**Preliminary results of an echo integration-trawl survey for walleye pollock (*Theragra chalcogramma*) on the Bering Sea shelf and slope in June and July 2002**

by Sarah Stienessen, Neal Williamson, Denise McKelvey and Taina Honkalehto

## INTRODUCTION

Scientists from the Midwater Assessment and Conservation Engineering (MACE) Program of the Alaska Fisheries Science Center (AFSC) conduct research surveys of Bering Sea walleye pollock (*Theragra chalcogramma*) to estimate pollock distribution and abundance. Preliminary results presented here are from the echo integration-trawl (EIT) survey carried out between 4 June and 30 July 2002 on the eastern Bering Sea (EBS) shelf. The principal objective of the survey was to collect echo integration and trawl data to estimate midwater pollock abundance and distribution. This report summarizes observed pollock distribution, relative abundance, size composition and maturity information. Biomass estimates, acoustic system and intership calibration results, oceanography, and other survey results will be reported in a subsequent document. In addition to the EIT survey work, scientists from the National Marine Mammal Laboratory (NMML) conducted a marine mammal sighting survey along the EIT survey track. The AFSC survey was conducted in cooperation with the research vessel *TINRO* from TINRO-Centre, Vladivostok, Russia. Results of the NMML sighting survey and the RV *TINRO* survey will be reported elsewhere.

## METHODS

Itinerary

Leg 1

3 Jun Embark scientists in Kodiak, AK

4-6 Jun Depart Kodiak 1500; calibration of acoustic system in Three Saints Bay, Kodiak Island, AK. This includes time needed to diagnose and repair a

damaged transducer cable.

7 Jun Transit to Bering Sea.

8 Jun Calibration of acoustic system in Lost Harbor, Akutan Bay, AK.

9 Jun-2 Jul Echo integration-trawl survey of the EBS shelf through waypoint 20.1; personnel exchange in Dutch Harbor, AK on 17 June.

2-3 Jul Transit to Dutch Harbor; arrive 0900 3 July.

4-5 Jul Inport Dutch Harbor.

Leg 2

6 Jul Depart Dutch Harbor 1200; calibration of acoustic systems in Captains Bay, Unalaska Island, AK.

7 Jul Transit to waypoint 21.0

8-24 Jul Echo integration-trawl survey of the EBS shelf through waypoint 29.1; intership calibration of scientific acoustic systems with the Russian RV *TINRO* 19-20 July.

25-28 Jul Transit to Dutch Harbor collecting acoustic data along 3 east-west oriented transects.

29 Jul Calibration of acoustic system in Humpback Bay, Unalaska Island.

30 Jul Arrive Dutch Harbor 1200; end of cruise.

Acoustic Equipment

Acoustic data were collected with Simrad EK500[1] and EK60 quantitative echo-sounding systems on the NOAA ship *Miller Freeman*, a 66-m stern trawler equipped for fisheries and oceanographic research. Three split-beam transducers (38 kHz, 120 kHz, and 200 kHz) were

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

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 120 kHz frequencies. The 38 kHz data were processed using Simrad BI500 echo integration and target strength data collection and analysis software on a SUN workstation. Acoustic data collected using the Simrad EK60 echo sounder were collected at 200 kHz frequency and processed with SonarData Echolog Software. Results presented here are based on the 38 kHz data.

Trawl Gear and Oceanographic Equipment

Midwater and near-bottom echosign was sampled using an Aleutian Wing 30/26 Trawl (midwater trawl). On or near bottom echosign was sampled with an 83-112 bottom trawl without roller gear. Vertical net opening and depth were monitored with either a WESMAR third wire netsounder system or a Furuno acoustic link netsounder system. Both nets were fished with 5 $m^2$ Fishbuster trawl doors. A Methot trawl was used to target age-0 pollock and macrozooplankton.

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 and salinity, and other environmental data were collected using the *Miller Freeman's* Scientific Computing System (SCS). Ocean current profile data were obtained using the vessel's centerboard-mounted acoustic Doppler current profiler system operating continuously in water-profiling mode.

Survey Design

The survey design consisted of 28 north-south transects spaced 20 nmi apart over the Bering Sea shelf from Port Moller, Alaska, to the U.S./Russia convention line (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, and acoustic system testing. Acoustic system settings used during the collection

were based on results from acoustic system calibrations and on experience from prior surveys. Pollock were sampled to determine sex, fork length, body weight, age, maturity, and ovary weight of selected females. Maturity was determined by visual inspection and categorized as immature, developing, pre-spawning, spawning, or post-spawning.

Data Analysis

Acoustic data were collected between 14 m from the surface (5 m below the centerboard-mounted transducer) and 0.5 m off the bottom. The depth limit of data collection was 1000 m. Data from echosign identified as pollock were stored in a relational database.

## PRELIMINARY RESULTS

Biological data and specimens were collected from 135 trawl hauls (Table 1, Fig. 1): 108 using the midwater trawl; 18 using the bottom trawl; and 9 using the Methot trawl. Walleye pollock was the dominant species captured by weight in midwater and bottom trawl hauls (Tables 2 and 3). Jellyfish (Scyphozoa) were the next most abundant species group sampled in midwater trawl hauls by weight and Pacific cod (*Gadus macrocephalus*) were the next most abundant by weight in bottom trawl hauls. Methot trawl hauls caught mainly jellyfish and euphausiids (Table 4). During the cruise 40,234 pollock lengths were measured and 3233 pairs of otoliths were collected from pollock obtained in trawl hauls (Table 5).

Preliminary abundance estimates for pollock indicate that approximately one third of the total biomass was found east of 170°W and two thirds west of 170°W. The predominant length mode east of 170°W was 27 cm, with additional modes at 49 cm, 37 cm, and 15 cm (Fig. 2). West of 170°W the predominant length modes for pollock were 24 cm and 31 cm, with additional modes at 39 cm, 45 cm and 15 cm. Among pollock of both sexes larger than 29 cm

fork length (approximately age 3 and older), fewer than 1% were actively spawning and the majority (72% of males and 70% of females) were developing (Fig. 3).

Pollock were observed on all transects (Fig. 4). They were most dense north of Unimak Island (transects 5-8), southeast of St. Matthew Island (transects 18-20), and west of St. Matthew Island (transects 22-25). During daylight hours, pollock were usually observed in aggregations within 20 m of the sea floor or as discrete schools located throughout the water column. During the night pollock tended to disperse throughout the water column.

## ACKNOWLEDGMENTS

The authors would like to thank the officers and crew of the NOAA ship *Miller Freeman* for their proficient field support.

## SCIENTIFIC PERSONNEL

| Name | Sex/Nationality | Position | Organization |
|---|---|---|---|
| | | Leg 1 (4 June-3 July) | |
| Taina Honkalehto | F/USA | Chief Scientist | MACE |
| William Karp | M/USA | Fish. Biologist | MACE |
| Steve de Blois | M/USA | Fish. Biologist | MACE |
| Elaina Jorgensen | F/USA | Fish. Biologist | MACE (4-16 June) |
| Dale Hanson | M/USA | Fish. Biologist | MACE (16 June-3 July) |
| Mike Brown | M/USA | Computer Spec. | MACE |
| Laura Morse | F/USA | Biologist | NMML |
| Stephanie Norman | F/USA | Biologist | NMML |
| Suzanne Yin | F/USA | Biologist | NMML |

| | | | |
|---|---|---|---|
| Alexander Nikolayev | M/Russia | Acoustician | TINRO |
| Mikhail Stepanenko | M/Russia | Fish. Biologist | TINRO |

Leg 2 (6-30 July)

| | | | |
|---|---|---|---|
| Neal Williamson | M/USA | Chief Scientist | MACE |
| John Horne | M/Canada | Fish. Biologist | UW |
| Denise McKelvey | F/USA | Fish. Biologist | MACE |
| Sarah Stienessen | F/USA | Fish. Biologist | MACE |
| Laura Morse | F/USA | Biologist | NMML |
| Doug Kinzey | M/USA | Biologist | NMML |
| Paula Olson | F/USA | Biologist | NMML |
| Alexander Nikolayev | M/Russia | Acoustician | TINRO |
| Mikhail Stepanenko | M/Russia | Fish Biologist | TINRO |
| David Walker | M/USA | Teacher at sea | NOAA |

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 Association, Seattle WA
TINRO - TINRO-Centre, Vladivostok, Russia
UW - University of Washington, Seattle WA.

