 | 3 | 0 | 0 | 0.01 | 33 | 0 | 0 |
| 72 | 0.97 | 2,380 | 0 | 0 | 0 | 0 | 0.11 | 238 | 0.15 | 351 | 0 | 0 | 0 | 0 |
| 73 | 0.49 | 1,239 | 0 | 0 | 0.05 | 126 | 0.16 | 362 | 0 | 0 | 0 | 0 | 0 | 0 |
| 74 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.14 | 362 | 0 | 0 | 0 | 0 |
| 75 | 0.49 | 1,340 | 0 | 0 | 0 | 0 | 0.04 | 90 | 0 | 0 | 0 | 0 | 0 | 0 |
| 76 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 77 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 78 | 0.49 | 1,503 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 79 | 0 | 0 | 0 | 0 | 0 | 0 | 0.39 | 1,118 | 0 | 0 | 0 | 0 | 0 | 0 |
| 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 12,815 | 2,886,223 | 8,521 | 2,310,728 | 20,683 | 2,592,178 | 11,629 | 3,285,138 | 9,630 | 3,048,697 | 14,124 | 3,622,072 | 6,835 | 3,306,937 |

Table 10.--Estimated age composition (numbers in millions and biomass in thousand metric tons) of pollock between near surface and 3 m off bottom from summer Bering Sea shelf echo integration-trawl surveys, 1994-2004.

| Age | 1994 | | 1996 | | 1997 | | 1999 | | 2000 | | 2002 | | 2004* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | num. | bio. | num. | bio. | num. | bio. | num. | bio. | num. | bio. | num. | bio. | num. | bio. |
| 1 | 610.2 | 17.1 | 972.3 | 36.7 | 12,360.0 | 417.8 | 111.9 | 3.3 | 257.9 | 8.1 | 634.8 | 21.2 | 25.7 | 1.0 |
| 2 | 4,781.1 | 425.3 | 446.4 | 35.3 | 2,745.2 | 369.9 | 1,587.6 | 156.6 | 1,272.3 | 144.0 | 4,850.4 | 645.1 | 709.0 | 148.7 |
| 3 | 1,336.0 | 312.4 | 520.4 | 118.7 | 386.2 | 99.5 | 3,597.0 | 847.4 | 1,184.9 | 284.6 | 3,295.1 | 843.7 | 977.9 | 320.2 |
| 4 | 1,655.7 | 641.3 | 2,686.5 | 888.8 | 490.9 | 188.6 | 1,683.6 | 640.2 | 2,480.0 | 974.4 | 1,155.0 | 458.2 | 2898.4 | 1337.2 |
| 5 | 1,898.1 | 1,067.2 | 820.7 | 396.0 | 1,921.5 | 921.0 | 582.6 | 271.7 | 899.7 | 488.6 | 507.2 | 286.0 | 1237.4 | 711.3 |
| 6 | 296.1 | 187.2 | 509.3 | 341.8 | 384.4 | 235.0 | 273.9 | 164.3 | 243.9 | 156.0 | 756.8 | 514.5 | 444.2 | 310.3 |
| 7 | 71.2 | 50.1 | 434.4 | 359.9 | 205.2 | 161.3 | 1,169.1 | 751.5 | 234.0 | 166.6 | 436.7 | 351.6 | 164.7 | 132.5 |
| 8 | 65.2 | 55.3 | 84.9 | 72.5 | 142.5 | 139.5 | 400.2 | 278.9 | 725.1 | 540.8 | 91.4 | 85.6 | 180.6 | 145.1 |
| 9 | 31.9 | 30.9 | 16.7 | 16.3 | 32.7 | 34.2 | 104.6 | 84.6 | 190.4 | 149.0 | 110.3 | 111.0 | 56.5 | 54.9 |
| 10 | 23.2 | 26.4 | 6.3 | 6.6 | 3.9 | 4.4 | 66.9 | 62.5 | 84.7 | 76.3 | 205.4 | 212.5 | 36.0 | 34.0 |
| 11 | 8.5 | 10.5 | 5.7 | 6.9 | 4.9 | 6.1 | 14.5 | 14.2 | 35.6 | 39.0 | 52.1 | 59.6 | 29.6 | 30.4 |
| 12 | 19.3 | 27.9 | 12.1 | 17.1 | 2.0 | 3.4 | 6.5 | 7.2 | 18.1 | 16.7 | 17.9 | 19.7 | 49.4 | 52.0 |
| 13 | 4.8 | 6.7 | 1.3 | 1.5 | 2.2 | 4.5 | 1.7 | 1.5 | 1.2 | 1.3 | 3.1 | 4.6 | 18.4 | 20.8 |
| 14 | 5.7 | 7.7 | 4.8 | 7.0 | 2.3 | 3.8 | 0.0 | 0.0 | 1.4 | 2.6 | 5.9 | 8.5 | 3.5 | 4.4 |
| 15 | 1.2 | 2.1 | 2.4 | 3.8 | 2.0 | 2.9 | 0.1 | 0.2 | 0.1 | 0.1 | 0.0 | 0.0 | 2.2 | 2.8 |
| 16 | 7.9 | 12.5 | 0.5 | 0.9 | 0.0 | 0.0 | 0.1 | 0.2 | 0.3 | 0.3 | 0.0 | 0.0 | 0.5 | 0.8 |
| 17 | 3.9 | 4.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 18 | 0.0 | 0.0 | 0.5 | 0.9 | 0.0 | 0.0 | 0.4 | 0.7 | 0.1 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 |
| 19 | 0.7 | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 20 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 21 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 22 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 23 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 24 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 25 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total | 10,821 | 2,886 | 6,525 | 2,311 | 18,686 | 2,592 | 9,601 | 3,285 | 7,630 | 3,049 | 12,122 | 3,622 | 6,834 | 3,306 |

* For 2004, age composition was estimated using age data from the 2004 Bering Sea bottom trawl survey.

