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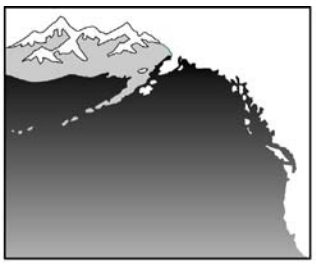

University of Washington
SCHOOL OF AQUATIC
& FISHERY SCIENCES

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NPAFC RESEARCH COORDINATION, 2001

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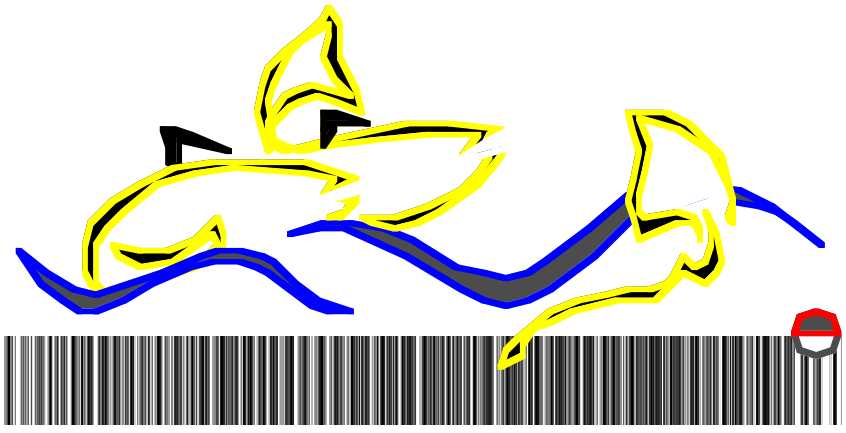
Final Report
NOAA Contract No. 50ABNF-1-00002



NPAFC RESEARCH COORDINATION, 2001

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NPAFC Research Coordination, 2001

1. Executive Summary

This report summarizes the results of research on high seas salmonids conducted in FY 2001 (1 October 2000-30 September 2001) by the High Seas Salmon Research Program, Fisheries Research Institute (FRI), School of Aquatic and Fishery Sciences (SAFS; formerly the School of Fisheries), University of Washington, under contract to the National Oceanic and Atmospheric Administration (NOAA Contract #50ABNF-1-00002, Title: NPAFC Research Coordination). This work is a continuation of research required to meet United States' commitments to the research program of the North Pacific Anadromous Fish Commission (NPAFC), and is authorized by the NOAA Authorization Act of 1992 (PL 102-567, Title VIII: North Pacific Anadromous Stocks Convention). The NOAA, National Marine Fisheries Service (NMFS), Auke Bay Laboratory (ABL) in Juneau, Alaska, is charged with the mission of stewardship for this program, and is its primary using office. The FY 2000 work was in two major areas: (1) international cooperative high seas salmon research, including maintenance of historical scale collections, high seas tagging, and salmon research vessel cruises; and (2) NPAFC participation.

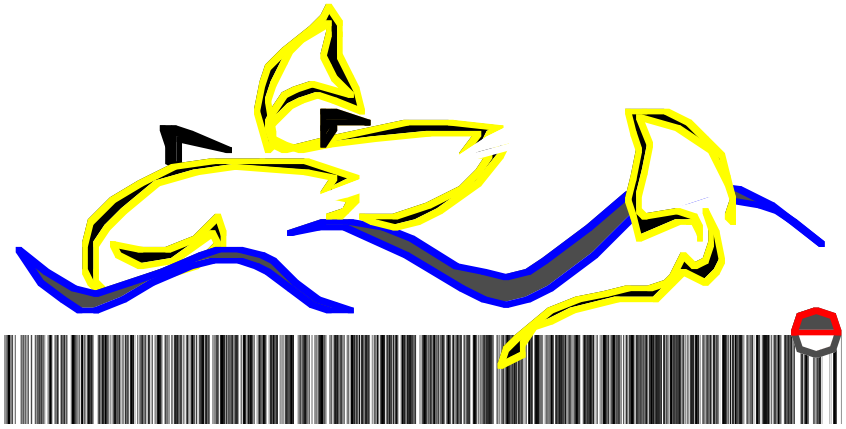
High seas salmon tagging research, conducted by SAFS scientists since 1955, provides stock-specific information on ocean distribution and migration patterns of salmon. Our work in FY 2001 included international cooperative disk-tagging of salmon at sea, activities for recovery of high seas tagged salmon from inshore areas, recovery of coded-wire tags (CWTs) from fish caught during cooperative Japan-US research vessel operations, maintenance, updating, and analyses of high seas disk tag and CWT release and recovery databases, CWT database coordination activities with ABL, and reporting of data to NPAFC. Range extensions were reported for southeastern Alaska chum salmon, juvenile southeastern Alaska coho salmon, British Columbia chinook salmon, U.S. West Coast coho salmon, and Oregon chinook salmon. In FY 2001, the most significant new information pertaining to ocean distribution and migration patterns of salmon was the recovery in the Yukon River delta of a sockeye salmon tagged with a data storage tag in the central Bering Sea. This is the only recovery of a Yukon sockeye from tagging in the Bering Sea.

In 1998, we initiated cooperative programs with ABL and the Fisheries Agency of Japan (FAJ) to place data storage tags (DSTs), which measure water temperature and swimming depth, on salmonids at sea. Data from previous recoveries of DSTs have shown clear diel patterns of salmon remaining near the surface at night and making frequent dives and ascents during the day; salmon spent most of the time in the top 40 meters, with infrequent excursions to 60-100 m. One new recovery was reported from tagging in 2000: the previously mentioned sockeye salmon tagged in the central Bering Sea and caught in the Yukon River delta. One DST- tagged coho salmon (caught in southeast Alaska) has been returned from 70 offshore releases in 2001, and two DSTs (one pink and one coho salmon) were recovered in south central Alaska from 18 releases during an ABL Ocean Carrying Capacity cruise. Data from tags recovered in 2001 confirm diurnal patterns and depth ranges recorded on previous tags.

We continued to update and standardize documentation and archiving of all scale collections (1950s-present) and databases that have been developed for previous high seas analyses at SAFS (1978-present). Computerized documentation was written along with the data to compact disks. Newly acquired scale samples and acetate impressions were transferred to archive boxes. A comprehensive electronic database of all scale collections and scale measurement databases was updated and stored on compact disk. We also fulfilled or coordinated the fulfillment of requests for exchange of scale samples and associated biological data made to the United States by other governments through the NPAFC.

We participated in two Japanese research vessel cruises in the North Pacific Ocean and Bering Sea beyond the 200-mile limit, as part of the NPAFC program of cooperative international salmon research. Summaries are presented of salmon research cruise data and salmonid food habits. Sockeye relative abundance in the north central Gulf of Alaska was at its highest level in eight years of sampling. The increase was due primarily to high abundance of young ocean age-.1 fish, although age-.2 and -.3 fish were also relatively abundant. In contrast, chum salmon in the same area were at their lowest level in eight years. For two years the proportions of squid in the diets of sockeye and pink salmon in the Subarctic Current area of the Gulf of Alaska have been low, but in 2001 proportions of squid in diets returned to higher levels, and stomach content weights relative to body weight increased. Feeding conditions for sockeye, pink, and chum salmon in the central North Pacific Ocean may have been less favorable in 2001 than in 2000 as shown by the abundance of a small pteropod (relatively low caloric value) in stomach contents. Chum salmon abundance in the central North Pacific was higher than it had been since 1993 (due to a high abundance of age-.2 and age-.3 fish) and pink salmon abundance was the highest it had been since 1991.

In 2001 in the Bering Sea, sockeye salmon were considerably more abundant than they had been since 1997, and there was a substantial increase in the abundance of young age-.1 sockeye over the previous year. Over the 11-year sampling period, the pattern of sockeye abundance indicates a four-year cycle, with maximum levels in 1993, 1997 and 2001 attributable to high abundance of young (age-.1) fish. Chum salmon abundance in the Bering Sea is inversely related to the odd-year cycle of pink salmon abundance but in 2001 chum catches were higher than expected. There may be a four year abundance cycle for chum salmon with minimum levels in 1991, 1995 and 1999, when young age-.1 fish were scarce in catches. Although pink salmon abundance in the Bering Sea was high, it was lower than in previous odd-year cycles. In two odd years, 1995 and 2001, pink salmon were particularly large, and the smallest pink salmon size was recorded in 1998, an even year; these observations do not support the assumption that pink salmon are smaller when they are abundant. Catches of chinook in 1993 and 2001 were the lowest during the eleven years of sampling. Although most of the chinook salmon sampled in the Bering Sea are typically immature age-1.2, in 2001 they were chiefly immature age-1.1.



NPAFC Research Coordination, 2001

2. Introduction

The work described herein is a continuation of North Pacific Anadromous Fish Commission (NPAFC) research coordination efforts and international cooperative high seas salmon (*Oncorhynchus* spp.) research in support of U.S. commitments to the NPAFC, which operates under the NOAA Authorization Act of 1992 (PL 102-567, Title VIII: North Pacific Anadromous Stocks Convention). The NOAA, National Marine Fisheries Service (NMFS), Auke Bay Laboratory (ABL) in Juneau, Alaska, is charged with the mission of stewardship for this program. Since 1955, the U.S. Government has contracted the Fisheries Research Institute (FRI), School of Aquatic and Fishery Sciences (SAFS; formerly School of Fisheries), University of Washington (UW), to conduct research on issues related to Pacific salmon and steelhead trout in the North Pacific Ocean. This work has included participation of SAFS scientists in the deliberations of the International North Pacific Fisheries Commission (INPFC, 1955-1992) and the North Pacific Anadromous Fish Commission (NPAFC, 1993-present). The results of SAFS's long-term High Seas Salmon Research Program have been used by the U.S. Government to establish a strong scientific basis for conservation and management of U.S. salmon stocks in international waters. In the 1980s, SAFS scientists pioneered cooperative U.S.-U.S.S.R. high seas salmon tagging research aboard Soviet vessels, and this program was expanded in the 1990s to include international cooperative high seas salmon research aboard Canadian and Japanese vessels, as part of the NPAFC research program. SAFS houses a large archive of historical high seas salmon research samples and data (1954-present) that is used in the described work.

The NPAFC Convention (Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean) entered into force on 16 February 1993. The Convention prohibits directed fishing for anadromous stocks in international waters of the North Pacific Ocean and its adjacent seas (north of 33°N latitude, beyond 200-mile zones). Incidental taking of anadromous stocks in fisheries directed at other species is strictly limited, and retention of incidental take is prohibited. The NPAFC member-nations (Canada, Japan, Russia, and the United States) can act individually or collectively to prevent unauthorized fishing activities and trafficking in illegally harvested fish; and they have the authority to board, inspect, and seize fishing vessels of other member-nations operating in violation of the Convention. The NPAFC, established under the Convention, serves as a forum for international coordination of scientific research and enforcement activities and promotion of conservation of Pacific salmon and ecologically related species in the Convention area and adjacent waters.

Article VII of the NPAFC Convention calls for extensive cooperation among member-nations in conducting scientific research for the purpose of conservation of anadromous stocks. With respect to the Convention area, cooperation includes "collecting, reporting and exchanging biostatistical information, fisheries data, including catch and fishing effort statistics, biological samples and other relevant data." Pertaining

to areas adjacent to the Convention area, the member-nations can be requested by the NPAFC to provide "catch information, enhancement information, materials such as biological samples and other technical data or information related to anadromous stocks and ecologically related species." The Convention calls for the development of "appropriate cooperation programs, including scientific observer programs, to collect fishing information in the Convention Area for the purpose of scientific research on anadromous stocks." Member-nations are also to cooperate in scientific exchanges such as seminars, workshops, and exchanges of scientific personnel.

In 1995, ABL developed an Ocean Carrying Capacity (OCC) research plan to address research issues identified by NPAFC. SAFS's High Seas Salmon Research Program is closely coordinated with the research efforts and mission of ABL's OCC Program. Work under current and previous NOAA contracts has included provision of participants in OCC high seas salmon research cruises and extensive collaboration in the writing, review, and publication of research plans and results. In addition, SAFS and OCC scientists routinely exchange samples, databases, and other ocean salmon research information. We continue to work closely with scientists at ABL on all aspects of the design and implementation of international cooperative high seas salmon research and NPAFC participation to maximize its usefulness within the overall framework and design of the OCC research program. The work described herein contributes substantially to the U.S. commitment for high seas salmon research under the NPAFC Science Plan.

3. International Cooperative High Seas Salmon Research

3.1 Maintenance of historical scale collections

One scientist, N. Davis, was designated to maintain the collection of scales, acetate impressions of scales, associated biological data, and scale measurement data used in previous contracted scale pattern analyses from 1956 through September 2000. Maintenance includes safe storage of scales and acetate impressions, maintenance of a scale inventory, and satisfying requests for scale exchange.

Historical collections of scales and acetate impressions of scales that are archived at SAFS, include samples from U.S., Canadian, and Japanese INPFC-related high seas research and observer programs (1955-1992), from cooperative U.S.-U.S.S.R. high seas salmon research (1983-1991), from recent cooperative NPAFC-related research (1992-present), and from various NMFS observer programs (1976-present). SAFS 's high seas scale collections from historical tagging studies comprise over 240,000 scales from 1956 to 1991. SAFS is also the repository of scales collected during high seas salmon research by the former Bureau of Commercial Fisheries (BCF, now NMFS) from 1955 to 1973, and from various NMFS observer programs (Japanese mothership and squid driftnet fisheries, and some salmon bycatch samples from Bering Sea and Gulf of Alaska groundfish fisheries). SAFS also has an extensive collection of acetate impressions of scales and biological data from Canadian high seas salmon research in the Gulf of Alaska (1962-1969), and from *Oshoro maru* (1980-2000) and *Wakatake maru* (1991-2000) cruises in the central North Pacific, Bering Sea, and Gulf of Alaska. SAFS currently has electronic archives of over 100,000 measurements of scale data from all six salmonid

species, including data covering the major productive range of sockeye (*O. nerka*; five years), chinook (*O. tshawytscha*; seven years), coho (*O. kisutch*; six years), and chum (*O. keta*; one year) salmon. These historical collections and databases are useful for retrospective analyses of age, growth, and stock composition of salmon in the North Pacific Ocean and Bering Sea.

We continued to update and standardize documentation and archiving of all scale collections (1950s-present) and databases that have been developed for previous high seas analyses at SAFS (1978-present). Computerized documentation was written along with the data to compact disks. Newly acquired scale samples and acetate impressions were transferred to archive boxes. A comprehensive electronic database of all scale collections and scale measurement databases was updated and stored on compact disk. We also fulfilled or coordinated the fulfillment of requests for exchange of scale samples and associated biological data made to the United States by other governments through the NPAFC.

3.2 High seas tagging program

Since 1955, FRI has conducted a high seas tagging program consisting of release of disk-tagged salmon at sea and recovery activities for high seas tags from inshore areas. In the 1980s, we began a program of recovery of coded-wire tags from fish caught during high seas fishing operations. In 1998, SAFS added additional activities including cooperative programs with ABL and the Fisheries Agency of Japan (FAJ) for placing data storage tags (DSTs) on salmonids at sea.

Although no U.S. vessel has been dedicated to high seas salmon tagging since 1982, a pilot program of tagging trawl-caught fish has been tested by SAFS and NMFS scientists during ABL cruises in 1998 and 1999. In 1998 seven salmon were tagged with disk and data storage tags. In 1999 34 salmon were tagged with disk and data storage tags, and 28 salmon were tagged with disk tags alone.

3.2.1 Cooperative high seas tagging

In FY01, R. Walker, served as the U.S. representative/co-operator with the NPAFC high seas salmonid tagging programs of Canada, Japan, and Russia. Japan is presently conducting high seas salmon tagging studies aboard two vessels, the *Wakatake maru* and the *Oshoro maru*, during summer research cruises in the central North Pacific, Bering Sea, and Gulf of Alaska. Two numbered disk tags, one U.S. tag with addresses of FRI, the National Salmon Resources Center (NASREC) in Japan, and the Kamchatka Research Institute of Fisheries and Oceanography (KamchatNIRO) in Russia, and one Japanese tag (with the word "Japan" and no mailing address) are attached to the fish with a single plastic cinch strap.

3.2.1.1 Disk tag releases

Tagging operations on viable salmonids caught by longline were conducted by scientists aboard the *Wakatake maru* in the central North Pacific and Bering Sea in

summer 2001 (Fig. 1; Fukuwaka et al. 2001a,b). Tagging experiments resulted in the release of a total of 697 salmonids, including 32 sockeye, 478 chum, 141 pink (*O. gorbuscha*), 39 coho, 4 chinook salmon, and 3 steelhead trout (*O. mykiss*). Among these releases, 32 fish were tagged with DSTs, of which 25 were U.S. DSTs (Table 1).

In 2001 aboard the *Oshoro maru*, 60 salmonids (31 in 2000) in the Gulf of Alaska (GOA) along the 145°W transect were double disk-tagged and released including 45 salmonids also tagged with U.S. DSTs (Fig. 1; Table 1; Fukuwaka et al. 2001b, Yamaguchi et al. 2001).

3.2.1.2 Disk tag recoveries

High seas tag recoveries totaled 18 Japan-U.S. tags in the period from 1 October 2000 through 30 September 2001, (15 chum, 1 sockeye, 1 pink, and 1 coho; Table 2; Walker et al. 2001, Fukuwaka et al. 2001b). These tagged salmon were released from 2000 to 2001 during cooperative Japan-U.S. tagging operations aboard the *Wakatake maru* and *Oshoro maru* in the central Aleutian Islands, Bering Sea, and GOA in June and July. One sockeye was released in the central Bering Sea in July 2000 and recovered in the Yukon River delta. The sockeye also carried a data storage tag and was the first Yukon recovery of a sockeye tagged in the Bering Sea, and thus provides the only information on distribution of this stock in the Bering Sea. One coho salmon, tagged with disk and data storage tags in July 2001 in the GOA, was recovered in southeast Alaska in Cross Sound. Fourteen maturing chum salmon released in July of 2000 in the central Bering Sea were recovered in Hokkaido, Japan, and Primorye, Russia, from August to November 2000. One maturing chum salmon, recovered near Vladivostok in Primorye province, Russia, was a westernmost recovery of an Asian chum salmon carrying a high-seas tag. Five of the maturing chum salmon recovered in Hokkaido carried data storage tags implanted by Japanese scientists, of which two were returned. One pink salmon, tagged in the central Bering Sea, was recovered on the high seas the next day by the tagging vessel. (Two additional recoveries of salmon tagged during US tagging operations aboard the F/V *Great Pacific* in the GOA in August 2001 were of fish carrying DSTs only, with no high seas disk tags.)

3.2.1.3 Snout collection for potential recovery of coded-wire tags

During operations aboard foreign research vessels, participating SAFS scientists have always encouraged the examination of the catch for salmonids missing the adipose fin, which indicates that a coded-wire tag may be present. SAFS has also facilitated the transport and provision of recovery samples and data to ABL, which is responsible for processing high seas recoveries of coded-wire tagged fish.

Snouts were collected from fin-clipped salmonids because these fish may contain a coded-wire tag (CWT). During high seas salmon research operations in 2001 aboard the *Oshoro maru*, 38 snouts were collected from salmonids lacking the adipose fin, including 35 steelhead, 2 chinook, and 1 coho salmon (Table 3). Snouts were frozen and sent to ABL for recovery of coded-wire tags. Aboard the *Wakatake maru*, snouts were recovered from 19 steelhead lacking the adipose fin (Table 4). These snouts were also

sent to ABL. Snouts from these cruises have not yet been examined to determine if they contain coded-wire tags.

In 2000, CWTs were found in five coho snouts and one steelhead snout from 66 snouts collected on two vessels. All CWTs were from snouts collected in the central Gulf of Alaska. Two wild and two hatchery coho had been tagged in south central Alaska, one hatchery coho had been tagged in Grays Harbor, Washington, and one hatchery steelhead had been tagged in a tributary of the Snake River in Oregon (Myers et al. 2001a). The Washington coho and Oregon steelhead are discussed below in section 3.2.3.2.

3.2.2 New tagging technologies

New tagging technologies have enabled us to get precise detailed data from individual fish as they migrate, and data from a few recoveries have already yielded a wealth of information. We have worked with NPAFC scientists in the deployment of data storage tags (DSTs) for international cooperative high seas tagging programs since 1998. In 1998 and 1999 NMFS provided SAFS with archival DSTs that recorded temperature (1998) or temperature and depth (1999) during salmonid ocean migrations. These tags were applied to salmon captured during ABL and Japanese research cruises. The number of recoveries (for example, 6 of 24 sockeye salmon tagged in the GOA, 1 of 1 chinook salmon tagged in the GOA, 5 of 23 chum salmon in the Bering Sea) demonstrated that DST tagging programs were feasible and justified. These recoveries yielded the first records of the thermal environment of individual salmon migrating at sea, with new information on diurnal behavior, length of recuperation from tagging procedures, and proportions of time spent at different temperatures. Data from the first recoveries of temperature-depth tags in 1999 show that salmon spent most of the time in the top 40 meters, with infrequent excursions to 60-100 m.

Japan has also initiated a program using DSTs. In 1998, 1999, 2000, and 2001 Japanese scientists surgically inserted tags that recorded temperature, depth, light levels, and swimming (current meter) speeds in chum salmon in the Bering Sea. As recommended by the CSRS, research issues to be addressed with the data from DST tagging programs include concerns about conservation (stock-specific migration behavior), global warming (vertical and horizontal behavior and associated environmental factors), carrying capacity (swimming behavior and bioenergetics), salmon enhancement (migration mechanisms of Pacific salmon), and technical considerations (for example, geoposition algorithms and incorporation of new tag features).

The data from five U.S. DSTs deployed in 1998 were analyzed for a publication in *Marine Ecology Progress Series* (Friedland et al. 2001). This article uses differences in sea surface temperatures between the beginning and end of day and night as indications of progress against thermal gradients, and concludes that chum salmon migrating from the Bering Sea to Japan make more progress in their migration during the day than during the night. Rough migration routes based on sea surface temperatures are also estimated. A second paper was published in NPAFC Bulletin 2, publication of proceedings of the 1999 NPAFC Symposium in Juneau (Walker et al. 2000a). In that paper, actual

temperatures recorded on DSTs were used in a bioenergetic model to estimate daily ration and to compare simulated salmon marine growth under differing temperature conditions.

3.2.2.1 2000 DST Tagging

The release of 31 DSTs and recovery of four DSTs in the GOA and Japan prior to 30 September 2000 were reported previously (Myers et al. 2000a, Walker et al. 2000b). Previously-reported 2000 recoveries were all coho salmon tagged in the GOA in July and recovered in Alaska (Unimak Island, Cook Inlet, Prince William Sound, and Tsiu River). The recovery in Prince William Sound was the first of a high seas DST from a North American hatchery fish (Solomon Gulch Hatchery). Data from tags recovered in 2000 confirmed diurnal patterns and depth ranges recorded on previous tags. Since our last annual report, one additional DST from 2000 tagging was returned (Table 2). A sockeye salmon carrying a temperature-depth DST was caught at in the Yukon River delta. This was the first recovery of a Yukon River sockeye tagged in the Bering Sea. A graph of ambient temperature and pressure data from this tag is presented in Fig. 2. Due to faulty calibration data in the tag, temperature and depth data may not be reliable.

3.2.2.2 2001 DST Tagging

Eighty-eight DSTs, which record temperature and depth data, were placed on Pacific salmon in the North Pacific Ocean and Bering Sea during three research cruises (Table 1; Walker et al. 2001). Twenty-one sockeye and three chinook salmon, and one steelhead trout were tagged in June and July in the central North Pacific and Bering Sea aboard the R/V *Wakatake maru*. Forty-five salmonids (8 sockeye, 8 chum, 9 pink, 16 coho, 2 chinook, and 2 steelhead) were tagged aboard the T/S *Oshoro maru* along 145°W in the GOA in early July. Aboard the F/V *Great Pacific* in the GOA in August, ABL scientists tagged eighteen viable salmon caught by trawl (6 sockeye, 7 chum, 2 pink, and 3 coho). As of September 30, 2001, three DSTs had been returned from fish tagged in the GOA (Table 2). One coho tagged in July was recovered in southeast Alaska off Yakobi Island, Cross Sound. Two fish (one coho and one pink) tagged off Kodiak Island by ABL scientists were recovered in Chignik Lagoon and off Kodiak Island. Data from tags recovered in 2001 confirm diurnal patterns and depth ranges recorded on previous tags. Graphs of ambient temperature and pressure data from these tags are presented in Figs. 3-5.

3.2.3 Update and correct tag databases

We continued SAFS's role under previous NOAA contracts in the updating and correction of the two parts of the high seas tagging database: (1) the NPAFC high seas tagging database and (2) the coded-wire tag database. The NPAFC tag release and recovery databases and the high seas CWT database are archived on CD ROM at the SAFS.

In 1998, SAFS added additional activities including the responsibility for managing the high seas salmonid coded-wire tag database (1981-present) and reporting CWT recoveries to NPAFC.

3.2.3.1 NPAFC high seas tagging database

The high seas salmon tag release and recovery databases were updated with data provided at the 2000 NPAFC annual meeting. Japan reported double-tagging operations conducted with the United States, and the United States reported U.S. tagging operations in the GOA. The release database was updated with 43 operations in which 714 fish were tagged and released. Nineteen fish were added to the tag recovery database (9 recoveries from Japan, 9 recoveries from Alaska, 1 recovery from British Columbia). The updated databases are available to all NPAFC Parties. Preliminary information from cruise data in 2001 indicates 775 fish were tagged during operations on three research cruises, and 20 recoveries were reported. New tag release and recovery information will be added to the databases.

3.2.3.2 High seas coded-wire tag database

Information on high seas recoveries of CWT salmonids has been reported annually to the INPFC (1981-1992) and to the NPAFC (1993-present). The Regional Mark Processing Center, Pacific States Marine Fisheries Commission (PSMFC), incorporates the high seas CWT recovery data into their coastwide, on-line CWT recovery data set (Regional Mark Information System (RMIS), http://www.rmis.org/cwt/cwt_qbe.html). SAFS maintains, updates, and corrects errors in the high seas CWT database, reports new CWT recovery data to NPAFC, and responds to all requests for high seas CWT recovery data. This work is fully coordinated with ABL, which receives and decodes CWTs from salmonids caught by high seas research vessels or in the U.S. groundfish fishery, codes the original recovery data, and reports CWT recovery data to PSMFC. High seas recoveries of CWT salmon and steelhead in 2000 were reported to NPAFC at their 8th Annual Meeting (Myers et al. 2000b).

Release and recovery data for 445 CWT salmonids in 2001 were reported for the first time in a document submitted to the 9th Annual Meeting of the NPAFC (Myers et al. 2001a). Reported recoveries are from U.S. commercial groundfish (trawl) fishery operations (419 recoveries) in 1996-2001 and U.S. and Japanese high seas research vessel operations (26 recoveries) in 1998-2000. The results were compared to previous CWT and high seas tag (HST) recoveries, and significant new information on ocean distribution of Pacific salmon and steelhead is discussed. Two recoveries of Yukon River hatchery chinook salmon corroborate information from seven previous recoveries showing that Yukon Territory chinook salmon are distributed in the southeastern Bering Sea in winter (December-March; Fig. 6). One recovery in March at 52°56'N, 156°48'W is a southern range extension for British Columbia chinook salmon in the western Gulf of Alaska (Fig. 7). Nine recoveries of Idaho (8) and Oregon (1) hatchery chinook salmon from the Snake River Basin provide new information (only 3 previous recoveries) on their distribution off the Washington Coast (Fig. 8). Two recoveries at 58°42'N, 150°35'W and 59°42'N, 149°22'W are westward extensions of the known ocean range of

juvenile (ocean age-.0) Oregon chinook salmon in the coastal Gulf of Alaska (Fig. 9). A recovery at 56°11'N, 166°21'W is a northwestern range extension for southeastern Alaska chum salmon in the Bering Sea (only two previous recoveries; Fig. 10). A coho salmon released in Grays Harbor (Satsop River), Washington, and recovered in the central Gulf of Alaska at 54°N, 145°W in July is a significant extension of the known high seas (international waters) range of maturing U.S. West Coast coho salmon (Fig. 11). Previous CWT and high seas tag recoveries of Washington coho salmon in international waters were all south of 48°N. Two recoveries at 58°22'N, 150°16'W and 59°17'N, 148°55'W are western range extensions for juvenile (ocean age-.0) southeastern Alaska coho salmon in the coastal Gulf of Alaska (Fig. 12). Four CWT recoveries (59°00'N, 150°49'W; 58°51'N, 150°42'W; 58°32'N, 150°25'W; and 59°17'N, 148°55'W) are western range extensions for juvenile Washington coho salmon in the coastal Gulf of Alaska (Fig. 13). An inland summer run hatchery steelhead from the Snake River Basin, Oregon was recovered in the central Gulf of Alaska (47°59'N, 145°W) in mid July (Fig. 14). Although this recovery location is well within the known ocean range of Snake River Basin steelhead, it is the southernmost recovery of this stock along 145°W longitude, which is currently the only survey line for high seas recovery of CWT salmonids across this vast region of the North Pacific Ocean.

3.2.4 Processing center for high seas salmon tags

Since 1956, FRI has served as the North American processing center for recovery of high seas salmonid tags. This activity requires advertising for tag returns, returning tags and recovery information to appropriate agencies, returning information on tag recoveries and a reward to fishermen and processors who return high seas tags, and reporting new tag recoveries in documents for NPAFC (Walker et al. 2000b, 2001).

Each year in the spring, we advertise for return of high seas salmon tags by mailing approximately 1400 informational packets to addresses in Alaska, British Columbia, Washington, Oregon, and California. These packets are sent to federal, state, and tribal fisheries research and management agencies, fishermen's organizations, salmon buyers and processors, and post offices. The informational packet includes a letter explaining the tagging program and the importance of returning tags, a poster advertising for tag returns (Fig. 15), and a business-reply envelope that includes a form for recording recovery information (tag number, date, location, fishing gear) and salmon biological data (species, sex, body weight, and how to collect scales).

Since 1991, we have offered a custom-embroidered cap as a reward for people who return high seas tags. The reward caps are embroidered with colorful, stylized salmon and lettering emphasizing the cooperative aspects of the high seas salmon tagging program.

3.3 Salmon research vessel cruises

Participation in cooperative cruises on foreign salmon research vessels has proven to be a cost-efficient and effective method for U.S. scientists to obtain up-to-date information on distribution, abundance, and origins of salmonids in offshore waters.

SAFS has had a program for cooperative research on the high seas since 1983. In 2001, SAFS scientists participated in cooperative salmon research cruises with Hokkaido University (HU; *Oshoro maru*) and Hokkaido National Fisheries Research Institute (HNFRI; *Wakatake maru*). The *Oshoro maru* operated in the eastern North Pacific and GOA in June and July, continuing a transect at 165°W started in 1998 and the transect at 145°W sampled since 1994 (Fig. 1; Yamaguchi et al. 2001). The *Wakatake maru* continued its sampling program, begun in 1991, along 180° in the central North Pacific in June and in the Bering Sea in July (Fig. 1; Fukuwaka et al. 2001a).

3.3.1 Data collection

The NPAFC provides a forum for international exchange of scientific data on salmon, and the CSRS is attempting to expand this role to include the standardization and compilation of comprehensive data sets that can be shared among scientists of the member nations. During the *Wakatake maru* and *Oshoro maru* cruises, N. Davis and R. Walker worked with Japanese scientists to collect biological samples and data pertinent to the continuation of existing data series that were initiated and developed under previous NOAA contracts.

3.3.1.1 Trends in salmonid abundance, maturity, age, and size - *Oshoro maru*

One SAFS scientist (R. Walker), in collaboration with one ABL scientist (J. Murphy), participated in the cooperative Japan-U.S. salmon research cruise on board the T/S *Oshoro maru* from 28 June to 10 July 2000 (Fig. 1, Table 5; Yamaguchi et al. 2001). Salmon surveys conducted aboard the *Oshoro maru* in the central North Pacific Ocean and GOA have provided valuable time series of fisheries and oceanographic data. This was the eighth consecutive year of cooperative Japan-U.S. sampling for salmon along a 145°W-longitude transect in the central GOA in early July, and the fourth year of a transect along 165°W in late June. The primary objective of the 2001 cooperative research was to continue the collection of oceanographic and biological data along the 165°W and 145°W transects. Because of adverse weather conditions, no fishing was conducted at southern (Subarctic Current) stations on the 165°W transect, and only two southern stations were sampled along 145°W. In 2001, late June mean SSTs at gillnet stations on the 165°W transect were 6.8°C, slightly warmer than in 2000 and near the average of the previous three years. Early July mean SSTs (9.2°C) were 1.2°C cooler than in 2000 at gillnet stations along the 145°W transect and cooler than the 1994-2000 average along 145°W (mean 10.2°C). The northern edge of the Subarctic Current (52°N) was slightly north of the average position, but the observed position of the minimum SST was further south (50°N) than in previous years (51°N-54°N). Although SSTs have fluctuated in the seven years the 145°W transect has been sampled, a declining trend is noticeable in the temperatures at 100 m in both the Ridge/Dilute Domain and the Subarctic Current (Table 5, Fig. 16). Temperatures in the Ridge/Dilute Domain steadily decreased from 5.6°C in 1994 to 4.1°C in 2000 and rose slightly to 4.3°C in 2001 (r^2=0.81, $p<0.005$). In the Subarctic Current, temperatures at 100 m have fallen from 6.5°C in 1994 to 4.7°C in 2001 (r^2=0.61, $p<0.05$). Along the 165°W transect, there are only three or four years of data, and there is no clear trend. Catches by gillnet totaled

2,262 salmonids, including 525 salmonids (192 in 2000) along the 165°W transect and 1,737 salmonids (2,110 in 2000) in the GOA.

On the *Oshoro maru* salmon research cruise along the 165°W transect in late June, salmonids were caught by research gillnet in the Ridge Domain (48°-50°N; Table 6; Yamaguchi et al. 2001). Overall sockeye salmon abundance in the Ridge Domain was the lowest in the four years sampled, but age 2.2 and age 2.3 fish were more abundant than in the previous three years (Fig. 17). Chum and pink salmon abundances were much higher than in 2000. For chum salmon, the increase was most pronounced in older (age-0.2 and age-0.3) fish (Fig. 17). Coho salmon were again uncommon in the Ridge Domain, though more common than previously, and steelhead trout were more abundant than in the previous three years. No fishing was conducted further south in the Subarctic Current.

Along the 145°W transect in early July, salmonids were caught by research gillnet in the Subarctic Current (50°-52°N) and the Ridge/Dilute Domains (53°N-56°N). Sockeye relative abundance was at the highest level in eight years of sampling, more than twice that of the previous highest year in the Ridge/Dilute Domains, 1997 (Table 6). The increase was due primarily to high abundance of young ocean age-.1 fish, although age-.2 and -.3 fish were also relatively abundant (Table 7, Fig. 18). Although a link through a 4-year cycle to high sockeye CPUE in 1997 might be suggested, the 1997 high catch was due to high abundance of age-.2 and -.3 fish. In the Subarctic Current, sockeye abundance was slightly higher than the previous (1998) high, and again, the increase was due to age-.1 fish, though age-.2 fish were also common. Chum salmon, in contrast, were at their lowest level in the Ridge/Dilute Domains, though abundance in the Subarctic Current was above 1994-2000 average values. Chum salmon were predominantly (59% and 62%) immature, ocean age-.2 in both areas (Table 8). The abundance by age in the Gulf of Alaska overall was similar to 1999, with age-0.2 fish predominant (Fig. 18). This age group was also dominant in 1995-1996 and 1999-2000, but was about equal in abundance to age-0.1 fish in 1997-1998. The abundances of pink and coho salmon in the Ridge/Dilute Domains in 2000 continued a decline from highs in 1999, to levels near (coho) or below (pink) 1994-2000 averages. Relative abundances of both species rebounded to above-average levels in the Subarctic Current. Unlike most previous years, steelhead were predominantly maturing age-.1, and juvenile, ocean age-.0 fish, were uncommon in both regions (Table 9). Fork lengths, body weights, and condition factors of salmonids in the 1994-2001 *Oshoro maru* research gillnet (C-gear) catches are summarized by species, age group and oceanic area (Tables 10-13). Preliminary statistical analyses of these biological data indicate that variation between stations within one year is as high as variation between years or between oceanic areas.

3.3.1.2 Trends in salmonid abundance, maturity, age, and size - *Wakatake maru*

One SAFS scientist (N. Davis) participated in an annual high-seas salmonid research cruise, which surveyed the central North Pacific Ocean and Bering Sea, from June 8 to July 23, 2001 on board the Japanese research vessel, *Wakatake maru,* (Fig. 1; Fukuwaka et al. 2001a). The objective of this cruise was to investigate salmon stock condition. Research cruise activities included collection of data on oceanography, primary

production, zooplankton, salmonids, and other organisms. Average sea surface temperatures in the North Pacific were 1.1°C warmer than in 2000, continuing a warming trend begun in 1999. However, in the Bering Sea, sea surface temperatures in 2001 were 1.8°C cooler than in 2000. A total of 11,044 salmonids was caught by longline and gillnet: 1,075 fish in the central North Pacific Ocean and 9,969 fish in the central Bering Sea. In the North Pacific Ocean, chum salmon was the most abundant species (39% of the salmonid catch), followed by coho (34%), pink (18%), sockeye (5%), steelhead trout (3%), and chinook salmon (1%). In the Bering Sea, pink salmon was the most abundant species (52% of the salmonid catch), followed by chum (39%), sockeye (9%), and chinook salmon (0.5%). Salmon stomach contents were examined on board the research vessel, and tissue (heart, liver and muscle) and otolith samples were collected from 1,144 chum salmon in the Bering Sea, and from an additional 349 pink salmon (145 in the North Pacific Ocean and 204 in the Bering Sea) for stock identification. Muscle samples from 250 chum salmon and 20 round samples of pink and chum salmon were collected for analysis of their lipid content, and ten round samples of pink and chum salmon were collected for stable isotope determinations. Brain, pituitary, gonad, and blood samples were taken from 100 chum salmon for endocrine studies. A total of 697 salmonids (478 chum, 141 pink, 39 coho, 32 sockeye, 4 chinook salmon, and 3 steelhead trout) were double-tagged with disk tags and released to the North Pacific Ocean and Bering Sea. These fish included 7 chum, 21 sockeye, 3 chinook salmon, and 1 steelhead trout, which were released carrying NMFS-supplied DSTs.