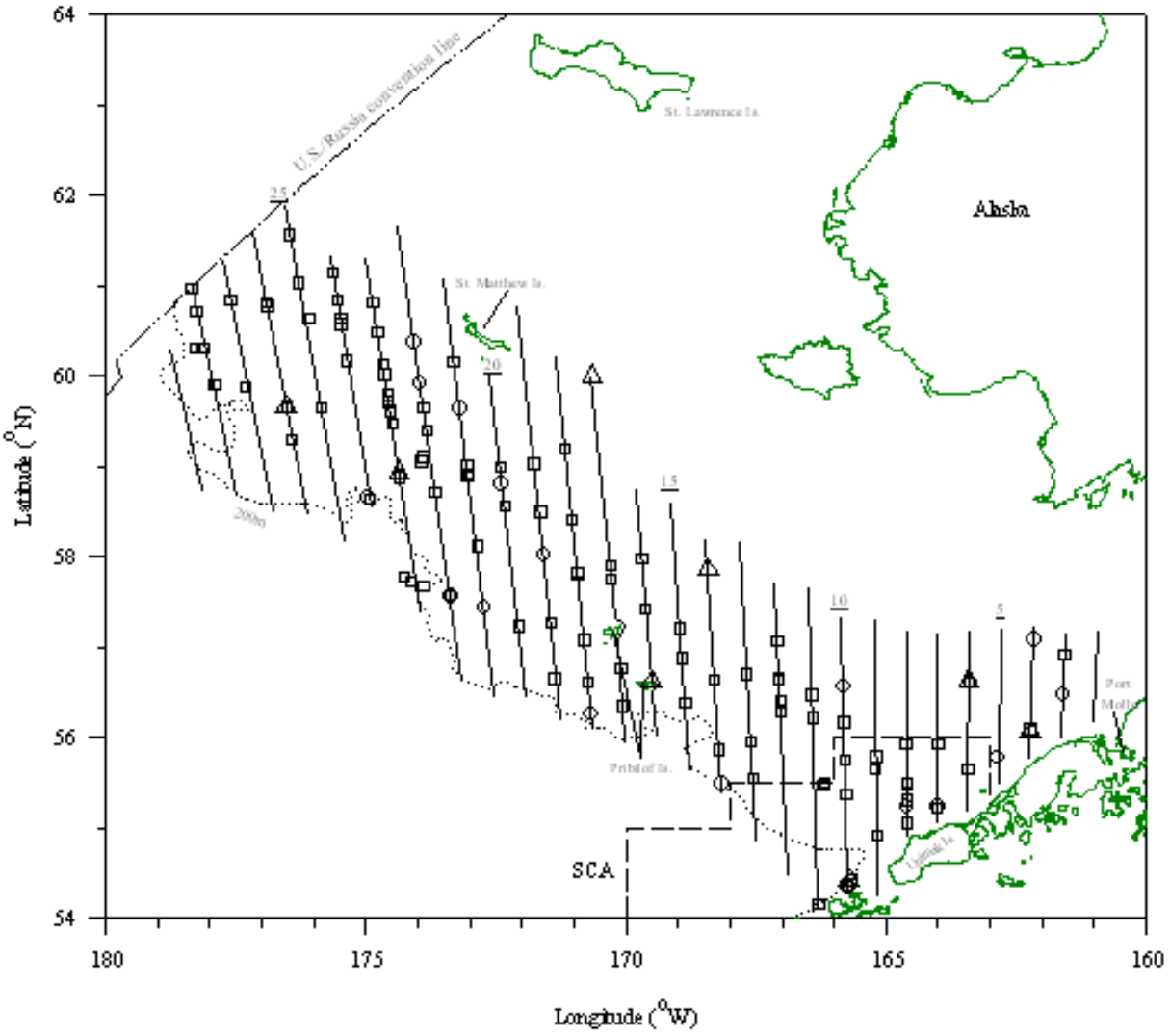


Figure 1: Transect lines with locations of midwater (square), bottom (circle), and Methot (triangle) trawl hauls during the summer 2002 pollock echo integration-trawl survey of the eastern Bering Sea shelf and slope. Underlined numbers indicate transect sequence, and the

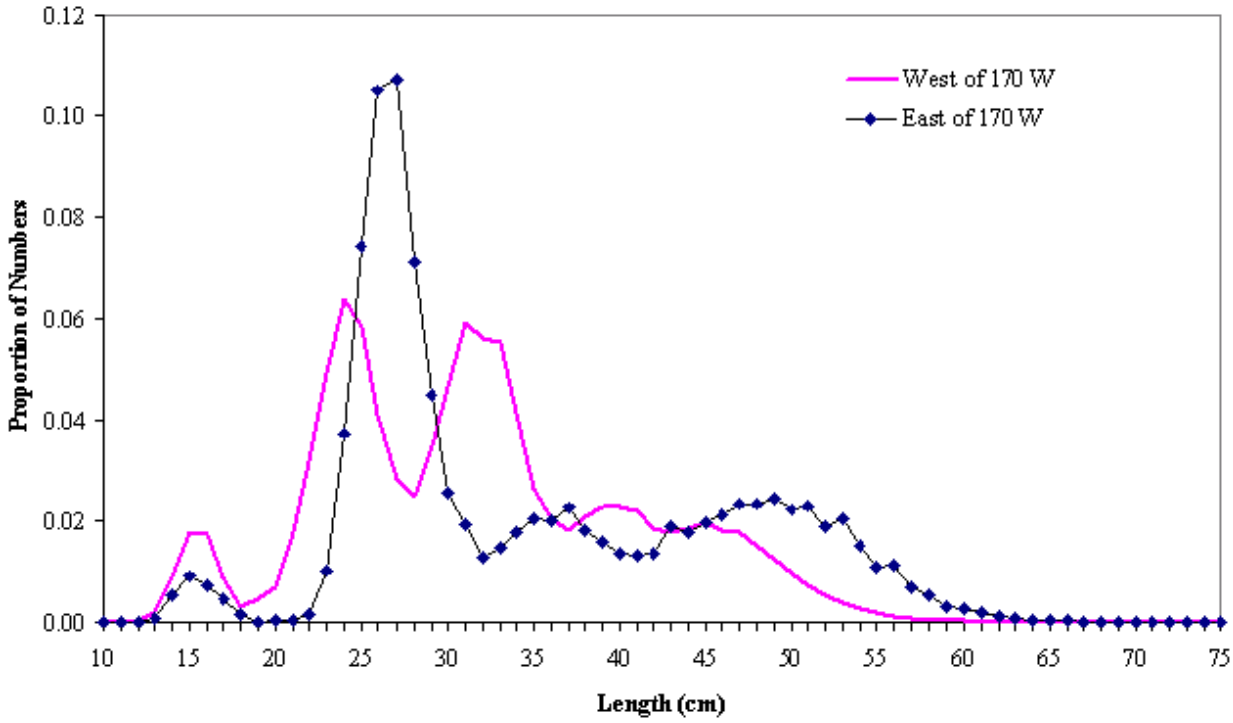


Figure 2: Estimated population of walleye pollock by length (proportion of numbers) between 14 m from the surface and 0.5 m off bottom from the summer echo integration-trawl survey of the eastern Bering Sea shelf and slope, MF0208.

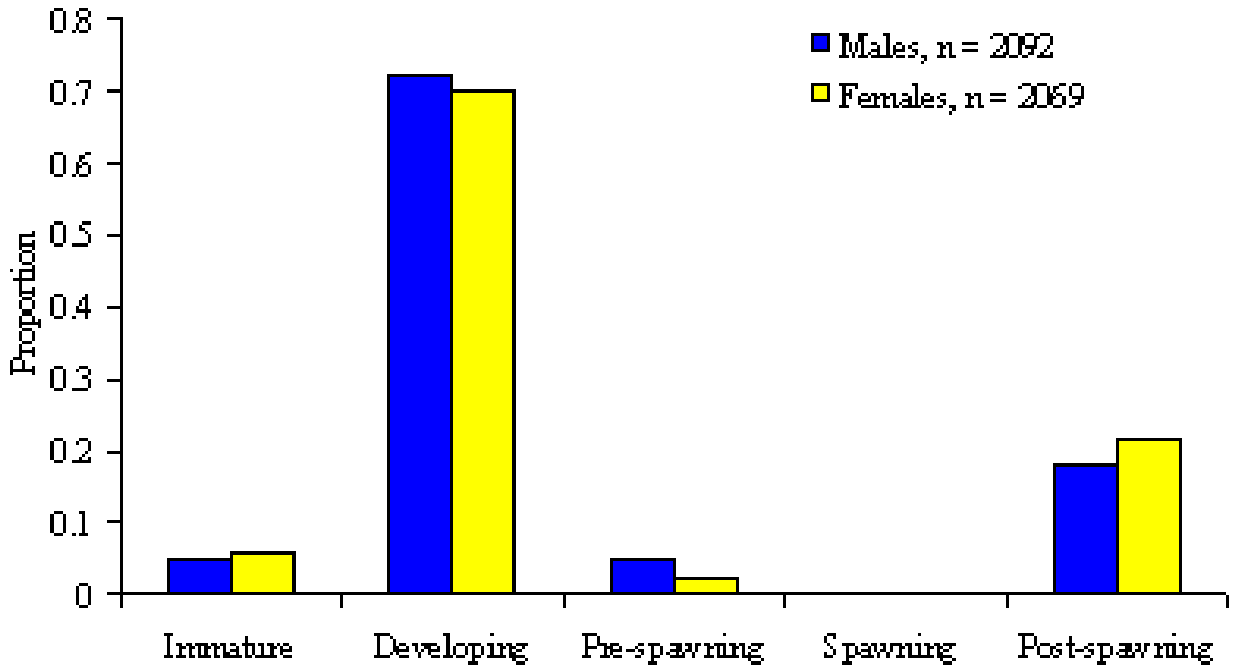


Figure 3: Maturity stage (by sex) for pollock greater than 29 cm in length oberved in the 2002 echo intergration-trawl survey of the eastern Bering Sea shelf and slope.