Table 11.--Estimated numbers and biomass of pollock from Bering Sea echo integration-trawl surveys in the U.S. and Cape Navarin area of Russia. Data are for pollock observed between near surface and 0.5 m off bottom.

| Year | Region | Numbers (billions) | Biomass (million metric tons) | % Biomass | Survey Nation | Area (nmi2) |
|---|---|---|---|---|---|---|
| **2004** | US EEZ | 7.95 | 4.03 | 91 | US | 99,659 |
| | Russia EEZ (Cape Navarin) | 1.55 | 0.40 | 9 | US | 7,870 |
| | Total | 9.51 | 4.43 | | | |
| **2002** | US EEZ | 13.81 | 4.53 | 98 | US | 99,526 |
| | Russia EEZ (Cape Navarin) | 0.75 | 0.08 | 2 | Russia | 32,270 |
| | Total | 14.56 | 4.61 | | | |
| **1994** | US EEZ | 12.60 | 3.72 | 85 | US | 78,250 |
| | Russia EEZ (Cape Navarin) | 2.77 | 0.65 | 15 | US | 18,460 |
| | Total | 15.37 | 4.37 | | | |

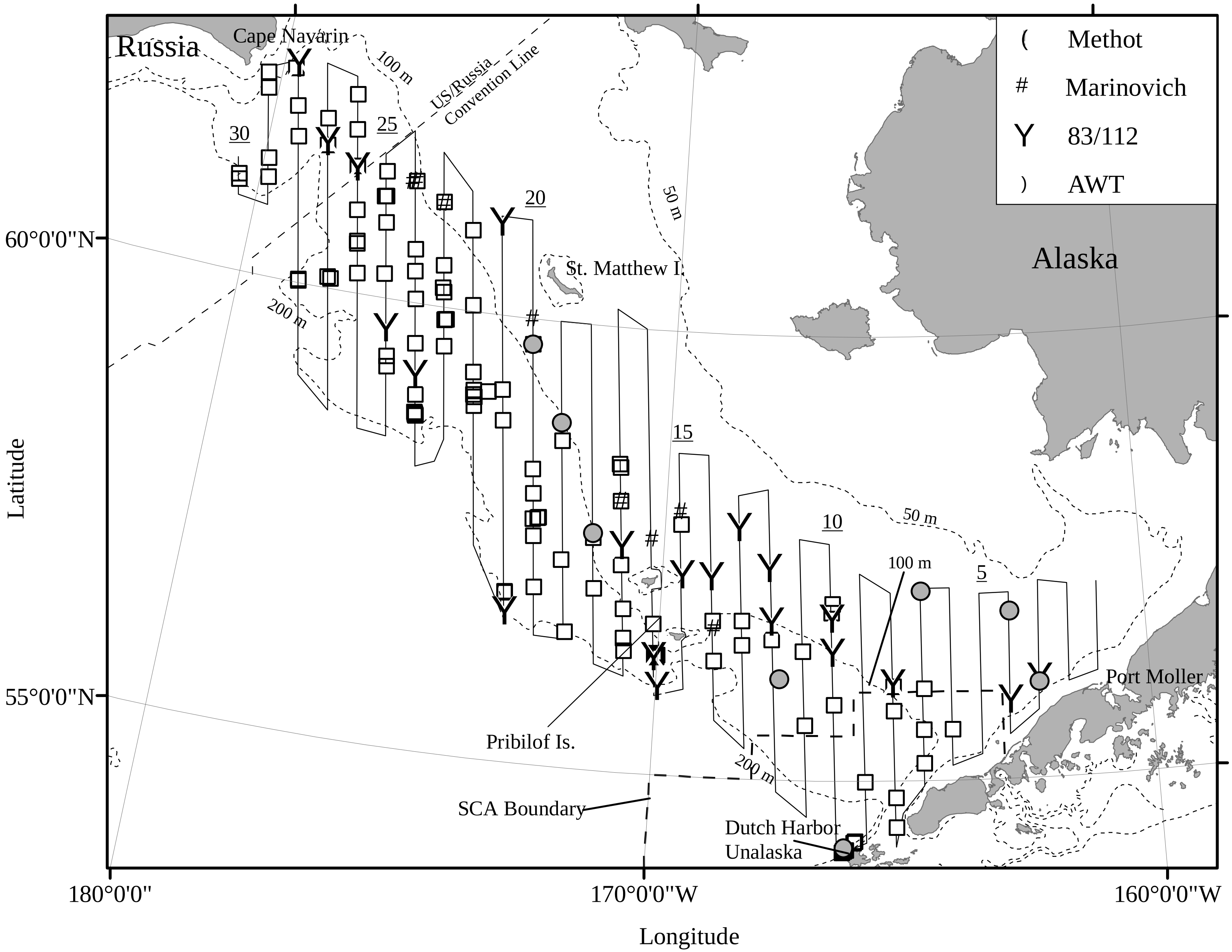


Figure 1.--Transect lines with locations of midwater (Aleutian wing, Marinovich, and Methot trawls) and bottom trawl (83/112) hauls during the summer 2004, echo integration-trawl survey of pollock on the Bering Sea shelf. Transect numbers are outlined, and the Steller sea lion Conservation Area (SCA) is outlined.