Abundance of salmonids caught by research gillnets fished by the *Wakatake maru* in 1991-2001 are summarized by oceanographic domain and year (Table 14). The abundance of sockeye in the Subarctic Current in 2001 was approximately the same as was found in 2000, and 1998, but considerably less than the unusually high abundance caught in 1999. In 2001, the size of ocean age-.1 sockeye salmon was approximately the same in 2000, however, the size of ocean age-.2 fish was larger than those caught the previous year (Table 15). In 2001 sockeye salmon were mostly immature age-2.1, age-1.2, and age-2.2. This was a substantial increase in the abundance of ocean age-.2 sockeye compared with 2000 (Fig. 19, Table 16). In 2001 in the Bering Sea, sockeye salmon were considerably more abundant than they had been since 1997 (Fig. 20, Table 14). In 2001 there was a substantial increase in the abundance of young age-.1 sockeye over the previous year (Fig. 20, Table 17). Over the 11-year period, the pattern in sockeye salmon abundance indicates a four-year cycle with maximum levels in 1993, 1997 and 2001. These maximum values were attributed to high abundance of young (age-.1) fish in catches. Average weight and fork length of age-.1 sockeye were slightly smaller than they were in 2001 and these results continue a trend of somewhat smaller ocean age-.1 sockeye since 1998 (Table 15). Ocean age-.2 and age-.3 sockeye salmon were approximately the same size in 2000-2001.

In 2001, chum salmon abundance in the central North Pacific was higher than it had been since 1993 (Table 14). The increased abundance was attributed to a high abundance of age-.2 and age-.3 fish (Fig. 19, Tables 18, 19). The proportion of age-.1 fish was similar in 2001 and 2000 and continued a lower abundance of young fish since 1996. Although the average size of age-.1 fish was smaller in 2001 than last year, the size of age-.2 chum salmon was the largest since 1991 and the size of age-.3 fish was larger than

fish caught since 1998 (Table 18). Chum salmon abundance in the Bering Sea is inversely related to the odd-year cycle of pink salmon abundance. However, 1997 and 2001 were odd years when chum salmon catches were higher than expected (Fig. 20, Table 14). In 2001 the proportion of age-.1 chum salmon increased in the catch and the proportion of older age groups decreased. Young age-.1 fish were smaller in 2001 than in 2000, while age-.3 fish were larger than in 2000 (Fig. 20, Table 18). There may be a four year abundance cycle in chum salmon with minimum levels in 1991, 1995 and 1999, when young age-.1 fish were scarce in catches (Fig. 20).

Pink salmon abundance in the central North Pacific was the highest it had been since 1991 (Table 14). All the pink salmon caught in June and July by the *Wakatake maru* were maturing age 0.1 fish. Although the size of pink salmon was smaller in 2001 than the previous year, the size of pink salmon caught in 2001 was larger than other odd years since 1995 (Table 20). In the Bering Sea, pink salmon continued a cycle of high abundance in odd years (Table 14). Although pink salmon abundance increased over 50 times from 2000 to 2001, pink salmon abundance in 2001 was not as high as those in other odd years, including 1991, 1995, 1997, and 1999. In two odd years, 1995 and 2001, pink salmon were particularly large, and the smallest pink salmon size was recorded in 1998, an even year (Table 20). The assumption that pink salmon are smaller when they are abundant does not characterize this data from the Bering Sea.

Coho salmon were substantially more abundant in the central North Pacific in 2001 than was observed in 1999 and 2000 (Table 14). All the coho salmon caught by the *Wakatake maru* are maturing age-.1. The mean size of these fish was dramatically larger than any year since 1991 (Table 21).

Chinook salmon are not abundant in the central North Pacific Ocean (Table 14). In 2001, two chinook salmon were caught in the more southerly Transition Domain rather than in the Subarctic Current area, which was typical of previous years. Both of these fish were relatively large immature age-.2 fish (Tables 22, 23). In the Bering Sea, chinook salmon are relatively more abundant than in the central North Pacific. Catches in 1993 and 2001 indicated the lowest chinook abundance during the 11-year record (Table 14). Typically, most of the chinook salmon sampled in the Bering Sea are immature age-1.2; however, in 2001 the fish were chiefly immature age-1.1 (Tables 22, 24). These young fish were slightly larger than those caught in 2000.

Steelhead trout are not abundant in the central North Pacific Ocean, but the few fish that were caught suggest that steelhead were slightly more abundant in the Transition Domain than in the Subarctic Current area in 2001 (Table 14). The abundance of steelhead in the central North Pacific was approximately the same as in 2000. All the fish were ocean age-.1 and age-.2, and the mean size of steelhead sampled in 2001 was somewhat larger than that of steelhead of the same age caught since 1991 (Table 25). If freshwater age-1. steelhead are assumed to be hatchery fish, then the percentage of hatchery fish sampled in 2001 was 60%, an increase from the estimated 43% hatchery-reared steelhead trout sampled in 2000 (Table 26).

3.3.2 Process samples and update data series

SAFS scientists have been conducting cooperative shipboard research on offshore food habits of salmon with scientists at HNFRI since 1991, Hokkaido University since 1993, and Hokkaido Tokai University since 1997. We continued to process samples and update the recent Japan-U.S. cooperative high seas salmon data series for the central North Pacific and Bering Sea (1991-2001) and Gulf of Alaska (1993-2001).

3.3.2.1 Summary of salmon food habits - *Oshoro maru*

Eight years of sampling along a 145°W transect by the *Oshoro maru* in the central GOA have generally shown some striking differences in the food habits of salmonids in Ridge/Dilute Domain versus Subarctic Current areas (Tables 27-28). In the Subarctic Current, squid, primarily *Berryteuthis anonychus*, usually has been the dominant prey of all species except chum salmon, which had a much more diverse diet (primarily amphipods, euphausiids, copepods, pteropods, and gelatinous zooplankton; Table 27). In 1999 and 2000 the percentage of squid in the diets of sockeye and pink salmon in this area was low, and amphipods were abundant. In 2001, salmon feeding seemed to have returned to conditions thought of as 'normal' in 1994-1998.

In the Ridge/Dilute Domain (Table 28), prey composition of stomach contents of sockeye, chum, and pink salmon is more diverse and the mean SCI is often lower than in the Subarctic Current, though in 2001 it was equal for pink salmon in the two areas. Pteropods, copepods, and amphipods were important prey items for sockeye, chum, and pink salmon in the Ridge/Dilute Domain. Chum salmon fed largely on pteropods in both areas. Coho, chinook, and steelhead tend to specialize in feeding on squid and fish, regardless of oceanic area, but in 2000 coho diets contained a high proportion of amphipods as well as squid.

On the 165°W transect, euphausiids were much more common, and pteropods much less common, in stomach samples from the Ridge Domain compared to those from the Ridge/Dilute Domain along 145°W (Table 29). No samples were available from the Subarctic Current. The first three years of sampling along the 165°W transect showed that squid was important but not always the dominant prey compared with feeding in the Subarctic Current along 145°W.

3.3.2.2 Summary of salmon food habits - *Wakatake maru*

A total of 856 stomach samples was examined on board the *Wakatake maru*. This total included samples collected from 228 sockeye, 284 chum, 222 pink, 52 coho, and 44 chinook salmon, and 26 steelhead trout. Results from *Wakatake maru* food habits investigations from 1991-2001 are summarized by salmon species, year and oceanographic areas (Tables 30-35). Observations in 2001 indicated that prey species were similar to previous years and that salmon feeding conditions may have been somewhat less favorable than in 2000, as evidenced by high abundance of the small pteropod, *Limacina* (2-4 mm shell diameter) in the stomachs of sockeye, pink, and chum salmon.

In the Transition Zone, gelatinous zooplankton, chiefly salps, was a major prey of chum salmon (Table 31). The squid, *Berryteuthis anonychus* sub-adults (50-110 mm mantle length), were the primary prey of coho salmon. In this area, the large hyperiid amphipod, *Phronima sedentaria* (approx. 23 mm total length) including their hollowed-out salp-barrel homes, and a small proportion of ostracods, *Conchoecia magna*, were frequently eaten by chum and coho salmon. Steelhead fed primarily on fish (three-spine stickleback, *Gasterosteus aculeatus*, Atka mackerel juveniles, *Pleurogrammus monopterygius,* and young daggertooth, *Anotopterus pharao*, 230 mm SL), and the long polychaete, *Rhynchonerella angelini* (70 mm total length) was found in the stomach contents of steelhead and chum salmon.

In the Subarctic Current, Ridge Domain, and Alaska Current the types of prey organisms fed on by salmon were similar across oceanographic domains (Tables 32-34). In these areas in 2001, the relatively high proportion of the pteropod *Limacina* was apparent in the stomach contents of sockeye, chum, and pink salmon. Often, numerous *Limacina* were so recently consumed by salmon that the pteropod's mucous feeding nets were intact in the stomach contents. Sockeye salmon were also feeding on hyperiid amphipods, including *Themisto pacifica*, and squid, *Berryteuthis*, in addition to *Limacina*. Sockeye and pink salmon increased their consumption of fish, often Atka mackerel, in the Alaska Current. Otherwise, pink salmon fed primarily on copepods (*Neocalanus cristatus*), squid (*Berryteuthis*), amphipods (*Themisto, Phronima*), and euphausiids (*Euphausia pacifica*). In these areas, the gelatinous zooplankton consumed by chum salmon was primarily ctenophores (*Beroe*) and secondarily small medusae (*Aglantha digitale*). Coho and chinook salmon were feeding exclusively on *Berryteuthis*, and steelhead fed on *Berryteuthis* and fish.

In the Bering Sea, the prey of sockeye, pink, and chum salmon expanded to include euphausiids (*Thysanoessa longipes*), copepods (*Neocalanus*), juvenile squids, and a variety of fish (juvenile Atka mackerel, flatfish, and *Hemilepodotus* sp., adult *Stenobrachius leucopsarus*; Table 35). In 2001, there was heavy consumption of *Limacina* by sockeye, pink, and chum salmon, and for the first time, chum salmon stomachs were found to contain relatively large fish (northern smoothtongue, *Leuroglossus stilbius schmidti*, approximately 133 mm SL) in their stomach contents. In this area, young age-.1 sockeye were observed to feed on a higher proportion of the small hyperiid amphipod (*Themisto*) than older sockeye salmon.

4. NPAFC Participation

4.1 Participants for annual meetings, sub-committees, and working groups

SAFS scientists have regularly participated as U.S. salmon experts at NPAFC meetings, 1993-present. Since her appointment in October 1997, K. Myers has served as the U.S. member of the Science Sub-Committee, which is charged with developing the Science Plan for the CSRS. K. Myers and R. Walker participated in the CSRS at the 8th Annual Meeting in Tokyo October 30-November 2, 2000. K. Myers served as Rapporteur, and R. Walker assisted with U.S. editorial duties, in preparing the annual

CSRS report. K. Myers and R. Walker will participate in the CSRS at the 9th Annual Meeting in Vancouver October 28-November 2, 2001.

4.2 Rapporteur's Report

Duties of the Rapporteur include receiving, compiling, and editing material on field research plans, statistics, research results, and other routine information required for the annual report of the CSRS. A draft of the Rapporteur's report is sent by the NPAFC Secretariat to all CSRS participants prior to the start of the annual meeting. Since 1993, the appointment of the CSRS rapporteur has alternated between the United States and Canada, with the appointment of a Canadian rapporteur in odd years. K. Myers has been appointed as the CSRS Rapporteur in even years from 1994 – present.

At the 7th Annual Meeting of NPAFC, the CSRS endorsed the rapporteur system for the 2000 CSRS Annual Meeting. K. Myers was Rapporteur at the 8th Annual Meeting in Tokyo October 30-November 2, 2000. The rapporteur's report served as the basis for the Report of the CSRS, which was incorporated in the NPAFC Records of the Eighth Annual Meeting and in the NPAFC Annual Report.

4.3 Participants for NPAFC-related salmonid workshops, symposiums, and meetings

K. Myers was on the organizing committee for the NPAFC workshop, "Factors Affecting Production of Juvenile Salmon," held together with PICES in October 2000 in Tokyo, Japan, and was co-editor of the NPAFC Technical Report containing extended abstracts from the workshop. SAFS scientists presented or co-authored three papers at that workshop (Myers et al. 2001b; Nomura et al. 2001a; Urawa et al. 2001). K. Myers is co-author with R. Brodeur and J. Helle of NMFS of the U.S. review of juvenile salmon research for NPAFC Bulletin 3.

An annual Research Planning and Coordinating Meeting (RPCM) of NPAFC scientists is usually held in March of each year. SAFS researchers (K. Myers, R. Walker, and N. Davis) participated in the NPAFC RPCM held March 19-20, 2001 in Seattle, and assisted in the organization of the NPAFC International Workshop on Salmonid Otolith Marking, March 21, also held in Seattle. Both meetings were held at SAFS, University of Washington. K. Myers served as rapporteur and R. Walker as a U.S. editor for a summary report of the RPCM. K. Myers is co-editor of the NPAFC Technical Report which will contain extended abstracts from the otolith workshop. K. Myers helped prepare the Bering Sea-Aleutian Salmon International Survey research proposal (BASIS), in collaboration with S. Ignell of ABL and R. Beamish of Canada, for consideration by the CSRS.

K. Myers, R. Walker, N. Davis, K. Aydin, and S. Hyun co-authored eight papers which appeared in NPAFC Bulletin 2, publication of proceedings of the NPAFC symposium "Recent Changes in Ocean Production of Pacific Salmon" (Aydin et al. 2000a; Carlson et al. 2000; Davis et al. 2000; Kaeriyama et al. 2000; Myers et al. 2000c; Norris et al. 2000; Urawa et al. 2000a; Walker et al. 2000a).

As part of international cooperative tagging efforts, R. Walker and other NPAFC scientists from Canada, Japan, and the U.S. attended the Pacific Salmon Tagging Workshop, a pilot research project of the Census of Marine Life, which is an international research program to assess the diversity, distribution, and abundance of marine organisms. The workshop developed two proposals for five-year pilot programs of extensive tagging with archival data tags and acoustic tags. Proposed tagging, if funded, would occur in offshore waters of the Bering Sea, North Pacific Ocean, and Bering Sea, and in Pacific Northwest freshwater and coastal areas. The workshop, sponsored and funded by the Sloan Foundation, was held in Vancouver, B.C., December 7-9, 2000.

4.4 Necessary documents for Annual Meetings

In 2000, five documents were submitted or co-authored by SAFS researchers for the CSRS at the NPAFC 8th Annual Meeting, including Fukuwaka et al. 2000; Myers et al. 2000b; Urawa et al. 2000b; Walker et al. 2000b; and Yamaguchi et al. 2000. Eight documents co-authored by SAFS researchers were submitted for the CSRS for the NPAFC 9th Annual Meeting, including Abe et al. 2001; Fukuwaka et al. 2001a,b; Ishida et al. 2001; Myers et al. 2001a; Nomura et al. 2001; Walker et al. 2001; and Yamaguchi et al. 2001.

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6. 2000-2001 Reports, Documents, and Publications

The authors supported by NOAA Contract No. 50ABNF-1-00002 and previous contracts are indicated in bold characters.

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Aydin, K.Y. 2000. Trophic feedback and carrying capacity of Pacific salmon (*Oncorhynchus* spp.) on the high seas of the Gulf of Alaska. Ph.D. Dissertation. University of Washington, Seattle.

Aydin, K.Y., K.W. Myers, and R.V. Walker. 2000a. Variation in summer distribution of the prey of Pacific salmon (*Oncorhynchus* spp.) in the offshore Gulf of Alaska in relation to oceanographic conditions, 1994-98. NPAFC Bull. 2: 43-54.

Aydin, K.Y., K. W. Myers, R.V. Walker, and N.D. Davis. 2000b. ENSO- and regime-scale variation in the biogeography of Gulf of Alaska micronekton as a driving mechanism for observed growth trends in Pacific salmon. P. 26 *in* Abstracts of papers presented at the Ninth Annual Meeting of the North Pacific Marine Science Organization (PICES), Oct. 20-28, 2000, Hakodate.

Carlson, H.R., E.V. Farley, Jr., and **K.W. Myers**. 2000. The use of thermal otolith marks to determine stock-specific ocean distribution and migration patterns of Alaskan pink and chum salmon in the North Pacific Ocean, 1996-1999. NPAFC Bull. 2: 291-300.

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Fukuwaka, M., **N.D. Davis**, A. Urano, T. Onuma, and S. Tsuchiya. 2001a. International salmon research aboard the R/V *Wakatake maru* in the central North Pacific Ocean and Bering Sea during the summer of 2001. NPAFC Doc. 546. Hokkaido Nat. Fish. Res. Inst., Fisheries Research Agency, Kushiro. 18 p.

Fukuwaka, M., S. Urawa, I. Ono, **N.D. Davis, and R.V. Walker**. 2001b. Recoveries of high-seas tags in Japan in 2000, and tag releases and recoveries of fin-clipped salmon from Japanese research vessel surveys in the North Pacific Ocean in 2001. NPAFC Doc. 545. Hokkaido Nat. Fish. Res. Inst., Fisheries Research Agency, Kushiro. 12 p.

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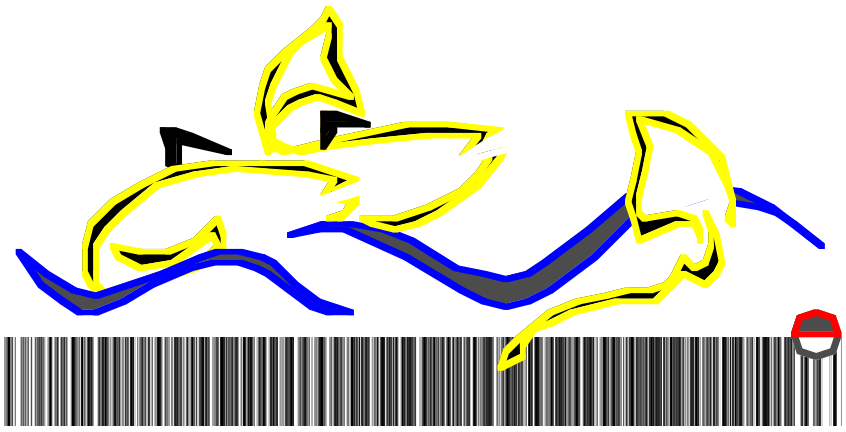

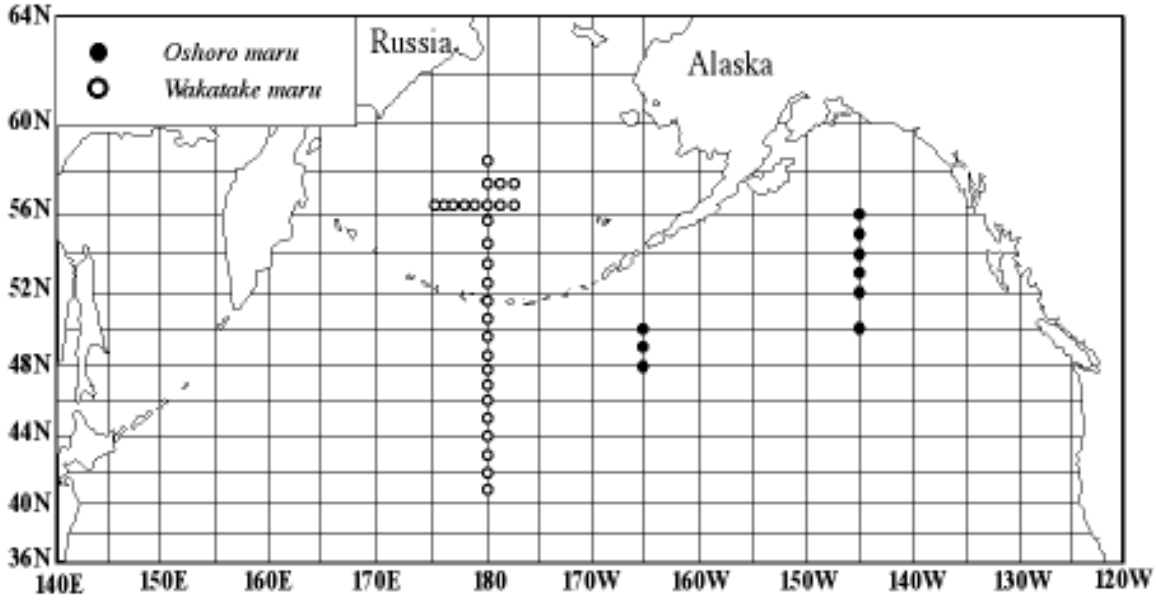

Figure 1. Sampling areas of international cooperative high seas salmon research cruises in 2001.

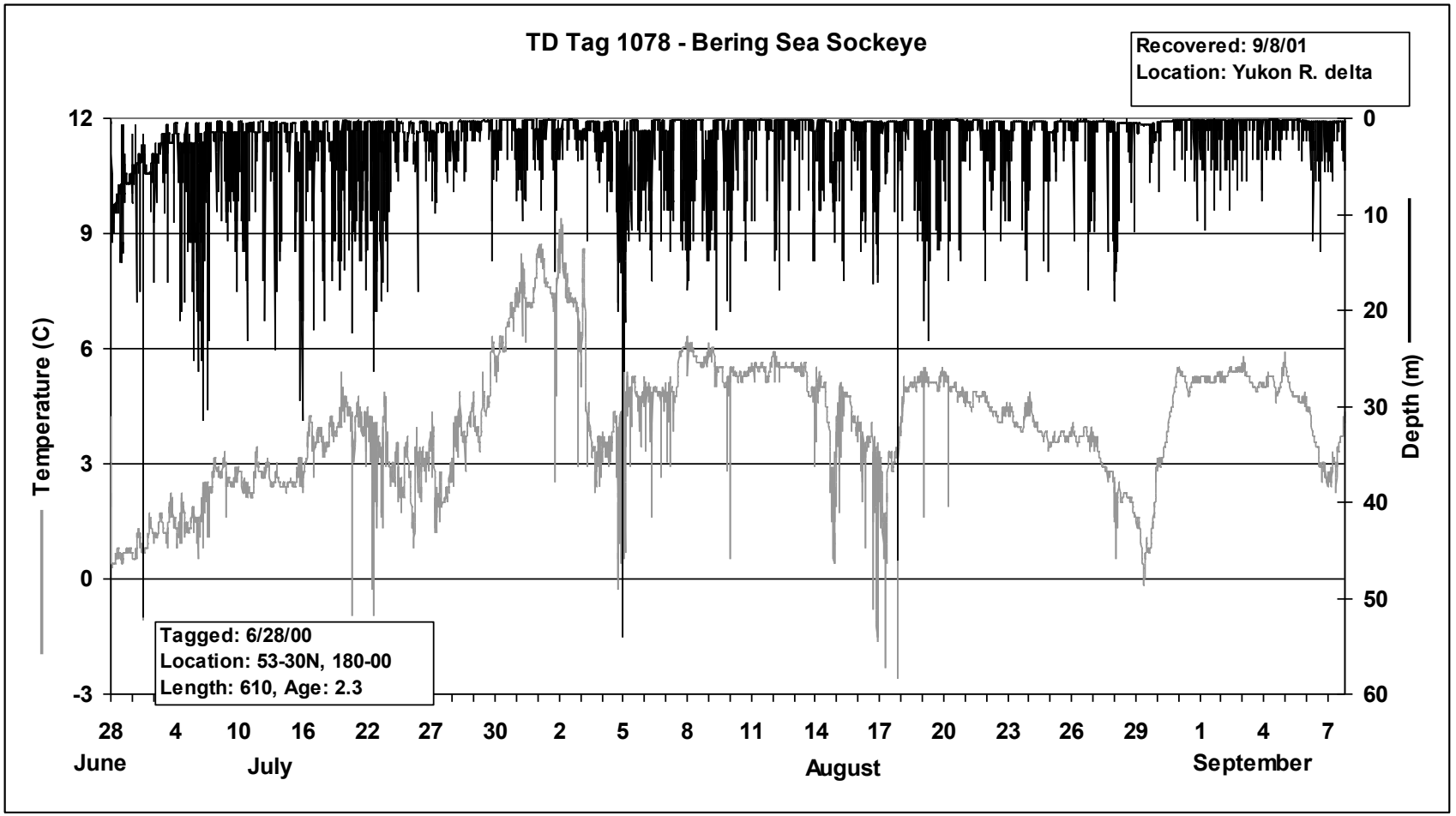

Figure 2. Temperature and depth data recorded on a data storage tag placed on a 610 mm sockeye salmon in the Bering Sea on 28 June 2000 and recovered in Alakanuk Slough, Yukon River delta, western Alaska, on 8 September 2000. Because of bad calibration data, temperature and depth data may not be reliable.

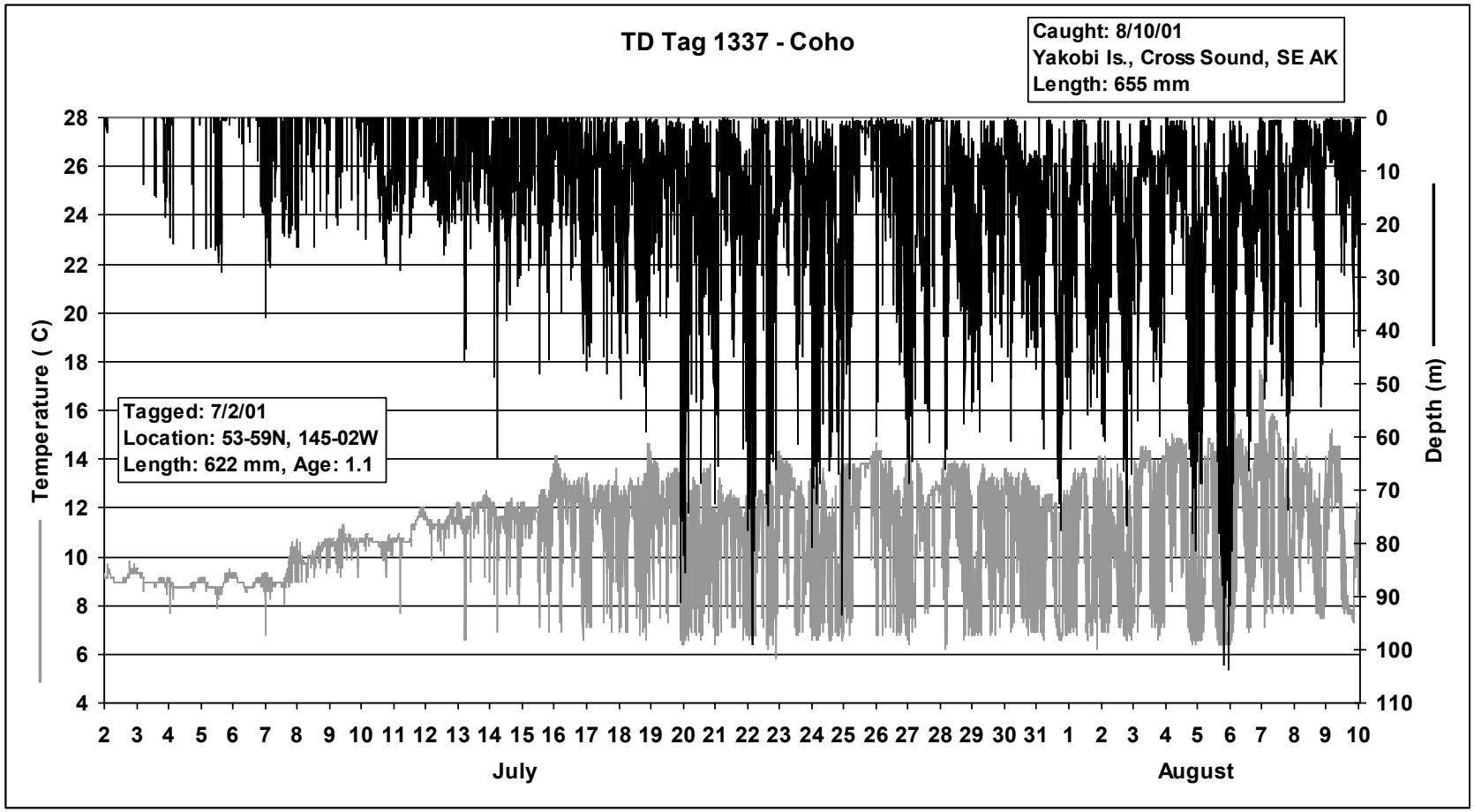

Figure 3. Temperature and depth data recorded on a data storage tag placed on a 622 mm coho salmon in the Gulf of Alaska on 2 July 2001 and recovered off Yakobi Island, southeastern Alaska, on 10 August 2001.

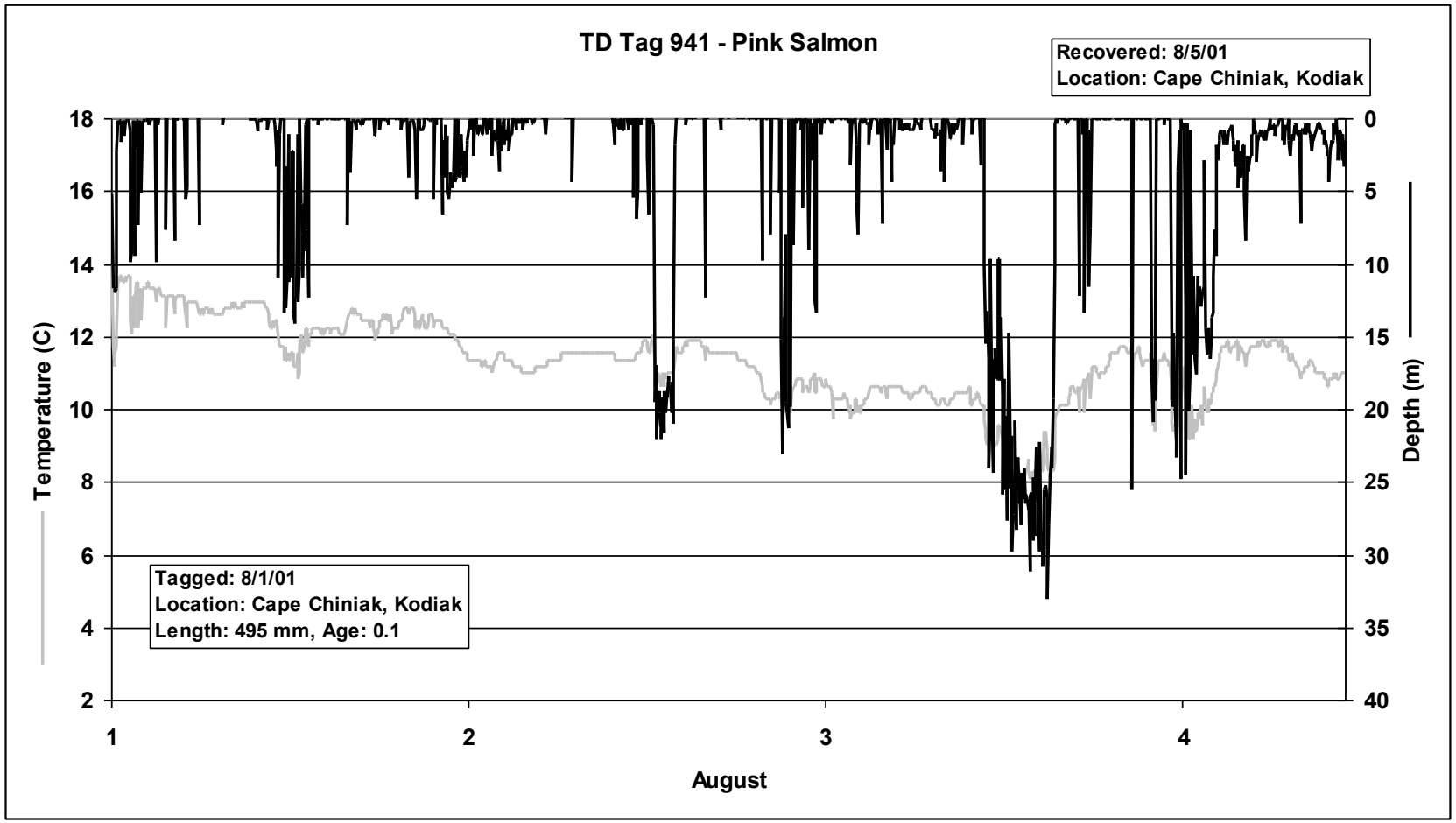

Figure 4. Temperature and depth data recorded on a data storage tag placed on a 495 mm pink salmon off Kodiak Island on 1 August 2001 and recovered off Kodiak Island, south central Alaska, on 5 August 2001.

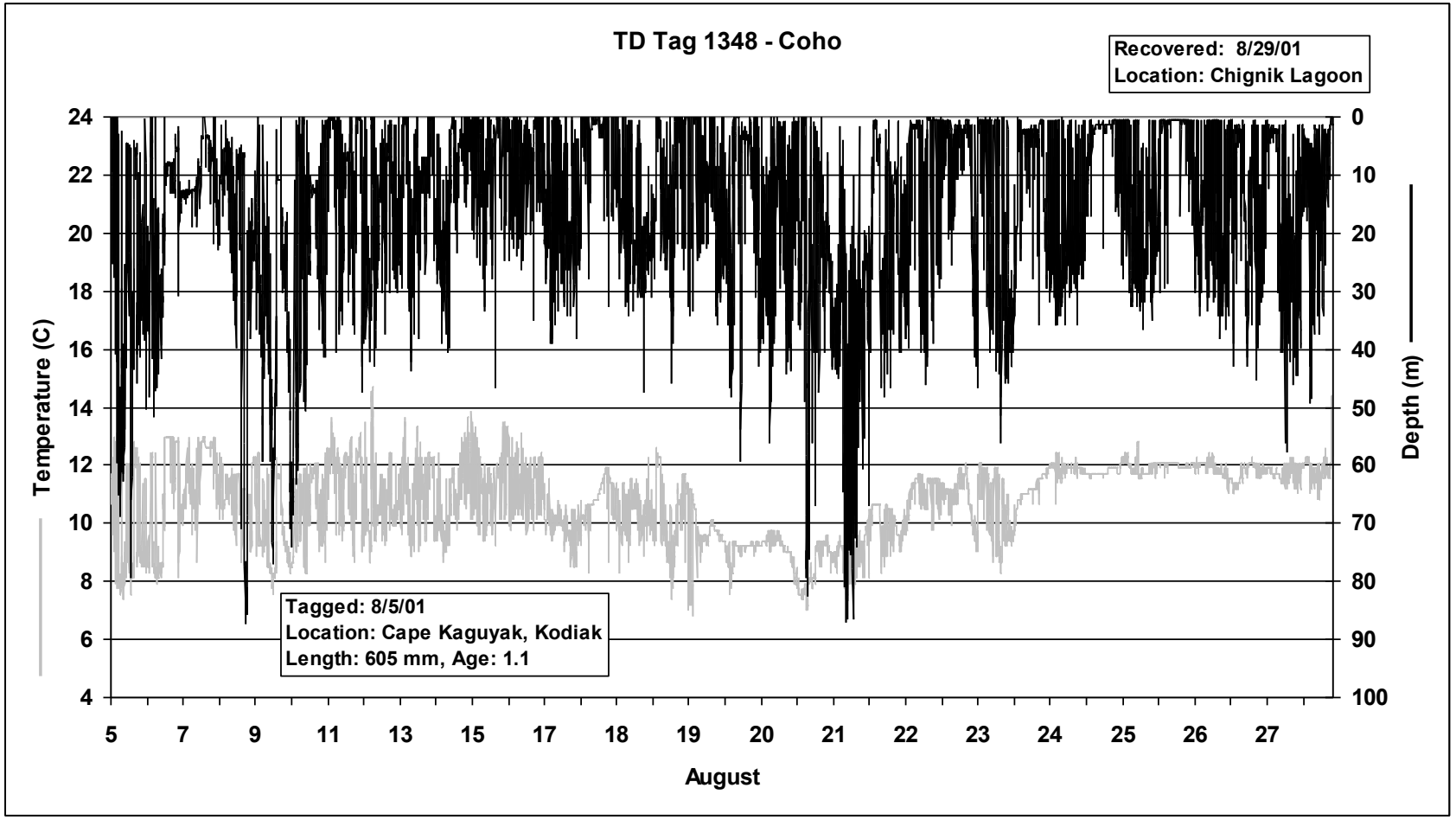

Figure 5. Temperature and depth data recorded on a data storage tag placed on a 585 mm coho salmon off Kodiak Island on 5 August 2001 and recovered in Chignik Lagoon, south central Alaska, on 29 August 2001.