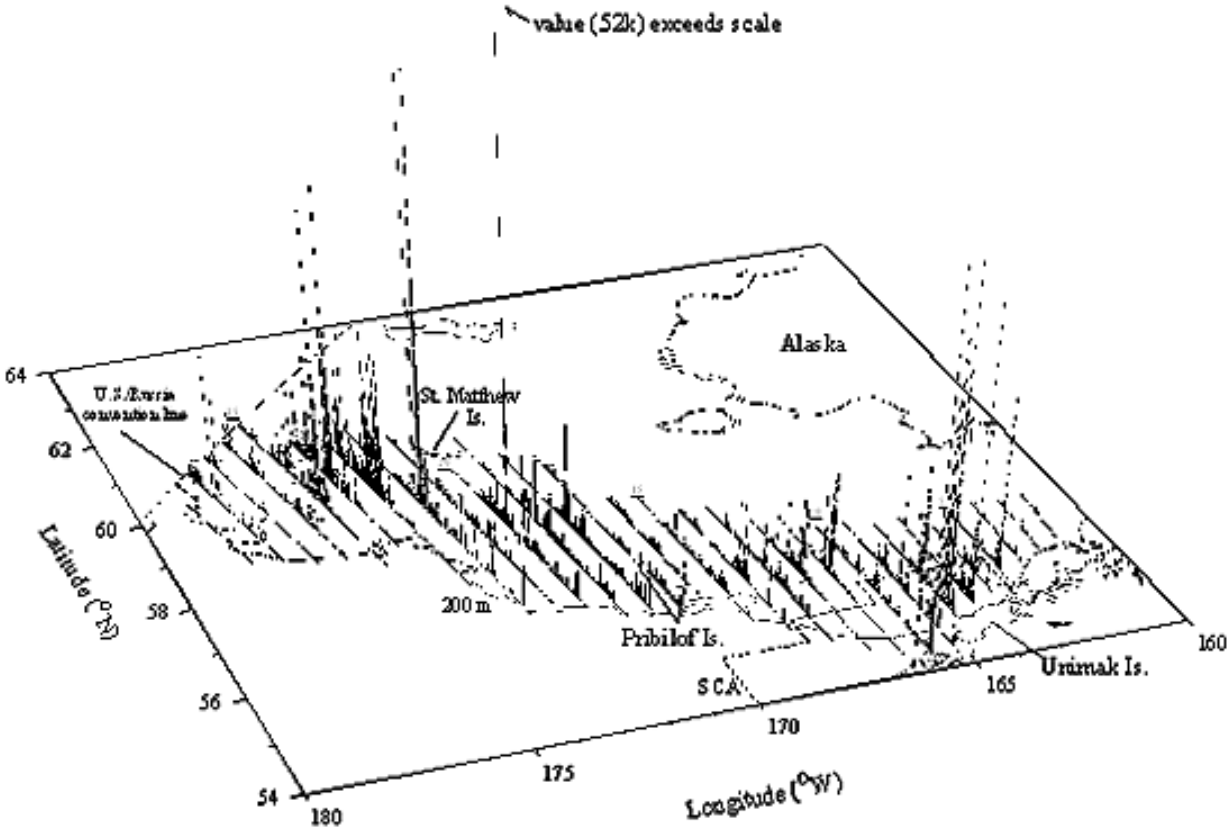


Figure 4: Pollock acoustic backscatter along trackline during the summer 2002 echo intergration-trawl survey of the eastern Bering Sea shelf and slope. Transect numbers are underlined, and the Steller sea lion Conservation Area (SCA) is outlined. Z axis = 40, 000.

Table 1. Trawl station and catch data summary from the summer 2002 eastern Bering sea shelf/slope walleye pollock echo integration-trawl survey, MF2002-08.

| Haul no. | Gear type[1] | Date | Start time (GMT) | Duration (minutes) | Start Position | | | | Depth (m) | | Temp. (deg. C) | | Profile No.[3] | Pollock catch | | Total catch |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Latitude | | Longitude | | Gear | Bottom | Gear[2] | Surface | | (kg)[4] | number | (kg) |
| 1 | 83-112 | 10 Jun | 17:53 | 17 | 56 | 28.81 | 161 | 35.73 | 66 | 66 | 3.8 | 5.7 | -- | 1,095.2 | 2,538 | 1,390.6 |
| 2 | AWT | 10 Jun | 22:00 | 20 | 56 | 55.61 | 161 | 34.05 | 67 | 74 | 2.3 | 4.9 | 303 | 0.0 | 0 | 67.3 |
| 3 | 83-112 | 11 Jun | 3:09 | 15 | 57 | 4.67 | 162 | 9.80 | 58 | 58 | 3.1 | 4.6 | 304 | 204.7 | 139 | 619.4 |
| 4 | AWT | 11 Jun | 11:35 | 28 | 56 | 5.68 | 162 | 14.10 | 68 | 76 | 3.7 | 6.2 | 306 | 173.5 | 215 | 253.9 |
| 5 | 83-112 | 11 Jun | 20:15 | 10 | 55 | 46.83 | 162 | 50.20 | 68 | 68 | 3.3 | 6.5 | 307 | 1,039.9 | 1,046 | 1,132.4 |
| 6 | 83-112 | 12 Jun | 9:00 | 10 | 56 | 37.02 | 163 | 23.72 | 78 | 78 | 2.5 | 5.9 | 308 | 4.1 | 3 | 38.5 |
| 7 | AWT | 12 Jun | 10:36 | 30 | 56 | 37.15 | 163 | 23.77 | 69 | 77 | 2.5 | 5.8 | 309 | 14.0 | 15 | 28.9 |
| 8 | AWT | 12 Jun | 19:54 | 16 | 55 | 39.16 | 163 | 25.20 | 65 | 81 | 3.1 | 7 | 312 | 307.9 | 363 | 638.9 |
| 9 | 83-112 | 13 Jun | 2:22 | 14 | 55 | 13.92 | 164 | 0.71 | 57 | 57 | 4.8 | 7.1 | 313 | 776.6 | 733 | 1,059.7 |
| 10 | AWT | 13 Jun | 3:45 | 10 | 55 | 13.65 | 164 | 0.73 | 58 | 58 | 4.8 | 6.8 | 314 | 54.7 | 58 | 436.9 |
| 11 | AWT | 13 Jun | 9:08 | 60 | 55 | 56.40 | 164 | 0.41 | 63 | 93 | 2.7 | 6.9 | 315 | 477.6 | 717 | 499.7 |
| 12 | AWT | 14 Jun | 5:16 | 15 | 55 | 55.89 | 164 | 36.88 | 77 | 95 | 2.9 | 7.1 | 316 | 501.2 | 1,753 | 543.3 |
| 13 | AWT | 14 Jun | 10:04 | 30 | 55 | 29.59 | 164 | 36.11 | 66 | 102 | 5.2 | 7.2 | 317 | 1,384.1 | 9,364 | 1,403.0 |
| 14 | AWT | 14 Jun | 12:14 | 33 | 55 | 29.76 | 164 | 36.40 | 90 | 102 | 4.7 | 7.1 | 318 | 496.8 | 3,362 | 513.3 |
| 15 | AWT | 14 Jun | 19:31 | 21 | 55 | 18.95 | 164 | 36.04 | 72 | 102 | 5.4 | 7.1 | 319 | 843.0 | 5,288 | 965.2 |
| 16 | 83-112 | 14 Jun | 21:18 | 10 | 55 | 14.08 | 164 | 35.86 | 101 | 101 | 4.2 | 6.5 | 320 | 480.3 | 491 | 511.5 |
| 17 | AWT | 15 Jun | 0:02 | 30 | 55 | 3.33 | 164 | 35.10 | 54 | 63 | 5.6 | 7.1 | 321 | 149.6 | 133 | 317.7 |
| 18 | AWT | 15 Jun | 10:51 | 20 | 54 | 54.98 | 165 | 9.92 | 104 | 112 | 5.5 | 5.8 | 322 | 893.4 | 919 | 895.8 |
| 19 | AWT | 15 Jun | 20:50 | 25 | 55 | 39.02 | 165 | 12.25 | 105 | 110 | 4.4 | 6.6 | 323 | 319.3 | 467 | 355.5 |
| 20 | AWT | 15 Jun | 23:34 | 10 | 55 | 47.56 | 165 | 11.92 | 73 | 101 | 4.6 | 6.9 | 324 | 974.3 | 6,818 | 990.1 |
| 21 | 83-112 | 16 Jun | 19:06 | 20 | 56 | 33.81 | 165 | 49.49 | 82 | 82 | 2.7 | 7.1 | 325 | 238.0 | 340 | 348.1 |
| 22 | AWT | 16 Jun | 22:32 | 21 | 56 | 10.48 | 165 | 48.44 | 90 | 98 | 4.3 | 9.8 | 326 | 654.6 | 5,404 | 672.7 |
| 23 | AWT | 17 Jun | 3:50 | 4 | 55 | 45.55 | 165 | 47.23 | 101 | 110 | 4.6 | 7.3 | 327 | 1,478.6 | 9,249 | 1,505.1 |
| 24 | AWT | 17 Jun | 7:08 | 10 | 55 | 22.86 | 165 | 46.24 | 101 | 120 | 4.3 | 8.6 | 328 | 139.6 | 154 | 153.4 |
| 25 | 83-112 | 17 Jun | 21:27 | 10 | 54 | 20.85 | 165 | 43.84 | 96 | 96 | 4.9 | 8 | 329 | 30.4 | 35 | 30.4 |
| 26 | AWT | 18 Jun | 6:37 | 6 | 54 | 9.38 | 166 | 17.94 | 123 | 141 | 5.6 | 8.4 | 330 | 1,188.7 | 1,832 | 1,188.7 |
| 27 | AWT | 18 Jun | 11:36 | 15 | 54 | 25.38 | 165 | 39.96 | 150 | 150 | 4.4 | 8.3 | 332 | 191.5 | 187 | 195.8 |