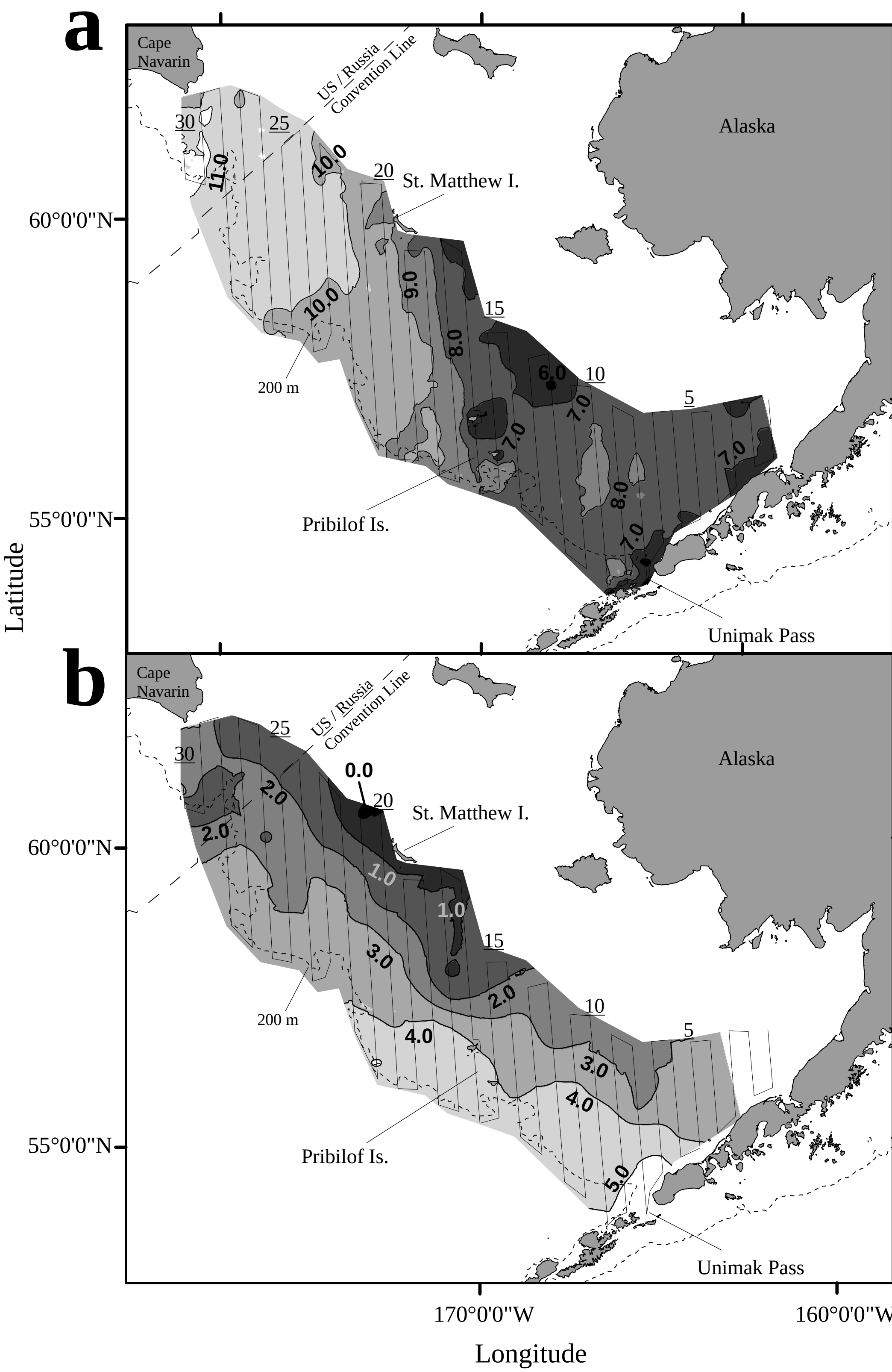


Figure 2.--Transect lines with surface temperature contours (°C) from a) sea surface measurements and b) at a depth of 60 m during the summer 2004 echo integration-trawl survey of the Bering Sea Shelf.

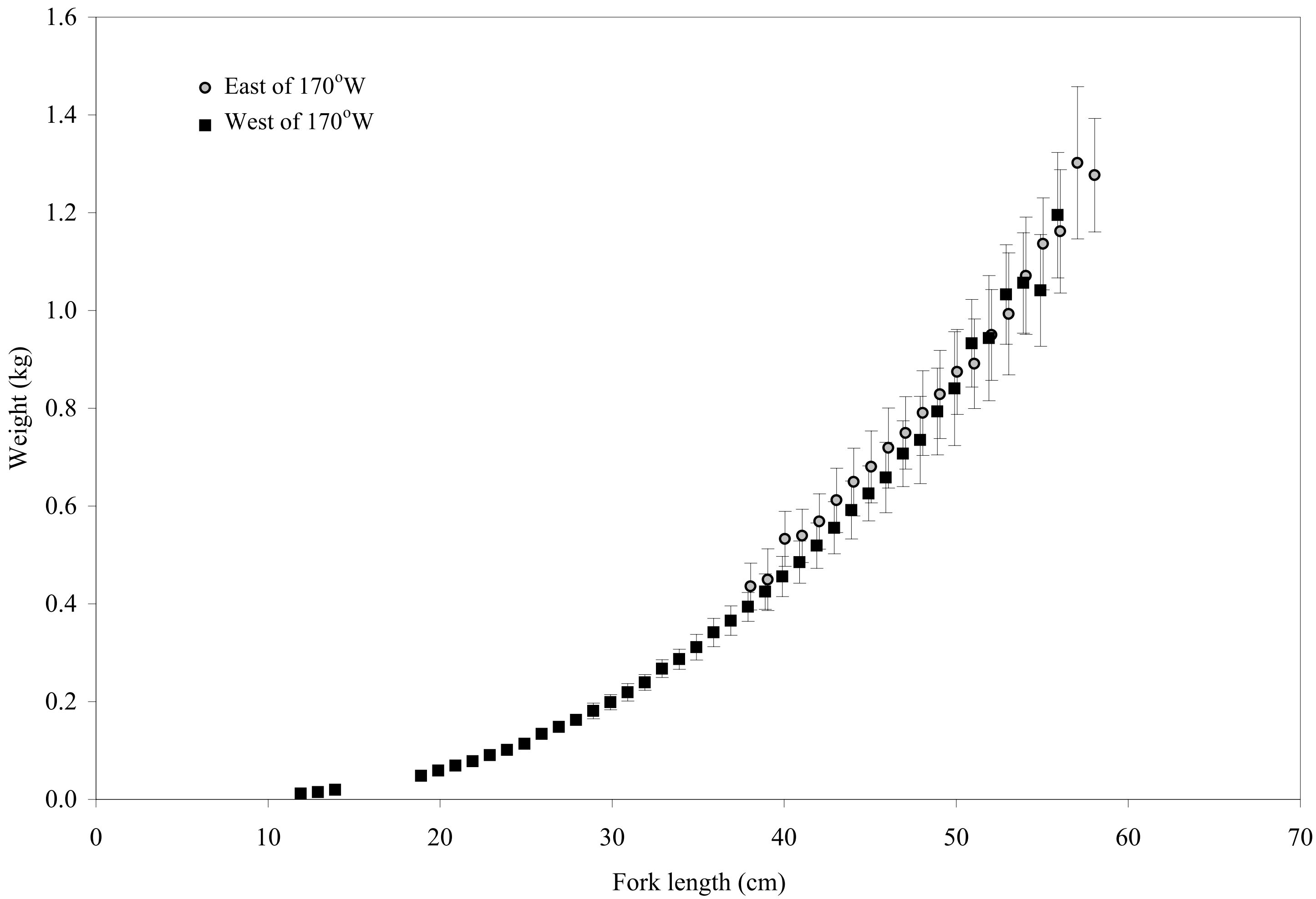


Figure 3.--Mean weight at length for pollock sampled east and west of 170°W (including Cape Navarin, Russia) from the summer 2004 Bering Sea shelf echo integration-trawl survey. Vertical bars indicate one standard deviation.