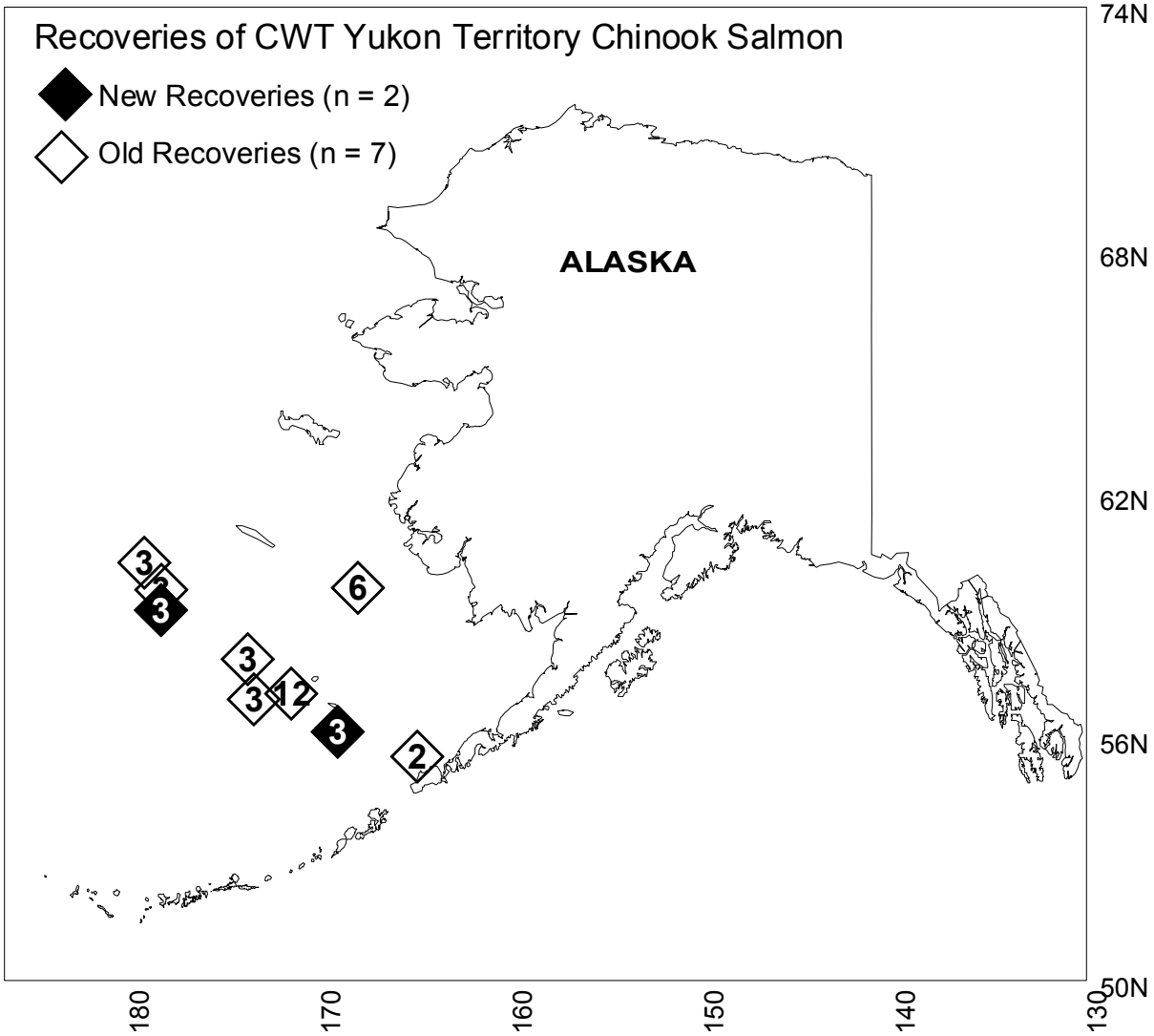

Fig. 6. Recovery locations of coded-wire tagged (CWT) Yukon River (Yukon Territory) hatchery chinook salmon in the eastern Bering Sea. The numbers inside the open and closed symbols indicate the month of recovery. These CWT recoveries provide the only direct information on the distribution of Yukon River chinook salmon in the eastern Bering Sea.

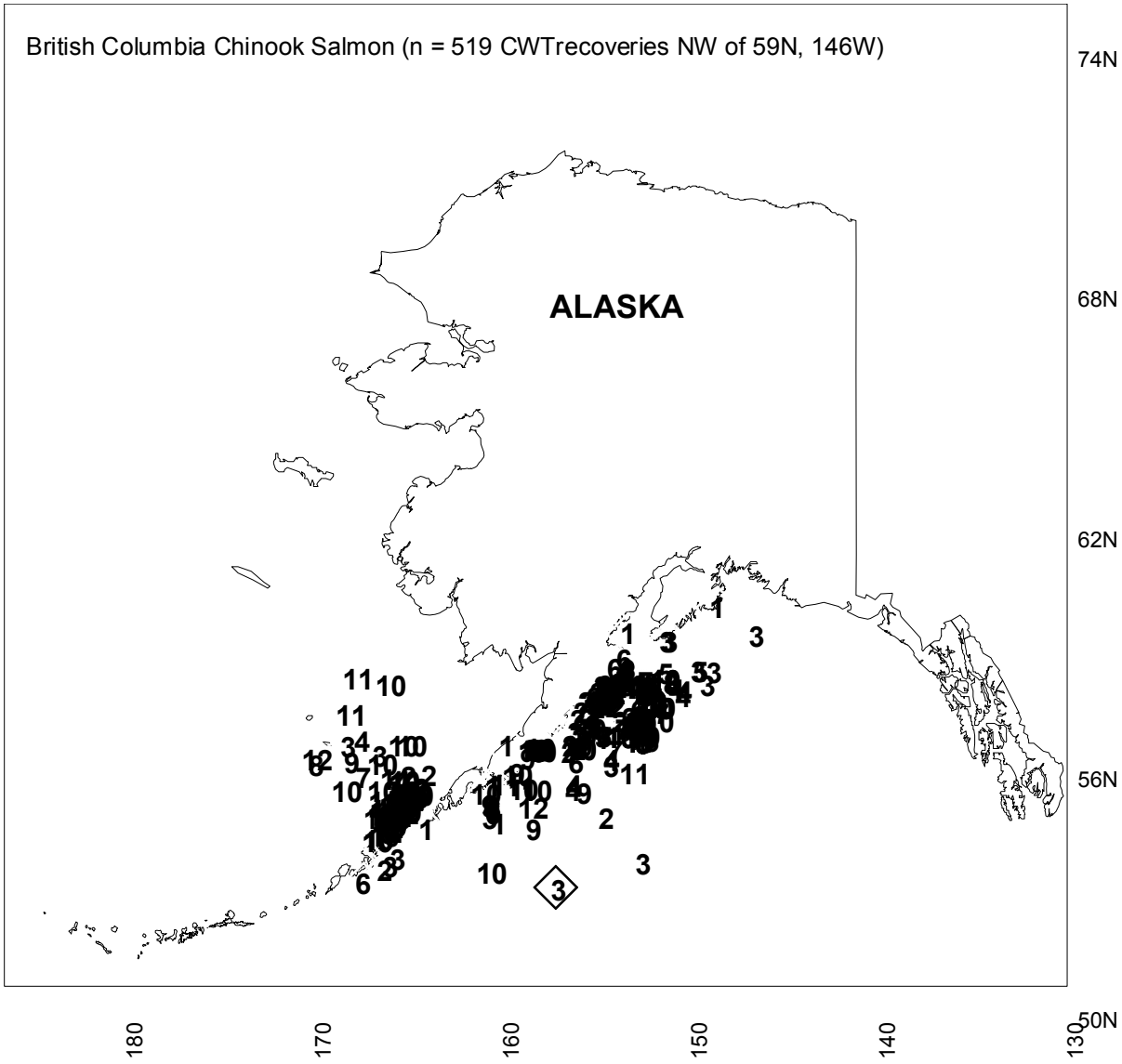

Fig. 7. Coded-wire tag (CWT) recovery locations of British Columbia chinook salmon in the Gulf of Alaska (1980-present). The numbers indicate the month of recovery. The open diamond indicates a recovery at 52°56'N, 156°48'W that is a southern range extension for British Columbia chinook salmon in the western Gulf of Alaska.

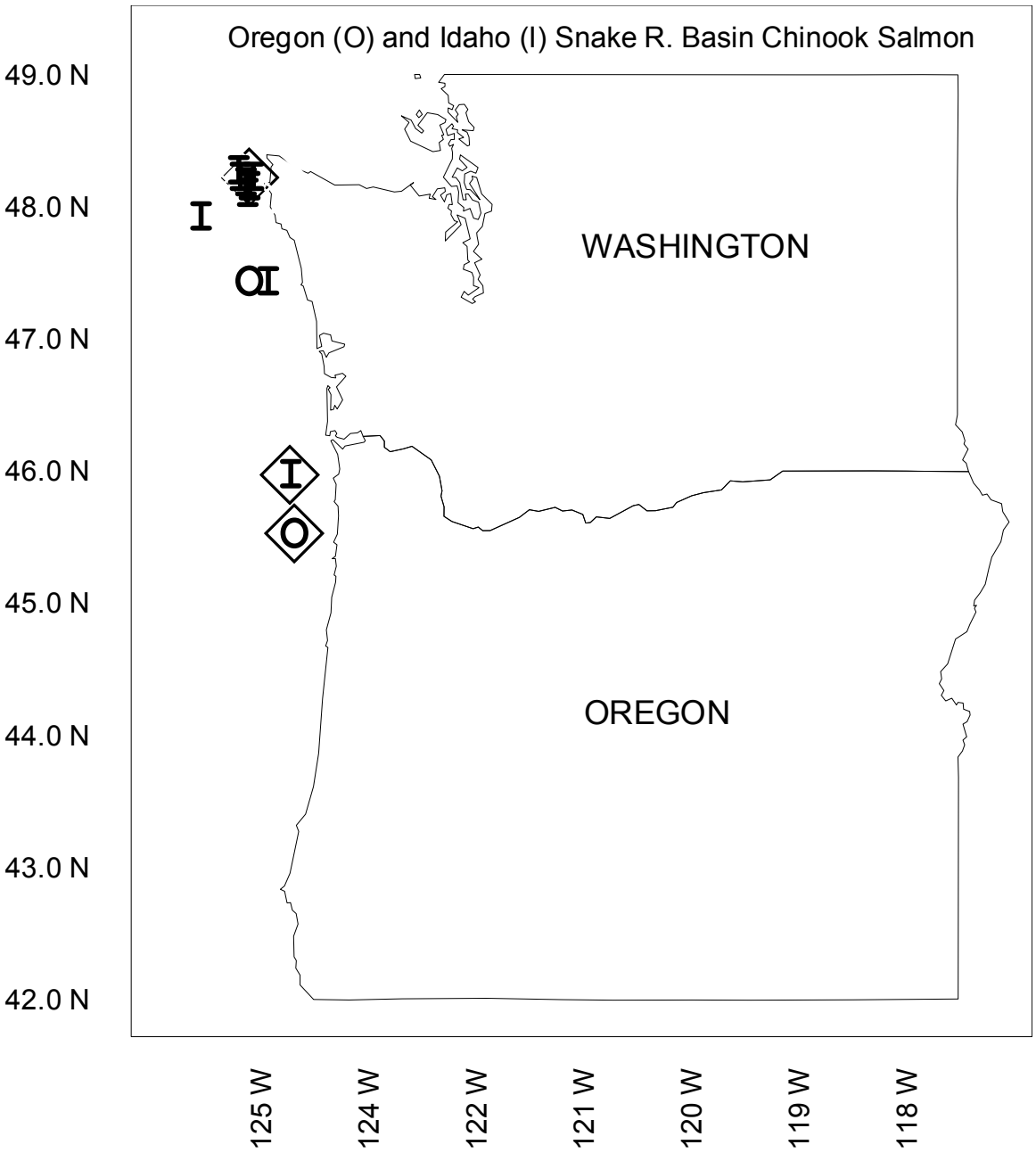

Fig. 8. Coded-wire tag (CWT) recovery locations of Oregon (O) and Idaho (I) Snake River Basin chinook salmon off the coasts of Washington and Oregon. New recoveries shown include 2 Oregon and 8 Idaho hatchery fish. Previously reported recovery locations are indicated by the open diamonds (1 Oregon and 2 Idaho fish).

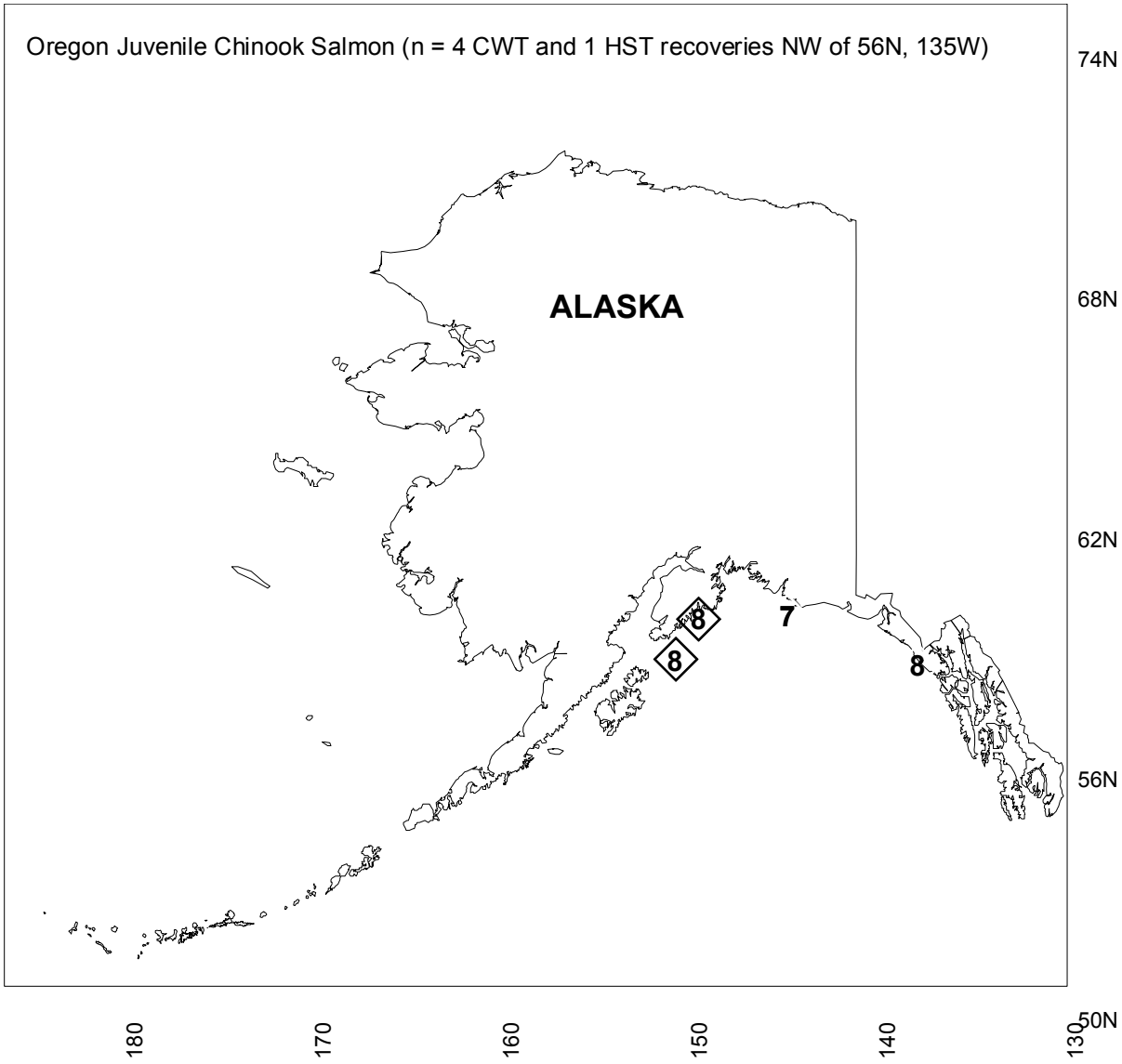

Fig. 9. Coded-wire tag (CWT) recovery and high seas tag (HST) release locations of juvenile (ocean age-.0) Oregon chinook salmon in the Gulf of Alaska. The numbers indicate the month of recovery or release. The open diamonds indicate two new recoveries at 58°42'N, 150°35'W and 59°42'N, 149°22'W that are western range extensions for juvenile Oregon chinook salmon in the coastal Gulf of Alaska.

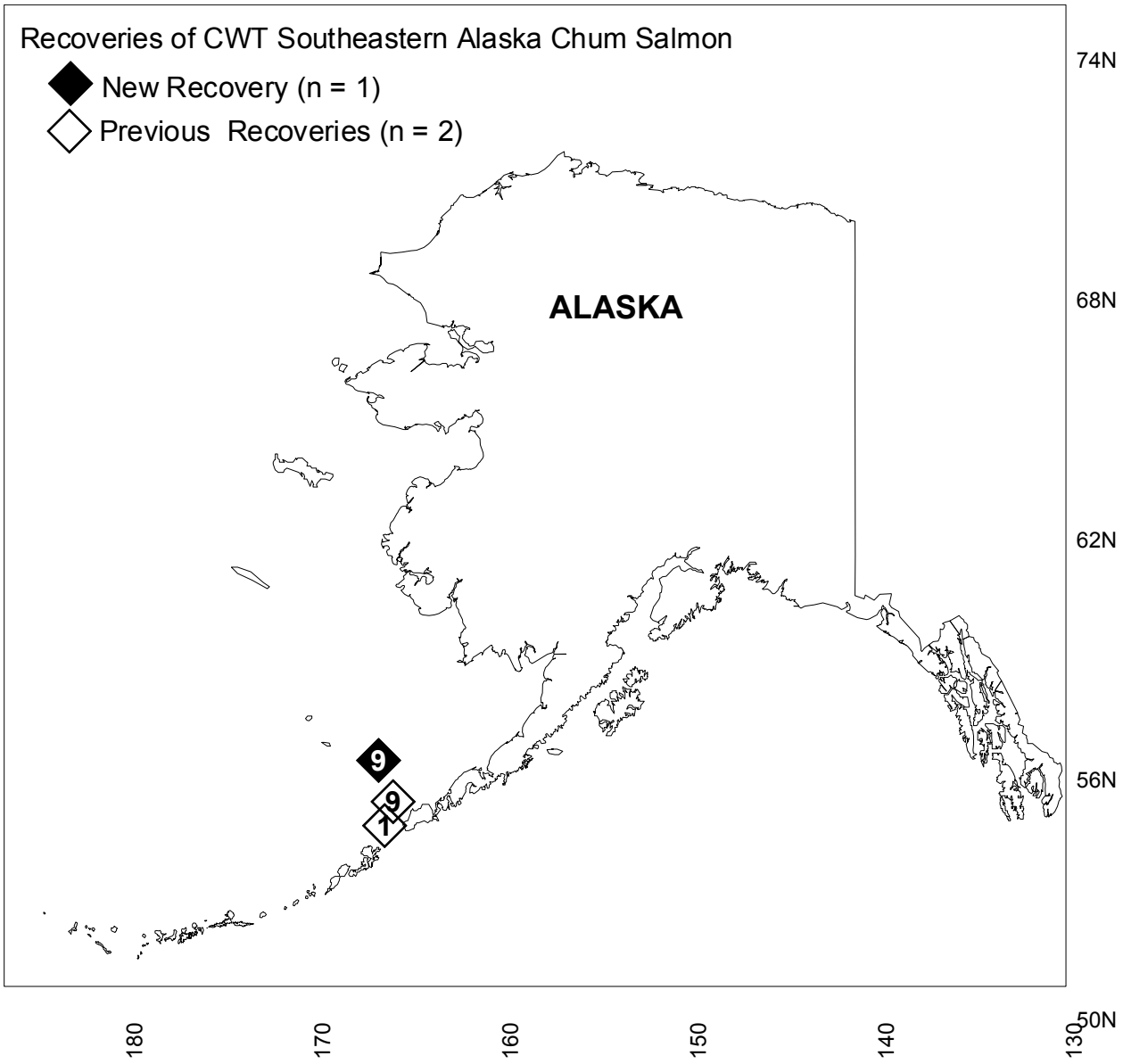

Fig. 10. Recovery locations of coded-wire tagged (CWT) southeastern Alaska chum salmon in the Bering Sea. The numbers indicate the month of recovery. A new recovery at 56°11'N, 166°21'W is a northwestern range extension for southeastern Alaska chum salmon in the Bering Sea.

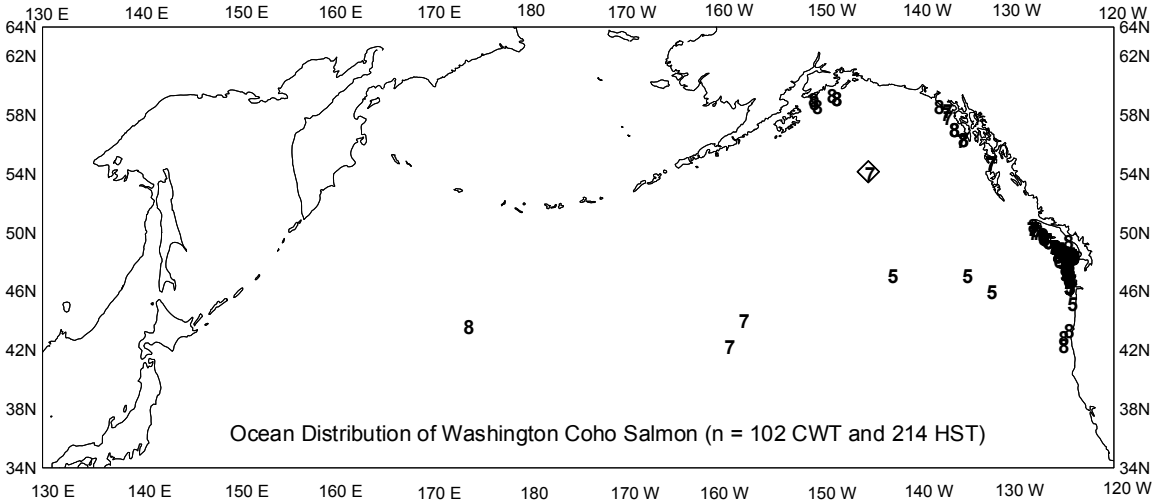

Fig. 11. Coded-wire tag (CWT) recovery and high seas tag (HST) release locations of Washington coho salmon in the North Pacific Ocean. The numbers indicate the month of CWT recovery or HST release. The open diamond indicates a new recovery at 54°N, 145°W that is a significant range extension for maturing U.S. West Coast coho salmon in the international waters of the central Gulf of Alaska.

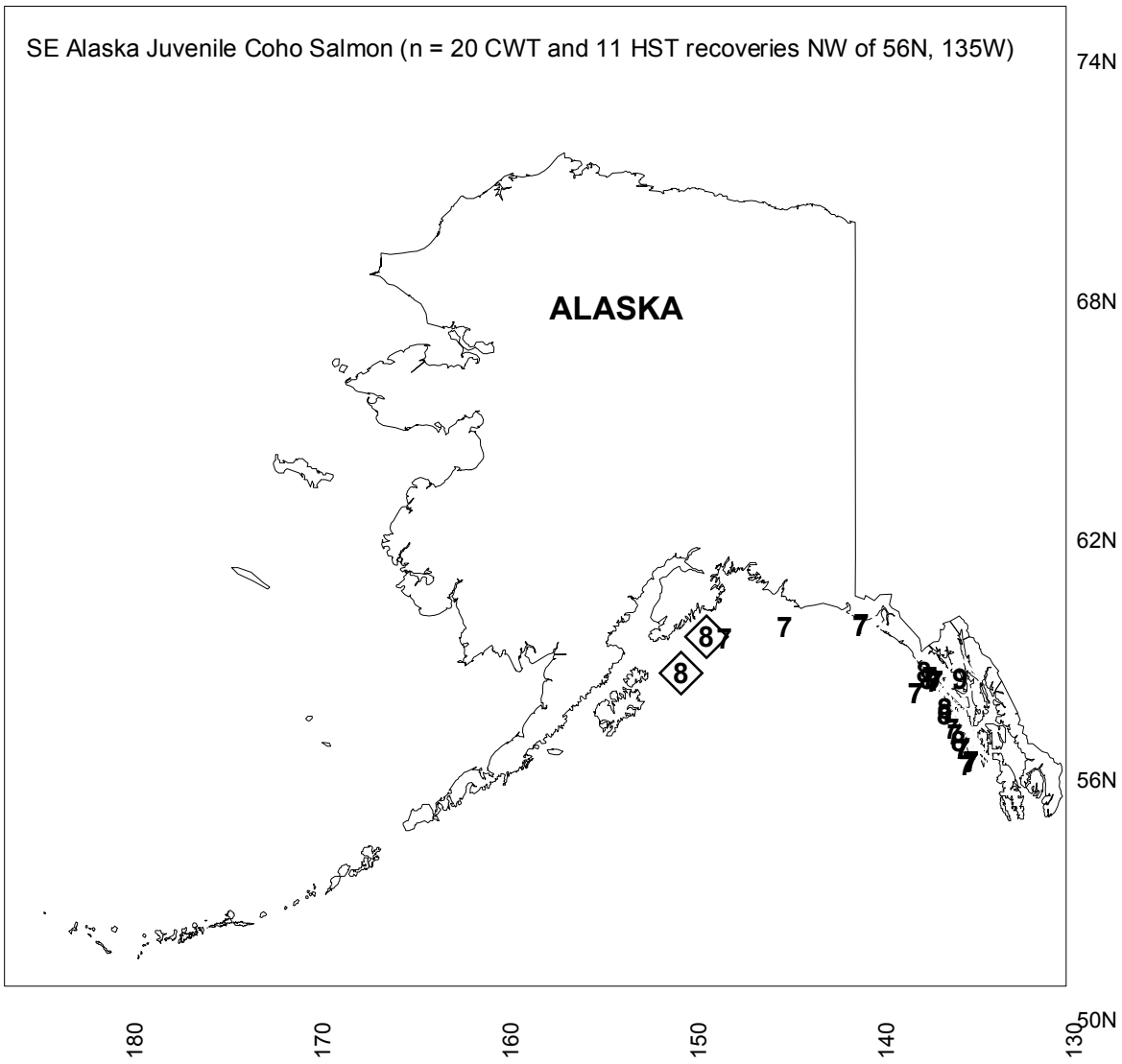

Fig. 12. Coded-wire tag (CWT) recovery and high seas tag (HST) release locations of juvenile (ocean age-.0) southeastern Alaska coho salmon in the Gulf of Alaska. The numbers indicate the month of CWT recovery or HST release. The open diamonds indicate two new recoveries at 58°22'N, 150°16'W and 59°17'N, 148°55'W that are western range extensions for juvenile southeastern Alaska coho salmon in the coastal Gulf of Alaska.

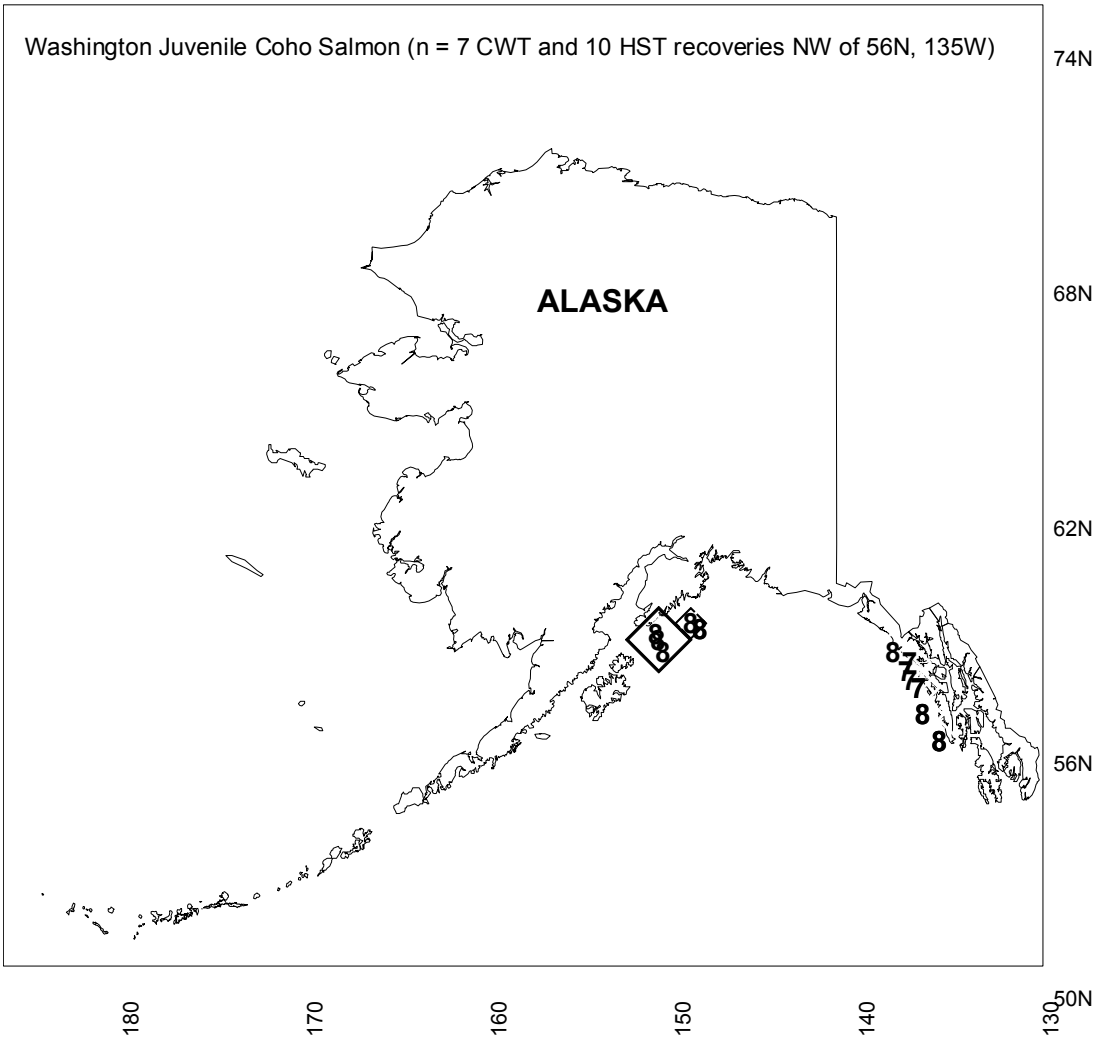

Fig. 13. Coded-wire tag (CWT) recovery and high seas tag (HST) release locations of juvenile (ocean age-.0) Washington coho salmon in the Gulf of Alaska. The numbers indicate the month of CWT recovery or HST release. The open diamonds indicate four new CWT recoveries (59°00'N, 150°49'W; 58°51'N, 150°42'W; 58°32'N, 150°25'W; and 59°17'N, 148°55'W) that are western range extensions for juvenile Washington coho salmon in the coastal Gulf of Alaska.

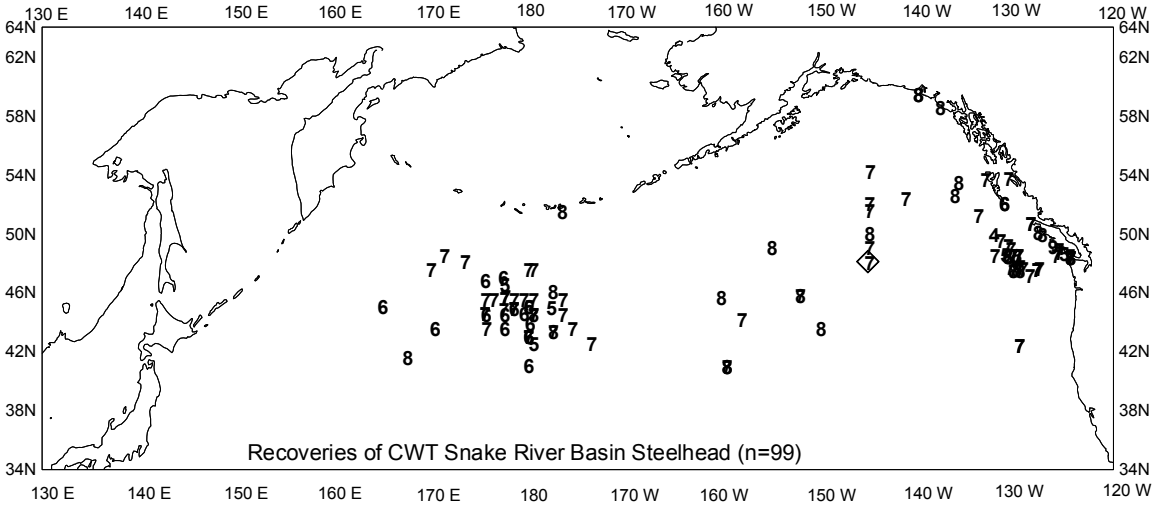

Fig. 14. Recovery locations of coded-wire tagged (CWT) Snake River Basin steelhead in the North Pacific Ocean. The numbers indicate the month of recovery. The open diamond shows the location of the only new high seas recovery of a CWT steelhead reported in this document. This is the southernmost recovery of this stock along 145°W longitude, which is currently the only survey line for high seas recovery of CWT salmonids in this vast region of the North Pacific Ocean.

Figure 15. Poster advertising for return of high seas salmon and steelhead tags.

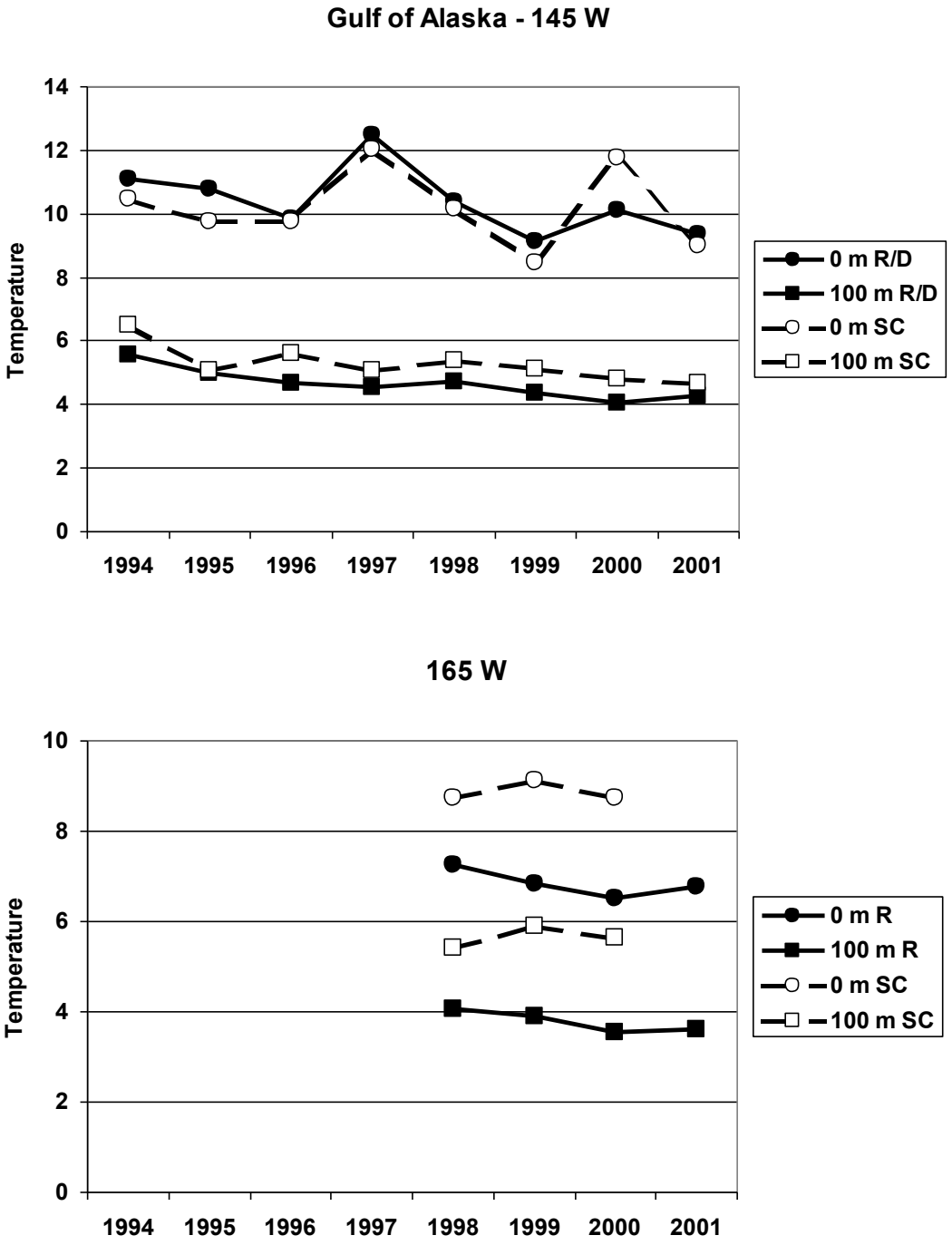

Figure 16. Sea temperatures recorded at 0 m and 100 m during T/S Oshoro maru cruises, 1994-2001, along 145°W and 165°W longitudes. R/D = Ridge/Dilute Domains, SC = Subarctic Current, R = Ridge Domain.