Table 1. Continued.

| Haul no. | Gear type[1] | Date | Start time (GMT) | Duration (minutes) | Start Position | | | | Depth (m) | | Temp. (deg. C) | | Profile No.[3] | Pollock catch | | Total catch |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Latitude | | Longitude | | Gear | Bottom | Gear[2] | Surface | | (kg)[4] | number | (kg) |
| 28 | AWT | 18 Jun | 14:37 | 13 | 54 | 22.19 | 165 | 45.16 | 128 | 137 | 5.5 | 7.9 | 333 | 6,019.7 | 8,818 | 6,019.7 |
| 29 | AWT | 19 Jun | 3:56 | 2 | 56 | 13.52 | 166 | 24.99 | 96 | 109 | 4.6 | 8.3 | 334 | 1,796.2 | 11,317 | 1,826.3 |
| 30 | AWT | 19 Jun | 10:54 | 10 | 56 | 28.81 | 166 | 25.66 | 51 | 99 | 5.7 | 9.6 | 335 | 61.2 | 402 | 84.5 |
| 31 | AWT | 20 Jun | 0:00 | 26 | 57 | 4.44 | 167 | 5.23 | 71 | 74 | 3 | 13.3 | 336 | 27.0 | 32 | 69.6 |
| 32 | AWT | 20 Jun | 3:53 | 15 | 56 | 39.27 | 167 | 3.34 | 93 | 96 | 3 | 12.2 | 337 | 813.3 | 3,326 | 851.7 |
| 33 | AWT | 20 Jun | 5:03 | 30 | 56 | 38.41 | 167 | 3.26 | 46 | 96 | 6.5 | 12.2 | 338 | 3.1 | 8 | 157.0 |
| 34 | AWT | 20 Jun | 8:42 | 12 | 56 | 17.24 | 167 | 1.49 | 77 | 117 | 4.3 | 9.9 | 339 | 639.8 | 2,311 | 643.2 |
| 35 | AWT | 20 Jun | 10:52 | 30 | 56 | 24.35 | 167 | 1.88 | 52 | 112 | 6.6 | 10.2 | 340 | 466.7 | 2,704 | 469.3 |
| 36 | AWT | 21 Jun | 9:23 | 15 | 55 | 33.15 | 167 | 33.68 | 128 | 138 | 3.6 | 9.8 | 341 | 593.8 | 639 | 600.6 |
| 37 | AWT | 21 Jun | 18:12 | 17 | 55 | 57.70 | 167 | 36.14 | 124 | 132 | 3.8 | 8.7 | 342 | 1,466.4 | 1,517 | 1,476.9 |
| 38 | AWT | 21 Jun | 23:45 | 7 | 56 | 42.35 | 167 | 40.43 | 89 | 96 | 3 | 10.1 | 343 | 1,110.1 | 2,855 | 1,153.7 |
| 39 | AWT | 23 Jun | 0:39 | 13 | 56 | 38.59 | 168 | 18.13 | 96 | 108 | 3.2 | 10.1 | 345 | 788.8 | 1,509 | 800.5 |
| 40 | AWT | 23 Jun | 7:08 | 18 | 55 | 51.96 | 168 | 12.93 | 137 | 142 | 3.8 | 9.2 | 346 | 1,792.9 | 1,685 | 1,794.5 |
| 41 | 83-112 | 23 Jun | 18:42 | 30 | 55 | 29.74 | 168 | 9.92 | 155 | 155 | 3.8 | 8.3 | 347 | 185.6 | 150 | 494.1 |
| 42 | AWT | 24 Jun | 2:51 | 9 | 56 | 23.24 | 168 | 51.73 | 113 | 128 | 3.5 | 10 | 348 | 591.4 | 845 | 591.4 |
| 43 | AWT | 24 Jun | 8:01 | 10 | 56 | 52.71 | 168 | 55.02 | 60 | 85 | 3.5 | 9.7 | 349 | 607.0 | 1,986 | 631.4 |
| 44 | AWT | 24 Jun | 17:50 | 15 | 57 | 12.88 | 168 | 57.66 | 72 | 75 | 3.6 | 9.5 | 350 | 184.0 | 331 | 200.6 |
| 45 | AWT | 25 Jun | 9:17 | 40 | 57 | 59.20 | 169 | 41.60 | 59 | 71 | 2.3 | 9.1 | 351 | 295.1 | 460 | 319.3 |
| 46 | AWT | 25 Jun | 17:51 | 17 | 57 | 25.48 | 169 | 37.09 | 67 | 71 | -- | 8.4 | -- | 905.1 | 1,901 | 923.5 |
| 47 | AWT | 26 Jun | 9:17 | 30 | 56 | 21.23 | 170 | 4.10 | 104 | 110 | 3.4 | 9.8 | 354 | 716.8 | 1,305 | 720.9 |
| 48 | AWT | 26 Jun | 17:31 | 26 | 56 | 46.17 | 170 | 5.68 | 84 | 90 | 4.5 | 9.8 | 355 | 937.0 | 1,273 | 1,023.3 |
| 49 | AWT | 27 Jun | 1:12 | 16 | 57 | 45.36 | 170 | 17.05 | 69 | 73 | 2.7 | 9.8 | 356 | 375.9 | 1,302 | 394.2 |
| 50 | AWT | 27 Jun | 22:25 | 60 | 59 | 11.55 | 171 | 10.84 | 70 | 77 | 0.8 | 7.8 | 358 | 539.3 | 603 | 957.5 |
| 51 | AWT | 28 Jun | 5:00 | 12 | 58 | 24.67 | 171 | 2.49 | 79 | 84 | 2.4 | 7.6 | 359 | 1,426.1 | 7,648 | 1,522.7 |
| 52 | AWT | 28 Jun | 9:37 | 20 | 57 | 49.23 | 170 | 56.00 | 66 | 87 | 3.5 | 10.3 | 360 | 437.2 | 844 | 455.4 |
| 53 | AWT | 28 Jun | 13:57 | 25 | 57 | 49.47 | 170 | 56.05 | 68 | 87 | 3.5 | 9.7 | 361 | 531.3 | 816 | 535.3 |
| 54 | AWT | 28 Jun | 19:26 | 16 | 57 | 5.14 | 170 | 48.47 | 85 | 88 | 3.9 | 9.7 | 362 | 409.0 | 644 | 466.0 |
| 55 | AWT | 28 Jun | 23:31 | 13 | 56 | 36.58 | 170 | 43.61 | 107 | 115 | 3.9 | 10.3 | 363 | 390.3 | 723 | 393.3 |
| 56 | 83-112 | 29 Jun | 2:56 | 19 | 56 | 15.71 | 170 | 40.21 | 124 | 124 | 3.8 | 9.6 | 364 | 1,378.7 | 1,465 | 1,730.0 |
| 57 | AWT | 29 Jun | 12:02 | 20 | 56 | 39.49 | 171 | 22.02 | 114 | 121 | 3.6 | 10 | 365 | 488.6 | 593 | 488.6 |

Table 1. Continued.