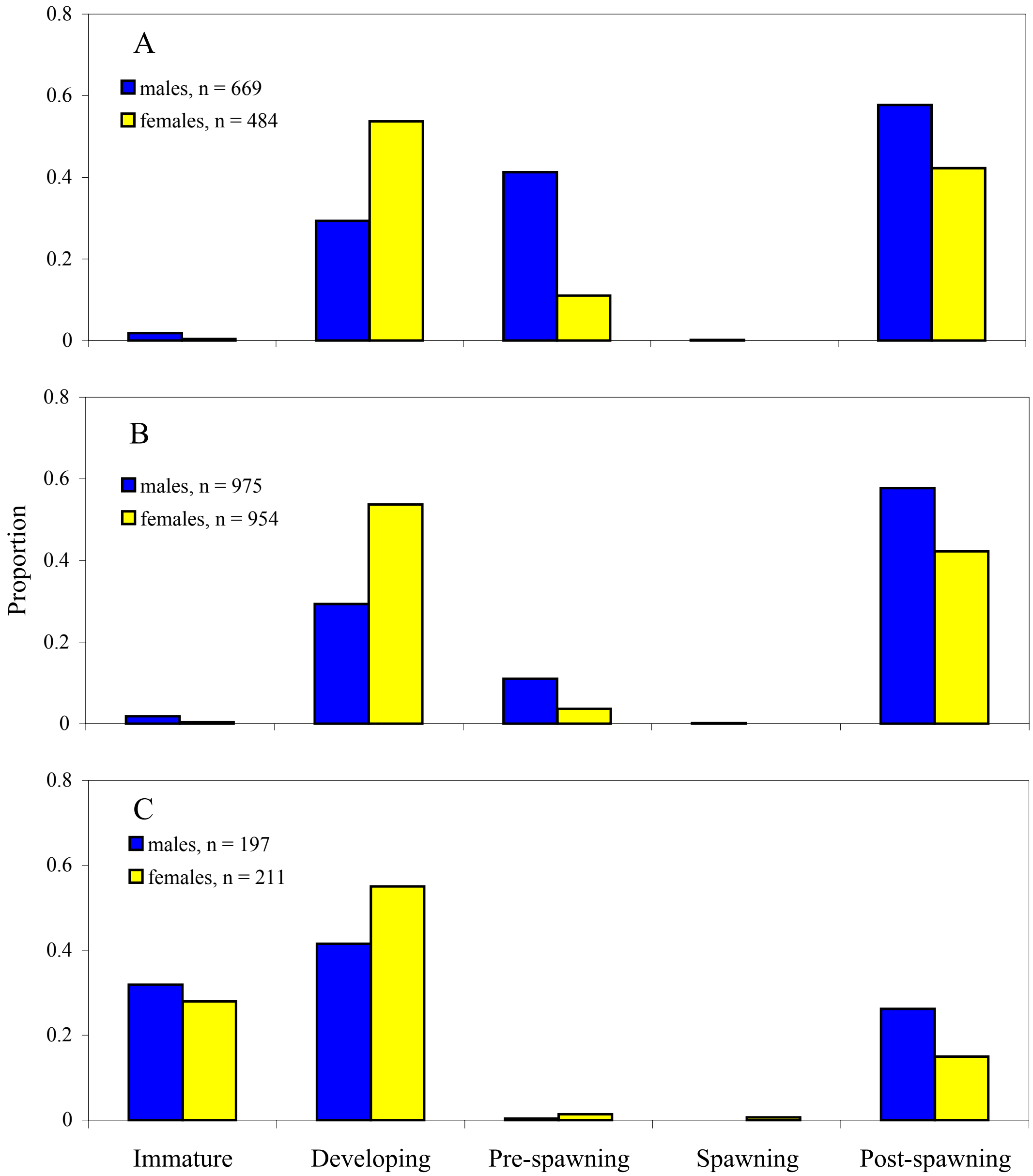


Figure 4.--Maturity stage (by sex) for pollock greater than 29 cm observed in A), U.S.-east of 170° long., B), U.S.-west of 170° long., and in C), Russia-Cape Navarin, during the summer 2004, echo integration-trawl survey of pollock on the Bering Sea shelf, MF2004-08.