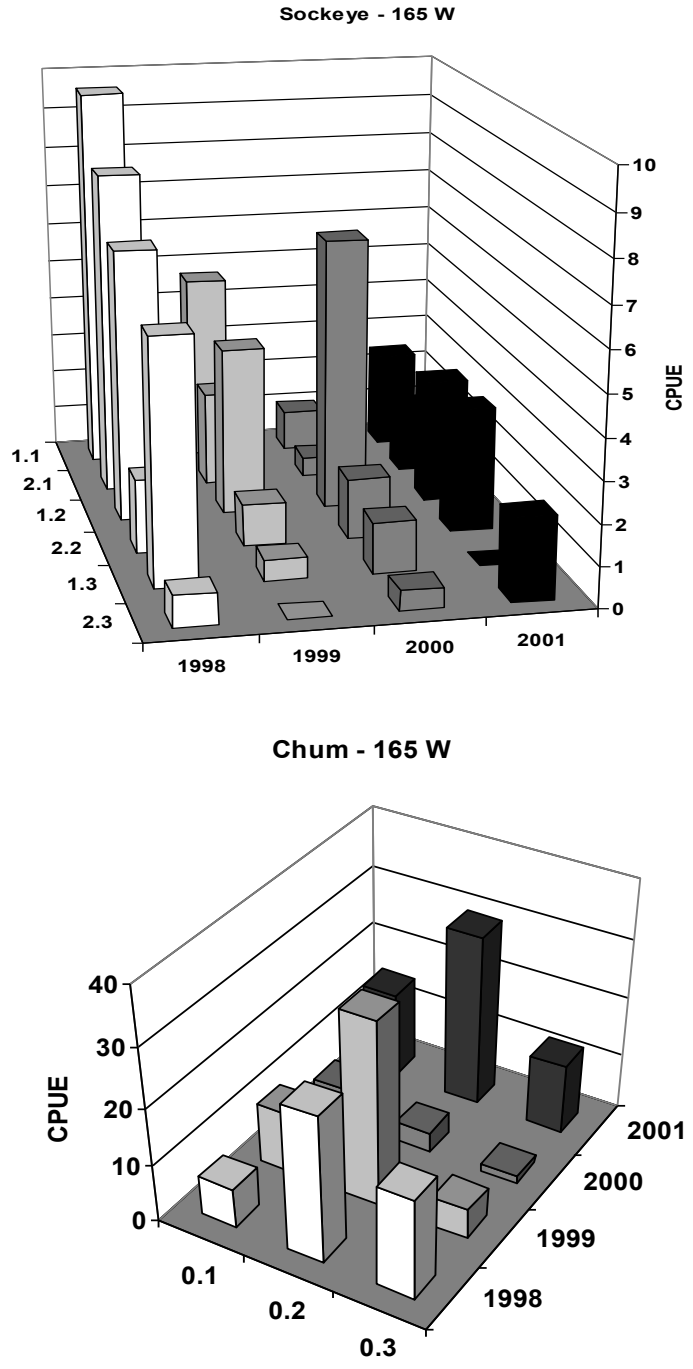

Figure 17. Estimates of CPUE represented by each age-class of sockeye and chum salmon in the central North Pacific Ocean along 165°W longitude, 1994-2001. CPUE = number of fish caught per 30 tans (1 tan = 50 m) of varied-mesh research gillnet (C-gear).

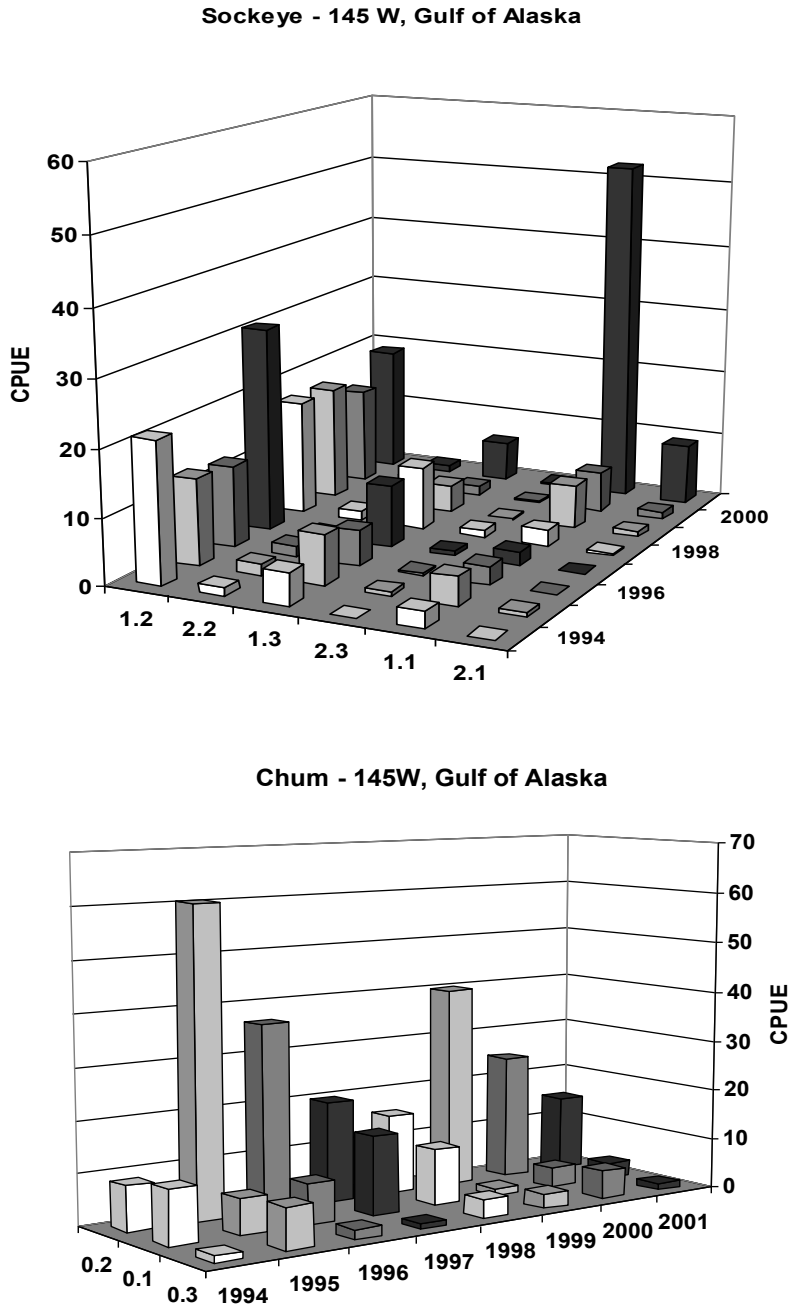

Figure 18. Estimates of CPUE represented by each age-class of sockeye and chum salmon in the central Gulf of Alaska, 1994-2001. CPUE = number of fish caught per 30 tans (1 tan = 50 m) of varied-mesh research gillnet (C-gear).

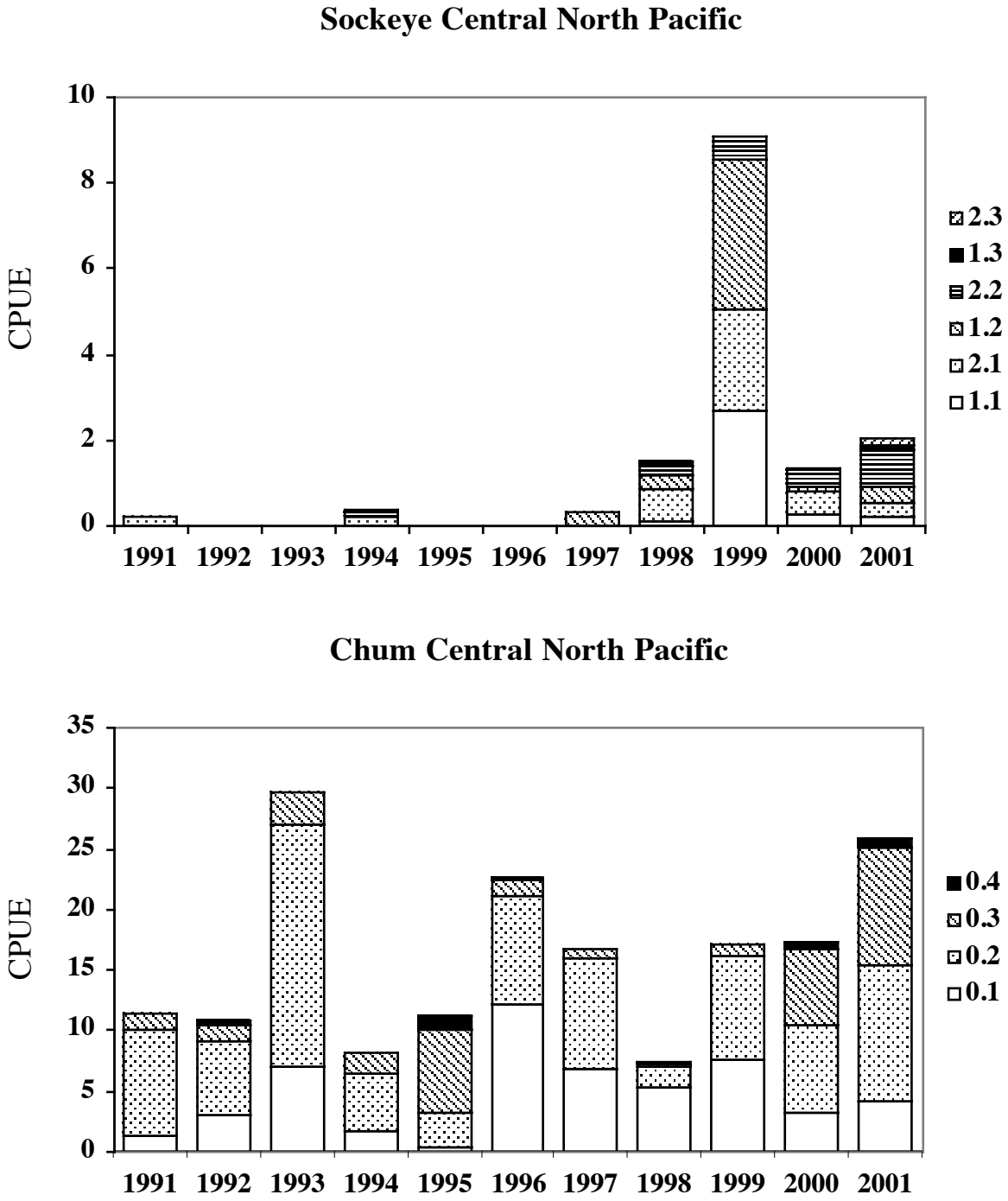

Figure 19. Estimates of CPUE represented by each age-class of sockeye and chum salmon in the central North Pacific Ocean, 1991-2001. CPUE=number of fish per unit (30-tans) of effort by C-gear (research-mesh gillnet). Values estimated by multiplying CPUE by % age composition and dividing by 100.

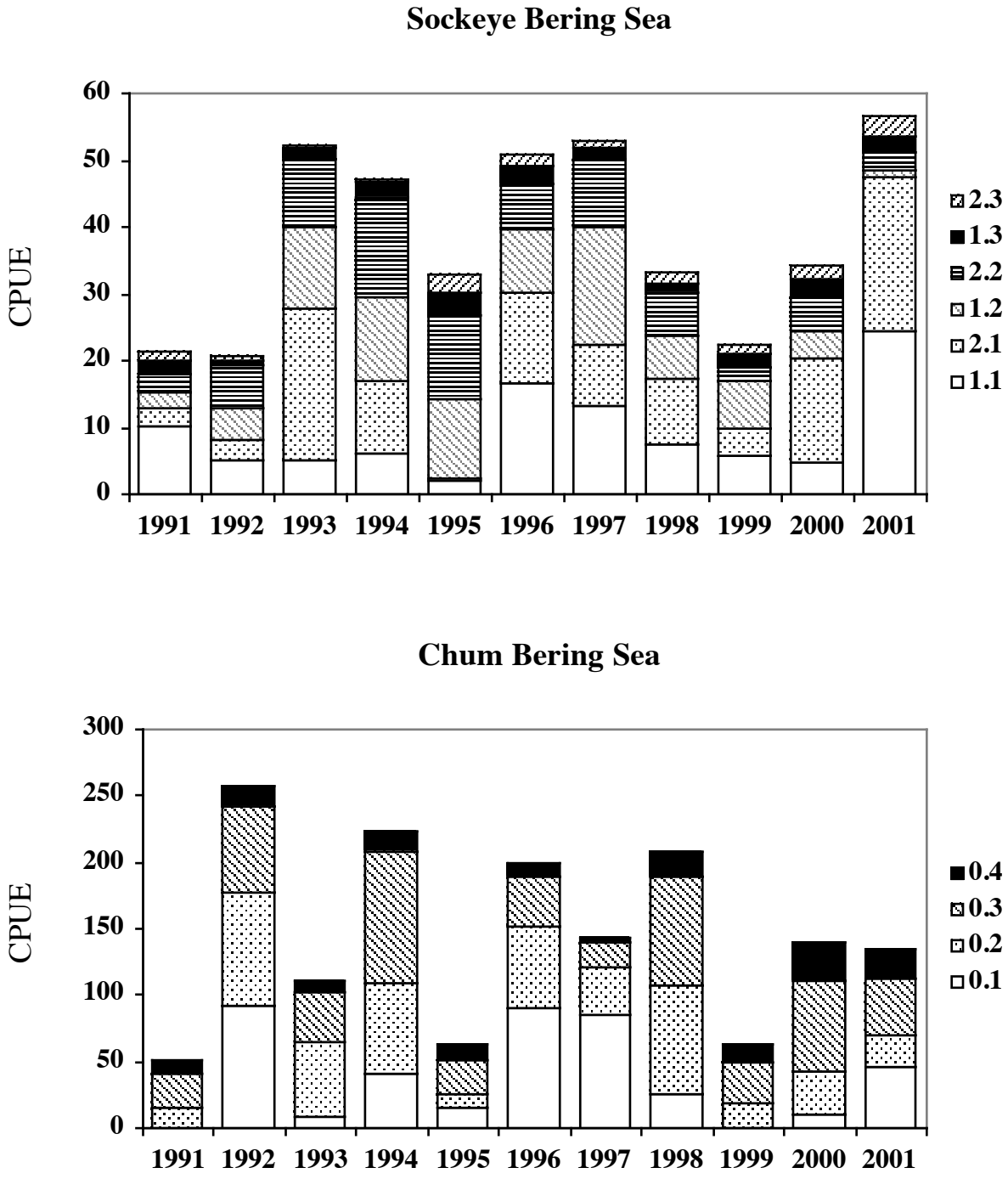

Figure 20. Estimates of CPUE represented by each age-class of sockeye and chum salmon in the central Bering Sea, 1991-2001. CPUE=number of fish per unit (30-tans) of effort by C-gear (research-mesh gillnet). Values estimated by multiplying CPUE by % age composition and dividing by 100.

Table 1. U.S. archival data storage tags placed on salmonids in the North Pacific Ocean and Bering Sea in 2001 tags record temperature and depth data. LL = longline; HL = hook and line. FRI = Fisheries Research Institute; FAJ = Fisheries Agency of Japan.

Vessel and	Tag		Release	Location			Fork		Other tags	
Data Tag #	Model	Species	Date	Latitude	Longitude	Gear	Length	Age	FRI	FAJ
R/V *Wakatake maru*										
1095	RL-31	Steelhead	6/18/01	44°00'N	180°00'	LL	642	1.1	LL4043	LL3043
1098	RL-31	Sockeye	6/20/01	46°00'N	180°00'	LL	482	2.2	LL4075	LL3075
1158	RL-42	Sockeye	6/23/01	47°30'N	180°00'	LL	480	1.2	red blank	LL3094
1159	RL-42	Sockeye	6/24/01	48°30'N	180°00'	LL	536	X.3	red blank	LL3100
1100	RL-31	Sockeye	6/24/01	48°30'N	180°00'	LL	552	2.3	LL4122	LL3122
1102	RL-31	Sockeye	6/24/01	48°30'N	180°00'	LL	538	2.3	LL4123	LL3123
1106	RL-31	Sockeye	6/24/01	48°30'N	180°00'	LL	520	2.2	LL4124	LL3124
1108	RL-31	Sockeye	6/24/01	48°30'N	180°00'	LL	526	2.3	LL4125	LL3125
1160	RL-42	Sockeye	6/24/01	48°30'N	180°00'	LL	530	1.3	red blank	LL3126
1161	RL-42	Sockeye	6/24/01	48°30'N	180°00'	LL	498	2.2	red blank	LL3127
1109	RL-31	Sockeye	6/25/01	49°30'N	180°00'	LL	521	2.2	LL4138	LL3138
1110	RL-31	Sockeye	6/25/01	49°30'N	180°00'	LL	571	2.3	LL4139	LL3139
1112	RL-31	Sockeye	6/26/01	50°30'N	180°00'	LL	663	1.3	LL4140	LL3140
1113	RL-31	Sockeye	6/26/01	50°30'N	180°00'	LL	554	1.3	LL4146	LL3146
1115	RL-31	Sockeye	6/30/01	54°30'N	180°00'	LL	530	1.3	LL4216	LL3216
1117	RL-31	Sockeye	7/3/01	57°30'N	180°00'	LL	600	1.3	LL4322	LL3322
1119	RL-31	Sockeye	7/3/01	57°30'N	180°00'	LL	660	2.3	LL4323	LL3323
1121	RL-31	Sockeye	7/3/01	57°30'N	180°00'	LL	604	1.3	LL4327	LL3327
1162	RL-42	Sockeye	7/5/01	57°30'N	179°00'W	LL	598	2.3	red blank	LL3366
1163	RL-42	Sockeye	7/5/01	57°30'N	179°00'W	LL	586	1.3	red blank	LL3402
1164	RL-42	Chinook	7/5/01	57°30'N	179°00'W	LL	610	X.2	red blank	LL3403
1165	RL-42	Sockeye	7/6/01	57°30'N	178°00'W	LL	594	1.3	red blank	LL3496
1167	RL-42	Chinook	7/6/01	57°30'N	178°00'W	LL	504	X.X	red blank	LL3497
1168	RL-42	Chinook	7/6/01	57°30'N	178°00'W	LL	524	1.2	red blank	LL3498
1169	RL-42	Sockeye	7/9/01	56°30'N	179°00'W	LL	550	2.3	red blank	LL3594
T/S *Oshoro maru*										
1293	RL-42	Coho	6/29/01	56°00'N	145° 00'W	HL	582	1.1	LL1639	red blank
1297	RL-42	Pink	6/29/01	56°00'N	145° 00'W	HL	469	0.1	LL1640	red blank
1301	RL-42	Coho	6/29/01	56°00'N	145° 00'W	HL	570	1.1	LL1641	red blank
1304	RL-42	Sockeye	6/29/01	56°00'N	145° 00'W	HL	655	1.3	LL1643	red blank
1311	RL-42	Coho	6/30/01	56°07'N	145° 00'W	LL	585	2.1	LL1651	BB6441
1310	RL-42	Coho	6/30/01	56°07'N	145° 00'W	LL	620	X.X	LL1652	BB6442
1314	RL-42	Coho	6/30/01	56°07'N	145° 00'W	LL	600	2.1	LL1653	BB6443
1316	RL-42	Sockeye	6/30/01	56°07'N	145° 00'W	LL	590	1.2	LL1654	BB6444
1290	RL-42	Chinook	6/30/01	56°07'N	145° 00'W	LL	625	1.2	LL1655	BB6445
1319	RL-42	Coho	6/30/01	56°07'N	145° 00'W	LL	580	2.1	LL1656	BB6446
1292	RL-42	Chum	6/30/01	56°07'N	145° 00'W	LL	490	X.X	LL1657	BB6447
1320	RL-42	Pink	6/30/01	56°07'N	145° 00'W	LL	475	X.X	LL1660	BB6450
1295	RL-42	Chum	6/30/01	56°07'N	145° 00'W	LL	520	0.2	LL1658	BB6448

continued

Table 1. continued.

Vessel and Data Tag #	Tag Model	Species	Release Date	Location Latitude	Location Longitude	Gear	Fork Length	Age	Other tags FRI	Other tags FAJ
R/V *Oshoro maru* (continued)										
1296	RL-42	Chum	6/30/01	56°07'N	145° 00'W	LL	530	X.X	LL1659	BB6449
1321	RL-42	Coho	6/30/01	56°07'N	145° 00'W	LL	625	X.X	LL1661	BB6451
1322	RL-42	Pink	6/30/01	56°07'N	145° 00'W	LL	460	0.1	LL1662	BB6452
1307	RL-42	Coho	6/30/01	56°07'N	145° 00'W	LL	662	X.1	LL1663	BB6453
1323	RL-42	Steelhead	7/1/01	55°00'N	145° 03'W	LL	455	X.1	LL1668	BB6458
1315	RL-42	Chum	7/1/01	55°00'N	145° 03'W	LL	505	0.3	LL1669	BB6459
1324	RL-42	Coho	7/2/01	53°59'N	145° 02'W	LL	626	1.1	LL1670	BB6460
1327	RL-42	Coho	7/2/01	53°59'N	145° 02'W	LL	640	2.1	LL1671	BB6461
1312	RL-42	Coho	7/2/01	53°59'N	145° 02'W	LL	650	2.1	LL1672	BB6462
1328	RL-42	Pink	7/2/01	53°59'N	145° 02'W	LL	460	0.1	LL1673	BB6463
1331	RL-42	Pink	7/2/01	53°59'N	145° 02'W	LL	496	0.1	LL1674	BB6464
1337	RL-42	Coho	7/2/01	53°59'N	145° 02'W	LL	622	1.1	LL1675	BB6465
1335	RL-42	Coho	7/2/01	53°29'N	145° 00'W	HL	512	2.1	LL1711	KK1601
1340	RL-42	Chinook	7/2/01	53°29'N	145° 00'W	HL	645	1.2	LL1713	KK1603
1342	RL-42	Sockeye	7/3/01	52°56'N	145° 01'W	LL	552	0.1	LL1677	BB6467
1343	RL-42	Sockeye	7/3/01	52°56'N	145° 01'W	LL	693	2.1	LL1678	BB6468
1325	RL-42	Coho	7/3/01	52°56'N	145° 01'W	LL	583	2.1	LL1680	BB6470
1345	RL-42	Sockeye	7/3/01	52°56'N	145° 01'W	LL	590	1.2	LL1681	BB6471
1334	RL-42	Pink	7/3/01	52°56'N	145° 01'W	LL	500	0.1	LL1682	BB6472
1318	RL-42	Sockeye	7/3/01	52°56'N	145° 01'W	LL	468	1.2	LL1684	BB6474
1344	RL-42	Pink	7/3/01	52°56'N	145° 01'W	LL	468	0.1	LL1685	BB6475
1313	RL-42	Sockeye	7/3/01	51°57'N	144° 56'W	HL	574	X.X	LL1715	KK1605
1317	RL-42	Coho	7/3/01	51°57'N	144° 56'W	HL	640	2.1	LL1716	KK1606
1329	RL-42	Steelhead	7/4/01	51°58'N	144° 54'W	LL	645	X.1	LL1687	BB6477
1332	RL-42	Chum	7/4/01	51°58'N	144° 54'W	LL	525	0.2	LL1688	BB6478
1347	RL-42	Sockeye	7/4/01	51°58'N	144° 54'W	LL	638	1.2	LL1689	BB6479
1308	RL-42	Coho	7/4/01	51°58'N	144° 54'W	LL	687	1.1	LL1690	BB6480
1349	RL-42	Pink	7/4/01	51°58'N	144° 54'W	LL	510	0.1	LL1693	BB6483
955	RL-42	Chum	7/7/01	49°58'N	144° 55'W	LL	485	0.2	LL1694	BB6484
926	RL-42	Chum	7/7/01	49°58'N	144° 55'W	LL	368	0.1	LL1695	BB6485
958	RL-42	Chum	7/7/01	49°58'N	144° 55'W	LL	453	0.2	LL1696	BB6486
1336	RL-42	Pink	7/7/01	49°58'N	144° 55'W	LL	467	0.1	LL1697	BB6487
F/V *Great Pacific*										
949	CDI	Chum	8/1/01	56°42'N	151° 17'W	trawl	560	0.2	-	-
907	CDI	Pink	8/1/01	56°55'N	151° 29'W	trawl	503	0.1	-	-
941	CDI	Pink	8/1/01	56°55'N	151° 29'W	trawl	495	0.1	-	-
947	CDI	Sockeye	8/1/01	56°55'N	151° 29'W	trawl	655	1.2	-	-
948	CDI	Chum	8/1/01	56°55'N	151° 29'W	trawl	460	0.2	-	-
1333	CDI	Coho	8/2/01	57°24'N	152° 07'W	trawl	553	1.1	-	-
1348	CDI	Coho	8/5/01	56°15'N	153°31'W	trawl	605	1.1	-	-
1353	CDI	Coho	8/5/01	56°15'N	153°31'W	trawl	660	1.1	-	-
1355	CDI	Sockeye	8/5/01	56°15'N	153°31'W	trawl	400	2.1	-	-
1356	CDI	Sockeye	8/5/01	56°08'N	153°22'W	trawl	620	2.2	-	-
1350	CDI	Sockeye	8/5/01	55°55'N	153°09'W	trawl	622	2.2	-	-

continued

Table 1. continued.

Vessel and Data Tag #	Tag Model	Species	Release Date	Location Latitude	Location Longitude	Gear	Fork Length	Age	Other tags FRI	Other tags FAJ
F/V *Great Pacific* (continued)										
1351	CDI	Chum	8/5/01	55°55'N	153°09'W	trawl	420	0.1	-	-
1361	CDI	Chum	8/5/01	55°55'N	153°09'W	trawl	560	0.2	-	-
1362	CDI	Chum	8/5/01	55°42'N	152°55'W	trawl	404	0.1	-	-
705	LTD	Chum	8/5/01	55°42'N	152°55'W	trawl	410	0.1	-	-
607	LTD	Chum	8/5/01	55°42'N	152°55'W	trawl	407	0.1	-	-
612	LTD	Sockeye	8/6/01	55°42'N	152°55'W	trawl	350	1.1	-	-
711	LTD	Sockeye	8/6/01	55°42'N	152°55'W	trawl	325	1.1	-	-

Table 2. Preliminary release and recovery information for U.S. tags and cooperative Japan-U.S. tags returned from 1 October 2000 to 30 September 2001. A blank indicates the information is not available. LL=longline, PS=purse seine. Age designation is the European method, first number is the number of freshwater annuli, second number is the number of ocean annuli. FL=fork length and BW=body weight. Data storage tags: TD = temperature and depth.

U.S. Tag. Nos.	Japan Tag No.	Release							Recovery										
		Date	Lat. (°N)	Long.	2°X5° Area	Gear	FL (mm)	Age	Date	Lat. (°N)	Long.	Area Code	Gear	Sex	FL (mm)	BW (g)	Gonad (g)	Age	Location
A. Sockeye Salmon																			
LL3493, TD data tag no. 1078	EE4286	27-Jun-00	53°30	180°00	W8052	LL	610	2.3	8-Sep-00	62°44	164°52W	42-1	-	-	-	-	-	-	Alakanuk Slough, Yukon R. delta, western Alaska, USA
B. Chum Salmon																			
LL3556	EE4349	30-Jun-00	55°30N	180°00	W8054	LL	494	0.3	6-Nov-00	40°10	141°53E	01-0	Setnet	-	-	-	-	-	Pacific coast, Iwate prefecture, Honshu, Japan
LL3583	EE4376	1-Jul-00	56°30N	180°00	W8056	LL	540	0.3	30-Oct-00	43°24	145°13E	02-0	River	F	590	2200	-	-	Nishibetsu R., Hokkaido
LL3597	EE4390	1-Jul-00	56°30N	180°00	W8056	LL	560	0.3	11-Sep-00	43°18	145°32E	02-0	Setnet	M	620	2800	-	-	Nemuro Strait, Hokkaido, Japan
LL3638	EE4431	2-Jul-00	57°30N	180°00	W8056	LL	532	0.2	12-Oct-00	42°21	142°26E	02-1	River	-	-	-	-	-	Shizunai R., Hokkaido
LL3685	EE4478	4-Jul-00	57°30N	179°00W	W8056	LL	560	0.3	29-Aug-00	42°30	143°28E	02-1	Setnet	F	582	2500	-	-	Pacific coast, Hokkaido, Japan
LL3687	EE4480	4-Jul-00	57°30N	179°00W	W8056	LL	550	0.3	25-Oct-00	43°30	131°31E	04-0	-	F	605	1934	-	-	Narva Bay, Primorye, Russia
LL3787	EE4580	6-Jul-00	57°30N	178°00W	W8056	LL	610	0.3	6-Oct-00	43°42	145°06E	02-0	Setnet	F	600	3600	-	-	Nemuro Strait, Hokkaido, Japan
LL3788	EE4581	6-Jul-00	57°30N	178°00W	W8056	LL	550	0.3	25-Oct-00	44°00	145°11E	02-0	Setnet	F	-	1500	-	-	Nemuro Strait, Hokkaido, Japan
LL3794	EE4587, DST not recovered	6-Jul-00	57°30N	178°00W	W8056	LL	572	0.3	4-Oct-00	42°28	143°26E	02-1	Setnet	-	-	-	-	-	Pacific coast, Hokkaido, Japan
LL3795	EE4588, AT1283	6-Jul-00	57°30N	178°00W	W8056	LL	572	0.3	4-Oct-00	42°28	143°26E	02-1	Setnet	F	-	-	-	-	Pacific coast, Hokkaido, Japan
LL3821	EE4614	7-Jul-00	56°30N	178°00W	W8056	LL	585	0.3	3-Oct-00	44°17	145°21E	02-0	Setnet	-	600	-	-	-	Nemuro Strait, Hokkaido, Japan
LL3883	EE4676	8-Jul-00	56°30N	179°00W	W8056	LL	610	0.4	2-Oct-00	43°42	145°06E	02-0	Setnet	M	680	3400	-	-	Nemuro Strait, Hokkaido, Japan

Table 2. Continued

U.S. Tag. Nos.	Japan Tag No.	Release Date	Lat. (°N)	Long.	2°X5° Area	Gear	FL (mm)	Age	Recovery Date	Lat. (°N)	Long.	Area Code	Gear	Sex	FL (mm)	BW (g)	Gonad (g)	Age	Location
B. Chum Salmon																			
LL3891	EE4684, DST not recovered	8-Jul-00	56°30	179°00W	W8056	LL	634	0.3	17-Sep-00	45°18	142°12E	02-2	Setnet	-	-	2780	-	-	Okhotsk Sea coast, Hokkaido, Japan
LL3902	EE4695, DST not recovered	9-Jul-00	56°30	179°00E	E7556	LL	632	0.3	30-Sep-00	42°10	142°41E	02-1	Setnet	M	620	2500	-	-	Pacific coast, Hokkaido, Japan
LL3916	EE4709, DL20	9-Jul-00	56°30	179°00E	E7556	LL	685	0.4	16-Sep-00	43°19	145°46E	02-1	Setnet	-	-	-	-	-	Pacific coast, Hokkaido, Japan
B. Pink Salmon																			
LL4542	LL3542	7-Jul-01	56°30	178°00W	W8056	LL	460	0.1	8-Jul-01	56°30	178°00W	25	GN	M	460	1260	86	0.1	high seas, central Bering Sea
TD data tag no. 941		1-Aug-01	56°55	151°30	W5556	trawl	495	0.1	5-Aug-01	57°43	152°12W	56-2	PS	-	-	-	-	-	Cape Chiniak, east coast of Kodiak Is., central Alaska, USA
C. Coho salmon																			
LL1675, TD data tag no. 1337	BB6465	2-Jul-01	53°59	145°02W	W5052	LL	622	1.1	10-Aug-01	58°03	136°36W	62-0	troll	-	655	-	-	1.1	Hocktaheen, Yakobi Is., Cross Sound, southeast Alaska, USA
TD data tag no. 1348		5-Aug-01	55°58	144°56W	W4554	trawl	605	1.1	29-Aug-01	56°21	158°16W	54-1	PS	-	-	-	-	1.1	Chignik Lagoon, Pacific coast of Alaska Peninsula, central Alaska, USA

Table 3. Snouts collected from salmonids without adipose fins caught by T/S *Oshoro maru*, 2001. Gear: A=commercial mesh gillnet; C=varied mesh gillnet; followed by mesh size (mm). N=38 (35 steelhead, 2 chinook, and 1 coho)

Species	Gillnet station	Date	Latitude	Longitude	Gear	Fork Length (mm)	Weight (g)	Sex	Gonad weight (g)	Age
Steelhead	OSG 04	6/30/01	56°01'N	145°03'W	C93	549	1680	F	10	1.1
Steelhead	OSG 04	6/30/01	56°01'N	145°03'W	C82	554	1640	F	20	X.1
Coho	OSG 04	6/30/01	56°01'N	145°03'W	A121	580	2500	F	51	2.2
Steelhead	OSG 05	7/1/01	55°00'N	145°01'W	A115	611	2300	F	14	1.1
Steelhead	OSG 05	7/1/01	55°00'N	145°01'W	C121	549	1700	M	10	X.1
Steelhead	OSG 06	7/2/01	54°00'N	145°02'W	A115	525	1480	F	6	1.1
Steelhead	OSG 06	7/2/01	54°00'N	145°02'W	C93	563	1740	M	13	1.1
Steelhead	OSG 06	7/2/01	54°00'N	145°02'W	C63	330	310	M	4	X.0
Steelhead	OSG 06	7/2/01	54°00'N	145°02'W	C121	580	2140	F	7	X.1
Steelhead	OSG 06	7/2/01	54°00'N	145°02'W	A121	686	2500	F	29	1.2
Steelhead	OSG 07	7/3/01	53°00'N	145°00'W	A115	608	2500	M	14	1.2
Steelhead	OSG 07	7/3/01	53°00'N	145°00'W	A115	510	1400	F	5	X.1
Steelhead	OSG 07	7/3/01	53°00'N	145°00'W	C93	568	1900	M	5	1.2
Steelhead	OSG 07	7/3/01	53°00'N	145°00'W	C138	712	3700	M	49	1.3
Steelhead	OSG 08	7/4/01	51°59'N	144°59'W	A115	608	2740	M	3	1.1
Steelhead	OSG 08	7/4/01	51°59'N	144°59'W	A115	532	1640	F	9	1.1
Steelhead	OSG 08	7/4/01	51°59'N	144°59'W	A115	570	2100	F	9	X.1
Steelhead	OSG 08	7/4/01	51°59'N	144°59'W	C93	590	2140	F	6	X.1
Steelhead	OSG 08	7/4/01	51°59'N	144°59'W	C106	552	1820	M	28	1.1
Steelhead	OSG 08	7/4/01	51°59'N	144°59'W	C72	565	2100	F	13	X.1
Steelhead	OSG 08	7/4/01	51°59'N	144°59'W	C82	557	1600	F	9	X.1
Steelhead	OSG 08	7/4/01	51°59'N	144°59'W	C82	463	1020	M	1	1.0
Steelhead	OSG 08	7/4/01	51°59'N	144°59'W	A121	564	2000	M	8	X.1
Steelhead	OSG 08	7/4/01	51°59'N	144°59'W	A121	604	2800	F	28	1.1
Chinook	OSG 09	7/7/01	50°00'N	145°00'W	A115	555	2400	M	4	1.1
Steelhead	OSG 09	7/7/01	50°00'N	145°00'W	A115	576	2460	M	3	X.1
Steelhead	OSG 09	7/7/01	50°00'N	145°00'W	A115	558	1900	F	20	1.1
Steelhead	OSG 09	7/7/01	50°00'N	145°00'W	A115	722	3300	F	35	X.2
Steelhead	OSG 09	7/7/01	50°00'N	145°00'W	A115	584	2240	F	9	1.1
Steelhead	OSG 09	7/7/01	50°00'N	145°00'W	A115	575	2300	M	19	X.1
Steelhead	OSG 09	7/7/01	50°00'N	145°00'W	C93	583	2360	F	20	X.1
Steelhead	OSG 09	7/7/01	50°00'N	145°00'W	C106	564	2000	F	12	X.1
Steelhead	OSG 09	7/7/01	50°00'N	145°00'W	C106	614	2500	M	9	1.1
Steelhead	OSG 09	7/7/01	50°00'N	145°00'W	C72	751	4300	M	6	X.2
Chinook	OSG 09	7/7/01	50°00'N	145°00'W	A121	529	2300	F	11	X.1
Steelhead	OSG 09	7/7/01	50°00'N	145°00'W	A121	595	2620	F	31	1.1
Steelhead	OSG 09	7/7/01	50°00'N	145°00'W	A121	579	2360	F	21	X.1
Steelhead	OSG 09	7/7/01	50°00'N	145°00'W	A121	608	2660	M	41	X.1

Table 4. Steelhead snout samples collected for potential recovery of coded-wire tags from adipose fin-clipped fish from catches aboard the *Wakatake maru,* summer 2001. Gear: B=longline, A and C=research gillnet, number is mesh size (mm).