| Haul no. | Gear type[1] | Date | Start time (GMT) | Duration (minutes) | Start Position | | | | Depth (m) | | Temp. (deg. C) | | Profile No.[3] | Pollock catch | | Total catch |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Latitude | | Longitude | | Gear | Bottom | Gear[2] | Surface | | (kg)[4] | number | (kg) |
| 58 | AWT | 29 Jun | 20:29 | 28 | 57 | 16.85 | 171 | 26.61 | 99 | 102 | 3.6 | 10.3 | 366 | 287.5 | 538 | 290.8 |
| 59 | 83-112 | 30 Jun | 2:20 | 15 | 58 | 0.75 | 171 | 34.26 | 98 | 98 | 3.1 | 10.4 | 367 | 1,307.6 | 2,919 | 1,700.0 |
| 60 | AWT | 30 Jun | 6:25 | 37 | 58 | 30.08 | 171 | 38.56 | 81 | 95 | 2.5 | 10.4 | 368 | 181.6 | 612 | 203.9 |
| 61 | AWT | 30 Jun | 10:44 | 20 | 59 | 1.86 | 171 | 46.28 | 78 | 87 | 1.2 | 9.3 | 369 | 320.4 | 565 | 351.6 |
| 62 | AWT | 1 Jul | 19:00 | 9 | 58 | 59.69 | 172 | 24.58 | 85 | 99 | 2 | 9.7 | 370 | 163.4 | 318 | 169.1 |
| 63 | 83-112 | 1 Jul | 21:28 | 15 | 58 | 48.67 | 172 | 22.97 | 101 | 101 | 2.4 | 9.9 | 371 | 559.7 | 1,288 | 638.7 |
| 64 | AWT | 2 Jul | 0:13 | 12 | 58 | 34.15 | 172 | 19.74 | 49 | 102 | 6 | 10.2 | 372 | 1,096.5 | 6,009 | 1,097.5 |
| 65 | AWT | 2 Jul | 8:22 | 25 | 57 | 14.46 | 172 | 3.56 | 100 | 111 | 3.5 | 10.3 | 373 | 138.9 | 174 | 138.9 |
| 66 | AWT | 2 Jul | 12:49 | 20 | 57 | 14.34 | 172 | 3.37 | 104 | 111 | 3.5 | 10.5 | 374 | 17.1 | 188 | 17.1 |
| 67 | 83-112 | 8 Jul | 20:42 | 20 | 57 | 26.38 | 172 | 43.46 | 118 | 118 | 3.5 | 10.8 | 375 | 895.7 | 1,185 | 931.9 |
| 68 | AWT | 9 Jul | 2:06 | 30 | 58 | 7.61 | 172 | 52.02 | 86 | 108 | 3.5 | 10.1 | 376 | 185.9 | 234 | 193.5 |
| 69 | AWT | 9 Jul | 9:16 | 4 | 59 | 0.29 | 173 | 3.34 | 77 | 107 | 2.9 | 10.6 | 377 | 827.6 | 2,931 | 836.2 |
| 70 | AWT | 9 Jul | 12:57 | 17 | 58 | 54.43 | 173 | 2.66 | 93 | 109 | 3.1 | 10.2 | 378 | 287.2 | 771 | 287.7 |
| 71 | AWT | 9 Jul | 14:18 | 21 | 58 | 55.61 | 173 | 2.17 | 47 | 109 | 5.8 | 10.2 | 379 | 0.1 | 1 | 125.0 |
| 72 | 83-112 | 9 Jul | 19:39 | 23 | 59 | 37.98 | 173 | 11.49 | 96 | 96 | 1.6 | 9 | 380 | 589.2 | 938 | 601.7 |
| 73 | AWT | 10 Jul | 1:05 | 18 | 60 | 9.57 | 173 | 18.59 | 57 | 67 | 4.5 | 8.4 | -- | 2.5 | 2 | 27.6 |
| 74 | 83-112 | 10 Jul | 18:50 | 15 | 60 | 22.91 | 174 | 4.15 | 90 | 90 | 1.6 | 7.5 | 382 | 2,083.4 | 5,481 | 2,188.0 |
| 75 | 83-112 | 10 Jul | 23:23 | 20 | 59 | 55.50 | 173 | 57.32 | 100 | 100 | 1.9 | 9.2 | 383 | 72.5 | 141 | 93.9 |
| 76 | AWT | 11 Jul | 3:35 | 11 | 59 | 39.21 | 173 | 53.19 | 96 | 106 | 4.9 | 9.8 | 384 | 641.4 | 1,573 | 666.2 |
| 77 | AWT | 11 Jul | 6:47 | 9 | 59 | 23.54 | 173 | 49.12 | 63 | 110 | 4.4 | 10 | 385 | 450.9 | 1,746 | 531.0 |
| 78 | AWT | 11 Jul | 21:27 | 25 | 58 | 43.13 | 173 | 40.51 | 109 | 127 | 3.3 | 9.9 | 386 | 190.5 | 278 | 198.0 |
| 79 | AWT | 12 Jul | 6:09 | 25 | 57 | 34.77 | 173 | 23.22 | 136 | 137 | 3.6 | 10.3 | 387 | 1,769.6 | 2,540 | 1,769.6 |
| 80 | 83-112 | 12 Jul | 10:59 | 12 | 57 | 33.50 | 173 | 21.15 | 136 | 136 | 3.5 | 10.1 | 388 | 226.8 | 295 | 233.2 |
| 81 | AWT | 12 Jul | 18:16 | 12 | 57 | 47.07 | 174 | 15.74 | 227 | 234 | 3.4 | 10.3 | 389 | 0.0 | 0 | 20.4 |
| 82 | AWT | 12 Jul | 22:55 | 36 | 57 | 43.37 | 174 | 7.23 | 96 | 116 | 4 | 10.6 | 390 | 0.0 | 0 | 600.1 |
| 83 | AWT | 13 Jul | 19:12 | 46 | 57 | 41.11 | 173 | 53.82 | 101 | 110 | 3.7 | 10.1 | 391 | 0.0 | 0 | 1.1 |
| 84 | AWT | 14 Jul | 6:40 | 60 | 58 | 52.70 | 174 | 20.46 | 114 | 133 | 3.3 | 10.2 | 392 | 474.2 | 577 | 493.6 |
| 85 | AWT | 14 Jul | 12:19 | 17 | 58 | 55.34 | 174 | 21.09 | 98 | 132 | 3.3 | 10.1 | 393 | 224.0 | 289 | 227.5 |
| 86 | AWT | 14 Jul | 18:50 | 27 | 59 | 28.20 | 174 | 29.74 | 114 | 121 | 2.8 | 9.9 | 396 | 288.4 | 396 | 385.1 |
| 87 | AWT | 14 Jul | 22:19 | 39 | 59 | 47.70 | 174 | 34.65 | 47 | 113 | 6.4 | 10.3 | 397 | 203.8 | 1,147 | 624.3 |

Table 1. Continued.

| Haul no. | Gear type[1] | Date | Start time (GMT) | Duration (minutes) | Start Position Latitude | | Start Position Longitude | | Depth (m) Gear | Depth (m) Bottom | Temp. (deg. C) Gear[2] | Temp. (deg. C) Surface | Profile No.[3] | Pollock catch (kg)[4] | Pollock catch number | Total catch (kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 88 | AWT | 15 Jul | 1:15 | 9 | 59 | 42.85 | 174 | 33.65 | 111 | 115 | 2.4 | 10.5 | 398 | 867.7 | 5,636 | 913.0 |
| 89 | AWT | 15 Jul | 3:54 | 41 | 59 | 37.06 | 174 | 32.02 | 91 | 117 | 2.5 | 10.5 | 399 | 19.4 | 48 | 74.1 |
| 90 | AWT | 15 Jul | 10:15 | 12 | 60 | 1.48 | 174 | 38.56 | 42 | 110 | 6.7 | 10.1 | 400 | 202.7 | 1,414 | 247.4 |
| 91 | AWT | 15 Jul | 12:39 | 15 | 60 | 7.64 | 174 | 40.19 | 97 | 107 | 1.9 | 10.1 | 401 | 895.3 | 2,248 | 897.7 |
| 92 | AWT | 15 Jul | 16:23 | 9 | 60 | 29.62 | 174 | 46.36 | 94 | 101 | 1.7 | 9.2 | 402 | 222.9 | 666 | 272.5 |
| 93 | AWT | 15 Jul | 19:36 | 8 | 60 | 49.56 | 174 | 51.69 | 88 | 96 | 1.2 | 9.2 | 403 | 1,373.3 | 3,707 | 1,396.9 |
| 94 | AWT | 16 Jul | 4:02 | 15 | 61 | 8.62 | 175 | 38.56 | 42 | 101 | 4 | 9.6 | 404 | 46.0 | 260 | 222.1 |
| 95 | AWT | 16 Jul | 7:54 | 10 | 60 | 50.56 | 175 | 32.96 | 89 | 107 | 2.1 | 9.4 | 405 | 340.4 | 1,327 | 418.0 |
| 96 | AWT | 16 Jul | 14:23 | 11 | 60 | 38.17 | 175 | 29.21 | 90 | 109 | 1.9 | 9.6 | 406 | 525.9 | 1,790 | 534.8 |
| 97 | AWT | 16 Jul | 17:46 | 17 | 60 | 34.71 | 175 | 28.31 | 57 | 107 | 2.7 | 10 | 407 | 711.7 | 5,107 | 846.9 |
| 98 | AWT | 16 Jul | 21:41 | 26 | 60 | 10.39 | 175 | 21.30 | 56 | 115 | 4.2 | 11 | 408 | 406.7 | 3,208 | 524.0 |
| 99 | AWT | 17 Jul | 8:28 | 40 | 58 | 38.72 | 174 | 55.74 | 302 | 302 | 3.2 | 11.7 | 409 | 4.6 | 4 | 21.1 |
| 100 | 83-112 | 17 Jul | 10:43 | 29 | 58 | 38.65 | 174 | 56.76 | 313 | 313 | 3.3 | 11.4 | 410 | 0.0 | 0 | 0.0 |
| 101 | AWT | 18 Jul | 3:16 | 4 | 59 | 39.54 | 175 | 51.83 | 126 | 137 | 2.3 | 11.4 | 411 | 735.4 | 2,827 | 737.6 |
| 102 | AWT | 18 Jul | 15:41 | 11 | 60 | 38.08 | 176 | 5.93 | 93 | 119 | 1.6 | 10.4 | 412 | 535.8 | 2,744 | 549.3 |
| 103 | AWT | 18 Jul | 19:22 | 16 | 61 | 2.11 | 176 | 17.68 | 105 | 112 | 1.7 | 9.9 | 413 | 422.5 | 533 | 439.4 |
| 104 | AWT | 18 Jul | 23:45 | 7 | 61 | 33.83 | 176 | 27.75 | 101 | 107 | 0.4 | 9.9 | 414 | 3,294.2 | 7,350 | 3,320.0 |
| 105 | AWT | 19 Jul | 9:18 | 4 | 60 | 49.56 | 176 | 54.59 | 97 | 127 | 2 | 10.4 | 415 | 527.5 | 2,694 | 550.0 |
| 106 | AWT | 20 Jul | 23:53 | 14 | 60 | 46.70 | 176 | 53.61 | 98 | 127 | 2 | 10.3 | 417 | 456.9 | 1,385 | 476.2 |
| 107 | AWT | 21 Jul | 8:47 | 6 | 59 | 39.43 | 176 | 31.32 | 103 | 137 | 2.1 | 11.2 | 418 | 425.8 | 3,227 | 425.8 |
| 108 | AWT | 21 Jul | 11:24 | 10 | 59 | 39.83 | 176 | 31.52 | 40 | 137 | 6.4 | 9.1 | 419 | 229.0 | 2,579 | 229.0 |
| 109 | AWT | 21 Jul | 19:35 | 12 | 59 | 17.95 | 176 | 26.14 | 127 | 137 | 2.2 | 10.3 | 421 | 1,482.5 | 2,136 | 1,485.1 |
| 110 | AWT | 22 Jul | 17:27 | 11 | 59 | 53.03 | 177 | 18.00 | 125 | 136 | 1.8 | 9.9 | 422 | 425.8 | 1,901 | 430.4 |
| 111 | AWT | 23 Jul | 0:26 | 17 | 60 | 50.29 | 177 | 35.74 | 125 | 138 | 1.6 | 10.2 | 423 | 680.2 | 1,877 | 680.2 |
| 112 | AWT | 23 Jul | 6:59 | 9 | 60 | 58.25 | 178 | 20.68 | 158 | 162 | 2.2 | 10 | 424 | 805.4 | 3,540 | 807.1 |
| 113 | AWT | 23 Jul | 9:05 | 22 | 60 | 58.20 | 178 | 21.05 | 156 | 162 | 2.2 | 10 | 425 | 136.2 | 755 | 140.9 |
| 114 | AWT | 23 Jul | 11:21 | 20 | 60 | 58.28 | 178 | 20.68 | 152 | 162 | 2.1 | 10.1 | 426 | 104.9 | 438 | 112.8 |
| 115 | AWT | 23 Jul | 13:30 | 20 | 60 | 58.24 | 178 | 20.73 | 148 | 162 | 2.1 | 9.8 | 427 | 61.7 | 251 | 63.7 |
| 116 | AWT | 23 Jul | 17:19 | 5 | 60 | 42.88 | 178 | 15.41 | 138 | 165 | 2.2 | 10.1 | 428 | 671.8 | 3,588 | 674.9 |
| 117 | AWT | 23 Jul | 21:09 | 3 | 60 | 18.74 | 178 | 7.51 | 100 | 156 | 2.4 | 10.4 | 429 | 1,723.3 | 48,918 | 1,734.0 |