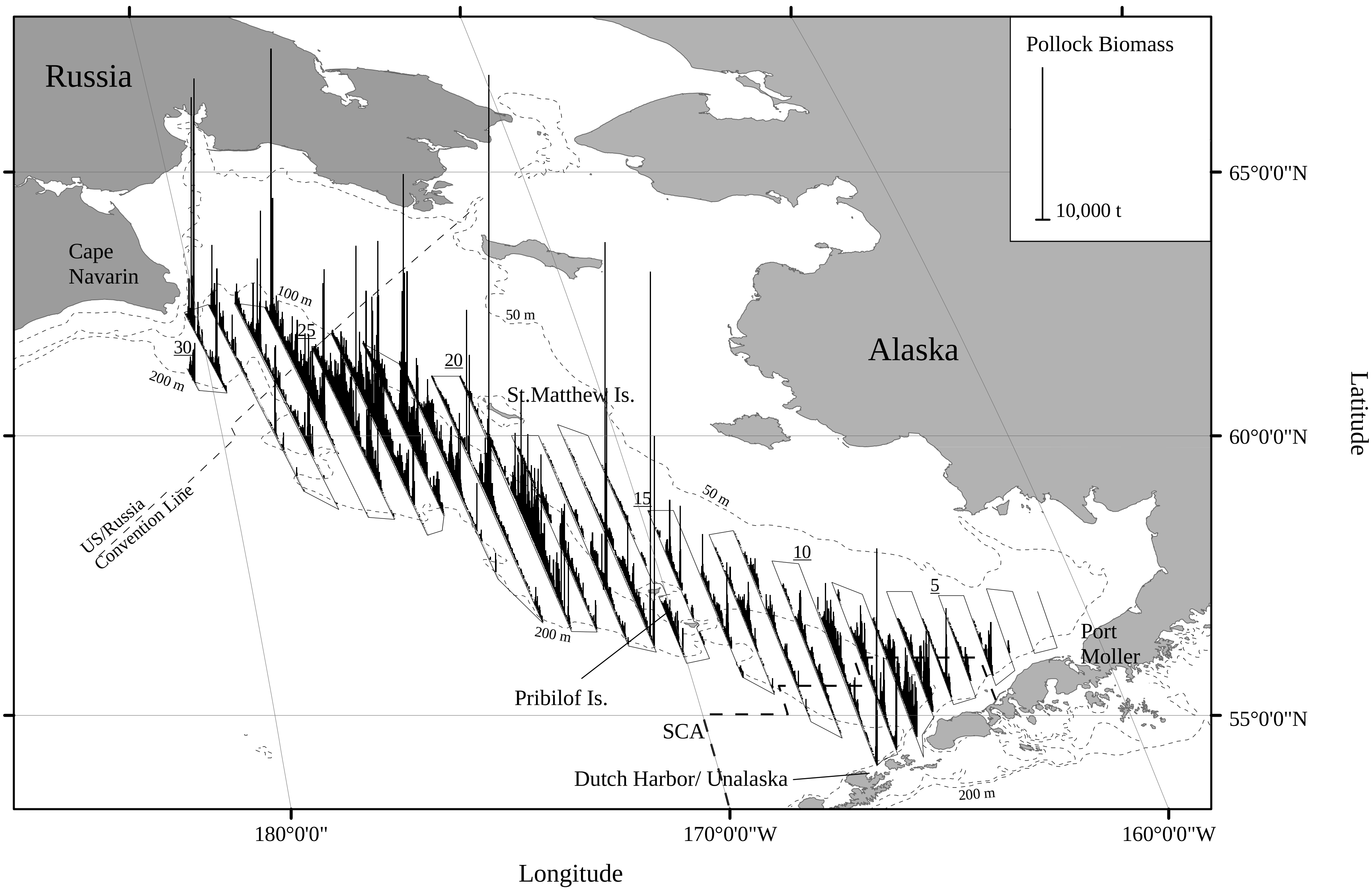


Figure 5.--Estimated pollock biomass (t) between 3 m off bottom and 12 m from the surface along tracklines surveyed during the summer 2004 echo integration-trawl survey of the Bering Sea shelf. Transect numbers are underlined, and the Steller sea lion Conservation Area (SCA) is outlined.

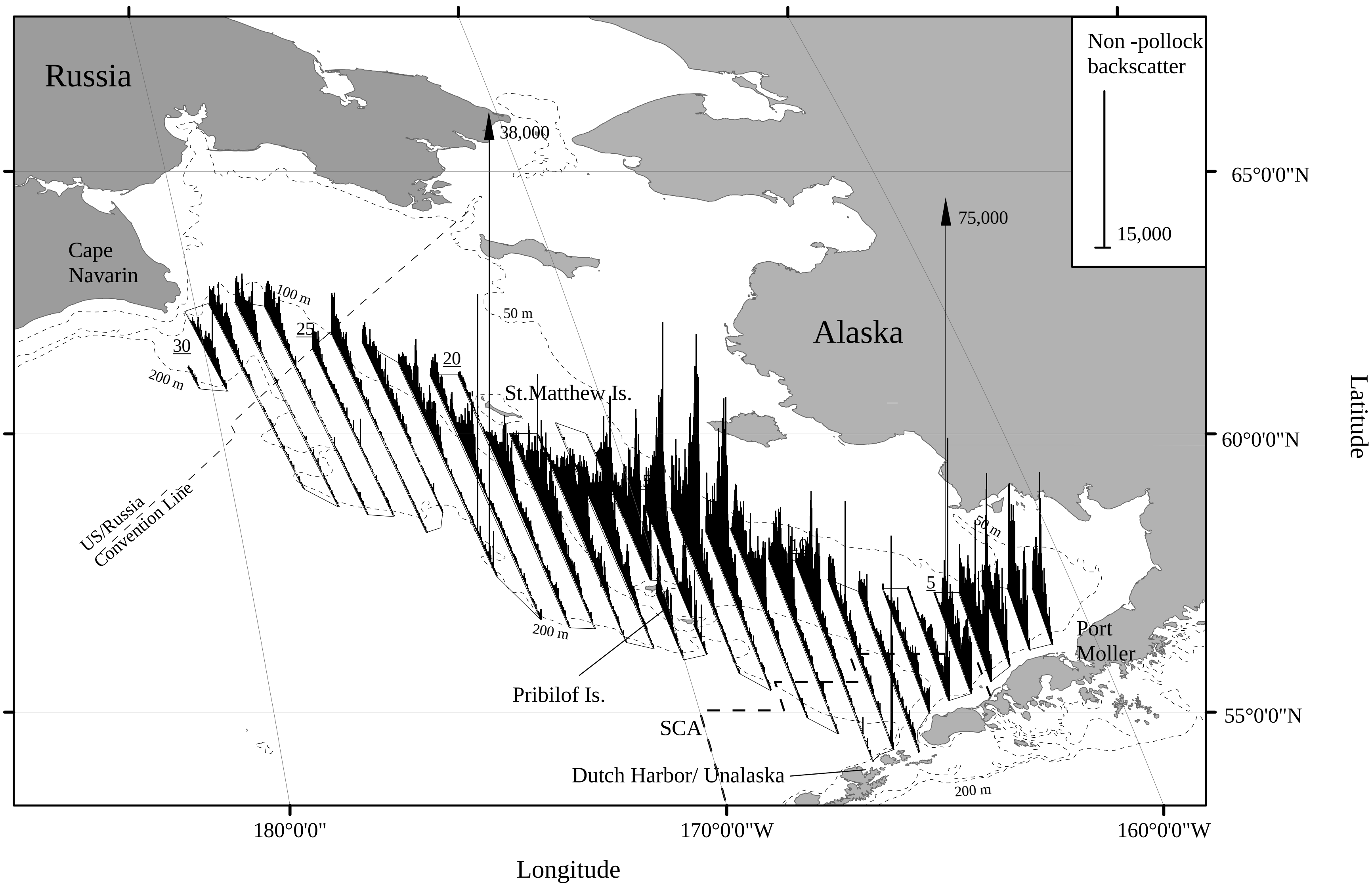


Figure 6.--Non-pollock backscatter ($s_A$, $m^2/nmi^2$) for the jellyfish - macrozooplankton - fish mixture between 3 m off bottom and 12 m from the surface along tracklines surveyed during the summer 2004 echo integration - trawl survey of the Bering Sea shelf. Transect numbers are outlined, and the Steller sea lion Conservation Area (SCA) is outlined.