Date	Location		Gear	Fork Length (mm)	Body Weight (g)	Sex	Gonad Weight (g)	Age	Sample Number
	Latitude	Longitude							
6/18/01	43°00'N	180°00	C138	712	3500	F	23	1.2	4-1
6/18/01	43°00'N	180°00	A115	590	1900	F	5	1.1	7-12
6/18/01	43°00'N	180°00	A115	568	1800	M	2	1.1	7-13
6/18/01	43°00'N	180°00	A115	614	2450	M	3	1.1	7-14
6/18/01	43°00'N	180°00	A115	622	2580	M	5	1.1	7-15
6/19/01	44°00'N	180°00	C157	747	4500	F	17	1.2	16-14
6/19/01	44°00'N	180°00	A115	574	1800	M	1	1.1	19-7
6/19/01	44°00'N	180°00	A115	654	2950	F	15	1.2	19-9
6/19/01	44°00'N	180°00	A115	574	2050	F	7	1.1	19-10
6/19/01	44°00'N	180°00	A115	576	1900	-	5	1.1	19-12
6/20/01	45°00'N	180°00	C106	586	2050	F	13	X.1	26-20
6/20/01	45°00'N	180°00	A115	606	2080	F	20	1.1	30-14
6/20/01	45°00'N	180°00	A115	586	1960	M	2	1.1	30-16
6/20/01	45°00'N	180°00	A115	584	2000	M	11	1.1	30-18
6/20/01	45°00'N	180°00	C138	690	2650	F	32	1.2	31-7
6/20/01	45°00'N	180°00	C138	642	2400	F	8	1.2	31-8
6/22/01	47°00'N	180°00	B	755	3950	F	7	X.2	49-5
6/23/01	47°00'N	180°00	C157	756	4250	M	4	1.2	55-2

Clipped Fin
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Table 5. Gillnet stations, mean water temperature, and salinities by oceanic region along summer transect lines of the *Oshoro maru*, 1994-2001.

Transect line	Ocean domain	Year	Number of stations	Latitude, °N start	Latitude, °N end	Sampling Dates start	Sampling Dates end	Water temperature, °C at 0m mean	Water temperature, °C at 0m s.d.	Water temperature, °C at 100m mean	Water temperature, °C at 100m s.d.	Water salinity, psu at 0m mean	Water salinity, psu at 0m s.d.	Water salinity, psu at 100m mean	Water salinity, psu at 100m s.d.
145° W	R/D	2001	4	53	56	June 30	July 3	9.4	0.2	4.3	0.1	32.69	0.10	33.06	0.06
	Domains	2000	5	52	56	July 5	July 9	10.1	0.7	4.1	0.6	33.00	0.51	33.22	0.25
		1999	5	52	56	July 10	July 14	9.2	0.7	4.4	1.1	32.76	0.09	33.46	0.35
		1998	3	54	56	July 3	July 5	10.4	0.5	4.7	0.5	32.36	0.21	33.29	0.10
		1997	5	52	56	July 8	July 12	12.5	0.2	4.6	0.6	32.58	0.04	33.20	0.30
		1996	5	52	56	July 3	July 7	9.8	0.5	4.7	0.3	32.58	0.03	32.92	0.13
		1995	4	53	56	July 7	July 10	10.8	0.5	5.0	0.5	31.24	1.79	32.94	0.31
		1994	6	51	56	July 3	July 8	11.1	0.5	5.6	0.5	32.37	0.14	32.95	0.22
	Subarctic	2001	2	50	52	July 4	July 7	9.0	0.4	4.7	0.2	32.57	0.02	32.86	0.06
	Current	2000	5	47	51	July 10	July 14	11.8	0.8	4.8	0.3	32.52	0.13	32.75	0.10
		1999	2	50	51	July 8	July 9	8.5	0.2	5.1	0.2	32.71	0.00	32.87	0.01
		1998	5	49	53	July 6	July 10	10.2	0.4	5.4	0.3	32.45	0.12	33.16	0.22
		1997	2	50	51	July 6	July 7	12.0	0.3	5.1	0.2	32.54	0.03	33.13	0.13
		1996	2	50	51	July 8	July 9	9.8	0.1	5.6	0.1	32.61	0.04	32.93	0.02
		1995	1	51.5	51.5	July 6	July 6	9.8	-	5.1	-	28.70	-	33.02	-
		1994	1	50	50	July 2	July 2	10.5	-	6.5	-	32.60	-	33.30	-
165° W	Ridge	2001	3	48	50	June 19	June 21	6.8	0.3	3.6	0.3	32.89	0.06	33.04	0.04
		2000	2	48.5	50	June 24	June 26	6.5	0.2	3.5	0.1	32.79	0.03	32.98	0.12
		1999	2	47	50	June 24	June 26	6.8	0.8	3.9	0.9	32.70	0.04	32.81	0.02
		1998	1	50	50	June 26	June 26	7.3	-	4.1	-	32.18	-	32.97	-
	Subarctic	2000	2	44	45.5	June 20	June 22	8.7	0.8	5.6	1.0	32.40	0.11	32.86	0.12
		1999	2	44	45.5	June 27	June 29	9.1	0.9	5.9	0.7	32.84	0.05	33.01	0.11
		1998	3	45.5	48.5	June 27	June 28	8.7	0.8	5.4	0.2	32.40	0.11	32.98	0.09

Table 6. Catch (number of salmonids) per unit effort by C-gear summarized by oceanic region and transect line for the research vessel *Oshoro maru*, 1994-2001. One unit of effort is equal to one operation of the 30-tan (1500 m) non-selective research mesh gillnet, except as indicated below.

					C.P.U.E.											
Transect	Ocean		Total	Tans per	**Sockeye**		**Chum**		**Pink**		**Coho**		**Chinook**		**Steelhead**	
line	domain	Year	sets	unit effort	mean	s.d.	mean	s.d.	mean	s.d.	mean	s.d.	mean	s.d.	mean	s.d.
145° W	R/D	2001	4	30	133.8	92.3	16.3	15.0	35.5	23.9	17.5	6.5	0.8	1.0	5.8	3.0
	Domains	2000	5	27	39.0	15.2	60.4	21.8	52.2	42.2	21.2	14.5	0.2	0.4	9.8	2.5
		1999	5	30	34.2	11.4	54.6	30.3	95.0	84.4	29.0	7.9	1.0	1.7	7.4	3.0
		1998	3	30	41.0	24.9	34.3	10.6	57.3	12.3	18.3	10.1	1.7	2.9	4.3	2.1
		1997	5	30	59.6	22.9	48.0	39.5	21.0	15.4	10.2	5.7	0.0	0.0	3.4	2.5
		1996	5	27	33.8	16.6	65.2	40.1	15.4	14.8	20.4	10.6	0.4	0.9	6.2	6.6
		1995	4	30	36.3	13.0	88.8	4.2	42.5	5.4	13.5	4.7	0.5	0.6	4.0	2.9
		1994	6	30	42.5	32.6	26.2	24.7	30.8	14.7	14.0	6.8	0.2	0.4	2.3	2.7
	Subarctic	2001	2	30	33.5	7.8	30.5	34.6	24.5	17.7	10.5	3.5	2.0	0.0	10.0	2.8
	Current	2000	5	27	14.4	14.1	10.0	7.5	11.0	13.3	0.8	0.8	0.0	0.0	2.0	2.5
		1999	2	28.5	24.5	17.7	20.5	6.4	58.0	7.1	21.5	9.2	0.0	0.0	3.5	4.9
		1998	5	30	32.0	22.8	31.4	19.0	21.0	14.5	5.6	6.5	0.4	0.9	7.4	3.4
		1997	2	30	14.5	6.4	14.5	0.7	0.0	0.0	2.0	1.4	0.0	0.0	0.0	0.0
		1996	2	26	7.5	6.4	10.5	3.5	16.0	1.4	6.0	7.1	0.0	0.0	2.0	0.0
		1995	1	30	29.0	-	68.0	-	18.0	-	15.0	-	1.0	-	8.0	-
		1994	1	30	9.0	-	10.0	-	27.0	-	0.0	-	0.0	-	2.0	-
	145° W -	2001	6	30	100.3		21.0		31.8		15.2		1.2		7.2	
	both areas	2000	10	27	26.7		35.2		31.6		11.0		0.1		5.9	
	combined	1999	7	29.6	31.4		44.9		84.4		26.9		0.7		6.3	
		1998	8	30	35.4		32.5		34.6		10.4		0.9		6.3	
		1997	7	30	46.7		38.4		15.0		7.9		0.0		2.4	
		1996	7	26.7	26.3		49.6		15.6		16.3		0.3		5.0	
		1995	5	30	34.8		84.6		37.6		13.8		0.6		4.8	
		1994	7	30	37.7		23.9		30.3		12.0		0.1		2.3	
165° W	Ridge	2001	3	30	14.0	9.2	62.3	3.8	31.3	7.8	2.3	2.1	0.0	0.0	6.0	9.5
		2000	2	30	24.5	4.9	10.5	4.9	3.5	0.7	1.5	0.7	0.0	0.0	0.0	0.0
		1999	2	30	25.0	35.4	64.0	38.2	60.5	68.6	1.0	0.0	3.0	4.2	1.5	2.1
		1998	1	30	78.0	-	82.0	-	14.0	-	0.0	-	0.0	-	0.0	-
	Subarctic	2000	2	30	0.0	0.0	12.0	14.1	4.5	2.1	13.0	11.3	0.0	0.0	3.5	0.7
		1999	2	30	1.5	2.1	37.0	38.2	11.5	12.0	4.5	0.7	0.0	0.0	4.0	5.7
		1998	3	30	20.0	11.0	42.0	22.7	13.7	9.0	10.3	13.8	0.3	0.6	1.7	1.5
	165° W -	2001	3	30	14.0		62.3		31.3		2.3		0.0		6.0	
	both areas	2000	4	30	12.3		11.3		4.0		7.3		0.0		1.8	
	combined	1999	4	30	13.3		50.5		36.0		2.8		1.5		2.8	
		1998	4	30	34.5		52.0		13.8		7.8		0.3		1.3	

Table 7. Ocean age composition and maturity at age of sockeye salmon caught by the *Oshoro maru* research gillnet, 1994-2001.
Percent values indicate average percentage of fish in specific age class and maturity in each catch, grouped by oceanic region and year.

Species	**Sockeye**

				Percent of (year x domain) catch in each category												
				Ocean Age 1			**Ocean Age 2**			**Ocean Age 3**			**Ocean Age 4**			% Mature
Transect Line	Ocean Domain	Year	N	Immature	Mature	Total	Immature	Mature	Total	Immature	Mature	Total	Immature	Mature	Total	Overall
145° W	R/D Domains	2001	458	68	3	71	10	10	20		9	9				22
		2000	195	35	1	36	31	24	55	1	7	8		1	1	33
		1999	167	31	1	32	28	29	57		11	11				41
		1998	119	14	3	17	3	34	37	2	42	44		3	3	82
		*1997	294	2	2	4	6	65	70	0.34	25	25				92
		1996	154	10	3	13	5	54	58		28	28		1	1	85
		1995	132	10	11	20	2	45	47		33	33				89
		1994	214	4	3	7	18	57	75		17	17		0.47	0.47	78
	Subarctic Current	2001	67	51	4	55	15	27	42		3	3				34
		2000	71	14		14	3	80	83		3	3				83
		1999	49	2	2	4	4	63	67		29	29				94
		1998	148	1		1	3	68	72		27	27				95
		1997	28	7	7	14	18	61	79		7	7				75
		1996	13	15		15		77	77		8	8				85
		1995	22	5	9	14	9	59	68		14	14		5	5	86
		1994	9	11		11	33	56	89							56
165° W	Ridge Domain	2001	40	33	5	38	30	15	45	3	15	18				35
		2000	49	12		12	55	14	69	2	16	18				30
		1999	48	60		60	33	4	38		2	2				6
		1998	74	59	7	66	11	7	18	3	14	16				27
	Subarctic Current	2000	0													
		1999	3					67	67		33	33				100
		1998	59	27	8	36	8	31	39	2	24	25				63

*Catch included 1 immature ocean-age 5 fish.

Table 8. Ocean age composition and maturity at age of chum salmon caught by the *Oshoro maru* research gillnet, 1994-2001.
Percent values indicate average percentage of fish in specific age class and maturity in each catch, grouped by oceanic region and year.

Species	**Chum**

				Percent of (year x domain) catch in each category											
Transect	Ocean			**Ocean Age 1**			**Ocean Age 2**			**Ocean Age 3**			**Ocean Age 4**			% Mature
Line	Domain	Year	N	Immature	Mature	Total	Immature	Mature	Total	Immature	Mature	Total	Immature	Mature	Total	Overall
145° W	R/D Domains	2001	61	8	2	10	59	21	80	5	3	8		2	2	27
		2000	297	2		2	78	2	80	17	1	18				3
		1999	274	3		4	88	1	89	5	1	6		1	1	3
		1998	97	13		13	55	6	61	15	9	25		1	1	16
		*1997	232	39	3	43	53	2	54	2	0.43	3				6
		1996	276	17	1	18	74	3	77	1	3	4				7
		1995	315	8	3	11	59	19	77	6	5	11		0.32	0.32	27
		1994	133	47	7	53	31	10	41	2	4	6				20
	Subarctic Current	2001	56	25	0	25	62	9	71	4	0	4				9
		2000	46	72		72	26		26	2		2				0
		1999	41				90		90	10		10				0
		1998	153	51		51	45		45	3	1	4				1
		1997	29	41		41	59		59							0
		1996	18				100		100							0
		1995	62	2		2	81	11	92	5	2	6				13
		1994	8	13		13	50	25	75		13	13				38
165° W	Ridge Domain	2001	179	25	1	25	42	10	53	13	7	21				18
		2000	21	62		62	14	5	19	5	9	14		5	5	19
		1999	128	14	2	16	69	1	70	13	2	15				5
		1998	75	1	1	3	9	21	31	17	47	64		3	3	72
	Subarctic Current	2000	14	43		43	50		50	1		1				0
		1999	72	36		36	61		61	3		3				0
		1998	120	19		19	48	14	63	11	8	18				22

*Catch included 1 immature ocean-age 0 fish.

Table 9. Ocean age composition and maturity at age of chinook salmon and steelhead caught by the *Oshoro maru* research gillnet, 1994-2001. Percent values indicate average percentage of fish in specific age class and maturity in each catch, grouped by oceanic region and year.

Species **Chinook**

Transect Line	Ocean Domain	Year	N	Percent of (year x domain) catch in each category: Ocean Age 1 Immature	Ocean Age 1 Mature	Ocean Age 1 Total	Ocean Age 2 Immature	Ocean Age 2 Mature	Ocean Age 2 Total	Ocean Age 3 Immature	Ocean Age 3 Mature	Ocean Age 3 Total	% Mature Overall
145° W	R/D Domains	2001	3				100		100				0
		2000	1				100		100				0
		1999	5				100		100				0
		1998	5	40		40	60		60				0
		1996	3	33		33	67		67				0
	Subarctic Current	2001	4				75		75	25		25	0
		1998	2				100		100				0
165° W	Ridge Domain	1999	6				83		83	17		17	0
	Subarctic Current	1998	1				100		100				0

Species **Steelhead**

Transect Line	Ocean Domain	Year	N	Percent of (year x domain) catch in each category: Ocean Age 0 Immature	Ocean Age 0 Mature	Ocean Age 0 Total	Ocean Age 1 Immature	Ocean Age 1 Mature	Ocean Age 1 Total	Ocean Age 2 Immature	Ocean Age 2 Mature	Ocean Age 2 Total	Ocean Age 3 Immature	Ocean Age 3 Mature	Ocean Age 3 Total	% Mature Overall
145° W	R/D Domains	2001	23		4	4	13	57	70		9	9		17	17	87
		*2000	47	42		42	15	21	36	4	8	12		8	8	39
		*1999	37	22	3	24	35	22	57		11	11		5	5	43
		1998	13	54		54		15	15		8	8		23	23	46
		1997	16	44	31	75		13	13		13	13				56
		*1996	32	59		59	16	9	25		6	6		3	3	25
		1995	1										100		100	0
		1994	14	79	7	86								14	14	21
	Subarctic Current	2001	20	5		5	25	65	90		5	5				70
		2000	10	90		90	10		10							0
		*1999	7				14	14	29		43	43		14	14	86
		1998	37	51	3	54	14	22	35		11	11				35
		1996	4	50		50	25		25		25	25				25
		1994	2	50		50								50	50	50
165° W	Ridge Domain	2001	17				6	47	53	0	35	35	0	12	12	94
		1999	3					100	100							100
	Subarctic Current	2000	7				14	43	57		29	29		14	14	86
		1999	8				50	50	100							50
		1998	5				20	60	80		20	20				80

*Catch included one mature ocean-age 4 fish

Table 10. Number sampled, mean and standard deviation of fork length (F.L., mm), body weight (B.W., g), and condition factor ($C.F.=10^6*B.W./F.L.^3$) of sockeye salmon caught by the *Oshoro maru* research gillnet, 1994-2001, grouped by ocean age.

Species **Sockeye**

			Ocean Age 1							**Ocean Age 2**							**Ocean Age 3**							**Ocean Age 4**						
Transect Line	Ocean Domain	Year	N	F.L. mean	F.L. s.d.	B.W. mean	B.W. s.d.	C.F. mean	C.F. s.d.	N	F.L. mean	F.L. s.d.	B.W. mean	B.W. s.d.	C.F. mean	C.F. s.d.	N	F.L. mean	F.L. s.d.	B.W. mean	B.W. s.d.	C.F. mean	C.F. s.d.	N	F.L. mean	F.L. s.d.	B.W. mean	B.W. s.d.	C.F. mean	C.F. s.d.
145°W	R/D Domains	2001	326	318	32	376	114	11.5	1.6	92	515	63	1791	744	12.4	1.4	40	618	27	3180	436.2	13.4	0.9							
		2000	71	324	58	390	208	10.9	1.9	108	512	66	1820	836	12.7	1.9	15	611	38	3213	771	13.8	1.2							
		1999	53	342	33	452	156	10.9	0.9	98	519	61	1815	737	12.3	1.1	19	620	47	3059	727.4	12.6	1.0							
		1998	20	348	24	518	137	12.1	1.8	44	554	48	2260	619	12.9	1.0	52	610	31	2910	517	12.7	1.0	3	556	41	2287	658	13.0	1.5
		*1997	12	413	80	1005	657	13.0	1.4	209	552	36	2225	471	12.9	2.3	74	610	39	2978	641	12.7	1.8							
		1996	20	359	52	589	458	11.6	1.2	90	563	46	2475	647	13.5	1.3	43	626	40	3360	669	13.5	1.3	1	610	-	3400	-	15.0	-
		1995	27	349	23	527	133	12.2	1.6	62	546	47	2083	565	12.5	1.1	43	607	41	2878	561	12.9	2.0							
		1994	16	347	25	503	99	11.9	1.6	160	555	39	2255	463	13.1	1.7	37	603	35	2775	528	12.5	1.2	1	650	-	2750	-	10.0	-
	Subarctic Current	2001	37	348	39	485	160	11.3	1.4	28	535	66	2158	888	13.2	1.4	2	614	74	3210	1117	13.6	0.1							
		2000	10	387	26	651	129	11.1	0.8	59	571	37	2621	489	13.8	1.0	2	612	25	3315	375	14.4	0.1							
		1999	2	470	150	1570	1428	12.6	1.3	33	561	33	2299	480	12.8	1.0	14	613	34	3072	630	13.1	1.0							
		1998	2	371	15	570	71	11.2	0.0	106	572	37	2641	584	13.9	1.1	40	613	31	3039	501	13.1	1.1							
		1997	4	457	82	1295	714	12.4	1.7	22	539	27	2031	398	12.8	1.2	2	617	59	2970	891	12.4	0.2							
		1996	2	369	4	550	14	11.0	0.7	10	578	29	2638	410	13.6	0.8	1	650	-	4050	-	14.7	-							
		1995	3	386	48	680	314	11.3	1.2	15	537	50	2157	577	13.8	3.2	3	593	105	3167	679	16.2	6.2	1	640	-	3000	-	11.4	-
		1994	1	360	-	560	-	12.0	-	8	547	28	2341	292	14.3	1.0														
165°W	Ridge Domain	2001	15	345	32	439	142	10.4	0.7	18	471.5	38.6	1213	449	11.2	1.09	7	544	52.6	2114	742.1	12.7	0.9							
		2000	6	332	38	380	136	10.0	0.6	34	467	49	1305	584	12.1	1.1	9	593	35	2946	702	13.9	1.4							
		1999	28	342	18	458	79	11.4	1.6	18	468	42	1186	351	11.3	0.9	1	592	-	2340	-	11.3	-							
		1998	49	332	22	426	118	10.7	3.2	13	483	76	1454	738	11.7	2.2	12	603	44	3010	1060	13.2	2.2							
	Subarctic Current	1999								2	547	30	1680	14	10.4	1.8	1	622	-	3100	-	12.9	-							
		1998	21	353	65	545	319	11.6	1.3	23	515	53	1723	588	12.1	0.8	15	589	26	2656	365	12.9	0.8							

*includes one ocean age 5 fish, FL 924, BW 7300, CF 9.25.

Table 11. Number sampled, mean and standard deviation of fork length (F.L., mm), body weight (B.W., g), and condition factor ($C.F.=10^6*B.W./F.L.^3$) of chum salmon caught by the *Oshoro maru* research gillnet, 1994-2001, grouped by ocean age.

Species **Chum**

			Ocean Age 1							**Ocean Age 2**							**Ocean Age 3**							**Ocean Age 4**						
Transect Line	Ocean Domain	Year	N	F.L. mean	F.L. s.d.	B.W. mean	B.W. s.d.	C.F. mean	C.F. s.d.	N	F.L. mean	F.L. s.d.	B.W. mean	B.W. s.d.	C.F. mean	C.F. s.d.	N	F.L. mean	F.L. s.d.	B.W. mean	B.W. s.d.	C.F. mean	C.F. s.d.	N	F.L. mean	F.L. s.d.	B.W. mean	B.W. s.d.	C.F. mean	C.F. s.d.
145°W	R/D Domains	2001	6	387	85	687	617	10.3	2.0	49	504	32	1493	338	11.5	1.2	5	544	43	1860	336	11.5	1.2	1	575	-	2800	-	14.7	-
		2000	5	409	32	804	186	11.6	1.5	238	475	28	1233	229	11.4	0.9	54	524	37	1684	419	11.5	0.9							
		1999	10	394	44	695	258	10.9	1.1	242	470	34	1153	307	10.9	0.8	17	545	85	2058	1209	11.4	1.3	3	629	48	2883	1107	11.3	1.8
		1998	15	398	45	736	367	11.1	1.1	60	516	51	1631	561	11.6	1.3	24	579	72	2423	936	11.9	2.0	1	529	-	1820	-	12.3	-
		1997	99	390	29	742	189	12.3	1.4	126	459	29	1134	219	11.7	1.0	6	511	61	1583	531	11.6	1.9							
		1996	51	405	32	771	185	11.5	1.6	214	471	27	1216	209	11.5	0.9	12	586	97	2698	1428	12.3	1.2							
		1995	34	421	75	803	212	11.3	2.6	244	490	30	1387	245	11.8	1.7	36	527	28	1721	307	11.6	1.1	1	528	-	1540	-	10.5	-
		1994	71	390	16	696	132	11.7	1.6	54	464	31	1205	313	11.9	1.5	8	492	37	1494	452	12.3	1.8							
	Subarctic Current	2001	14	405	29	767	198	11.3	0.9	40	482	24	1325	200	11.7	0.6	2	512	7	1700	0	12.7	0.5							
		2000	33	379	44	578	112	10.8	1.6	12	428	28	914	212	11.5	1.0	1	570	-	2350	-	12.7	-							
		1999								37	448	25	986	176	10.8	0.6	4	534	85	1865	1013	11.5	0.5							
		1998	78	387	24	656	138	11.2	0.7	69	471	45	1264	335	11.8	0.7	6	554	65	2162	957	12.0	1.5							
		1997	12	370	24	640	138	12.5	1.1	17	444	27	1145	190	13.0	0.9														
		1996								18	476	49	1237	268	11.6	2.0														
		1995	1	402	-	640	-	9.9	-	57	470	33	1219	271	11.5	0.7	4	510	23	1550	283	11.6	1.1							
		1994	1	380	-	650	-	11.8	-	6	463	35	1213	263	12.1	0.6	1	460	-	1220	-	12.5	-							
165°W	Ridge Domain	2001	45	366	29	470	105	9.6	1.4	94	440	21	917	142	10.7	1.1	38	480	24	1203	189	10.9	1.0	2	531	52	1640	368	10.9	0.8
		2000	13	331	18	374	42	10.3	0.9	4	445	32	1090	271	12.2	0.4	3	547	17	2290	293	13.9	0.5	1	593	-	2740	-	13.1	-
		1999	20	357	48	477	183	10.3	1.6	88	422	24	814	151	10.8	1.2	18	483	42	1234	334	10.8	0.9							
		1998	2	386	73	670	325	11.3	0.7	23	469	58	1100	363	10.6	2.2	48	518	29	1605	277	11.5	1.3	2	522	8	1575	35	11.1	0.2
	Subarctic Current	2000	6	334	9	402	55	10.4	0.6	7	453	70	1109	541	11.5	3.3	1	409	-	800	-	11.7	-							
		1999	23	331	15	399	56	11.0	0.8	44	420	19	859	136	11.5	0.8	2	438	42	1030	354	12.0	0.7							
		1998	25	322	27	378	117	11.0	1.3	75	445	41	1099	313	12.1	0.9	22	507	35	1551	291	11.9	1.3							

*includes 1 ocean age 0 fish: FL 402, BW 760, CF 11.7

Table 12. Number sampled, mean and standard deviation of fork length (F.L., mm), body weight (B.W., g), and condition factor (C.F.= 10^6*B.W./F.L.^{3}) of pink and coho salmon caught by the Oshoro maru research gillnet, 1994-2001, grouped by ocean age.

Species **Pink**

			Ocean Age 1							
Transect Line	Ocean Domain	Year	N	F.L. mean	s.d.	B.W. mean	s.d.	C.F. mean	s.d.
145°W	R/D Domains	2001	136	469	34	1259	409	11.9	1.7
		2000	248	452	29	1055	232	11.3	1.1
		1999	429	453	29	1098	254	11.6	0.9
		1998	170	469	31	1228	325	11.7	1.2
		1997	102	475	27	1300	217	11.7	2.2
		1996	73	466	32	1217	339	11.5	2.9
		1995	170	483	31	1337	370	11.7	1.6
		1994	186	483	28	1472	424	12.8	2.3
	Subarctic Current	2001	47	479	34	1441	487	12.6	1.8
		2000	55	457	39	1141	299	12.0	2.4
		1999	116	440	20	954	148	11.1	0.8
		1998	104	480	30	1435	368	12.7	1.5
		1996	30	493	32	1582	358	13.0	1.6
		1995	18	475	25	1326	383	12.1	1.7
		1994	28	491	22	1699	357	14.2	1.7
165°W	Ridge Domain	2001	91	447	24	1074	188	11.9	1.0
		2000	7	484	44	1247	220	11.1	1.9
		1999	109	415	21	878	119	12.2	0.9
		1998	14	437	23	1050	191	12.5	0.7
	Subarctic Current	2000	19	387	93	729	517	11.4	2.8
		1999	20	441	11	959	73	11.1	0.6
		1998	40	452	33	1106	270	11.7	0.9

Species **Coho**

			Ocean Age 1							
Transect Line	Ocean Domain	Year	N	F.L. mean	s.d.	B.W. mean	s.d.	C.F. mean	s.d.
145°W	R/D Domains	2001	69	594	51	2896	771	13.6	1.9
		2000	108	613	43	3050	657	13.1	1.8
		1999	141	583	46	2423	553	12.0	0.9
		1998	54	615	34	3102	612	13.2	1.4
		1997	50	580	47	2670	711	13.3	1.4
		1996	111	587	44	2817	659	13.8	1.7
		1995	51	579	40	2607	565	13.3	1.7
		1994	87	602	50	3021	815	13.6	1.9
	Subarctic Current	2001	21	606	41	3339	674	14.8	0.8
		2000	4	590	63	2645	1273	12.1	2.1
		1999	42	570	44	2373	517	12.6	0.9
		1998	28	616	48	3239	1011	13.5	1.6
		1997	4	544	89	2390	1062	14.1	0.4
		1996	12	602	40	3237	468	14.8	1.8
		1995	15	566	57	2671	856	14.3	1.1
165°W	Ridge Domain	2001	7	558	61	2241	776	12.4	1.2
		2000	3	540	79	2460	1027	14.8	0.7
		1999	2	535	83	1950	1061	12.0	1.2
	Subarctic Current	2000	26	525	31	1847	394	12.6	1.2
		1999	9	536	26	1893	297	12.3	1.3
		1998	31	567	45	2534	577	13.8	2.3

Table 13. Number sampled, mean and standard deviation of fork length (F.L., mm), body weight (B.W., g), and condition factor (C.F.= 10^6* B.W./F.L.^{3}) of chinook salmon and steelhead caught by the *Oshoro maru* research gillnet, 1994-2001, grouped by ocean age.

Species **Chinook**

			Ocean Age 1							Ocean Age 2							Ocean Age 3						
Transect	Ocean			F.L.		B.W.		C.F.			F.L.		B.W.		C.F.			F.L.		B.W.		C.F.	
Line	Domain	Year	N	mean	s.d.	mean	s.d.	mean	s.d.	N	mean	s.d.	mean	s.d.	mean	s.d.	N	mean	s.d.	mean	s.d.	mean	s.d.
145°W	R/D Domains	2001								3	618	50	3247	1052	13.4	1.2							
		2000								1	705	-	4610	-	13.2	-							
		1999								5	642	26	3512	435.3	13.2	0.5							
		1998								4	645	72.6	3880	1625	13.9	1.0							
		1996	1	374	-	550	-	10.5	-	2	563	10	2480	28	13.9	0.6							
		1995								1	652	-	4100	-	14.8	-							
	Subarctic Current	2001								3	627	28	3610	789	14.5	1.4	1	791	-	6800	-	13.7	-
		1998								2	656	84	4350	1697	15.0	0.2							
		1995								1	644	-	3800	-	14.2	-							
165°W	Ridge Domain	1999								5	576	20	2586	428	13.4	1.1	1	722	-	5100	-	13.6	-
	Subarctic Current	1998								1	676	-	4700	-	15.2	-							

Species **Steelhead**

			Ocean Age 0							Ocean Age 1							Ocean Age 2							Ocean Age 3						
Transect	Ocean			F.L.		B.W.		C.F.			F.L.		B.W.		C.F.			F.L.		B.W.		C.F.			F.L.		B.W.		C.F.	
Line	Domain	Year	N	mean	s.d.	mean	s.d.	mean	s.d.	N	mean	s.d.	mean	s.d.	mean	s.d.	N	mean	s.d.	mean	s.d.	mean	s.d.	N	mean	s.d.	mean	s.d.	mean	s.d.
145°W	R/D Domains	2001	1	330	-	310	-	8.6	-	16	537	35	1604	277.1	10.3	1.3	2	632	91	2500	849	9.8	0.8	4	742	21	3613	202	8.9	1.0
		****2000	20	322	22	306	89	8.9	1.7	17	570	40	1945	529	10.3	1.1	6	649	23	2476	405	9.0	1.3	4	776	33	4020	956	8.5	0.8
		**1999	9	329	39	369.4	142	10.0	1.1	21	567	28	1753	285.6	9.6	0.8	4	695	28	2820	381	8.4	1.1	2	745	52	3775	389	9.2	1.0
		1998	7	331	25	396	81	10.8	0.4	2	556	5	1800	226	10.5	1.6	1	581	-	2240	-	11.4	-	3	747	46	4100	1015	9.7	1.0
		1997	12	314	36	345	149	10.6	1.6	2	587	11	2070	184	10.2	0.4	2	746	35	4000	707	9.8	3.1							
		*1996	19	323	22	342	88	10.0	1.3	8	525	45	1461	233	10.2	1.7	2	721	7	2910	14	7.8	0.3	1	700	-	3250	-	9.5	-
		1995	6	311	33	332	94	10.9	1.2	6	548	34	1897	546	11.5	3.3	1	609	-	3100	-	13.7	-	1	675	-	2550	-	8.3	-
		1994	12	327	28	372	80	10.6	1.2																					
	Subarctic Current	2001	1	463	-	1020	-	10.3	-	18	588	34	2326	491	11.3	1.4	1	751	-	4300	-	10.2	-							
		2000	9	362	37	456	183	9.4	1.8	1	488	-	1060	-	9.1	-														
		***1999								2	558	6	1695	92	9.8	0.2	3	727	38	3073	166	8.1	1.1	1	710	-	3050	-	8.5	-
		1998	20	356	55	527	320	10.5	1.2	13	570	39	2145	492	11.4	1.3	4	695	72	4038	1006	11.9	0.9							
		1997	2	337	55	520	99	14.1	4.2	1	518	-	1580	-	11.4	-	1	732	-	4930	-	12.6	-							
		1996								7	557	56	1901	672	10.7	0.8														
		1995	1	400	-	700	-	10.9	-																					
165°W	Ridge Domain	2001								9	538	53	1622	237	10.8	3.1	6	669	49	2847	820	9.3	1.3	2	832	85	5750	2333	9.7	1.1
		1999								3	576	42	1760	349	9.1	0.5														
	Subarctic Current	2000								4	552	41	1728	404	10.2	0.7	2	661	51	3140	933	10.7	0.8	1	632	-	2250	-	8.9	-
		1999								8	552	46	1786	248	10.9	2.7														
		1998								4	561	28	1820	385	10.2	0.7	1	584	-	2060	-	10.3	-							

*includes 1 ocean age 4 fish: FL 800, BW 3950, CF 7.7; **includes 1 ocean age 4 fish: FL 830, BW 9720, CF 17.0; ***includes 1 ocean age 4 fish: FL 754, BW 4050, CF 9.4.
****includes 1 ocean age 4 fish: FL 822, BW 4310, CF 7.8

Table 14. Mean catch (number of salmonids) per unit (30-tans, 1500 m) of effort by C-gear (research-mesh gillnet) calculated by oceanographic region for the *Wakatake maru*, 1991-2001. Research-mesh gillnet is composed of 3 tans each of the following mesh sizes: 48, 55, 63, 72, 82, 93, 106, 121, 138, and 157 mm.