Table 1. Continued.

| Haul no. | Gear type[1] | Date | Start time (GMT) | Duration (minutes) | Start Position | | | | Depth (m) | | Temp. (deg. C) | | Profile No.[3] | Pollock catch | | Total catch |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Latitude | | Longitude | | Gear | Bottom | Gear[2] | Surface | | (kg)[4] | number | (kg) |
| 118 | AWT | 24 Jul | 11:52 | 6 | 60 | 18.86 | 178 | 16.27 | 49 | 163 | 7.4 | 10.1 | 430 | 570.7 | 14,779 | 580.6 |
| 119 | AWT | 25 Jul | 10:15 | 8 | 59 | 54.10 | 177 | 53.15 | 121 | 142 | 1.9 | 10.4 | 431 | 292.8 | 939 | 292.8 |
| 120 | AWT | 25 Jul | 12:09 | 11 | 59 | 54.12 | 177 | 53.46 | 107 | 142 | 1.9 | 10.2 | 432 | 106.5 | 350 | 107.0 |
| 121 | AWT | 25 Jul | 13:17 | 12 | 59 | 54.05 | 177 | 54.72 | 108 | 143 | 1.9 | 9.9 | 433 | 290.7 | 1,021 | 292.2 |
| 122 | AWT | 26 Jul | 9:50 | 11 | 59 | 6.57 | 173 | 53.03 | 113 | 118 | 3.3 | 11.9 | 434 | 394.3 | 892 | 394.3 |
| 123 | AWT | 26 Jul | 14:24 | 29 | 59 | 3.39 | 173 | 56.03 | 89 | 119 | 3.4 | 11.4 | 435 | 19.4 | 132 | 19.6 |
| 124 | AWT | 27 Jul | 9:18 | 9 | 57 | 54.00 | 170 | 16.76 | 49 | 75 | 6.3 | 11.8 | 436 | 2.2 | 97 | 114.2 |
| 125 | AWT | 28 Jul | 9:33 | 15 | 55 | 30.02 | 166 | 10.67 | 116 | 126 | 6.1 | 11.3 | 437 | 388.5 | 876 | 400.1 |
| 126 | AWT | 28 Jul | 14:03 | 31 | 55 | 28.81 | 166 | 12.37 | 98 | 126 | 5 | 9.4 | 438 | 256.3 | 712 | 275.1 |
| 201 | Methot | 11 Jun | 9:32 | 11 | 56 | 4.46 | 162 | 14.08 | 75 | 76 | 3.7 | 6.2 | 305 | 0.0 | 0 | 6.4 |
| 202 | Methot | 12 Jun | 12:48 | 26 | 56 | 37.70 | 163 | 23.77 | 38 | 77 | 4.2 | 5.8 | 310 | 0.0 | 45 | 5.4 |
| 203 | Methot | 12 Jun | 13:51 | 15 | 56 | 37.59 | 163 | 23.76 | 54 | 77 | 2.5 | 5.7 | 311 | 0.0 | 25 | 1.9 |
| 204 | Methot | 18 Jun | 2:30 | 13 | 54 | 25.43 | 165 | 42.72 | 71 | 257 | 5.4 | -- | 331 | 0.0 | 0 | 11.3 |
| 205 | Methot | 22 Jun | 16:33 | 23 | 57 | 51.36 | 168 | 25.39 | 35 | 71 | 3 | 9 | 344 | 0.0 | 0 | 1.7 |
| 206 | Methot | 25 Jun | 23:14 | 13 | 56 | 37.48 | 169 | 30.74 | 21 | 48 | 5.3 | 6 | 353 | 0.0 | 26 | 0.7 |
| 207 | Methot | 27 Jun | 13:54 | 26 | 60 | 0.00 | 170 | 38.74 | 64 | 65 | 1.4 | 7.8 | 357 | 0.0 | 13 | 9.6 |
| 208 | Methot | 14 Jul | 13:28 | 16 | 58 | 56.22 | 174 | 21.24 | 122 | 130 | 3.2 | 10.1 | 394 | 0.0 | 13 | 0.8 |
| 209 | Methot | 21 Jul | 14:23 | 9 | 59 | 39.60 | 176 | 32.00 | 135 | 137 | 1.8 | 10.1 | 420 | 0.0 | 0 | 0.7 |

[1] Gear type: AWT=Aleutian wing trawl, 83-112 = 83-112 bottom trawl, Methot=Methot trawl

[2] Gear temperature was measured at the trawl headrope depth.

[3] Temperature data collected with Sea-Bird SBE39

[4] Young of the year pollock were caught in Methot trawls where number > 0 and kg = 0.0 (pollock weighed

Table 2. Catch by species from 108 Aleutian Wing trawl hauls conducted the summer 2002 pollock echo integration-trawl survey of the eastern Bering Sea shelf/slope, MF2002-08.

| Common name | Scientific name | Weight (kg) | Weight (%) | Numbers |
|---|---|---|---|---|
| walleye pollock | *Theragra chalcogramma* | 63,063.8 | 92.5 | 257,540 |
| jellyfish | Scyphozoa | 4,144.1 | 6.1 | 531 |
| northern rockfish | *Sebastes polyspinis* | 324.3 | 0.5 | 648 |
| Pacific ocean perch | *Sebastes alutus* | 280.6 | 0.4 | 1,217 |
| chrysaora jellyfish | *Chrysaora* sp. | 124.1 | 0.2 | - |
| Pacific cod | *Gadus macrocephalus* | 98.2 | 0.1 | 34 |
| chum salmon | *Oncorhynchus keta* | 26.7 | < 0.1 | 8 |
| coho salmon | *Oncorhynchus kisutch* | 17.2 | < 0.1 | 6 |
| eulachon | *Thaleichthys pacificus* | 11.7 | < 0.1 | 159 |
| yellowfin sole | *Limanda aspera* | 10.5 | < 0.1 | 19 |
| squid | Teuthoidea | 10.3 | < 0.1 | - |
| flathead sole | *Hippoglossoides elassodon* | 7.2 | < 0.1 | 13 |
| smooth lumpsucker | *Aptocyclus ventricosus* | 5.4 | < 0.1 | 3 |
| dusky rockfish | *Sebastes ciliatus* | 4.0 | < 0.1 | 2 |
| chinook salmon | *Oncorhynchus tshawytscha* | 3.8 | < 0.1 | 1 |
| shrimp | *Pandalas* sp. | 3.7 | < 0.1 | 1,260 |
| rock sole | *Lepidopsetta* sp. | 3.4 | < 0.1 | 8 |
| Pacific lamprey | *Lampetra tridentata* | 2.9 | < 0.1 | 7 |
| arrowtooth flounder | *Atheresthes stomias* | 2.8 | < 0.1 | 4 |
| lumpsucker | Cyclopterinae | 2.3 | < 0.1 | 1 |
| great sculpin | *Myoxocephalus polyacanthocephalus* | 1.3 | < 0.1 | 1 |
| magistrate armhook squid | *Berryteuthis magister* | 1.3 | < 0.1 | 10 |
| capelin | *Mallotus villosus* | 1.0 | < 0.1 | 37 |
| Pacific herring | *Clupea pallasi* | 1.0 | < 0.1 | 2 |
| northern shrimp | *Pandalus borealis* | 0.4 | < 0.1 | 67 |
| sturgeon poacher | *Podothecus acipenserinus* | 0.4 | < 0.1 | 6 |
| Alaska plaice | *Pleuronectes quadrituberculatus* | 0.3 | < 0.1 | 1 |
| prowfish | *Zaprora silenus* | 0.2 | < 0.1 | 1 |
| Atka mackerel | *Pleurogrammus monopterygius* | 0.2 | < 0.1 | 1 |
| bigfin eelpout | *Lycodes cortezianus* | 0.1 | < 0.1 | 1 |
| daubed shanny | *Lumpenus maculatus* | 0.0 | < 0.1 | 1 |
| lanternfish | Myctophidae | 0.0 | < 0.1 | 1 |
| Totals | | 68,153.0 | | 261,590 |