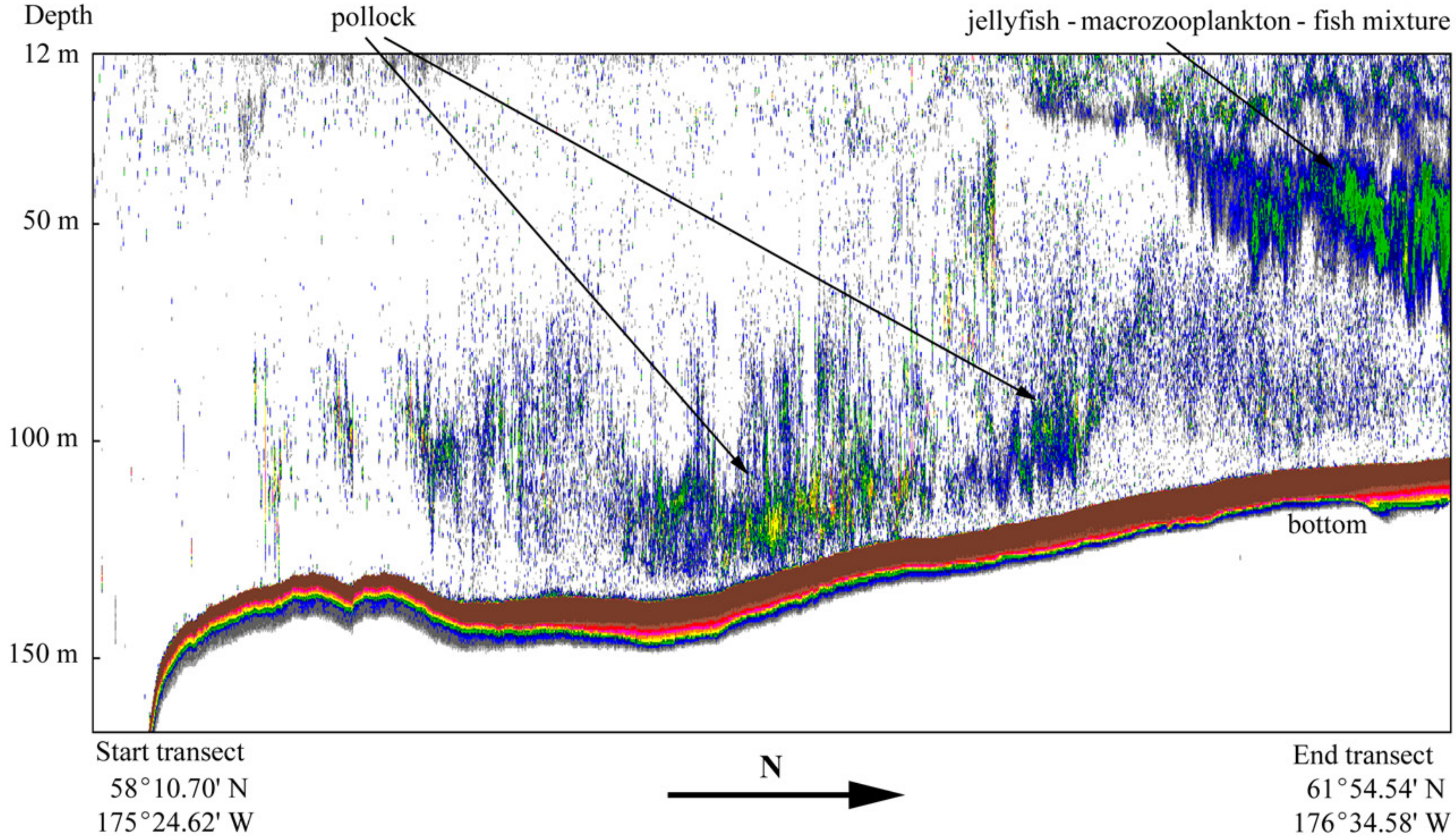


Figure 7.--Echosign detected along transect 24 from the summer 2004 echo integration-trawl survey of the Bering Sea shelf.

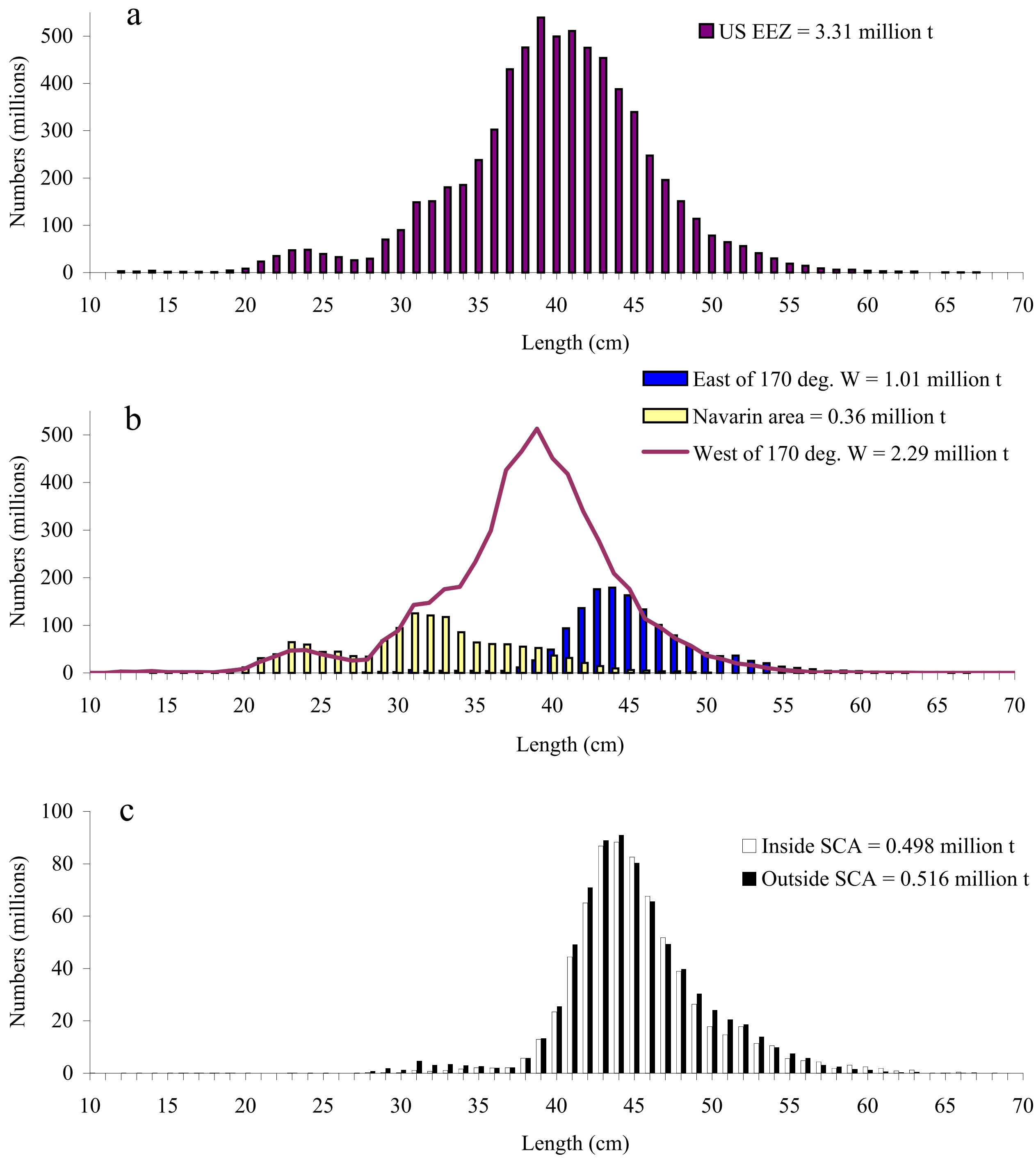


Figure 8.--Estimated pollock length composition between 12 m from the surface and 3 m off bottom a) in the US Exclusive Economic Zone (EEZ), b) east and west of 170$^{o}$W and in the Cape Navarin area, and c) east of 170$^{o}$W, inside and outside the Steller sea lion conservation area (SCA) during the summer 2004 echo integration-trawl survey of the Bering Sea shelf. Estimated biomass in each subarea isindicated. Note Y-axes differ.