		No.		Mean Temperature		Mean Salinity		Mean Catch per 30 tans C-gear								
Year	Sampling Dates	of Sta.	Locations	0 m	100 m	0 m	100 m	Sock-eye	Chum	Pink	Coho	Chi-nook	Steel-head	Dolly Varden	Masu	Total
Central North Pacific - Transition Zone																
2001	14-15 Jun	3	39°N-41°N, 180°	14.2	10.5	34.2	34.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2000	12-13 Jun	2	39°N-40°N, 180°	13.6	10.7	34.2	34.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1999	16-Jun	1	39°N, 180°	14.3	10.4	34.2	33.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1998	17-18 Jun	2	39°N-40°N, 180°	14.8	11.5	34.3	34.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1997	19-20 Jun	2	39°N-40°N, 180°	13.3	11.0	34.3	34.3	0.0	2.0	0.0	0.5	0.0	0.0	0.0	0.0	2.5
1996	15-17 Jun	3	38°N-40°N, 180°	14.3	11.2	34.2	34.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1995	18-21 Jun	4	38°N-41°N, 180°	13.0	10.8	34.1	34.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1994	18-20 Jun	3	38°N-40°N, 180°	14.2	11.6	34.3	34.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1993	17-22 Jun	5	38°N-42°N, 180°	12.9	10.6	34.2	34.2	0.0	13.4	0.0	0.0	0.0	0.0	0.0	0.0	13.4
1992	17-20 Jun	4	38°N-41°N, 180°	12.8	10.2	34.2	34.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1991	12-14 Jun	3	38°N-40°N, 180°	14.3	11.2	34.2	34.3	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.7
Central North Pacific - Transition Domain																
2001	16-18 Jun	4	42°N-45°N, 180°	8.9	6.0	33.4	33.5	0.0	14.5	1.3	32.0	0.5	2.3	0.0	0.0	50.5
2000	14-19 Jun	6	41°N-46°N, 180°	8.3	6.6	33.2	33.4	0.7	11.0	5.2	5.7	0.0	0.8	0.0	0.0	23.3
1999	16-22 Jun	6	40°N-45°N, 180°	9.1	7.4	33.3	33.4	0.0	2.5	1.0	9.0	0.0	1.0	0.0	0.0	13.5
1998	20-25 Jun	5	41°N-45°N, 180°	9.4	6.8	33.3	33.5	0.0	6.8	1.0	22.2	0.0	1.4	0.0	0.0	31.4
1997	21-25 Jun	5	41°N-45°N, 180°	10.0	7.7	33.5	33.6	0.2	11.6	1.4	21.0	0.2	2.4	0.0	0.0	36.8
1996	18-20 Jun	3	41°N-43°N, 180°	11.8	8.0	33.6	33.7	0.0	5.0	0.0	1.3	0.0	0.7	0.0	0.0	7.0
1995	22-24 Jun	3	42°N-44°N, 180°	10.6	8.4	33.7	33.9	0.0	3.7	2.0	9.0	0.0	0.3	0.0	0.0	15.0
1994	21-24 Jun	4	41°N-44°N, 180°	10.5	8.6	33.9	33.9	0.0	9.0	1.3	11.0	0.0	2.5	0.0	0.0	23.8
1993	23-25 Jun	2	43°N-44°N, 180°	9.2	7.7	33.7	33.9	0.0	27.5	0.0	8.5	0.0	1.0	0.0	0.0	37.0
1992	21-22 Jun	2	42°N-43°N, 180°	9.4	9.1	33.7	34.0	0.0	15.0	0.0	5.5	0.0	0.5	0.0	0.0	21.0
1991	15-19 Jun	5	41°N-45°N, 180°	10.4	8.3	33.5	33.8	0.0	10.6	0.4	29.2	0.0	3.2	0.0	0.0	43.4
Central North Pacific- Subarctic Current																
2001	20-23 Jun	3	46°N-47°N, 180°	6.6	3.2	33.0	33.2	5.3	49.3	42.0	1.3	0.0	0.3	0.0	0.0	98.3
2000	20-22 Jun	2	47°N, 180°	6.2	3.5	32.9	33.0	6.0	53.5	8.0	1.5	0.5	4.5	0.0	0.0	74.0
1999	24-26 Jun	3	46°N-47°N, 180°	5.8	3.7	32.7	33.0	36.0	52.0	51.0	2.3	2.0	4.0	0.0	0.0	147.3
1998	26-28 Jun	3	46°N-47°N, 180°	6.8	4.1	33.0	33.1	6.0	13.3	1.0	27.3	2.3	6.7	0.0	0.3	57.0
1997	26-28 Jun	3	46°N-47°N, 180°	8.8	4.8	32.8	33.0	0.7	35.3	24.7	8.3	2.0	1.7	0.0	0.0	72.7
1996	21-26 Jun	4	44°N-47°N, 180°	9.2	5.1	33.1	33.2	0.0	53.0	1.3	19.0	0.8	1.0	0.0	0.0	75.0
1995	25-27 Jun	3	45°N-47°N, 180°	7.8	4.7	33.0	33.2	0.7	33.0	6.7	25.7	0.7	7.7	0.0	0.0	74.3
1994	25-27 Jun	3	45°N-47°N, 180°	6.5	3.9	32.9	33.0	1.3	15.3	22.0	25.0	1.0	9.0	0.0	0.0	73.7
1993	26-28 Jun	3	45°N-47°N, 180°	7.3	3.6	33.0	33.2	0.0	58.3	2.7	16.3	0.3	5.0	0.0	0.0	82.7
1992	23-25 Jun	3	44°N-46°N, 180°	7.6	4.8	33.2	33.3	0.0	12.7	0.3	19.3	0.3	1.0	0.0	0.0	33.7
1991	20-21 Jun	3	46°N-47°N, 180°	7.4	4.5	33.0	33.1	1.0	30.5	10.5	24.0	1.0	1.5	0.0	0.0	68.5
North Pacific Ridge Domain																
1992	26-Jun	1	47°N, 180°	6.7	3.1	33.0	33.1	0.0	40.0	1.0	34.0	0.0	2.0	0.0	0.0	77.0
Central North Pacific All Areas Combined																
2001	14-23 Jun	10	39°N-47°N, 180°	9.8	6.5	33.5	33.6	2.0	25.8	16.4	16.5	0.3	1.3	0.0	0.0	62.1
2000	12-22 Jun	10	39°N-47°N, 180°	9.0	6.8	33.3	33.5	1.6	17.3	4.7	3.7	0.1	1.4	0.0	0.0	28.8
1999	16-26 Jun	10	39°N-47°N, 180°	8.6	6.6	33.2	33.3	10.8	17.1	15.9	6.1	0.6	1.8	0.0	0.0	52.3
1998	17-28 Jun	10	39°N-47°N, 180°	9.7	6.9	33.4	33.5	1.8	7.4	0.8	19.3	0.7	2.7	0.0	0.1	32.8
1997	19-28 Jun	10	39°N-47°N, 180°	10.3	7.5	33.4	33.6	0.3	16.8	8.1	13.1	0.7	1.7	0.0	0.0	40.7
1996	15-27 Jun	10	38°N-47°N, 180°	11.5	7.8	33.6	33.7	0.0	22.7	0.5	8.0	0.3	0.6	0.0	0.0	32.1
1995	18-27 Jun	10	38°N-47°N, 180°	10.7	8.2	33.6	33.8	0.2	11.1	2.6	11.2	0.2	2.4	0.0	0.0	26.9
1994	18-27 Jun	10	38°N-47°N, 180°	10.4	8.1	33.7	33.7	0.4	8.2	7.1	11.9	0.3	3.7	0.0	0.0	31.6
1993	17-28 Jun	10	38°N-47°N, 180°	10.4	7.9	33.7	33.9	0.0	29.7	0.8	6.6	0.1	1.7	0.0	0.0	25.4
1992	17-25 Jun	10	38°N-47°N, 180°	9.9	7.7	33.7	33.8	0.0	10.8	0.2	10.3	0.1	0.6	0.0	0.0	22.0
1991	12-21 Jun	10	38°N-47°N, 180°	11.0	8.4	33.6	33.8	0.2	11.4	2.3	19.6	0.2	1.9	0.0	0.0	35.6
Bering Sea																
2001	1-13 Jul	13	55°N-58°N,178°W-176°E	5.4	1.7	33.1	33.2	60.8	136.5	164.9	0.1	2.5	0.0	0.0	0.0	364.8
2000	30 Jun-12 Jul	11	55°N-58°N,178°W-178°E	7.9	1.8	33.0	33.2	36.1	141.5	2.2	0.0	10.2	0.0	0.0	0.0	189.9
1999	4-14 Jul	11	55°N-58°N,178°W-178°E	6.5	1.9	32.9	33.0	25.5	64.1	357.3	0.0	4.1	0.0	0.0	0.0	450.9
1998	6-16 Jul	11	55°N-58°N,177°W-177°E	7.0	2.5	32.3	33.0	37.7	209.6	5.6	0.4	22.7	0.0	5.0	0.0	281.1
1997	6-17 Jul	10	55°N-58°N,177°W-177°E	8.4	3.0	32.8	32.9	57.0	143.9	379.7	0.3	3.5	0.0	0.1	0.0	584.5
1996	4-14 Jul	9	55°N-58°N, 177°W-179°E	7.5	2.9	32.8	33.0	55.1	200.7	4.8	0.1	6.8	0.0	0.2	0.0	267.7
1995	5-15 Jul	11	55°N-58°N, 177°W-177°E	7.5	2.0	32.9	33.1	37.8	63.8	174.5	0.5	6.5	0.0	0.2	0.0	283.3
1994	5-15 Jul	11	55°N-58°N, 177°W-177°E	6.7	1.8	32.9	33.2	50.3	224.0	13.1	0.0	5.2	0.0	0.2	0.0	292.7
1993	6-16 Jul	11	55°N-58°N, 177°W-177°E	7.2	2.1	33.1	33.2	58.2	111.6	141.2	0.8	1.4	0.0	0.0	0.0	313.2
1992	4-14 Jul	11	55°N-58°N, 177°W-177°E	6.4	2.5	33.0	33.3	22.8	257.5	9.0	0.3	5.4	0.0	0.5	0.0	295.5
1991	1-8 Jul	8	55°N-58°N, 180°W-177°W	7.6	2.2	33.0	33.2	22.9	53.9	365.5	0.0	9.9	0.0	0.0	0.0	452.1

Table 15. Number sampled, mean, and standard deviation of fork length (FL, mm), body weight (BW, g), and condition factor ($CF=10^6*BW/FL^3$) of sockeye salmon caught by the *Wakatake maru* research gillnet, 1991-2001, grouped by ocean age.

Sockeye

	Ocean Age .1								Ocean Age .2								Ocean Age .3								Ocean Age .4							
		%	F L (mm)		B W (g)		CF			%	F L (mm)		B W (g)		CF			%	F L (mm)		B W (g)		CF			%	F L (mm)		B W (g)		CF	
Year	N	Age	mean	sd	mean	sd	mean	sd	N	Age	mean	sd	mean	sd	mean	sd	N	Age	mean	sd	mean	sd	mean	sd	N	Age	mean	sd	mean	sd	mean	sd
Central North Pacific - Subarctic Current (44°N-47°N, 180°)																																
2001	5	28	322	8	326	30	9.8	0.9	11	61	458	36	1097	482	11.0	1.2	2	11	544	14	1925	205	11.9	0.3	0							
2000	6	50	310	11	308	16	10.4	0.9	6	50	419	24	817	118	11.0	0.4	0								0							
1999	54	54	325	21	384	73	11.1	1.2	46	46	436	22	921	127	11.0	0.7	0								0							
1998	10	59	336	23	361	80	9.4	0.7	6	35	435	22	907	55	11.1	1.2	1	6	610		3000		13.2		0							
1997	0								5	100	461	41	1116	304	11.3	1.7	0								0							
1996	0								0								0								0							
1995	0								0								2	100	606	8	2950	354	13.2	1.0	0							
1994	2	50	365	49	464	91	9.7	2.0	1	25	452		980		10.6		1	25	615		3200		13.8		0							
1993	0								0								0								0							
1992	0								0								0								0							
1991	2	100	315	5	295	7	9.5	0.2	0								0								0							
Bering Sea (55°N-58°N, 177°W-176°E)																																
2001	622	83	308	25	314	73	10.6	1.7	44	6	463	36	1066	262	10.6	1.0	70	10	576	46	2605	744	13.3	1.9	4	1	618	30	3335	675	14.0	1.0
2000	235	60	317	19	321	63	10.0	1.3	104	27	460	38	1099	311	11.0	1.1	53	13	603	42	3198	837	14.2	1.6	0							
1999	121	46	300	24	254	70	9.2	1.5	104	39	477	36	1290	355	11.6	1.5	40	15	583	41	2691	661	13.3	1.7	0							
1998	221	56	331	36	403	219	10.9	5.1	141	36	471	43	1275	471	11.8	1.8	33	8	574	44	2715	768	14.0	2.0	0							
1997	215	41	341	25	422	97	10.5	0.9	273	53	461	28	1112	217	11.2	1.1	30	6	574	58	2489	802	12.6	1.2	0							
1996	270	59	340	29	382	119	9.5	1.1	139	30	472	38	1250	355	11.6	1.4	48	11	585	54	2659	865	12.9	1.9	0							
1995	37	10	330	45	399	200	10.5	1.0	292	73	495	30	1447	354	11.8	1.0	70	17	586	58	2599	792	12.6	1.8	2	0	624	63	2925	601	12.1	1.2
1994	133	37	340	26	404	97	10.2	1.5	209	57	474	30	1189	255	11.1	1.1	23	6	583	38	2643	651	13.1	1.3	0							
1993	297	52	351	25	430	101	9.8	1.0	246	43	483	36	1301	329	11.3	1.1	31	5	571	44	2423	773	12.6	1.8	2	0	628	20	3275	601	13.1	1.2
1992	92	39	337	31	392	105	10.1	1.3	126	54	483	31	1364	324	12.0	1.5	16	7	584	46	2929	803	14.5	3.1	1	0	650		4500		16.4	
1991	101	59	313	21	332	70	10.7	1.1	38	22	480	39	1335	477	11.7	1.3	30	18	595	44	2851	781	13.2	1.7	2	1	653	33	4225	460	15.2	0.6

Table 16. Percent ocean and freshwater age composition and maturity at age of sockeye salmon caught in the Subarctic Current by the *Wakatake maru* in research gillnets, 1991-2001. Percent values indicate the percentage of fish in each age and maturity class, grouped by year. Imm=immature, Mat=mature, Tot=Total.

Sockeye, Subarctic Current

Year	N	Ocean Age 1																	
		FW Age 0			FW Age 1			FW Age 2			FW Age 3			FW X			All FW Ages		
		Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot
01	5	0	0	0	11	0	11	17	0	17	0	0	0	0	0	0	28	0	28
00	6	0	0	0	17	0	17	33	0	33	0	0	0	0	0	0	50	0	50
99	54	2	0	2	25	0	25	22	0	22	0	0	0	5	0	5	54	0	54
98	10	6	0	6	6	0	6	41	0	41	6	0	6	0	0	0	59	0	59
97	0																		
96	0																		
95	0																		
94	2	0	0	0	0	0	0	50	0	50	0	0	0	0	0	0	50	0	50
93	0																		
92	0																		
91	2	0	0	0	0	0	0	100	0	100	0	0	0	0	0	0	100	0	100

		Ocean Age 2																	
		FW Age 0			FW Age 1			FW Age 2			FW Age 3			FW X			All FW Ages		
		Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot
01	11	0	0	0	11	6	17	44	0	44	0	0	0	0	0	0	56	6	61
00	6	17	0	17	8	0	8	25	0	25	0	0	0	0	0	0	50	0	50
99	46	3	0	3	30	2	32	5	0	5	0	0	0	5	1	6	43	3	46
98	6	0	0	0	18	0	18	12	0	12	0	0	0	6	0	6	35	0	35
97	5	0	0	0	100	0	100	0	0	0	0	0	0	0	0	0	100	0	100
96	0																		
95	0																		
94	1	0	0	0	0	0	0	25	0	25	0	0	0	0	0	0	25	0	25
93	0																		
92	0																		
91	0																		

		Ocean Age 3																	
		FW Age 0			FW Age 1			FW Age 2			FW Age 3			FW X			All FW Ages		
		Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot
01	2	0	0	0	6	0	6	0	6	6	0	0	0	0	0	0	6	6	11
00	0																		
99	0																		
98	1	0	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	6	6
97	0																		
96	2	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	100	100
95	0																		
94	1	0	0	0	0	25	25	0	0	0	0	0	0	0	0	0	25	0	25
93	0																		
92	0																		
91	0																		

Table 17. Percent ocean and freshwater age composition and maturity at age of sockeye salmon caught in the Bering Sea by the *Wakatake maru* in research gillnets, 1991-2001. Percent values indicate the percentage of fish in each age and maturity class, grouped by year. Imm=immature, Mat=mature, Tot=Total.

Sockeye, Bering Sea

Year	N	Ocean Age 1																	
		FW Age 0			FW Age 1			FW Age 2			FW Age 3			FW X			All FW Ages		
		Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot
01	622	2	0	2	40	0	40	38	0	38	1	0	1	3	0	3	84	0	84
00	235	1	0	1	13	0	13	43	0	43	1	0	1	2	0	2	60	0	60
99	121	0	0	0	23	0	23	15	0	15	0	0	0	6	0	6	45	0	46
98	177	2	0	2	20	0	20	26	0	26	1	0	1	3	0	3	51	0	51
97	215	0	0	0	23	0	23	16	0	16	0	0	0	2	0	2	42	0	42
96	266	1	0	1	30	0	30	25	0	25	0	0	0	3	0	3	60	0	60
95	37	1	0	1	5	0	5	1	0	1	0	0	0	1	0	1	9	0	9
94	133	0	0	0	12	0	12	22	0	22	0	0	0	2	0	2	36	0	36
93	297	0	0	0	9	0	9	38	1	39	1	0	1	3	0	3	51	1	52
92	92	1	0	1	22	0	22	13	0	13	0	0	0	3	0	3	39	0	39
91	80	0	0	0	44	0	44	13	0	13	0	0	0	2	0	2	59	0	59

		Ocean Age 2																	
		FW Age 0			FW Age 1			FW Age 2			FW Age 3			FW X			All FW Ages		
		Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot
01	44	0	0	0	2	0	2	4	0	4	0	0	0	0	0	0	6	0	6
00	104	0	0	0	12	0	12	13	1	14	0	0	0	1	0	1	26	1	27
99	104	0	0	0	25	4	28	9	0	9	0	0	0	1	1	2	35	5	39
98	136	1	0	1	16	1	17	15	2	17	1	1	1	2	1	3	35	5	39
97	273	0	0	0	27	3	31	16	2	18	1	0	1	3	1	4	47	6	53
96	133	0	0	0	15	1	17	11	0	12	0	0	0	1	0	1	28	2	30
95	292	0	0	0	26	5	32	26	7	33	1	0	1	5	1	6	59	14	73
94	209	0	0	0	23	2	25	27	2	29	1	0	1	2	0	3	54	4	57
93	246	0	0	0	19	2	21	16	2	17	0	0	0	4	0	4	39	3	43
92	125	0	0	1	19	3	22	23	4	27	1	0	1	2	1	3	46	8	53
91	31	0	0	0	7	1	9	10	1	12	1	0	1	1	1	1	19	4	23

		Ocean Age 3																	
		FW Age 0			FW Age 1			FW Age 2			FW Age 3			FW X			All FW Ages		
		Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot
01	70	0	0	0	1	3	4	2	3	5	0	0	0	0	0	0	3	7	10
00	53	0	0	0	1	7	7	1	5	6	0	0	0	0	1	1	2	12	14
99	40	0	0	1	3	5	8	1	4	5	0	0	0	0	1	1	5	11	15
98	33	0	0	0	1	3	4	1	3	4	0	0	0	1	1	1	1	7	10
97	30	0	0	0	1	2	3	0	2	2	0	0	0	0	1	1	2	4	6
96	45	0	0	1	2	3	5	1	2	3	0	0	0	0	1	1	4	7	10
95	70	0	0	0	3	5	9	1	6	7	0	0	0	1	0	1	6	12	17
94	23	0	0	0	1	3	5	0	1	1	0	0	0	0	0	0	2	5	6
93	31	0	0	0	1	2	3	1	1	1	0	0	0	0	0	0	2	3	5
92	16	0	0	0	0	3	3	0	3	3	0	0	0	0	0	0	0	6	7
91	23	0	0	0	4	5	10	1	4	5	1	1	1	1	0	1	7	10	17

		Ocean Age 4																	
		FW Age 0			FW Age 1			FW Age 2			FW Age 3			FW X			All FW Ages		
		Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot
01	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00	0																		
99	0																		
98	0																		
97	0																		
96	0																		
95	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
94	0																		
93	0																		
92	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
91	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1

Table 18. Number sampled, mean, and standard deviation of fork length (FL, mm), body weight (BW, g), and condition factor ($CF=10^6*BW/FL^3$) of chum salmon caught by the *Wakatake maru* research gillnet, 1991-2001, grouped by ocean age and oceanographic domain.

Chum

	Ocean Age .1								Ocean Age .2								Ocean Age .3								Ocean Age .4								Ocean Age .5								Ocean Age .6							
		%	FL (mm)		BW (g)		CF			%	FL (mm)		BW (g)		CF			%	FL (mm)		BW (g)		CF			%	FL (mm)		BW (g)		CF			%	FL (mm)		BW (g)		CF			%	FL (mm)		BW (g)		CF	
Year	N	Age	mean	sd	mean	sd	mean	sd	N	Age	mean	sd	mean	sd	mean	sd	N	Age	mean	sd	mean	sd	mean	sd	N	Age	mean	sd	mean	sd	mean	sd	N	Age	mean	sd	mean	sd	mean	sd	N	Age	mean	sd	mean	sd	mean
Central North Pacific - Transition Domain (41°N-45°N, 180°)																																															
2001	3	5	314	9	370	98	11.8	2.1	36	67	435	30	939	182	11.4	1.2	14	26	483	21	1292	226	11.4	1.1	1	2	538		1680		10.8		0								0							
2000	11	19	315	15	331	59	10.5	0.9	22	39	436	21	956	158	11.5	0.8	23	40	477	28	1260	250	11.5	1.0	1	2	492		1280		10.7		0								0							
1999	4	44	329	14	323	55	6.8	4.6	4	44	379	55	688	133	13.5	5.3	1	12	416		700		9.7		0								0								0							
1998	25	89	318	16	306	56	9.4	0.8	3	11	394	9	633	21	10.4	8.1	0								0								0								0							
1997	7	13	337	40	381	127	9.8	0.8	42	79	423	23	862	240	11.2	2.4	4	8	481	38	1330	358	11.8	1.3	0								0								0							
1996	1	8	328		380		10.8		10	77	434	15	1016	83	12.5	0.7	2	15	502	74	1450	636	11.1	0.1	0								0								0							
1995	0								7	58	480	46	1317	409	11.6	0.8	5	42	503	47	1524	457	11.7	0.7	0								0								0							
1994	5	15	334	9	408	23	10.9	0.5	22	67	422	29	831	192	10.9	0.8	6	18	480	32	1202	207	10.8	0.8	0	0							0								0							
1993	4	8	326	9	355	13	10.3	1.0	37	79	425	16	841	126	10.9	1.1	6	13	479	26	1255	252	11.3	0.9	0	0							0								0							
1992	1	3	362		520		11.0		24	83	418	12	846	143	11.5	1.2	3	10	470	21	1207	172	11.5	0.3	1	4	542		1800		11.3		0								0							
1991	9	19	309	13	271	41	9.1	0.8	34	71	413	25	757	166	10.6	0.9	5	10	525	65	1804	803	11.8	0.9	0	0							0								0							
Central North Pacific - Subarctic Current (44N°-47°N, 180°)																																															
2001	29	18	307	13	273	51	9.4	1.2	60	38	458	35	1134	258	11.8	1.4	63	40	490	24	1448	259	12.3	1.6	6	4	525	22	1638	355	11.2	1.4	0								0							
2000	20	19	325	13	332	52	9.6	1.0	44	42	435	18	943	203	11.3	2.0	37	35	474	23	1193	234	11.1	1.0	4	4	477	52	1353	453	12.2	0.5	0								0							
1999	64	43	337	22	381	59	10.0	1.2	78	52	416	23	801	126	11.2	1.7	7	5	471	41	1221	402	11.4	1.2	0								0								0							
1998	23	60	302	16	262	28	9.5	0.9	12	32	409	24	769	225	11.1	2.3	2	5	515	7	1590	127	11.7	1.4	1	3	573		2300		12.2		0								0							
1997	51	57	305	14	276	44	9.7	1.3	35	39	434	31	870	266	10.4	0.9	3	4	523	55	1653	516	11.3	0.7	0								0								0							
1996	110	57	319	18	315	62	9.6	0.9	71	37	437	23	928	165	11.0	0.9	11	6	475	24	1168	140	10.9	0.9	1	0	530		1620		10.9		0								0							
1995	7	7	326	25	332	32	9.8	1.8	19	20	471	29	1236	255	11.7	0.8	58	62	492	22	1452	247	12.1	1.7	10	11	522	35	1795	419	12.6	2.5	0								0							
1994	10	23	341	21	419	72	10.5	1.1	22	51	414	27	780	209	10.8	1.3	10	23	482	26	1221	281	10.7	1.5	1	3	488		1220		10.5		0								0							
1993	56	37	338	19	385	98	10.0	2.1	83	55	419	24	784	140	10.6	1.3	11	7	501	31	1577	554	12.2	2.7	1	1	494		1570		13.0		0								0							
1992	11	31	309	6	291	30	9.9	0.8	21	60	422	21	797	163	10.5	0.8	3	9	488	4	1340	260	11.5	2.2	0								0								0							
1991	2	3	344	25	430	85	10.5	0.2	47	83	421	25	804	164	10.6	1.1	8	14	491	40	1343	304	11.3	1.4	0								0								0							
Central North Pacific - Ridge Domain (47°N, 180°)																																															
1992	18	47	316	8	289	24	9.2	0.6	12	32	436	24	931	195	11.1	0.7	6	16	491	19	1338	195	11.3	0.5	2	5	594	54	2600	424	12.5	1.4	0								0							
Central North Pacific - All Areas (41°N-47°N, 180°)																																															
2001	32	15	307	13	282	62	9.6	1.4	96	45	449	35	1064	251	11.6	1.4	77	37	488	23	1420	259	12.1	1.6	7	3	527	20	1644	324	11.1	1.3	0								0							
2000	31	19	322	14	331	53	9.9	1.0	66	41	436	19	947	188	11.4	1.7	60	37	475	25	1219	240	11.2	1.0	5	3	480	46	1338	393	11.9	0.7	0								0							
1999	68	43	336	22	379	59	9.8	1.7	82	52	414	26	795	128	11.3	2.0	8	5	464	43	1156	415	11.2	1.3	0								0								0							
1998	48	73	310	18	285	50	9.5	0.9	15	23	406	22	742	207	10.9	2.0	2	3	515	7	1590	127	11.7	1.4	1	1	573		2300		12.2		0								0							
1997	58	41	309	21	289	68	9.7	1.2	77	54	428	27	865	250	10.9	1.9	7	5	499	47	1469	428	11.6	1.0	0								0								0							
1996	111	54	319	18	316	62	9.7	0.9	81	39	437	22	939	159	11.2	1.0	13	6	479	32	1212	248	11.0	0.8	1	1	530		1620		10.9		0								0							
1995	7	7	326	25	332	32	9.8	1.8	26	24	473	33	1258	297	11.7	0.8	64	60	494	25	1463	265	12.1	1.6	10	9	522	35	1795	419	12.6	2.5	0								0							
1994	15	20	339	18	415	59	10.6	1.0	44	58	418	28	806	200	10.9	1.1	16	21	481	28	1214	249	10.8	1.2	1	1	488		1220		10.5		0								0							
1993	60	24	337	19	383	95	10.0	2.1	169	67	420	22	805	138	10.8	1.2	23	9	488	29	1376	451	11.6	2.1	1	0	494		1570		13.0		0								0							
1992	30	29	315	12	298	49	9.5	0.8	57	56	423	19	846	167	11.1	1.1	12	12	485	18	1306	196	11.4	1.0	3	3	576	49	2333	551	12.1	1.2	0								0							
1991	11	11	315	20	300	79	9.4	0.9	81	77	418	25	784	166	10.6	1.0	13	12	504	51	1520	569	11.5	1.0	0								0								0							
Bering Sea (55°N-58°N, 177°W-176°E)																																															
2001	594	35	339	22	403	79	10.4	1.6	284	17	466	39	1163	329	11.2	1.0	513	31	565	44	2252	585	12.3	1.7	277	16	604	53	2863	821	12.8	3.4	18	1	629	53	3184	1064	12.4	2.1	0							
2000	106	7	350	25	439	113	10.1	1.3	354	23	466	32	1145	261	11.2	1.0	739	48	520	41	1695	490	11.8	1.2	319	21	583	51	2672	906	13.0	2.4	9	1	646	39	3500	728	12.8	1.2	1	0	728	5300	13.7
1999	0								175	28	453	30	1091	263	11.6	1.4	314	50	527	56	1904	720	12.4	1.4	130	21	610	39	2941	678	12.8	1.8	5	1	635	17	3428	254	13.4	1.3	1	0	657	3490	12.3
1998	281	14	341	21	396	159	9.8	1.3	786	39	425	37	837	266	10.6	1.3	776	38	538	45	1834	491	11.6	1.5	182	9	595	41	2524	585	11.8	1.4	10	0	622	47	3108	545	13.0	2.3	1	0	624	2550	10.5
1997	749	59	340	17	407	76	10.3	0.9	324	25	442	35	955	297	10.8	1.9	169	13	541	45	1866	507	11.6	1.7	36	3	608	48	2621	815	11.4	1.4	2	0	560	85	2250	1344	11.9	2.1	1*	0	663	3500	12.0
1996	732	45	342	21	375	95	9.2	1.0	503	31	440	32	921	231	10.7	1.0	292	18	534	44	1740	465	11.2	1.2	82	5	581	58	2355	785	11.6	1.2	9	1	619	62	2813	1197	11.5	2.3	1	0	591	2500	12.1
1995	155	24	364	44	515	224	10.4	1.7	107	17	482	33	1280	337	11.2	1.6	259	40	523	38	1701	424	11.7	1.1	115	18	574	36	2316	468	12.2	1.6	7	1	613	44	2957	793	12.6	1.0	0							
1994	328	18	356	22	438	102	9.6	1.0	582	31	437	32	887	226	10.5	1.1	824	44	510	35	1484	342	11.1	1.2	133	7	562	47	2126	654	11.7	1.4	4	0	573	61	2330	605	12.3	1.7	0							
1993	78	7	368	20	488	90	9.7	0.9	544	51	442	29	942	223	10.7	1.1	352	33	535	42	1835	518	11.7	1.3	83	8	588	56	2564	885	12.2	1.2	7	1	594	40	2617	647	12.3	1.1	0							
1992	928	36	350	22	423	89	9.7	1.1	857	33	429	32	885	265	10.7	1.3	629	25	514	40	1657	487	11.8	1.6	154	6	586	46	2578	686	12.6	1.6	3	0	600	72	3017	1158	13.5	1.1	0							
1991	2	1	363	11	450	14	9.4	0.6	112	29	449	34	995	272	10.8	1.0	171	44	556	39	2071	504	11.9	1.4	84	22	604	45	2844	703	12.8	2.0	17	4	613	27	3119	466	13.5	1.2	0							

*chum salmon may be ocean age 7

Table 19. Percent ocean age composition and maturity at age of chum salmon caught by the Wakatake maru in research gillnets, 1991-2001. Percent values indicate the percentage of fish in each age and maturity class, grouped by year. Imm=immature, Mat=mature, Tot=Total.

Chum

Year	N	Ocean age .1			Ocean age .2			Ocean age .3			Ocean age .4			Ocean age .5			Ocean age .6			Total	
		Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat
Central North Pacific - Transition Domain (41°N-45°N, 180°)																					
2001	52	6	0	6	65	0	65	21	6	27	2	0	2	0	0	0	0	0	0	94	6
2000	57	19	0	19	33	5	39	28	12	40	2	0	2	0	0	0	0	0	0	83	17
1999	8	38	0	38	50	0	50	12	0	12	0	0	0	0	0	0	0	0	0	100	0
1998	27	89	0	89	11	0	11	0	0	0	0	0	0	0	0	0	0	0	0	100	0
1997	53	13	0	13	62	17	79	6	2	8	0	0	0	0	0	0	0	0	0	81	19
1996	13	8	0	8	77	0	77	15	0	15	0	0	0	0	0	0	0	0	0	100	0
1995	12	0	0	0	33	25	58	25	17	42	0	0	0	0	0	0	0	0	0	58	42
1994	33	15	0	15	61	6	67	12	6	18	0	0	0	0	0	0	0	0	0	88	12
1993	47	9	0	9	79	0	79	8	4	12	0	0	0	0	0	0	0	0	0	96	4
1992	29	3	0	3	76	7	83	7	3	10	0	3	3	0	0	0	0	0	0	86	14
1991	48	19	0	19	65	6	71	2	8	10	0	0	0	0	0	0	0	0	0	85	15
Central North Pacific - Subarctic Current (44°N-47°N, 180°)																					
2001	153	19	0	19	34	3	37	32	9	41	3	1	3	0	0	0	0	0	0	88	12
2000	105	19	0	19	40	2	42	32	3	35	3	1	4	0	0	0	0	0	0	94	6
1999	142	45	0	45	50	0	50	1	4	5	0	0	0	0	0	0	0	0	0	97	3
1998	38	61	0	61	24	8	32	5	0	5	0	3	3	0	0	0	0	0	0	90	10
1997	89	56	1	57	37	2	39	1	2	3	0	0	0	0	0	0	0	0	0	94	6
1996	192	56	1	57	35	2	37	5	1	6	0	1	1	0	0	0	0	0	0	96	4
1995	91	4	0	4	19	2	21	46	18	64	6	6	11	0	0	0	0	0	0	75	25
1994	43	23	0	23	49	2	51	14	9	23	2	0	2	0	0	0	0	0	0	88	12
1993	151	37	0	37	50	5	55	3	4	7	1	0	1	0	0	0	0	0	0	91	9
1992	35	31	0	31	54	6	60	3	6	9	0	0	0	0	0	0	0	0	0	89	11
1991	57	4	0	4	79	4	83	9	5	14	0	0	0	0	0	0	0	0	0	91	9
Central North Pacific - Ridge Domain (47°N, 180°)																					
1992	38	47	0	47	21	11	32	8	8	16	3	3	5	0	0	0	0	0	0	79	21
Central North Pacific - All Areas (41°N-47°N, 180°)																					
2001	205	16	0	16	42	2	44	29	8	37	2	1	3	0	0	0	0	0	0	89	11
2000	162	19	0	19	38	3	41	31	6	37	3	1	3	0	0	0	0	0	0	90	10
1999	150	45	0	45	50	0	50	2	3	5	0	0	0	0	0	0	0	0	0	97	3
1998	65	72	0	72	19	5	23	3	0	3	0	2	2	0	0	0	0	0	0	94	6
1997	142	40	1	41	47	8	54	3	2	5	0	0	0	0	0	0	0	0	0	89	11
1996	205	53	1	54	38	2	39	5	1	6	0	1	1	0	0	0	0	0	0	96	4
1995	104	4	0	4	20	5	25	44	17	62	5	5	10	0	0	0	0	0	0	73	27
1994	76	20	0	20	54	4	58	13	8	21	1	0	1	0	0	0	0	0	0	88	12
1993	253	24	0	24	64	3	67	6	3	9	0	0	0	0	0	0	0	0	0	94	6
1992	102	29	0	29	48	8	56	6	6	12	1	2	3	0	0	0	0	0	0	84	16
1991	105	11	0	11	72	5	77	6	7	12	0	0	0	0	0	0	0	0	0	89	11
Bering Sea (55°-58°N, 177°W-176°E)																					
2001	1661	34	0	34	15	2	17	10	21	31	4	13	17	0	1	1	0	0	0	63	37
2000	1551	7	0	7	20	3	23	32	16	48	6	15	21	0	1	1	0	0	0	65	35
1999	624	0	0	0	26	2	28	29	22	50	2	19	21	0	1	1	0	0	0	56	44
1998	2004	12	0	12	37	3	39	18	21	39	2	7	9	0	0	1	0	0	0	69	31
1997	1281	58	0	59	23	3	25	4	9	13	1	2	3	0	0	0	0	0	0	85	15
1996	1606	45	0	45	30	1	31	11	7	18	2	3	5	0	1	1	0	0	0	89	11
1995	642	23	2	24	13	4	17	22	18	40	3	15	18	0	1	1	0	0	0	61	39
1994	1869	17	0	18	29	2	31	30	15	44	2	5	7	0	0	0	0	0	0	78	22
1993	1064	7	0	7	45	6	51	13	20	33	1	7	8	0	1	1	0	0	0	66	34
1992	2570	36	0	36	31	3	33	13	11	25	1	5	6	0	0	0	0	0	0	80	20
1991	370	0	0	0	23	6	29	10	36	46	1	20	21	0	5	5	0	0	0	34	66

Table 20. Number sampled, mean, and standard deviation of fork length (FL, mm), body weight (BW, g), and condition factor ($CF=10^6*BW/FL^3$) of pink salmon caught by the *Wakatake maru* research gillnet, 1991-2001, grouped by ocean age and oceanographic domain.

Pink

Year	Ocean Age .1							
		%	Fork length (mm)		Body weight (g)		Condition Factor	
	N	Age	mean	sd	mean	sd	mean	sd
Central North Pacific - Transition Domain (41°N-45°N, 180)								
2001	4	100	452	37	1060	337	11.2	1.2
2000	26	100	461	31	1124	279	11.3	0.6
1999	4	100	434	29	940	104	11.5	1.0
1998	4	100	450	20	1055	168	11.5	1.1
1997	6	100	433	25	1045	279	12.9	3.9
1996	0							
1995	6	100	467	33	1186	328	11.4	1.2
1994	7	100	469	38	1063	265	10.1	0.3
1993	0							
1992	0							
1991	1	100	416		720		10.0	
Central North Pacific - Subarctic Current (44°N-47°N, 180°)								
2001	127	100	433	20	986	137	12.1	0.8
2000	17	100	444	36	1029	280	11.5	1.3
1999	148	100	410	23	776	131	11.2	1.7
1998	3	100	476	10	1193	83	11.1	0.6
1997	79	100	433	23	928	135	11.4	1.4
1996	5	100	436	45	844	349	9.6	1.4
1995	18	100	459	26	1070	360	10.8	1.7
1994	66	100	455	28	1023	210	10.8	1.0
1993	8	100	429	21	738	134	9.3	1.0
1992	2	100	458	0	920	57	9.6	0.6
1991	21	100	423	35	787	252	10.1	1.1
Central North Pacific - Ridge Domain (47°N, 180°)								
1992	1	100	450		910		10.0	
Central North Pacific - All Areas Combined (41°N-47°N, 180°)								
2001	131	100	434	21	988	145	12.0	0.8
2000	43	100	454	34	1087	280	11.4	1.0
1999	152	100	411	23	780	132	11.2	1.6
1998	7	100	461	21	1114	148	11.3	0.9
1997	85	100	433	23	936	150	11.5	1.7
1996	5	100	436	45	844	349	9.6	1.4
1995	24	100	461	27	1099	349	11.0	1.6
1994	73	100	456	29	1027	214	10.7	1.0
1993	8	100	429	21	738	134	9.3	1.0
1992	3	100	455	5	917	40	9.7	0.5
1991	22	100	422	34	784	247	10.1	1.0
Bering Sea (55°N-58°N, 177°W-176°E)								
2001	1882	100	461	26	1220	247	12.3	1.1
2000	27	100	455	35	1165	290	12.1	0.7
1999	2485	100	441	31	1100	260	12.7	1.3
1998	60	100	414	40	859	342	11.7	2.1
1997	1537	100	446	27	1117	244	12.5	2.0
1996	43	100	455	35	1117	275	11.7	1.4
1995	1749	100	470	29	1298	266	12.4	1.2
1994	143	100	444	30	1055	262	11.9	1.1
1993	1434	100	449	27	1106	240	12.1	1.1
1992	100	100	451	27	1153	255	12.4	1.1
1991	2621	100	447	37	1108	362	12.0	1.2

Table 21. Number sampled, mean, and standard deviation of fork length (FL, mm), body weight (BW, g), and condition factor (10^6*BW/FL^3) of coho salmon caught by the *Wakatake maru* research gillnet, 1991-2001, grouped by ocean age and oceanographic domain.