Table 3. Catch by species from 18 bottom trawl hauls trawl hauls conducted the summer 2002 pollock echo integration-trawl survey of the eastern Bering Sea shelf/slope, MF2002-08.

| Common name | Scientific name | Weight (kg) | Weight (%) | Numbers |
|---|---|---|---|---|
| walleye pollock | *Theragra chalcogramma* | 11,168.4 | 81.3 | 19,187 |
| Pacific cod | *Gadus macrocephalus* | 357.0 | 2.6 | 147 |
| yellowfin sole | *Limanda aspera* | 337.8 | 2.5 | 1,372 |
| flathead sole | *Hippoglossoides elassodon* | 274.7 | 2.0 | 678 |
| arrowtooth flounder | *Atheresthes stomias* | 273.8 | 2.0 | 373 |
| jellyfish | Scyphozoa | 239.0 | 1.7 | 4 |
| rock sole | *Lepidopsetta* sp. | 227.9 | 1.7 | 872 |
| starfish | Asteroidea | 136.9 | 1.0 | 2,278 |
| basketstar | *Gorgonocephalus eucnemis* | 90.4 | 0.7 | 439 |
| red king crab | *Paralithodes camtschaticus* | 87.2 | 0.6 | 43 |
| Pacific halibut | *Hippoglossus stenolepis* | 70.3 | 0.5 | 14 |
| Alaska plaice | *Pleuronectes quadrituberculatus* | 67.6 | 0.5 | 74 |
| hermit crab | Paguridae | 50.4 | 0.4 | 619 |
| Alaska skate | *Bathyraja parmifera* | 47.8 | 0.3 | 11 |
| rex sole | *Glyptocephalus zachirus* | 45.2 | 0.3 | 122 |
| snail | Gastropoda | 43.6 | 0.3 | 423 |
| sea urchin | Echinacea | 41.5 | 0.3 | 1,139 |
| octopus | Octopodidae | 36.2 | 0.3 | 2 |
| great sculpin | *Myoxocephalus polyacanthocephalus* | 26.8 | 0.2 | 8 |
| sea anemone | Actiniaria | 26.0 | 0.2 | 103 |
| empty gastropod shells | | 17.3 | 0.1 | 219 |
| Tanner crab | *Chionoecetes bairdi* | 16.4 | 0.1 | 184 |
| snow crab | *Chionoecetes opilio* | 10.1 | 0.1 | 63 |
| brittlestarfish | Ophiuroid | 7.6 | 0.1 | 1,969 |
| starry flounder | *Platichthys stellatus* | 6.8 | < 0.1 | 5 |
| sponge | Porifera | 4.6 | < 0.1 | 77 |
| Aleutian skate | *Bathyraja aleutica* | 4.2 | < 0.1 | 5 |
| bigmouth sculpin | *Hemitripterus bolini* | 3.0 | < 0.1 | 1 |
| | *Neptunea* sp. | 2.5 | < 0.1 | 7 |
| sea cucumber | Holothuroidea | 2.3 | < 0.1 | 4 |
| Greenland turbot | *Reinhardtius hippoglossoides* | 2.1 | < 0.1 | 2 |
| skate egg case | | 2.1 | < 0.1 | 63 |
| eelpout | Zoarcidae | 1.6 | < 0.1 | 6 |
| plain sculpin | *Myoxocephalus jaok* | 1.3 | < 0.1 | 1 |
| cockle | Veneroida | 1.3 | < 0.1 | 29 |
| butter sole | *Isopsetta isolepis* | 1.1 | < 0.1 | 4 |
| Hairy Triton | *Fusitriton* sp. | 0.9 | < 0.1 | 11 |
| Kamchatka flounder | *Atheresthes evermanni* | 0.9 | < 0.1 | 1 |
| snail eggs | | 0.8 | < 0.1 | 4 |
| sturgeon poacher | *Podothecus acipenserinus* | 0.8 | < 0.1 | 9 |
| bivalve unidentifed | Pelecypoda | 0.6 | < 0.1 | 5 |
| Atka mackerel | *Pleurogrammus monopterygius* | 0.5 | < 0.1 | 1 |
| Pacific herring | *Clupea pallasi* | 0.5 | < 0.1 | 2 |
| salmon snailfish | *Careproctus rastrinus* | 0.4 | < 0.1 | 1 |
| empty bivalve shells | | 0.4 | < 0.1 | 1 |

Table 3 continued

| Common name | Scientific name | Weight (kg) | Weight (%) | Numbers |
|---|---|---|---|---|
| spinyhead sculpin | *Dasycottus setiger* | 0.4 | < 0.1 | 1 |
| circumboreal toad crab | *Hyas coarctatus* | 0.4 | < 0.1 | 13 |
| ronquil | Bathymasteridae | 0.3 | < 0.1 | 1 |
| rose sea star | *Crossaster papposus* | 0.3 | < 0.1 | 17 |
| shortfin eelpout | *Lycodes brevipes* | 0.3 | < 0.1 | 6 |
| sea pen or sea whip | Pennatulacea | 0.3 | < 0.1 | 10 |
| crab | Brachyura | 0.2 | < 0.1 | 2 |
| tunicate | *Ascidian unident.* | 0.3 | < 0.1 | 4 |
| melon snail | *Volutopsius* sp. | 0.1 | < 0.1 | 4 |
| thorny sculpin | *Icelus spiniger* | 0.1 | < 0.1 | 7 |
| nudibranch | *Nudibranchia unident.* | 0.1 | < 0.1 | 1 |
| bat sea star | *Ceramaster sp.* | 0.1 | < 0.1 | 1 |
| rusty moonsnail | *Natica russa* | 0.1 | < 0.1 | 9 |
| shrimp | *Pandalas* sp. | 0.1 | < 0.1 | 11 |
| scale worm | *Polynoidae* | 0.1 | < 0.1 | 11 |
| Pacific lyre crab | *Hyas lyratus* | 0.1 | < 0.1 | 7 |
| tanner crab | *Chionoecetes* sp. | 0.0 | < 0.1 | 5 |
| graceful decorator crab | *Oregonia gracilis* | 0.0 | < 0.1 | 1 |
| sand dollar | Echinoidea | 0.0 | < 0.1 | 1 |
| bryozoan | Ectoprocta | 0.0 | < 0.1 | 1 |
| shrimp | *Crangon* sp. | 0.0 | < 0.1 | 2 |
| capelin | *Mallotus villosus* | 0.0 | < 0.1 | 1 |
| squid | Teuthoidea | 0.0 | < 0.1 | 1 |
| sea mouse | Aphroditidae | 0.0 | < 0.1 | 1 |
| Totals | | 13,741.9 | | 30,700 |

Table 4. Catch by species from 9 Methot trawl hauls conducted the summer 2002 pollock echo integration-trawl survey of the eastern Bering Sea shelf/slope, MF2002-08.

| Common name | Scientific name | Weight (kg) | Weight (%) | Numbers |
|---|---|---|---|---|
| jellyfish | Scyphozoa | 20.6 | 53.7 | 56 |
| euphausiid | Euphausiacea | 14.0 | 36.6 | 2951 |
| mottled sea star | *Evasterias troschelii* | 1.4 | 3.7 | 1 |
| salps | Thaliacea | 1.2 | 3.1 | 7 |
| yellowfin sole | *Limanda aspera* | 0.6 | 1.4 | 2 |
| flathead sole | *Hippoglossoides elassodon* | 0.4 | 1.1 | 2 |
| crangonid shrimp | Crangonidae | 0.0 | < 0.1 | 65 |
| flatfish larvae | Pleuronectiformes | 0.0 | < 0.1 | 560 |
| amphipod | Amphipoda | 0.0 | < 0.1 | 261 |
| walleye pollock | *Theragra chalcogramma* | 0.0 | < 0.1 | 122 |
| fish larvae | Teleostei | 0.0 | < 0.1 | 21 |
| codlings | Moridae | 0.0 | < 0.1 | 205 |
| rockfish | *Sebastes* sp. | 0.0 | < 0.1 | 64 |
| polychaete worm | Polychaeta | 0.0 | < 0.1 | 17 |
| Totals | | 38.3 | | 4,334 |

Table 5. Numbers of walleye pollock biological samples and other fish specimens collected during the summer 2002 pollock echo integration-trawl survey of the eastern Bering Sea shelf/slope, MF2002-08.