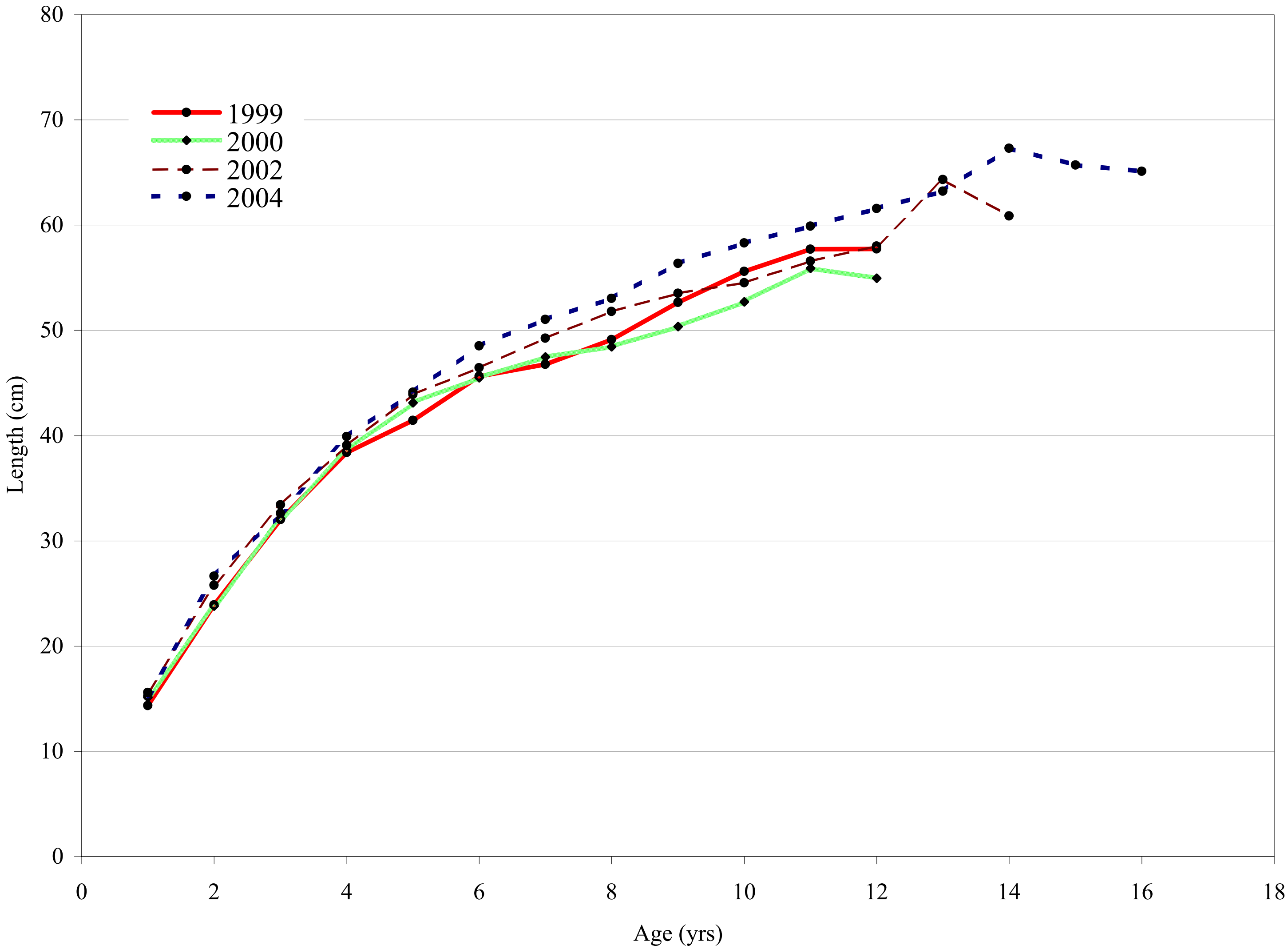


Figure 9.--Mean lengths-at-age of Bering Sea walleye pollock collected during the summer 1999, 2000, and 2002 echo integration-trawl surveys, and during the 2004 bottom trawl survey. Sample size for each age is greater than 5 fish.