Coho

Year	Ocean Age .1							
		%	Fork length (mm)		Body Weight (g)		Condition Factor	
	N	Age	mean	sd	mean	sd	mean	sd
Central North Pacific - Transition Domain (41°N-45°N, 180°)								
2001	125	100	556	34	2277	420	13.1	1.3
2000	33	100	540	58	1996	370	12.8	1.9
1999	53	100	515	32	1613	307	11.7	0.9
1998	110	100	519	34	1763	345	12.5	1.5
1997	99	100	510	37	1754	408	13.1	2.0
1996	4	100	542	20	1925	155	12.1	0.8
1995	26	100	525	40	1786	328	12.4	2.3
1994	43	100	516	39	1563	414	11.2	1.3
1993	18	100	506	58	1562	472	11.8	1.2
1992	11	100	512	55	1678	486	12.2	1.2
1991	148	100	520	40	1631	393	11.4	0.9
Central North Pacific - Subarctic Current (44°N-47°N, 180°)								
2001	4	100	553	65	2380	815	13.6	0.6
2000	3	100	507	43	1780	370	13.6	0.6
1999	7	100	505	57	2006	311	16.2	0.5
1998	80	100	543	43	2122	494	13.1	1.4
1997	32	100	498	49	1468	398	11.8	2.1
1996	75	100	516	39	1653	399	11.8	1.0
1995	73	100	532	46	1836	512	11.9	1.0
1994	78	100	527	39	1829	415	12.3	1.3
1993	49	100	521	48	1755	512	12.1	1.5
1992	58	100	503	31	1514	340	11.7	1.2
1991	49	100	526	39	1821	419	12.4	1.0
Central North Pacific - Ridge Domain (47°N, 180°)								
1992	34	100	507	39	1611	367	12.1	0.9
Central North Pacific - All Areas Combined (41°N-47°N, 180°)								
2001	129	100	556	35	2281	432	13.1	1.3
2000	36	100	537	57	1978	370	12.9	1.8
1999	60	100	514	36	1659	330	12.2	2.4
1998	190	100	529	40	1914	450	12.7	1.5
1997	132	100	508	41	1698	450	12.8	2.1
1996	79	100	517	38	1666	394	11.8	1.0
1995	99	100	530	45	1823	469	12.0	1.5
1994	121	100	523	39	1735	432	11.9	1.4
1993	67	100	517	51	1703	505	12.0	1.5
1992	103	100	505	37	1563	367	11.9	1.1
1991	197	100	521	40	1678	407	11.7	1.0
Bering Sea (55°N-58°N, 177°W-176°E)								
2001	1	100	582		2150		10.9	
2000	0							
1999	0							
1998	3	100	556	62	2430	725	13.8	0.4
1997	3	100	518	72	1740	1095	11.4	2.3
1996	1	100	630		3800		15.2	
1995	5	100	605	35	2910	667	12.9	1.0
1994	0							
1993	9	100	556	33	2166	581	12.4	2.1
1992	3	100	568	37	2450	492	13.3	0.1
1991	0							

Table 22. Number sampled, mean, and standard deviation of fork length (FL, mm), body weight (BW, g), and condition factor (10^6*BW/FL^3) of chinook salmon caught by the *Wakatake maru* research gillnet, 1991-2001, grouped by ocean age and oceanographic domain.

Chinook

Year	Ocean Age .1								Ocean Age .2								Ocean Age .3								Ocean Age .4							
		%	F L (mm)		B W (g)		CF			%	F L (mm)		B W (g)		CF			%	F L (mm)		B W (g)		CF			%	F L (mm)		B W (g)		CF	
	N	Age	mean	sd	mean	sd	mean	sd	N	Age	mean	sd	mean	sd	mean	sd	N	Age	mean	sd	mean	sd	mean	sd	N	Age	mean	sd	mean	sd	mean	sd
Central North Pacific - Transition Domain (42°N-45°N, 180)																																
2001	0								2	100	683	4	4650	212	14.6	0.9	0								0							
Central North Pacific - Subarctic Current (44°N-47°N, 180)																																
2001	0								0								0								0							
2000	0								1	100	600		3100		14.4		0								0							
1999	0								5	100	617	30	3220	448	13.6	0.6	0								0							
1998	0								6	86	582	39	2488	472	12.5	0.7	1	14	780		6850		14.4		0							
1997	0								6	86	641	47	3408	1026	12.6	2.2	1	14	700		4400		12.8		0							
1996	3	100	395	44	823	320	12.9	0.8	0								0								0							
1995	0								1	50	562		2200		12.4		1	50	832		7800		13.5		0							
1994	0								3	100	616	33	3150	477	13.4	0.3	0								0							
1993	0								1	100	624		3700		15.2		0								0							
1992	0								1	100	575		2300		12.1		0								0							
1991	0								2	100	572	82	2625	926	13.8	1.0	0								0							
Central North Pacific - Ridge Domain (47°N, 180)																																
1992	0								0								0								0							
Bering Sea (55°-58°N, 177°W-176°E)																																
2001	24	73	345	28	476	136	11.4	1.3	5	15	492	99	1660	736	12.6	1.7	3	9	603	56	2260	754	10.1	1.7	1	3	780		6300		13.3	
2000	36	33	326	49	421	329	11.0	1.6	50	46	520	51	1779	524	12.3	0.9	22	20	671	48	4030	1122	13.1	2.0	1	1	728		5300		13.7	
1999	13	30	330	27	403	114	10.9	1.0	22	51	533	60	1936	694	12.5	2.2	8	19	658	64	3566	1236	12.1	0.8	0							
1998	140	60	348	41	528	311	11.7	1.2	62	27	545	57	2202	793	13.1	0.9	30	13	678	76	4346	1434	13.3	1.6	0							
1997	12	35	350	24	478	94	11.1	0.8	19	56	550	35	1954	390	11.6	0.8	3	9	714	100	4650	2079	12.2	0.9	0							
1996	24	43	407	31	826	221	12.0	1.0	25	45	567	46	2382	632	12.8	1.0	7	12	732	46	5121	1366	12.7	1.1	0							
1995	18	27	339	31	442	128	11.1	0.9	43	65	525	52	1813	522	12.3	1.7	4	6	726	61	4725	1300	12.2	0.8	1	2	812		6800		12.7	
1994	25	47	374	31	620	173	11.3	1.0	11	21	543	57	2179	740	13.1	1.5	17	32	720	41	4855	1129	12.8	1.0	0							
1993	1	8	352		480		11.0		7	59	573	25	2340	314	12.4	0.6	3	25	716	95	4710	2175	12.3	1.1	1	8	862		8600		13.4	
1992	17	36	356	27	525	116	11.4	0.9	23	49	567	47	2333	709	12.6	1.5	6	13	654	27	3822	648	13.6	0.8	1	2	850		7650		12.5	
1991	45	66	345	26	497	120	11.9	1.3	21	31	530	57	1816	634	11.8	0.8	2	3	715	18	4050	71	11.1	1.0	0							

Table 23. Percent ocean and freshwater age composition and maturity at age of chinook salmon caught in the central North Pacific Ocean by the *Wakatake maru* in research gillnets, 1991-2001. Percent values indicate the percentage of fish in each age and maturity class, grouped by year. Imm=immature, Mat=Mature, Tot=Total.

Chinook, Central North Pacific- All Areas Combined

Year	N	Ocean Age 1														
		FW Age 0			FW Age 1			FW Age 2			FW X			All FW Ages		
		Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot
01	0															
00	0															
99	0															
98	0															
97	0															
96	3	0	0	0	33	0	33	0	0	0	67	0	67	100	0	100
95	0															
94	0															
93	0															
92	0															
91	0															

		Ocean Age 2														
		FW Age 0			FW Age 1			FW Age 2			FW X			All FW Ages		
		Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot
01	2	0	0	0	50	0	50	0	0	0	50	0	50	100	0	100
00	1	0	0	0	100	0	100	0	0	0	0	0	0	100	0	100
99	5	0	0	0	80	0	80	0	0	0	20	0	20	100	0	100
98	6	0	0	0	57	0	57	0	0	0	29	0	29	86	0	86
97	6	0	0	0	71	0	71	0	0	0	14	0	14	86	0	86
96	0															
95	1	0	0	0	0	0	0	50	0	50	0	0	0	50	0	50
94	3	0	0	0	33	0	33	0	0	0	67	0	67	100	0	100
93	1	0	0	0	0	0	0	0	0	0	100	0	100	100	0	100
92	1	0	0	0	0	0	0	0	0	0	100	0	100	100	0	100
91	2	0	0	0	100	0	100	0	0	0	0	0	0	100	0	100

		Ocean Age 3														
		FW Age 0			FW Age 1			FW Age 2			FW X			All FW Ages		
		Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot
01	0															
00	0															
99	0															
98	1	0	0	0	14	0	14	0	0	0	0	0	0	14	0	14
97	1	0	0	0	14	0	14	0	0	0	0	0	0	14	0	14
96	0															
95	1	0	0	0	0	0	0	0	0	0	50	0	50	50	0	50
94	0															
93	0															
92	0															
91	0															

Table 24. Percent ocean and freshwater age composition and maturity at age of chinook salmon caught in the Bering Sea by the *Wakatake maru* in research gillnets, 1991-2001. Percent values indicate the percentage of fish in each age and maturity class, grouped by year. Imm=immature, Mat=Mature, Tot=Total.

Chinook, Bering Sea

Year	N	Ocean Age 1														
		FW Age 0			FW Age 1			FW Age 2			FW X			All FW Ages		
		Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot
01	24	0	0	0	55	0	55	0	0	0	18	0	18	73	0	73
00	36	0	0	0	27	0	27	0	0	0	6	0	6	33	0	33
99	13	5	0	5	17	0	17	2	0	2	7	0	7	31	0	31
98	98	0	0	0	36	1	37	0	0	0	15	0	15	51	1	52
97	12	0	0	0	27	0	27	3	0	3	6	0	6	35	0	35
96	19	0	0	0	24	2	27	0	0	0	16	0	16	40	2	42
95	18	0	0	0	21	0	21	0	0	0	6	0	6	27	0	27
94	24	0	0	0	40	0	40	0	0	0	6	0	6	46	0	46
93	1	0	0	0	0	0	0	0	0	0	8	0	8	8	0	8
92	17	0	0	0	23	0	23	0	0	0	13	0	13	36	0	36
91	27	0	0	0	49	0	49	0	0	0	29	0	29	77	0	77

		Ocean Age 2														
		FW Age 0			FW Age 1			FW Age 2			FW X			All FW Ages		
		Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot
01	5	0	0	0	15	0	15	0	0	0	0	0	0	15	0	15
00	50	0	0	0	38	0	38	0	0	0	8	0	8	46	0	46
99	22	0	0	0	33	0	33	0	0	0	19	0	19	52	0	52
98	62	2	0	2	22	0	22	0	0	0	10	0	10	33	0	33
97	19	0	0	0	32	0	32	3	0	3	22	0	22	56	0	56
96	19	0	0	0	31	0	31	0	0	0	11	0	11	42	0	42
95	43	0	0	0	53	0	53	0	0	0	12	0	12	65	0	65
94	11	0	0	0	15	0	15	0	0	0	6	0	6	21	0	21
93	7	0	0	0	50	0	50	0	0	0	8	0	8	58	0	58
92	23	0	0	0	36	0	36	0	0	0	13	0	13	49	0	49
91	8	0	0	0	17	0	17	0	0	0	6	0	6	23	0	23

		Ocean Age 3														
		FW Age 0			FW Age 1			FW Age 2			FW X			All FW Ages		
		Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot
01	3	0	0	0	9	0	9	0	0	0	0	0	0	9	0	9
00	22	0	0	0	16	0	16	0	0	0	5	0	5	20	0	20
99	7	0	0	0	14	0	14	0	0	0	2	0	2	17	0	17
98	29	0	0	0	11	0	11	0	0	0	4	0	4	15	0	15
97	3	0	0	0	3	0	3	0	0	0	6	0	6	9	0	9
96	7	0	0	0	7	2	9	2	0	2	4	0	4	13	2	16
95	4	0	0	0	5	0	5	0	0	0	2	0	2	6	0	6
94	17	0	0	0	19	2	21	0	0	0	11	0	11	31	2	33
93	3	0	0	0	17	0	17	0	0	0	8	0	8	25	0	25
92	6	0	0	0	6	0	6	0	0	0	6	0	6	13	0	13
91	0															

		Ocean Age 4														
		FW Age 0			FW Age 1			FW Age 2			FW X			All FW Ages		
		Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot
01	1	0	0	0	3	0	3	0	0	0	0	0	0	3	0	3
00	1	0	0	0	1	0	1	0	0	0	0	0	0	1	0	1
99	0															
98	0															
97	0															
96	0															
95	1	0	0	0	0	0	0	0	0	0	2	0	2	2	0	2
94	0															
93	1	0	0	0	8	0	8	0	0	0	0	0	0	8	0	8
92	1	0	0	0	2	0	2	0	0	0	0	0	0	2	0	2
91	0															

Table 25. Number sampled, mean, and standard deviation of fork length (FL, mm), body weight (BW, g), and condition factor (10^6*BW/FL^3) of steelhead trout caught by the *Wakatake maru* research gillnet, 1991-2001, grouped by ocean age and oceanographic domain.

Steelhead

	Ocean Age .1								Ocean Age .2								Ocean Age .3							
		%	F L (mm)		B W (g)		CF			%	F L (mm)		B W (g)		CF			%	F L (mm)		B W (g)		CF	
Year	N	Age	mean	sd	mean	sd	mean	sd	N	Age	mean	sd	mean	sd	mean	sd	N	Age	mean	sd	mean	sd	mean	sd
Central North Pacific - Transition Domain (41°N-45°N, 180)																								
2001	5	39	586	17	1928	101	9.6	0.8	8	62	698	44	3263	950	9.4	1.1	0							
2000	2	40	557	1	1645	7	9.5	0.0	2	40	694	117	3450	1909	9.7	0.8	1	20	752		4050		9.5	
1999	5	71	544	45	1492	375	9.2	0.8	2	29	704	76	3275	1096	9.2	0.1	0							
1998	5	71	539	52	1684	245	11.1	3.0	2	29	708	76	3425	1167	9.5	0.2	0							
1997	7	64	549	63	1717	644	9.9	1.1	4	36	697	17	3323	349	9.8	0.6	0							
1996	2	100	555	11	1770	212	10.4	0.6	0								0							
1995	0								1	100	682		3000		9.5		0							
1994	9	100	564	16	1812	189	10.1	0.7	0								0							
1993	1	50	540		1520		9.7		1	50	656		2650		9.4		0							
1992	0								1	100	718		4000		10.8		0							
1991	8	73	542	49	1608	434	9.9	1.2	3	27	741	24	4533	797	11.1	1.4	0							
Central North Pacific - Subarctic Current (44°N-47°N, 180)																								
2001	0								1	100	756		4250		9.8		0							
2000	0								7	78	670	18	3929	305	11.5	0.8	2	22	749	2	4425	672	10.5	1.5
1999	3	25	615	108	2177	844	9.3	1.3	7	58	684	75	3124	992	9.5	0.6	2	17	747	57	4155	771	10.0	0.4
1998	10	50	556	52	1726	543	9.7	0.8	8	40	645	28	2488	330	9.3	1.0	2	10	692	28	3350	71	10.1	1.0
1997	1	16	536		1750		11.4		4	67	685	47	3005	308	9.4	1.1	1	17	800		4850		9.5	
1996	4	100	555	12	1608	116	9.4	0.5	0								0							
1995	16	73	574	41	1791	317	9.4	0.6	5	23	672	51	3050	752	9.9	0.9	1	4	700		3000		8.7	
1994	21	84	551	44	1850	231	11.4	3.1	4	16	692	61	3538	1090	10.5	1.1	0							
1993	4	40	563	24	1695	93	9.6	1.2	6	60	688	70	2975	424	9.4	2.5	0							
1992	0								3	100	663	49	2867	569	9.8	0.5	0							
1991	2	75	522	60	1315	403	9.1	0.3	1	25	712		3800		10.5		0							
Central North Pacific - Ridge Domain (47°N, 180)																								
1992	1	50	548		1530		9.3		1	50	658		2350		8.2		0							
Central North Pacific - All areas (41°N-47°N, 180)																								
2001	5	50	586	17	1928	101	9.6	0.8	5	50	709	46	3460	934	9.5	1.0	0							
2000	2	15	557	1	1645	7	9.5	0.0	9	64	698	44	3822	755	11.1	1.1	3	21	750	3	4300	522	10.2	1.2
1999	8	42	571	76	1749	640	9.2	0.9	9	47	689	71	3158	945	9.4	0.6	2	11	747	57	4155	771	10.0	0.4
1998	15	56	550	51	1712	455	10.2	1.8	10	37	657	44	2675	626	9.3	0.9	2	7	692	28	3350	71	10.1	1.0
1997	8	47	547	59	1721	597	10.1	1.1	8	47	691	33	3164	349	9.6	0.8	1	6	800		4850		9.5	
1996	6	100	555	11	1662	155	9.7	0.7	0								0							
1995	16	70	574	41	1791	317	9.4	0.6	6	26	674	46	3042	673	9.8	0.9	1	4	700		3000		8.7	
1994	30	88	555	38	1839	216	11.0	2.7	4	12	692	61	3538	1090	10.5	1.1	0							
1993	5	42	558	23	1660	112	9.6	1.1	7	58	683	65	2929	406	9.4	2.3	0							
1992	1	17	548		1530		9.3		5	83	673	43	2990	728	9.7	1.0	0							
1991	10	71	538	49	1549	424	9.7	1.1	4	29	734	24	4350	747	10.9	1.1	0							

Table 26. Percent ocean and freshwater age composition and maturity at age of steelhead trout caught in the central North Pacific by the *Wakatake maru* in research gillnets, 1991-2001. Percent values indicate the percentage of fish in each age and maturity class, grouped by year. Imm=immature, Mat=Mature, Tot=Total.

Steelhead, Central North Pacific- All Areas Combined

Year	N	Ocean Age 1																	
		FW Age 1			FW Age 2			FW Age 3			FW 4			FW X			All FW Ages		
		Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot
01	5	10	0	10	10	0	10	20	0	20	0	0	0	0	10	10	40	10	50
00	2	0	7	7	0	0	0	0	7	7	0	0	0	0	0	0	0	14	14
99	7	0	22	22	0	6	6	0	6	6	0	0	0	0	6	6	0	39	39
98	15	7	11	18	0	4	4	4	15	19	0	15	15	0	0	0	11	44	56
97	8	0	6	6	6	0	6	0	0	0	0	0	0	12	24	35	18	29	47
96	6	17	17	33	17	0	17	0	0	0	0	0	0	50	0	50	83	17	100
95	16	0	13	13	0	22	22	4	0	4	0	0	0	4	26	30	9	61	70
94	30	27	3	29	6	0	6	0	0	0	0	0	0	32	21	53	65	24	88
93	5	8	0	8	8	0	8	8	0	8	0	0	0	17	0	17	42	0	42
92	1	0	0	0	17	0	17	0	0	0	0	0	0	0	0	0	17	0	17
91	10	0	0	0	14	0	14	0	0	0	0	0	0	36	21	57	50	21	71

		Ocean Age 2																	
		FW Age 1			FW Age 2			FW Age 3			FW 4			FW X			All FW Ages		
		Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot
01	5	20	30	50	0	0	0	0	0	0	0	0	0	0	0	0	20	30	50
00	9	0	29	29	0	0	0	0	36	36	0	0	0	0	0	0	0	64	64
99	9	0	6	6	0	0	0	0	17	17	0	0	0	0	28	28	0	50	50
98	10	0	11	11	0	4	4	0	11	11	0	11	11	0	0	0	0	37	37
97	8	0	12	12	0	6	6	0	0	0	0	0	0	12	18	29	12	35	47
96	0																		
95	6	0	9	9	0	4	4	0	0	0	0	0	0	0	13	13	0	26	26
94	4	0	6	6	0	0	0	0	0	0	0	0	0	3	3	6	3	9	12
93	7	8	8	17	8	8	17	0	0	0	0	0	0	8	17	25	25	33	58
92	5	0	17	17	17	33	50	0	0	0	0	0	0	0	17	17	17	67	83
91	4	0	0	0	0	14	14	0	0	0	0	0	0	7	7	14	7	21	29

		Ocean Age 3																	
		FW Age 1			FW Age 2			FW Age 3			FW 4			FW X			All FW Ages		
		Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot	Imm	Mat	Tot
01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00	3	0	7	7	0	0	0	0	14	14	0	0	0	0	0	0	0	21	21
99	2	0	0	0	0	6	6	0	0	0	0	0	0	0	6	6	0	11	11
98	2	0	4	4	0	0	0	0	0	0	0	4	4	0	0	0	0	7	7
97	1	0	0	0	0	0	0	0	0	0	0	0	0	0	6	6	0	6	6
96	0																		
95	1	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	4	0	4
94	0																		
93	0																		
92	0																		
91	0																		

Table T14. Mean % composition of stomach contents of salmonids caught in the Subarctic Current along the 145° W transect line by the *Oshoro maru*, 1994-2000. PW=prey weight; % empty=percent of stomachs that did not contain stomach contents. Empty stomachs were not included in other table entries. SCI=PW*100/body weight. Prey composition is based on visual estimates.

						Mean % composition by volume											
Species	Year	N	% empty	mean pw	mean SCI	EU	CO	AM	CR	SQ	PT	FI	PO	CH	GE	OTH	UNID
Sockeye	2001																
	2000	57	23	11	0.50	3	4	38	0	50	2	3	0	0	0	0	0
	1999	59	19	19	0.77	2	23	13	0	53	1	0	2	0	3	0	3
	1998	127	13	37	1.45	1	0	0	0	92	5	0	0	0	0	1	0
	1997	51	14	38	1.83	0	0	0	0	93	3	4	0	0	0	0	0
	1996	39	18	30	1.20	0	0	0	0	100	0	0	0	0	0	0	0
	1995	11	27	30	1.35	0	0	0	0	88	0	0	0	0	0	0	13
	1994	12	25	20	1.19	0	0	0	0	100	0	0	0	0	0	0	0
Chum	2001																
	2000	42	12	7	0.79	2	9	38	0	6	0	31	0	0	10	0	4
	1999	43	7	3	0.36	1	5	48	0	0	9	0	0	0	4	1	32
	1998	105	31	4	0.30	2	1	11	0	1	27	1	4	0	6	0	47
	1997	37	16	7	0.73	6	0	1	0	0	1	0	7	0	28	0	56
	1996	25	44	6	0.43	2	0	2	0	7	2	0	0	0	37	1	49
	1995	10	0	12	0.74	0	0	0	0	0	0	0	0	0	29	0	72
	1994	16	50	2	0.17	0	0	0	0	0	13	0	1	0	1	0	84
Pink	2001																
	2000	43	14	13	1.03	1	12	54	0	8	3	22	0	0	0	0	0
	1999	60	17	4	0.36	0	31	39	0	2	10	0	0	0	0	2	15
	1998	116	16	23	1.52	0	0	1	0	80	16	2	0	0	0	0	0
	1997	1	0	11	0.71	0	0	0	0	60	20	20	0	0	0	0	0
	1996	51	6	18	1.09	0	0	0	0	71	23	6	0	0	0	0	0
	1995	10	20	5	0.30	1	0	18	0	49	3	0	0	0	0	21	9
	1994	14	21	8	0.45	0	0	0	0	66	25	0	0	0	0	0	9
Coho	2001																
	2000	14	57	30	0.91	17	15	18	0	50	0	0	0	0	0	0	0
	1999	60	15	36	1.51	1	1	2	0	93	0	0	0	0	0	0	4
	1998	57	12	41	1.28	0	0	0	0	93	2	3	0	0	0	2	0
	1997	11	27	59	2.10	0	0	0	0	100	0	0	0	0	0	0	0
	1996	22	45	36	1.18	0	0	0	0	100	0	0	0	0	0	0	0
	1995	19	42	43	1.87	0	0	0	0	100	0	0	0	0	0	0	0
	1994	1	100														
Chinook	2001																
	2000	0															
	1999	0															
	1998	8	25	65	1.45	0	0	0	0	99	0	0	0	0	0	0	1
	1997	0															
	1996	1	100														
	1995	2	100														
	1994	0															
Steelhead	2001																
	2000	25	4	18	1.46	0	2	15	0	50	19	6	1	0	1	4	1
	1999	21	24	7	0.31	0	0	13	0	24	0	32	6	0	0	25	0
	1998	48	4	22	1.23	2	0	2	0	61	14	17	3	0	0	0	2

Table 27. Mean % composition of stomach contents of salmonids caught in the Subarctic Current along the 145° W transect line by the *Oshoro maru*, 1994-2001. PW=prey weight; % empty=percent of stomachs that did not contain stomach contents. Empty stomachs were not included in other table entries. SCI=PW*100/body weight. Prey composition is based on visual estimates.

			%	mean	mean	Mean % composition by volume											
Species	Year	N	empty	pw	SCI	EU	CO	AM	CR	SQ	PT	FI	PO	CH	GE	OTH	UNID
Sockeye	2001	40	22	30	1.37	0	0	15	0	68	10	0	0	0	3	1	3
	2000	57	23	11	0.50	3	4	38	0	50	2	3	0	0	0	0	0
	1999	59	19	19	0.77	2	23	13	0	53	1	0	2	0	3	0	3
	1998	127	13	37	1.45	1	0	0	0	92	5	0	0	0	0	1	0
	1997	51	14	38	1.83	0	0	0	0	93	3	4	0	0	0	0	0
	1996	39	18	30	1.20	0	0	0	0	100	0	0	0	0	0	0	0
	1995	11	27	30	1.35	0	0	0	0	88	0	0	0	0	0	0	13
	1994	12	25	20	1.19	0	0	0	0	100	0	0	0	0	0	0	0
Chum	2001	22	36	2	0.16	0	0	1	0	5	45	7	4	0	7	16	15
	2000	42	12	7	0.79	2	9	38	0	6	0	31	0	0	10	0	4
	1999	43	7	3	0.36	1	5	48	0	0	9	0	0	0	4	1	32
	1998	105	31	4	0.30	2	1	11	0	1	27	1	4	0	6	0	47
	1997	37	16	7	0.73	6	0	1	0	0	1	0	7	0	28	0	56
	1996	25	44	6	0.43	2	0	2	0	7	2	0	0	0	37	1	49
	1995	10	0	12	0.74	0	0	0	0	0	0	0	0	0	29	0	72
	1994	16	50	2	0.17	0	0	0	0	0	13	0	1	0	1	0	84
Pink	2001	42	21	13	0.93	0	11	5	0	46	37	0	0	0	0	1	0
	2000	43	14	13	1.03	1	12	54	0	8	3	22	0	0	0	0	0
	1999	60	17	4	0.36	0	31	39	0	2	10	0	0	0	0	2	15
	1998	116	16	23	1.52	0	0	1	0	80	16	2	0	0	0	0	0
	1997	1	0	11	0.71	0	0	0	0	60	20	20	0	0	0	0	0
	1996	51	6	18	1.09	0	0	0	0	71	23	6	0	0	0	0	0
	1995	10	20	5	0.30	1	0	18	0	49	3	0	0	0	0	21	9
	1994	14	21	8	0.45	0	0	0	0	66	25	0	0	0	0	0	9
Coho	2001	26	35	39	1.66	0	0	0	0	94	0	6	0	0	0	0	0
	2000	14	57	30	0.91	17	15	18	0	50	0	0	0	0	0	0	0
	1999	60	15	36	1.51	1	1	2	0	93	0	0	0	0	0	0	4
	1998	57	12	41	1.28	0	0	0	0	93	2	3	0	0	0	2	0
	1997	11	27	59	2.10	0	0	0	0	100	0	0	0	0	0	0	0
	1996	22	45	36	1.18	0	0	0	0	100	0	0	0	0	0	0	0
	1995	19	42	43	1.87	0	0	0	0	100	0	0	0	0	0	0	0
	1994	1	100														
Chinook	2001	8	0	72	1.86	0	0	0	0	100	0	0	0	0	0	0	0
	2000	0															
	1999	0															
	1998	8	25	65	1.45	0	0	0	0	99	0	0	0	0	0	0	1
	1997	0															
	1996	1	100														
	1995	2	100														
	1994	0															
Steelhead	2001	32	28	23	1.09	0	0	0	0	78	9	13	0	0	0	0	0
	2000	25	4	18	1.46	0	2	15	0	50	19	6	1	0	1	4	1
	1999	21	24	7	0.31	0	0	13	0	24	0	32	6	0	0	25	0
	1998	48	4	22	1.23	2	0	2	0	61	14	17	3	0	0	0	2
	1997	8	25	24	0.92	0	0	0	0	83	0	0	17	0	0	0	0
	1996	5	0	13	0.50	0	0	1	0	51	26	22	0	0	0	0	0
	1995	19	11	15	1.02	0	0	18	0	61	0	9	9	0	0	3	0
	1994	1	0	1	0.07	0	2	15	0	50	18	6	1	0	1	4	1

Prey categories are: EU=euphausiids, AM=amphipods, CR=crab larvae, SQ=squids, PT=pteropods (shelled and naked), FI=fish, PO=polychaetes, CH=chaetognaths, GE=gelatinous zooplankton, including coelenterates, ctenophores, and salps. OTH=other groups, UNID=unidentified material.

Table T13. Mean % composition of stomach contents of salmonids caught in the Ridge/Dilute Domains along the 145° W transect line by the *Oshoro maru,* 1994-2001. PW=prey weight; % empty=percent of stomachs that did not contain stomach contents. Empty stomachs were not included in other table entries. SCI=PW*100/body weight. Prey composition is based on visual estimates.

			%	mean	mean	Mean % composition by volume											
Species	Year	N	empty	pw	SCI	EU	CO	AM	CR	SQ	PT	FI	PO	CH	GE	OTH	UNID
Sockeye	2001	86	21	8	0.52												
	2000	86	14	13	0.91	15	7	33	0	34	6	5	0	0	0	0	0
	1999	146	14	4	0.30	18	23	19	0	10	13	4	4	0	1	3	6
	1998	64	25	20	0.74	7	6	11	0	32	27	3	2	0	2	5	5
	1997	145	14	12	0.55	25	49	5	0	9	2	5	2	0	0	2	0
	1996	96	25	26	0.96	6	14	9	0	62	2	5	0	0	0	0	2
	1995	67	52	25	0.97	6	3	3	0	48	17	7	0	0	0	2	16
	1994	90	18	21	0.97	9	5	21	0	49	6	4	2	0	0	0	5
Chum	201	57	21	5	0.35												
	2000	66	2	5	0.35	8	7	38	1	2	0	8	3	0	9	1	23
	1999	138	6	4	0.32	13	4	24	0	0	4	1	1	0	12	2	38
	1998	60	38	6	0.36	4	4	18	1	0	33	0	0	0	10	0	29
	1997	122	27	6	0.58	22	5	3	0	0	14	1	7	0	26	0	22
	1996	105	42	5	0.30	25	3	9	0	1	4	2	2	0	27	0	27
	1995	70	51	8	0.55	9	0	3	0	0	5	3	8	0	2	0	69
	1994	97	19	4	0.35	3	0	32	0	1	21	0	1	0	3	0	39
Pink	2001	66	20	11	0.91												
	2000	73	15	6	0.52	2	7	57	1	25	3	5	0	0	0	0	0
	1999	144	6	7	0.66	24	47	17	0	2	3	1	0	0	0	0	6
	1998	61	13	10	0.71	1	15	17	0	22	38	2	0	0	0	0	3
	1997	118	13	11	0.83	27	53	6	0	2	9	1	0	0	0	0	1
	1996	76	29	14	1.04	7	13	13	2	45	5	4	0	0	0	11	1
	1995	68	54	9	0.63	12	10	11	0	20	28	6	1	0	0	0	13
	1994	94	27	11	0.69	1	10	18	2	36	20	3	0	0	0	0	10
Coho	2001	71	49	9	0.35												
	2000	65	31	76	2.50	14	0	6	0	79	1	0	0	0	0	0	0
	1999	138	37	5	0.22	23	5	24	0	33	5	0	0	0	0	1	8
	1998	70	37	37	1.16	8	0	7	0	77	8	0	0	0	0	0	0
	1997	88	56	17	0.63	13	4	2	0	59	7	14	0	0	0	0	0
	1996	92	27	43	1.50	0	0	0	0	99	0	1	0	0	0	0	0
	1995	65	54	17	0.68	15	0	2	0	65	0	18	0	0	0	0	0
	1994	89	34	41	1.47	3	0	7	0	73	9	7	0	0	0	0	1
Chinook	2001	5	0	22	0.65												
	2000	3	67	2	0.06	0	0	0	0	100	0	0	0	0	0	0	0
	1999	10	60	37	0.68	23	0	0	0	25	0	0	0	0	0	0	53
	1998	17	47	15	0.47	0	0	6	0	94	0	0	0	0	0	0	0
	1997	0															
	1996	7	29	42	1.57	0	0	0	0	80	0	0	0	0	0	0	20
	1995	5	40	32	0.76	0	0	0	0	100	0	0	0	0	0	0	0
	1994	9	11	48	1.18	0	0	0	0	81	0	0	0	0	0	0	19
Steelhead	2001	36	39	8	0.51												
	2000	63	22	21	1.18	1	0	9	0	45	32	4	8	0	0	1	0
	1999	57	14	8	0.73	3	2	2	0	31	3	34	6	0	1	11	6
	1998	17	6	47	2.24	0	0	1	0	46	5	46	0	0	0	1	0
	1997	26	8	29	1.60	0	0	3	0	10	8	58	0	0	0	21	0
	1996	42	38	19	1.30	0	0	1	0	44	0	29	4	0	0	18	4
	1995	40	35	13	0.68	0	0	0	0	47	8	32	12	0	0	0	0
	1994	17	18	3	0.55	0	0	9	0	43	9	33	0	0	0	0	6

Prey categories are: EU=euphausiids, AM=amphipods, CR=crab larvae, SQ=squids, PT=pteropods (shelled and naked), FI=fish, PO=polychaetes, CH=chaetognaths, GE=gelatinous zooplankton, including coelenterates, ctenophores, and salps. OTH=other groups, UNID=unidentified material.

Table 28. Mean % composition of stomach contents of salmonids caught in the Ridge/Dilute Domains along the 145° W transect line by the *Oshoro maru*, 1994-2001. PW=prey weight; % empty=percent of stomachs that did not contain stomach contents. Empty stomachs were not included in other table entries. SCI=PW*100/body weight. Prey composition is based on visual estimates.

			%	mean	mean	Mean % composition by volume											
Species	Year	N	empty	pw	SCI	EU	CO	AM	CR	SQ	PT	FI	PO	CH	GE	OTH	UNID
Sockeye	2001	86	21	8	0.52	5	17	11	0	29	31	1	1	0	3	1	1
	2000	86	14	13	0.91	15	7	33	0	34	6	5	0	0	0	0	0
	1999	146	14	4	0.30	18	23	19	0	10	13	4	4	0	1	3	6
	1998	64	25	20	0.74	7	6	11	0	32	27	3	2	0	2	5	5
	1997	145	14	12	0.55	25	49	5	0	9	2	5	2	0	0	2	0
	1996	96	25	26	0.96	6	14	9	0	62	2	5	0	0	0	0	2
	1995	67	52	25	0.97	6	3	3	0	48	17	7	0	0	0	2	16
	1994	90	18	21	0.97	9	5	21	0	49	6	4	2	0	0	0	5
Chum	2001	57	21	5	0.35	2	1	8	0	1	46	0	3	0	3	10	26
	2000	66	2	5	0.35	8	7	38	1	2	0	8	3	0	9	1	23
	1999	138	6	4	0.32	13	4	24	0	0	4	1	1	0	12	2	38
	1998	60	38	6	0.36	4	4	18	1	0	33	0	0	0	10	0	29
	1997	122	27	6	0.58	22	5	3	0	0	14	1	7	0	26	0	22
	1996	105	42	5	0.30	25	3	9	0	1	4	2	2	0	27	0	27
	1995	70	51	8	0.55	9	0	3	0	0	5	3	8	0	2	0	69
	1994	97	19	4	0.35	3	0	32	0	1	21	0	1	0	3	0	39
Pink	2001	66	20	11	0.91	4	39	13	0	17	24	1	0	0	0	2	0
	2000	73	15	6	0.52	2	7	57	1	25	3	5	0	0	0	0	0
	1999	144	6	7	0.66	24	47	17	0	2	3	1	0	0	0	0	6
	1998	61	13	10	0.71	1	15	17	0	22	38	2	0	0	0	0	3
	1997	118	13	11	0.83	27	53	6	0	2	9	1	0	0	0	0	1
	1996	76	29	14	1.04	7	13	13	2	45	5	4	0	0	0	11	1
	1995	68	54	9	0.63	12	10	11	0	20	28	6	1	0	0	0	13
	1994	94	27	11	0.69	1	10	18	2	36	20	3	0	0	0	0	10
Coho	2001	71	49	9	0.35	10	2	23	0	65	0	0	0	0	0	0	0
	2000	65	31	76	2.50	14	0	6	0	79	1	0	0	0	0	0	0
	1999	138	37	5	0.22	23	5	24	0	33	5	0	0	0	0	1	8
	1998	70	37	37	1.16	8	0	7	0	77	8	0	0	0	0	0	0
	1997	88	56	17	0.63	13	4	2	0	59	7	14	0	0	0	0	0
	1996	92	27	43	1.50	0	0	0	0	99	0	1	0	0	0	0	0
	1995	65	54	17	0.68	15	0	2	0	65	0	18	0	0	0	0	0
	1994	89	34	41	1.47	3	0	7	0	73	9	7	0	0	0	0	1
Chinook	2001	5	0	22	0.65	7	1	0	0	72	0	0	0	0	0	20	0
	2000	3	67	2	0.06	0	0	0	0	100	0	0	0	0	0	0	0
	1999	10	60	37	0.68	23	0	0	0	25	0	0	0	0	0	0	53
	1998	17	47	15	0.47	0	0	6	0	94	0	0	0	0	0	0	0
	1997	0															
	1996	7	29	42	1.57	0	0	0	0	80	0	0	0	0	0	0	20
	1995	5	40	32	0.76	0	0	0	0	100	0	0	0	0	0	0	0
	1994	9	11	48	1.18	0	0	0	0	81	0	0	0	0	0	0	19
Steelhead	2001	36	39	8	0.51	0	5	15	0	7	7	40	6	0	0	19	1
	2000	63	22	21	1.18	1	0	9	0	45	32	4	8	0	0	1	0
	1999	57	14	8	0.73	3	2	2	0	31	3	34	6	0	1	11	6
	1998	17	6	47	2.24	0	0	1	0	46	5	46	0	0	0	1	0
	1997	26	8	29	1.60	0	0	3	0	10	8	58	0	0	0	21	0
	1996	42	38	19	1.30	0	0	1	0	44	0	29	4	0	0	18	4
	1995	40	35	13	0.68	0	0	0	0	47	8	32	12	0	0	0	0
	1994	17	18	3	0.55	0	0	9	0	43	9	33	0	0	0	0	6

Prey categories are: EU=euphausiids, AM=amphipods, CR=crab larvae, SQ=squids, PT=pteropods (shelled and naked), FI=fish, PO=polychaetes, CH=chaetognaths, GE=gelatinous zooplankton, including coelenterates, ctenophores, and salps. OTH=other groups, UNID=unidentified material.