| | | | | Weight | | TINRO | Sea Lion | Classroom |
|---|---|---|---|---|---|---|---|---|
| Haul | Length | Maturity | Otoliths | Fish | Gonad | collection[1] | Fish Prey | Specimens |
| 1 | 394 | 82 | 40 | 82 | - | 50 | x | x |
| 2 | - | - | - | - | - | - | - | - |
| 3 | 139 | 82 | 40 | 82 | - | 50 | - | x |
| 4 | 215 | 58 | 58 | 58 | - | - | - | - |
| 5 | 336 | 90 | 42 | 90 | - | - | - | - |
| 6 | 3 | - | - | - | - | - | - | - |
| 7 | 15 | - | - | - | - | - | - | - |
| 8 | 308 | 55 | 40 | 55 | - | - | - | - |
| 9 | 402 | 67 | 42 | 67 | 1 | - | - | x |
| 10 | 58 | - | - | - | - | - | x | - |
| 11 | 372 | - | - | - | - | - | - | x |
| 12 | 429 | 81 | 41 | 81 | - | - | - | - |
| 13 | 521 | 73 | 41 | 73 | - | - | - | - |
| 14 | 440 | 124 | 39 | 124 | - | - | - | - |
| 15 | 297 | 80 | 40 | 80 | - | 50 | x | - |
| 16 | 394 | 97 | 40 | 97 | - | - | - | - |
| 17 | 133 | 87 | 40 | 87 | 2 | - | - | - |
| 18 | 357 | 93 | 40 | 93 | - | - | - | - |
| 19 | 347 | 119 | 43 | 119 | - | - | - | - |
| 20 | 367 | 48 | - | 48 | - | - | - | - |
| 21 | 281 | 59 | 40 | 59 | - | - | - | - |
| 22 | 418 | 107 | 40 | 107 | - | 50 | - | - |
| 23 | 427 | 46 | 7 | 46 | - | - | - | - |
| 24 | 154 | 68 | 43 | 68 | 1 | - | - | - |
| 25 | 35 | 35 | 35 | 35 | - | - | - | - |
| 26 | 433 | 96 | 46 | 96 | - | - | - | - |
| 27 | 187 | 64 | 40 | 64 | - | - | x | - |
| 28 | 475 | 50 | 39 | 50 | - | - | - | - |
| 29 | 397 | 56 | 39 | 56 | - | - | - | - |
| 30 | 353 | 49 | - | 49 | - | - | - | - |
| 31 | 32 | 32 | 32 | 32 | - | - | - | - |
| 32 | 285 | 36 | 36 | 36 | - | - | - | - |
| 33 | 8 | - | - | - | - | - | - | - |
| 34 | 382 | 54 | 41 | 54 | - | - | - | - |
| 35 | 334 | 60 | - | 60 | - | - | - | - |
| 36 | 406 | 84 | 41 | 84 | - | - | - | x |
| 37 | 341 | 49 | 40 | 49 | - | 50 | - | - |
| 38 | 285 | 48 | 48 | 48 | 1 | 50 | - | - |
| 39 | 472 | 84 | 40 | 84 | 2 | 50 | - | - |
| 40 | 358 | 84 | 40 | 84 | 2 | - | - | - |
| 41 | 150 | 31 | 31 | 31 | - | - | - | x |
| 42 | 383 | 84 | 40 | 84 | 1 | - | - | - |
| 43 | 704 | 90 | 46 | 90 | 1 | - | - | - |
| 44 | 331 | 24 | 24 | 24 | - | - | - | - |
| 45 | 298 | 39 | 25 | 39 | - | - | - | - |
| 46 | 448 | 45 | 25 | 45 | - | 50 | - | - |

Table 5 continued

| Haul | Length | Maturity | Otoliths | Weight | | TINRO collection[1] | Sea Lion Fish Prey | Classroom Specimens |
|---|---|---|---|---|---|---|---|---|
| | | | | Fish | Gonad | | | |
| 47 | 464 | 50 | 21 | 50 | - | - | x | - |
| 48 | 345 | 45 | 25 | 45 | 1 | 50 | - | - |
| 49 | 419 | 57 | 24 | 57 | - | - | - | - |
| 50 | 387 | 59 | 26 | 59 | 3 | 50 | - | - |
| 51 | 584 | 59 | 20 | 59 | - | - | - | - |
| 52 | 461 | 66 | 25 | 66 | 1 | | - | - |
| 53 | 331 | - | - | - | - | - | - | - |
| 54 | 339 | 41 | 25 | 41 | - | - | - | - |
| 55 | 342 | 59 | 26 | 59 | 1 | - | - | - |
| 56 | 397 | 57 | 25 | 57 | 2 | - | - | - |
| 57 | 363 | 38 | 24 | 38 | - | - | - | - |
| 58 | 482 | 56 | 25 | 56 | - | - | - | x |
| 59 | 499 | 59 | 25 | 59 | - | - | x | - |
| 60 | 350 | 50 | 25 | 50 | - | - | - | - |
| 61 | 327 | 47 | 25 | 47 | - | - | - | - |
| 62 | 318 | 58 | 25 | 58 | - | - | - | - |
| 63 | 495 | 53 | 25 | 55 | - | 50 | - | - |
| 64 | 459 | 60 | 25 | 60 | - | - | - | - |
| 65 | 174 | 34 | 20 | 34 | - | - | - | - |
| 66 | 188 | - | - | - | - | - | x | - |
| 67 | 351 | 55 | 55 | 55 | - | 50 | - | - |
| 68 | 234 | 44 | 44 | 44 | - | - | - | - |
| 69 | 533 | 50 | 41 | 50 | - | - | - | - |
| 70 | 586 | - | - | 185 | - | - | - | - |
| 71 | 1 | - | - | - | - | - | - | - |
| 72 | 310 | 42 | 42 | 42 | - | 50 | - | - |
| 73 | 2 | 2 | - | 2 | - | - | - | - |
| 74 | 492 | 53 | 53 | 53 | - | - | x | x |
| 75 | 141 | 40 | 40 | 40 | - | - | - | - |
| 76 | 324 | 40 | 40 | 40 | - | - | - | - |
| 77 | 334 | 40 | 40 | 40 | - | - | - | - |
| 78 | 278 | 41 | 41 | 41 | - | - | - | - |
| 79 | 332 | 40 | 40 | 40 | - | - | - | - |
| 80 | 295 | - | - | - | - | - | - | - |
| 81 | - | - | - | - | - | - | - | - |
| 82 | - | - | - | - | - | - | - | - |
| 83 | - | - | - | - | - | - | - | - |
| 84 | 304 | 37 | 37 | 37 | - | - | - | - |
| 85 | 289 | 99 | - | 99 | - | - | - | - |
| 86 | 309 | 35 | 35 | 35 | - | 50 | - | x |
| 87 | 341 | 43 | 43 | 43 | - | - | - | - |
| 88 | 570 | 36 | 36 | 36 | - | - | - | - |
| 89 | 48 | - | - | - | - | - | - | - |
| 90 | 344 | 34 | 34 | 34 | - | - | - | - |
| 91 | 307 | 41 | 41 | 41 | - | - | - | - |
| 92 | 338 | 33 | 33 | 33 | - | - | - | - |
| 93 | 361 | 38 | 38 | 38 | - | - | - | - |
| 94 | 260 | 35 | 35 | 35 | - | - | - | - |
| 95 | 355 | 36 | 36 | 36 | - | - | - | - |

Table 5 continued

| Haul | Length | Maturity | Otoliths | Weight | | TINRO collection[1] | Sea Lion Fish Prey | Classroom Specimens |
|---|---|---|---|---|---|---|---|---|
| | | | | Fish | Gonad | | | |
| 96 | 443 | 52 | 35 | 52 | - | - | - | - |
| 97 | 413 | 57 | 35 | 57 | - | 50 | - | - |
| 98 | 310 | - | - | - | - | - | - | - |
| 99 | 4 | - | - | - | - | - | - | - |
| 100 | - | - | - | - | - | - | - | - |
| 101 | 428 | 36 | 36 | 36 | - | - | - | - |
| 102 | 452 | 53 | 35 | 53 | - | 50 | - | - |
| 103 | 301 | 32 | 32 | 32 | - | 50 | - | - |
| 104 | 405 | 35 | 35 | 35 | - | 50 | - | - |
| 105 | 471 | 34 | 34 | 34 | - | - | - | - |
| 106 | 280 | - | - | - | - | - | - | - |
| 107 | 668 | 36 | 36 | 36 | - | - | - | - |
| 108 | 598 | 53 | 35 | 53 | - | - | - | - |
| 109 | 329 | 47 | 47 | 47 | - | 50 | - | - |
| 110 | 398 | 32 | 32 | 32 | - | - | - | - |
| 111 | 309 | 35 | 35 | 35 | - | - | - | - |
| 112 | 365 | 35 | 35 | 35 | - | - | - | - |
| 113 | 252 | 29 | - | 29 | - | - | - | - |
| 114 | 438 | - | - | - | - | - | - | - |
| 115 | 251 | - | - | - | - | - | - | - |
| 116 | 323 | 45 | 34 | 45 | - | 50 | - | - |
| 117 | 391 | 37 | 37 | 37 | - | - | - | - |
| 118 | 362 | - | - | - | - | - | - | - |
| 119 | 333 | 36 | 36 | 36 | - | - | - | - |
| 120 | 350 | 0 | 0 | 0 | - | - | - | - |
| 121 | 442 | 0 | 0 | 0 | - | - | - | - |
| 122 | 325 | 76 | 0 | 76 | - | - | - | - |
| 123 | 132 | 0 | 0 | 0 | - | - | - | - |
| 124 | 97 | 0 | 0 | 0 | - | - | - | - |
| 125 | 389 | 98 | 0 | 98 | - | - | - | - |
| 126 | 308 | 36 | 0 | 36 | - | - | - | - |
| Totals | 40,234 | 5,466 | 3,233 | 5,653 | 19 | 1,000 | 8 sites | 9 sites |

[1]TINRO center biological sampling includes weight, length, sex, maturity, stomach contents, and otolith collection.