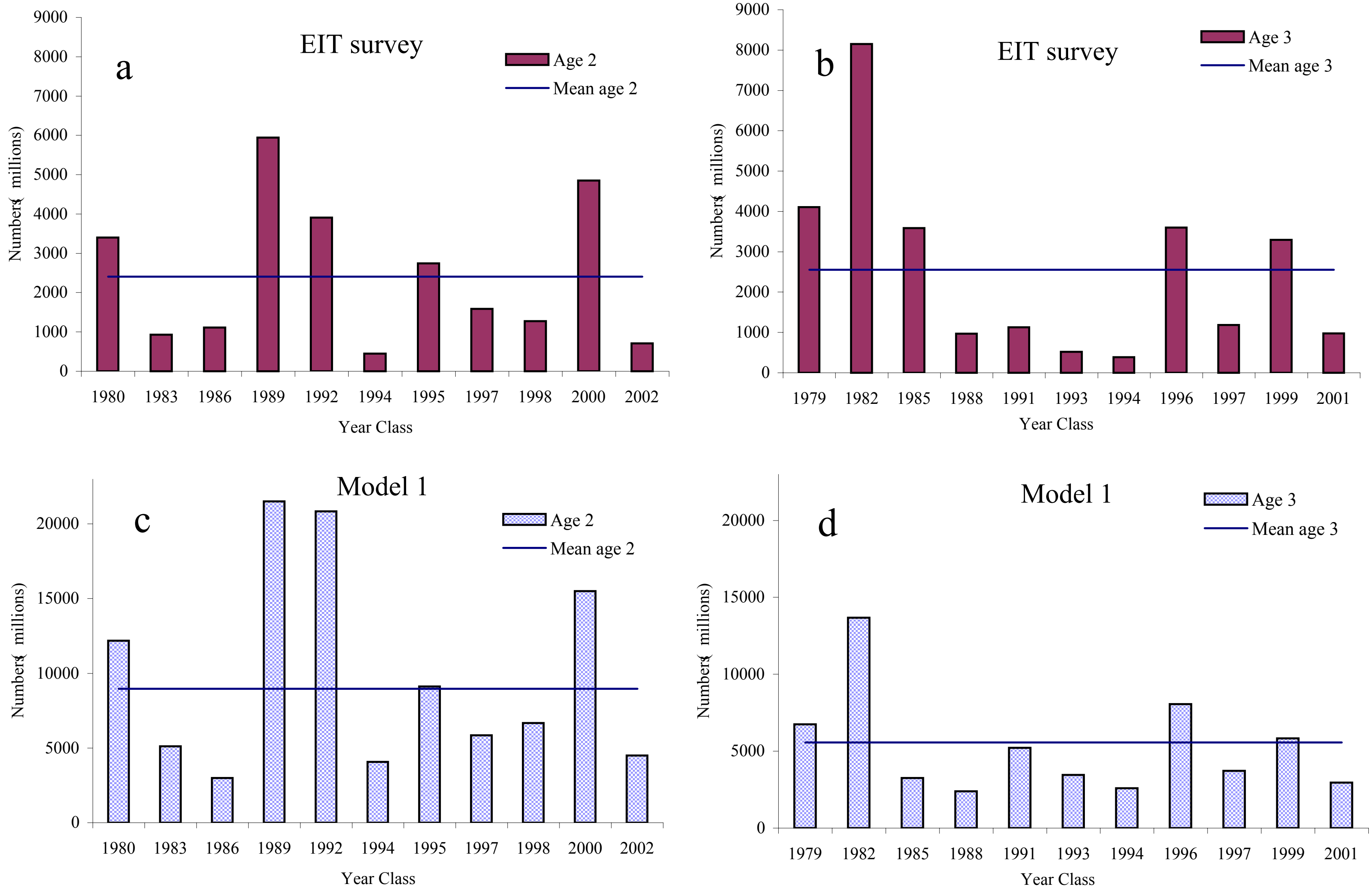


Figure 10.--Estimated numbers of age 2 and 3 pollock (bars) from echo integration-trawl (EIT) surveys and stock assessment Model 1 (Ianelli et al. 2004); a) EIT age 2, b) EIT age 3, c) Model 1 age 2, and d) Model 1 age 3. Mean numbers for each age group are indicated (lines). EIT survey years between 1982 and 2004 are represented. Numbers at age for survey year 2004 were estimated using the 2004 bottom trawl survey ages.

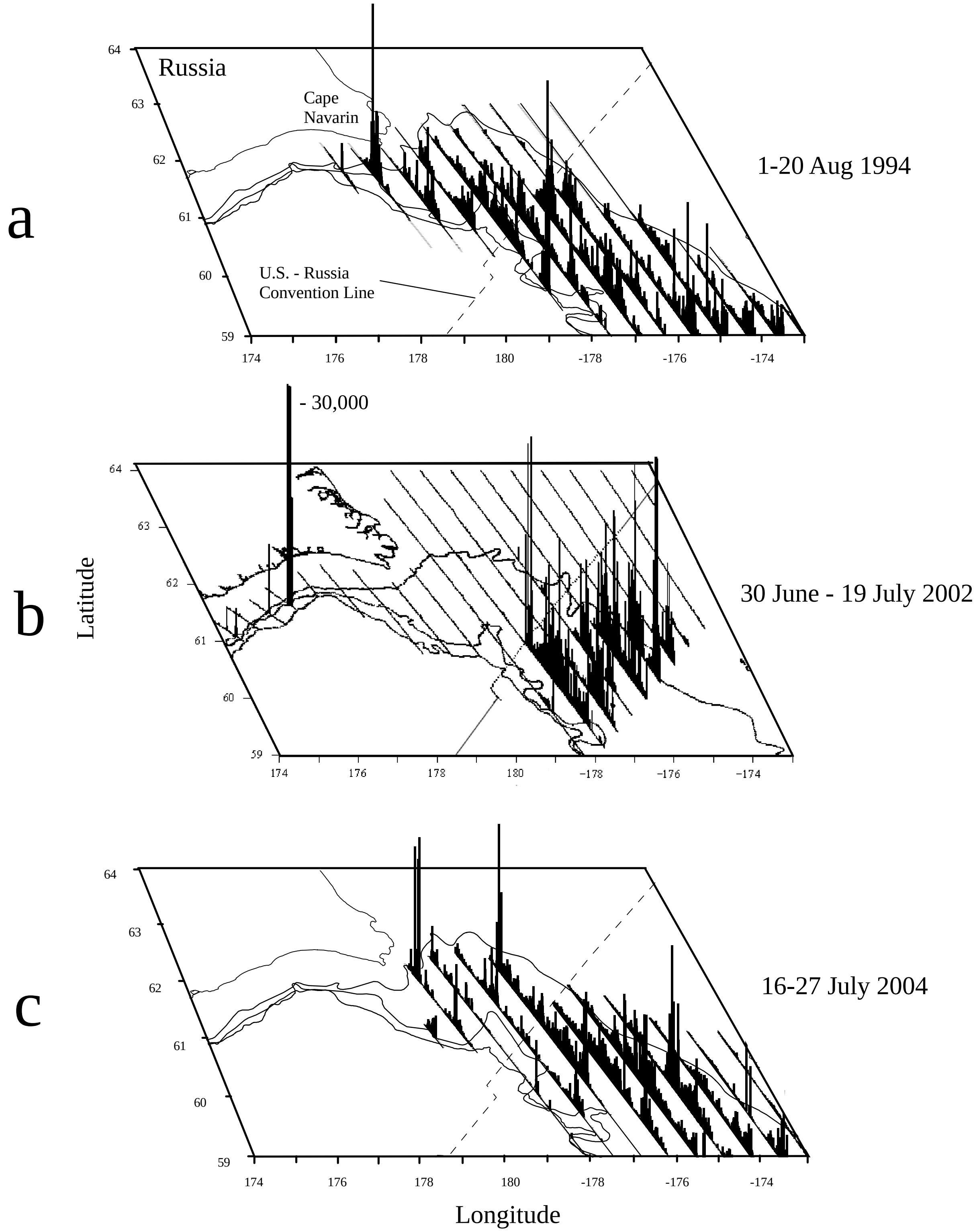


Figure 11.--Pollock acoustic backscatter ($s_A$ m$^2$/nmi$^2$) along tracklines from three echo integration-trawl surveys in the Cape Navarin area - a) 1994 U.S. survey (*Miller Freeman*), b) 2002 Russian survey (R/V *TINRO*) and c) 2004 U.S. survey (*Miller Freeman*).