Table 29. Mean % composition of stomach contents of salmonids caught along the 165° W transect line by the *Oshoro maru*, 1998-2001. PW=prey weight; % empty=percent of stomachs that did not contain stomach contents. Empty stomachs were not included in other table entries. SCI=PW*100/body weight. Prey composition is based on visual estimates.

				%	mean	mean	Mean % composition by volume											
Domain	Species	Year	N	empty	pw	SCI	EU	CO	AM	CR	SQ	PT	FI	PO	CH	GE	OTH	UNID
Ridge	**Sockeye**	2001	28	4	14	0.76	24	39	25	0	9	1	2	0	0	0	0	0
Domain		2000	31	19	27	1.31	2	0	31	1	61	0	1	4	0	0	0	0
		1999	29	7	7	0.60	0	19	63	0	10	5	1	0	0	0	0	2
		1998	26	31	4	0.38	2	7	36	0	10	24	5	0	0	0	0	17
	Chum	2001	25	32	5	0.40	22	10	17	0	2	2	0	2	9	0	0	36
		2000	5	0	7	0.71	0	1	7	0	1	0	2	0	0	2	0	87
		1999	55	2	5	0.67	0	4	16	0	2	4	0	0	2	23	0	49
		1998	18	22	6	0.35	0	3	14	0	13	40	0	0	0	6	0	23
	Pink	2001	28	0	15	1.22	15	67	10	0	1	1	2	0	3	0	0	1
		1999	38	5	14	1.62	20	54	9	0	4	6	0	0	4	0	0	4
		1998	11	0	17	1.42	0	39	18	0	1	19	4	0	0	0	0	20
	Coho	2001	8	50	11	0.41	56	3	1	0	31	0	9	0	0	0	0	0
		1999	4	0	13	0.54	0	0	1	0	96	0	0	0	0	0	3	0
	Chinook	1999	15	0	92	2.92	0	0	0	0	99	0	0	0	0	0	0	0
	Steelhead	2001	10	30	6	0.32	0	0	9	0	49	0	42	0	0	0	0	0
		1999	14	0	11	0.59	0	0	3	0	11	0	81	4	0	0	0	0
Subarctic	**Sockeye**	1999	3	0	52	2.20	0	0	0	0	99	0	0	0	0	1	0	0
Current		1998	45	16	8	0.56	3	5	54	0	29	2	0	1	0	1	0	5
	Chum	2000	12	8	1	0.26	1	7	17	0	0	0	0	0	0	3	0	72
		1999	40	23	3	0.36	0	6	8	0	0	8	0	0	1	2	0	74
		1998	58	10	5	0.48	3	3	7	0	2	2	0	0	0	0	0	83
	Pink	1999	20	35	3	0.19	0	12	43	0	10	1	15	0	4	0	10	5
		1998	47	15	7	0.58	0	3	44	0	33	17	4	0	0	0	0	0
	Coho	2000	21	10	18	0.95	0	0	18	0	61	16	1	0	0	0	4	0
		1999	24	29	11	0.58	0	0	0	0	80	0	18	0	0	0	0	2
		1998	28	25	44	1.69	0	0	0	0	94	6	0	0	0	0	0	0
	Chinook	1998	6	17	37	1.12	0	0	0	0	100	0	0	0	0	0	0	0
	Steelhead	1999	22	0	15	0.82	0	0	0	0	39	1	32	22	0	0	2	4
		1998	9	33	16	0.83	0	0	1	0	33	0	50	17	0	0	0	0

Prey categories are: EU=euphausiids, AM=amphipods, CR=crab larvae, SQ=squids, PT=pteropods (shelled and naked), FI=fish, PO=polychaetes, CH=chaetognaths, GE=gelatinous zooplankton, including coelenterates, ctenophores, and salps. OTH=other groups, UNID=unidentified material.

Table T15. Mean % composition of stomach contents of salmonids caught along the 165° W transect line by the *Oshoro maru*, 1998-2001. PW=prey weight; % empty=percent of stomachs that did not contain stomach contents. Empty stomachs were not included in other table entries. SCI=PW*100/body weight. Prey composition is based on visual estimates.

				%	mean	mean	Mean % composition by volume											
Domain	Species	Year	N	empty	pw	SCI	EU	CO	AM	CR	SQ	PT	FI	PO	CH	GE	OTH	UNID
Ridge	**Sockeye**	2001	28	4	14	0.76	24	39	25	0	9	1	2	0	0	0	0	0
Domain		2000	31	19	27	1.31	2	0	31	1	61	0	1	4	0	0	0	0
		1999	29	7	7	0.60	0	19	63	0	10	5	1	0	0	0	0	2
		1998	26	31	4	0.38	2	7	36	0	10	24	5	0	0	0	0	17
	Chum	2001	25	32	5	0.40	22	10	17	0	2	2	0	2	9	0	0	36
		2000	5	0	7	0.71	0	1	7	0	1	0	2	0	0	2	0	87
		1999	55	2	5	0.67	0	4	16	0	2	4	0	0	2	23	0	49
		1998	18	22	6	0.35	0	3	14	0	13	40	0	0	0	6	0	23
	Pink	2001	28	0	15	1.22	15	67	10	0	1	1	2	0	3	0	0	1
		1999	38	5	14	1.62	20	54	9	0	4	6	0	0	4	0	0	4
		1998	11	0	17	1.42	0	39	18	0	1	19	4	0	0	0	0	20
	Coho	2001	8	50	11	0.41	56	3	1	0	31	0	9	0	0	0	0	0
		1999	4	0	13	0.54	0	0	1	0	96	0	0	0	0	0	3	0
	Chinook	1999	15	0	92	2.92	0	0	0	0	99	0	0	0	0	0	0	0
	Steelhead	2001	10	30	6	0.32	0	0	9	0	49	0	42	0	0	0	0	0
		1999	14	0	11	0.59	0	0	3	0	11	0	81	4	0	0	0	0
Subarctic	**Sockeye**	1999	3	0	52	2.20	0	0	0	0	99	0	0	0	0	1	0	0
Current		1998	45	16	8	0.56	3	5	54	0	29	2	0	1	0	1	0	5
	Chum	2000	12	8	1	0.26	1	7	17	0	0	0	0	0	0	3	0	72
		1999	40	23	3	0.36	0	6	8	0	0	8	0	0	1	2	0	74
		1998	58	10	5	0.48	3	3	7	0	2	2	0	0	0	0	0	83
	Pink	1999	20	35	3	0.19	0	12	43	0	10	1	15	0	4	0	10	5
		1998	47	15	7	0.58	0	3	44	0	33	17	4	0	0	0	0	0
	Coho	2000	21	10	18	0.95	0	0	18	0	61	16	1	0	0	0	4	0
		1999	24	29	11	0.58	0	0	0	0	80	0	18	0	0	0	0	2
		1998	28	25	44	1.69	0	0	0	0	94	6	0	0	0	0	0	0
	Chinook	1998	6	17	37	1.12	0	0	0	0	100	0	0	0	0	0	0	0
	Steelhead	1999	22	0	15	0.82	0	0	0	0	39	1	32	22	0	0	2	4
		1998	9	33	16	0.83	0	0	1	0	33	0	50	17	0	0	0	0

Prey categories are: EU=euphausiids, AM=amphipods, CR=crab larvae, SQ=squids, PT=pteropods (shelled and naked), FI=fish, PO=polychaetes, CH=chaetognaths, GE=gelatinous zooplankton, including coelenterates, ctenophores, and salps. OTH=other groups, UNID=unidentified material.

Table 30. Mean percent composition of stomach contents of salmonids caught in the Transition Zone along the 180° longitude transect line by the *Wakatake maru,* 1991-2001. PW=prey weight, % empty=percent of stomachs that did not contain stomach contents. Empty stomachs were not included in other table entries. SCI=PW*100/body weight. Prey composition is based on visual estimates.

Transition Zone

						Mean % composition by volume											
Species	Year	N	% empty	Mean PW	Mean SCI	EU	CO	AM	CR	SQ	PT	FI	PO	CH	GE	OTH	UNID
Sockeye	2001	0															
	2000	0															
	1999	0															
	1998	0															
	1997	0															
	1996	0															
	1995	0															
	1994	0															
	1993	0															
	1992	0															
	1991	0															
Chum	2001	0															
	2000	0															
	1999	0															
	1998	0															
	1997	3	0	4.3	0.37	0	0	0	0	0	0	20	0	0	2	78	0
	1996	0															
	1995	1	0	8	0.45	0	5	0	0	0	0	0	0	0	95	0	0
	1994	0															
	1993	14	14	5	0.62	0	4	0	0	1	0	11	0	2	65	0	17
	1992	0															
	1991	0															
Pink	2001	0															
	2000	0															
	1999	0															
	1998	0															
	1997	1	0	1	0.12	0	0	0	0	30	40	0	0	0	0	30	0
	1996	0															
	1995	0															
	1994	0															
	1993	0															
	1992	0															
	1991	0															
Coho	2001	0															
	2000	0															
	1999	0															
	1998	0															
	1997	4	25	71	2.03	0	0	0	0	0	0	100	0	0	0	0	0
	1996	0															
	1995	0															
	1994	0															
	1993	1	100														
	1992	0															
	1991	1	100														
Chinook	2001	0															
	2000	0															
	1999	0															
	1998	0															
	1997	0															
	1996	0															
	1995	0															
	1994	0															
	1993	0															
	1992	0															
	1991	0															
Steelhead	2001	0															
	2000	0															
	1999	0															
	1998	0															
	1997	0															
	1996	0															
	1995	0															
	1994	0															
	1993	0															
	1992	0															
	1991	0															

Prey categories are EU=euphausiids, CO=copepods, AM=amphipods, CR=crab larvae, SQ=squids, PT=pteropods, FI=fish, PO=polychaetes, CH=chaetognaths, GE=gelatinous zooplankton (coelenterates, ctenophores, and salps), OTH=other groups, and UNID=unidentified material.

Table 31. Mean percent composition of stomach contents of salmonids caught in the Transition Domain along the 180° longitude transect line by the *Wakatake maru,* 1991-2001. PW=prey weight, % empty=percent of stomachs that did not contain stomach contents. Empty stomachs were not included in other table entries. SCI=PW*100/body weight. Prey composition is based on visual estimates.

Transition Domain

			%	Mean	Mean	Mean % composition by volume											
Species	Year	N	empty	PW	SCI	EU	CO	AM	CR	SQ	PT	FI	PO	CH	GE	OTH	UNID
Sockeye	2001	0															
	2000	5	40	33	1.73	0	0	0	0	100	0	0	0	0	0	0	0
	1999	0															
	1998	0															
	1997	0															
	1996	0															
	1995	0															
	1994	0															
	1993	0															
	1992	0															
	1991	0															
Chum	2001	30	3	8	0.71	3	1	6	0	1	9	0	12	0	62	6	0
	2000	25	8	8	0.75	0	1	1	0	2	8	0	13	0	53	19	3
	1999	7	14	3	0.47	0	7	26	0	0	8	2	0	29	22	0	6
	1998	24	8	3	0.56	1	5	2	0	0	9	5	1	13	44	13	7
	1997	32	6	5	0.56	10	8	5	0	1	1	5	2	35	25	7	1
	1996	10	0	14	1.22	4	4	2	0	0	0	4	4	21	17	34	10
	1995	7	0	9	0.85	0	3	1	0	0	0	32	0	9	51	4	0
	1994	18	0	9	1.05	1	1	2	0	1	2	1	0	38	39	11	4
	1993	23	4	10	1.13	0	5	6	0	0	8	7	1	30	25	11	7
	1992	10	0	9	1.04	39	5	10	0	0	0	3	2	0	3	0	38
	1991	14	0	16	1.92	5	0	18	0	0	0	0	0	0	2	0	75
Pink	2001	0															
	2000	10	10	22	1.76	11	0	2	0	69	0	3	0	1	0	14	0
	1999	0															
	1998	4	0	8	0.87	0	1	25	0	14	2	11	0	0	0	47	0
	1997	6	17	11	1.19	6	9	3	0	4	10	7	0	57	0	4	0
	1996	0															
	1995	3	0	17	1.83	0	3	6	0	2	0	17	0	43	0	29	0
	1994	23	4	6	0.63	1	50	11	0	4	15	2	0	10	0	6	1
	1993	0															
	1992	0															
	1991	1	0	7	0.96	10	0	90	0	0	0	0	0	0	0	0	0
Coho	2001	38	16	45	1.91	0	0	5	0	90	0	5	0	0	0	0	0
	2000	35	23	36	2.00	0	0	1	0	80	1	19	0	0	0	0	0
	1999	14	86	<1	0.02	0	0	5	0	45	0	0	0	0	0	45	0
	1998	39	41	21	1.17	0	0	3	0	91	5	1	0	0	0	0	0
	1997	78	35	20	1.08	6	2	7	0	48	9	28	0	0	0	0	0
	1996	13	15	41	2.04	18	0	1	0	74	3	4	0	0	0	0	0
	1995	15	7	25	1.38	0	0	11	0	54	9	26	0	0	0	0	0
	1994	16	19	13	0.84	0	0	17	0	34	27	22	0	0	0	0	0
	1993	13	15	7	0.44	1	0	3	0	15	79	0	0	0	2	0	0
	1992	8	0	25	1.44	12	1	4	0	76	1	1	0	0	5	0	0
	1991	57	9	26	1.37	4	0	23	0	59	11	2	0	0	1	0	0
Chinook	2001	4	0	42	1.07	0	0	0	0	100	0	0	0	0	0	0	0
	2000	2	0	76	2.07	0	0	0	0	100	0	0	0	0	0	0	0
	1999	0															
	1998	0															
	1997	0															
	1996	0															
	1995	0															
	1994	0															
	1993	0															
	1992	0															
	1991	0															
Steelhead	2001	23	17	18	0.81	0	0	2	0	26	0	51	17	0	0	1	3
	2000	14	7	31	1.03	0	0	0	0	39	0	30	28	0	0	2	0
	1999	1	0	5	0.26	0	0	0	0	0	0	95	0	0	0	5	0
	1998	6	50	5	0.30	0	0	3	0	16	5	46	0	0	0	30	0
	1997	26	27	7	0.35	3	1	16	0	9	3	9	31	0	0	28	0
	1996	2	0	64	3.49	0	0	0	0	70	0	30	0	0	0	0	0
	1995	1	0	5	0.27	0	0	0	0	0	5	95	0	0	0	0	0
	1994	4	0	3	0.16	0	0	20	0	25	20	35	0	0	0	0	0
	1993	1	0	16	0.88	5	0	5	0	85	5	0	0	0	0	0	0
	1992	1	0	20	0.91	5	0	0	0	90	5	0	0	0	0	0	0
	1991	11	0	22	1.38	1	0	18	1	68	2	10	0	0	0	0	0

Prey categories are EU=euphausiids, CO=copepods, AM=amphipods, CR=crab larvae, SQ=squids, PT=pteropods, FI=fish, PO=polychaetes, CH=chaetognaths, GE=gelatinous zooplankton (coelenterates, ctenophores, and salps), OTH=other groups, and UNID=unidentified material.

Table 32. Mean percent composition of stomach contents of salmonids caught in the Subarctic Current along the 180° longitude transect line by the *Wakatake maru,* 1991-2001. PW=prey weight, % empty=percent of stomachs that did not contain stomach contents. Empty stomachs were not included in other table entries. SCI=PW*100/body weight. Prey composition is based on visual estimates.

Subarctic Current

						Mean % composition by volume											
Species	Year	N	% empty	Mean PW	Mean SCI	EU	CO	AM	CR	SQ	PT	FI	PO	CH	GE	OTH	UNID
Sockeye	2001	24	17	7	0.62	4	9	50	0	10	19	0	0	2	0	4	2
	2000	11	55	2	0.27	0	3	6	0	32	39	20	0	0	0	0	0
	1999	31	39	1	0.23	9	16	33	0	10	6	0	12	9	0	0	5
	1998	10	50	9	0.96	0	6	0	0	94	0	0	0	0	0	0	0
	1997	17	0	17	0.94	11	24	9	0	38	0	0	5	10	0	3	0
	1996	1	100														
	1995	0															
	1994	0															
	1993	0															
	1992	1	0	2	0.15	0	0	50	0	0	50	0	0	0	0	0	0
	1991	0															
Chum	2001	43	7	14	0.89	3	1	1	0	3	27	0	0	0	65	0	0
	2000	19	0	8	0.85	0	3	2	0	12	9	0	5	0	66	0	3
	1999	35	17	4	0.46	5	5	11	0	0	17	0	0	13	29	0	20
	1998	44	27	4	0.60	0	4	4	0	1	25	1	2	6	11	1	45
	1997	32	3	8	0.75	6	5	10	0	0	2	1	3	45	24	0	4
	1996	67	0	8	0.72	1	1	5	0	6	8	1	5	10	43	8	12
	1995	41	0	8	0.70	28	3	5	0	3	6	0	1	1	50	0	3
	1994	27	1	11	1.16	0	0	0	0	0	3	0	0	17	32	0	48
	1993	39	0	12	1.61	0	3	5	0	1	17	0	7	4	2	45	16
	1992	18	11	5	0.62	6	1	26	0	8	9	0	2	12	11	0	25
	1991	34	9	13	1.32	0	0	4	0	2	0	0	0	0	2	0	92
Pink	2001	30	3	17	1.61	15	28	18	0	23	12	0	0	4	0	0	0
	2000	3	0	57	3.90	0	0	0	0	86	0	7	0	0	0	7	0
	1999	31	16	6	0.71	0	61	9	0	7	8	1	0	13	0	1	0
	1998	2	0	32	2.52	0	1	4	0	70	0	0	0	0	0	25	0
	1997	38	3	11	1.07	5	78	8	0	1	2	0	0	6	0	0	0
	1996	7	14	6	0.36	0	10	28	0	21	19	1	0	0	8	11	2
	1995	5	40	5	0.50	0	21	12	0	30	1	33	0	3	0	0	0
	1994	18	0	16	1.41	0	11	15	0	26	17	4	0	15	0	2	10
	1993	1	0	1	0.09	0	0	30	0	0	70	0	0	0	0	0	0
	1992	0															
	1991	13	0	10	1.29	7	4	24	0	10	49	0	0	0	0	0	6
Coho	2001	7	0	98	4.55	0	0	0	0	100	0	0	0	0	0	0	0
	2000	8	0	68	3.15	0	0	0	0	100	0	0	0	0	0	0	0
	1999	4	0	54	2.68	0	0	0	0	100	0	0	0	0	0	0	0
	1998	47	0	57	2.61	0	0	0	0	95	0	5	0	0	0	0	0
	1997	47	15	33	2.33	1	1	4	0	86	0	8	0	0	0	0	0
	1996	69	26	20	1.12	0	0	14	0	75	6	0	0	0	4	1	0
	1995	41	2	51	3.00	0	0	0	0	99	0	1	0	0	0	0	0
	1994	25	8	53	2.87	0	0	4	0	95	0	1	0	0	0	0	0
	1993	21	0	32	1.74	0	0	5	0	90	0	5	0	0	0	0	0
	1992	11	0	7	0.50	0	1	74	0	17	2	4	0	1	1	0	0
	1991	25	0	53	2.69	0	0	0	0	100	0	0	0	0	0	0	0
Chinook	2001	5	60	23	0.49	0	0	0	0	100	0	0	0	0	0	0	0
	2000	2	50	1	0.05	0	0	0	0	100	0	0	0	0	0	0	0
	1999	3	33	24	0.83	0	0	0	0	50	0	50	0	0	0	0	0
	1998	5	0	41	1.54	0	0	0	0	100	0	0	0	0	0	0	0
	1997	24	29	28	1.12	12	0	0	0	83	0	5	0	0	0	0	0
	1996	2	0	19	0.26	0	0	0	0	100	0	0	0	0	0	0	0
	1995	1	100														
	1994	3	0	13	0.28	0	0	0	0	100	0	0	0	0	0	0	0
	1993	3	33	74	1.94	0	0	0	0	100	0	0	0	0	0	0	0
	1992	0															
	1991	2	0	23	0.49	0	0	2	0	63	0	0	0	0	0	0	35
Steelhead	2001	2	0	5	0.11	0	0	10	0	40	0	50	0	0	0	0	0
	2000	14	0	68	1.70	0	0	0	0	69	0	31	0	0	0	0	0
	1999	8	13	16	0.45	0	1	4	0	14	1	79	0	0	0	0	0
	1998	15	0	37	1.72	0	0	0	0	79	0	15	0	0	0	6	0
	1997	26	12	13	0.67	1	1	3	0	22	0	41	9	0	0	23	0
	1996	13	15	5	0.34	0	0	8	0	36	0	39	1	0	0	16	0
	1995	8	38	10	0.49	0	0	11	10	28	0	51	0	0	0	0	0
	1994	9	0	33	1.39	0	0	0	0	74	0	26	0	0	0	0	0
	1993	1	0	2	0.06	0	0	100	0	0	0	0	0	0	0	0	0
	1992	4	0	7	0.37	26	0	26	0	23	0	25	0	0	0	0	0
	1991	3	0	70	2.22	0	0	3	7	77	0	13	0	0	0	0	0

Prey categories are EU=euphausiids, CO=copepods, AM=amphipods, CR=crab larvae, SQ=squids, PT=pteropods, FI=fish, PO=polychaetes, CH=chaetognaths, GE=gelatinous zooplankton (coelenterates, ctenophores, and salps), OTH=other groups, and UNID=unidentified material.

Table 33. Mean percent composition of stomach contents of salmonids caught in the Ridge Domain along the 180° longitude transect line by the *Wakatake maru,* 1991-2001. PW=prey weight, % empty=percent of stomachs that did not contain stomach contents. Empty stomachs were not included in other table entries. SCI=PW*100/body weight. Prey composition is based on visual estimates.

Ridge Domain

			%	Mean	Mean	Mean % composition by volume											
Species	Year	N	empty	PW	SCI	EU	CO	AM	CR	SQ	PT	FI	PO	CH	GE	OTH	UNID
Sockeye	2001	24	17	7	0.62	4	9	50	0	10	19	0	0	2	0	4	2
	2000	0															
	1999	1	0	5	0.16	5	5	5	0	0	85	0	0	0	0	0	0
	1998	7	14	5	0.25	0	15	25	0	45	0	0	3	0	0	12	0
	1997	10	0	20	1.04	47	29	10	0	10	3	0	0	1	0	0	0
	1996	9	0	20	0.82	30	7	24	0	21	9	6	0	1	0	2	0
	1995	8	0	25	1.09	0	22	20	0	51	2	1	0	4	0	0	0
	1994	6	17	11	0.43	0	37	6	0	40	17	0	0	0	0	0	0
	1993	0															
	1992	0															
	1991	4	25	17	0.96	27	18	7	0	0	8	0	0	3	0	0	37
Chum	2001	43	7	14	0.89	3	1	1	0	3	27	0	0	0	65	0	0
	2000	4	0	14	1.17	1	3	2	0	0	18	1	1	0	72	0	2
	1999	1	0	8	0.84	0	5	0	0	5	0	0	0	0	90	0	0
	1998	13	15	2	0.42	1	3	35	0	1	21	0	0	26	8	2	3
	1997	30	3	11	1.16	36	1	5	0	1	22	1	10	17	7	0	0
	1996	27	15	13	1.01	15	7	23	0	4	41	0	0	5	5	0	0
	1995	29	0	11	0.95	48	3	11	0	5	2	1	0	11	16	0	3
	1994	41	0	7	0.78	7	2	4	0	2	20	1	0	3	28	0	33
	1993	38	3	11	1.19	2	0	2	0	3	28	0	1	2	0	61	1
	1992	9	11	5	0.66	0	4	47	0	0	0	5	0	23	0	0	21
	1991	39	3	8	1.33	9	8	3	0	1	5	0	0	9	1	0	64
Pink	2001	30	3	17	1.61	15	28	18	0	23	12	0	0	4	0	0	0
	2000	0															
	1999	4	0	13	1.46	5	61	1	0	1	4	20	0	3	0	5	0
	1998	6	0	20	1.71	10	43	23	0	19	1	2	0	0	0	2	0
	1997	16	0	27	2.68	37	34	5	0	6	10	8	0	0	0	0	0
	1996	1	0	13	1.21	20	35	35	0	5	5	0	0	0	0	0	0
	1995	22	5	17	1.71	1	32	19	0	27	8	8	0	5	0	0	0
	1994	15	0	35	2.72	20	10	5	0	52	12	0	0	0	0	1	0
	1993	3	0	17	1.92	22	2	13	0	21	40	0	0	0	0	2	0
	1992	2	0	4	0.39	3	5	67	0	0	0	25	0	0	0	0	0
	1991	40	0	17	2.19	43	30	2	0	8	14	1	0	2	0	0	0
Coho	2001	7	0	98	4.55	0	0	0	0	100	0	0	0	0	0	0	0
	2000	0															
	1999	0															
	1998	2	100														
	1997	5	0	36	2.48	47	0	1	0	49	0	1	0	0	0	2	0
	1996	0															
	1995	4	0	68	3.71	0	0	1	0	98	0	1	0	0	0	0	0
	1994	4	0	97	3.75	25	0	0	0	75	0	0	0	0	0	0	0
	1993	1	0	29	1.47	0	0	0	0	95	5	0	0	0	0	0	0
	1992	1	0	83	4.15	0	0	0	0	100	0	0	0	0	0	0	0
	1991	0															
Chinook	2001	5	60	23	0.49	0	0	0	0	100	0	0	0	0	0	0	0
	2000	0															
	1999	0															
	1998	3	67	29	0.85	0	0	0	0	100	0	0	0	0	0	0	0
	1997	2	50	1	0.02	100	0	0	0	0	0	0	0	0	0	0	0
	1996	0															
	1995	2	0	39	1.21	0	0	0	0	100	0	0	0	0	0	0	0
	1994	0															
	1993	0															
	1992	0															
	1991	0															
Steelhead	2001	2	0	5	0.11	0	0	10	0	40	0	50	0	0	0	0	0
	2000	0															
	1999	0															
	1998	0															
	1997	3	0	7	0.24	12	0	0	0	12	0	55	0	0	0	21	0
	1996	6	0	30	0.75	0	0	3	0	38	0	59	0	0	0	0	0
	1995	1	0	194	3.88	0	0	0	0	90	0	10	0	0	0	0	0
	1994	3	0	76	1.47	0	0	0	0	83	0	17	0	0	0	0	0
	1993	1	0	41	1.78	0	0	0	0	95	5	0	0	0	0	0	0
	1992	2	0	99	2.79	0	0	0	0	80	0	20	0	0	0	0	0
	1991	0															

Prey categories are EU=euphausiids, CO=copepods, AM=amphipods, CR=crab larvae, SQ=squids, PT=pteropods, FI=fish, PO=polychaetes, CH=chaetognaths, GE=gelatinous zooplankton (coelenterates, ctenophores, and salps), OTH=other groups, and UNID=unidentified material.

Table 34. Mean percent composition of stomach contents of salmonids caught in the Alaska Stream along the 180° longitude transect line by the *Wakatake maru,* 1991-2001. PW=prey weight, % empty=percent of stomachs that did not contain stomach contents. Empty stomachs were not included in other table entries. SCI=PW*100/body weight. Prey composition is based on visual estimates.

Alaska Stream

			%	Mean	Mean	Mean % composition by volume											
Species	Year	N	empty	PW	SCI	EU	CO	AM	CR	SQ	PT	FI	PO	CH	GE	OTH	UNID
Sockeye	2001	8	0	25	0.93	1	0	33	0	19	14	11	0	0	0	22	0
	2000	0															
	1999	2	50	<1	<0.005	25	0	25	0	25	25	0	0	0	0	0	0
	1998	1	0	64	3.05	0	0	2	0	0	1	95	2	0	0	0	0
	1997	3	0	8	0.50	26	0	2	0	0	4	3	20	0	15	30	0
	1996	4	25	14	0.56	12	0	35	0	40	12	1	0	0	0	0	0
	1995	21	0	25	0.99	26	6	14	1	8	21	4	4	2	13	1	0
	1994	27	4	25	1.01	14	2	26	0	45	7	1	0	0	1	4	0
	1993	2	0	11	0.39	0	0	65	0	0	0	0	35	0	0	0	0
	1992	2	0	13	0.90	10	0	25	0	65	0	0	0	0	0	0	0
	1991	18	33	5	0.34	17	2	28	0	6	42	0	0	0	0	1	4
Chum	2001	11	0	29	1.60	0	0	3	0	1	15	9	0	0	72	0	0
	2000	3	0	4	0.39	0	2	9	0	1	6	0	0	8	74	0	0
	1999	4	0	32	0.99	0	0	2	0	1	6	0	0	0	91	0	0
	1998	16	0	24	1.24	0	1	6	0	1	21	1	41	0	20	0	9
	1997	2	0	16	2.29	0	0	1	0	0	3	0	0	48	0	48	0
	1996	10	20	19	0.56	9	0	25	0	8	4	16	1	1	23	13	0
	1995	28	4	12	0.91	34	0	1	0	10	19	0	10	1	25	0	0
	1994	40	5	10	1.02	19	3	15	0	14	30	5	0	0	10	3	1
	1993	6	17	14	1.22	0	0	4	6	0	1	2	82	1	4	0	0
	1992	5	0	5	0.47	0	4	32	0	0	6	0	0	15	29	0	14
	1991	47	4	10	1.27	2	1	5	0	2	17	3	0	1	0	0	69
Pink	2001	2	0	6	0.52	0	2	2	0	38	8	50	0	0	0	0	0
	2000	0															
	1999	5	0	17	1.54	33	0	1	0	45	20	0	0	0	0	1	0
	1998	0															
	1997	10	0	4	0.44	5	0	10	1	5	2	7	0	0	4	66	0
	1996	0															
	1995	14	0	17	1.44	27	1	14	1	10	20	24	3	0	0	0	0
	1994	8	0	25	2.15	17	25	11	0	24	7	6	0	0	0	10	0
	1993	2	0	10	0.95	0	3	15	0	0	15	60	2	0	5	0	0
	1992	0															
	1991	47	9	10	1.07	13	2	18	0	8	51	6	0	0	0	2	0
Coho	2001	0															
	2000	0															
	1999	0															
	1998	0															
	1997	1	0	68	3.80	0	0	0	0	0	0	100	0	0	0	0	0
	1996	0															
	1995	1	0	47	2.47	85	0	0	0	10	0	5	0	0	0	0	0
	1994	0															
	1993	0															
	1992	0															
	1991	1	0	7	0.28	20	0	0	0	40	0	40	0	0	0	0	0
Chinook	2001	0															
	2000	0															
	1999	0															
	1998	1	0	115	1.60	0	0	0	0	100	0	0	0	0	0	0	0
	1997	0															
	1996	0															
	1995	1	0	43	0.95	0	0	0	0	100	0	0	0	0	0	0	0
	1994	0															
	1993	0															
	1992	0															
	1991	0															
Steelhead	2001	0															
	2000	0															
	1999	0															
	1998	0															
	1997	0															
	1996	0															
	1995	0															
	1994	2	0	28	0.72	0	0	0	0	50	0	50	0	0	0	0	0
	1993	1	100														
	1992	1	0	40	0.85	0	0	0	0	60	0	40	0	0	0	0	0
	1991	0															

Prey categories are EU=euphausiids, CO=copepods, AM=amphipods, CR=crab larvae, SQ=squids, PT=pteropods, FI=fish, PO=polychaetes, CH=chaetognaths, GE=gelatinous zooplankton (coelenterates, ctenophores, and salps), OTH=other groups, and UNID=unidentified material.

Table 35. Mean percent composition of stomach contents of salmonids caught in the central Bering Sea by the *Wakatake maru,* 1991-2001. PW=prey weight, % empty=percent of stomachs that did not contain stomach contents. Empty stomachs were not included in other table entries. SCI=PW*100/body weight. Prey composition is based on visual estimates.

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						Mean % composition by volume											
Species	Year	N	% empty	Mean PW	Mean SCI	EU	CO	AM	CR	SQ	PT	FI	PO	CH	GE	OTH	UNID
Sockeye	2001	195	17	8	0.66	26	14	13	0	10	17	16	0	3	1	0	0
	2000	133	8	15	0.78	12	11	28	1	17	4	25	0	1	0	1	0
	1999	120	15	6	0.54	11	8	29	1	28	9	10	1	0	2	1	0
	1998	113	19	12	1.21	28	18	18	2	14	8	10	0	0	1	1	0
	1997	114	11	7	0.51	9	21	25	9	10	11	11	0	0	0	4	0
	1996	134	16	12	0.70	24	13	16	1	15	11	19	0	0	1	0	0
	1995	144	1	10	0.67	9	6	36	5	22	12	9	0	0	1	0	0
	1994	115	10	11	0.90	15	20	30	0	22	5	7	0	0	0	1	0
	1993	79	15	9	0.65	3	10	19	1	31	3	28	0	0	0	2	3
	1992	36	14	13	0.68	11	30	22	0	18	0	14	0	2	3	0	0
	1991	69	14	9	0.55	13	5	7	0	32	13	14	0	0	5	3	8
Chum	2001	199	3	35	1.51	18	1	1	0	2	46	2	0	0	29	1	0
	2000	184	4	18	1.05	28	4	8	0	3	9	8	0	0	40	0	0
	1999	228	4	14	0.68	11	2	2	0	3	20	3	1	0	54	1	3
	1998	316	5	13	1.02	19	9	14	1	4	19	7	10	0	11	1	5
	1997	174	3	14	1.05	20	2	6	1	5	28	5	5	2	8	16	2
	1996	238	6	15	1.00	39	3	9	0	2	20	10	0	0	13	4	0
	1995	216	2	14	1.01	23	1	12	1	7	9	22	0	0	23	0	2
	1994	279	1	11	0.99	13	6	13	0	5	7	2	0	3	39	1	11
	1993	291	4	16	1.42	6	2	4	0	10	5	14	1	0	27	29	2
	1992	235	1	19	1.33	26	17	13	0	13	0	5	0	1	6	0	19
	1991	311	1	23	1.53	8	2	4	0	3	4	1	0	0	11	22	45
Pink	2001	189	3	19	1.45	31	7	3	0	20	11	27	0	0	0	1	0
	2000	5	0	24	2.22	0	0	0	0	19	0	81	0	0	0	0	0
	1999	280	22	9	0.80	13	19	7	1	17	10	30	1	1	0	1	0
	1998	31	13	12	1.46	12	16	11	4	15	6	36	0	0	0	0	0
	1997	181	16	10	0.88	9	14	16	6	15	10	27	0	0	0	3	0
	1996	52	8	19	1.43	21	5	5	3	14	2	50	0	0	0	0	0
	1995	186	0	15	1.19	9	8	14	5	26	12	26	0	0	0	0	0
	1994	28	0	17	1.37	23	12	8	4	28	2	23	0	0	0	0	0
	1993	159	3	16	1.36	2	6	10	0	28	2	50	0	0	0	2	0
	1992	14	0	27	1.95	14	12	6	0	40	0	21	0	0	0	4	3
	1991	312	7	17	1.42	14	7	11	0	33	6	21	0	0	1	0	7
Coho	2001	1	100														
	2000	0															
	1999	0															
	1998	1	100														
	1997	8	50	16	0.94	15	0	0	0	36	0	49	0	0	0	0	0
	1996	2	0	76	2.07	0	0	0	0	0	0	100	0	0	0	0	0
	1995	0															
	1994	0															
	1993	0															
	1992	2	0	9	0.63	87	0	5	0	5	0	3	0	0	0	0	0
	1991	2	0	11	0.30	50	0	0	0	50	0	0	0	0	0	0	0
Chinook	2001	40	35	4	0.50	6	0	0	0	34	2	58	0	0	0	0	0
	2000	60	27	26	0.81	29	1	0	0	36	0	34	0	0	0	0	0
	1999	22	32	3	0.26	9	0	6	0	36	4	45	0	0	0	0	0
	1998	96	34	15	0.82	12	3	2	0	66	0	16	0	0	0	0	1
	1997	54	35	13	0.54	29	0	0	0	52	0	19	0	0	0	0	0
	1996	72	19	25	1.03	18	0	2	0	47	1	32	0	0	0	0	0
	1995	44	16	10	0.63	16	0	0	0	52	0	29	0	0	0	0	3
	1994	26	31	12	0.54	20	0	10	0	58	1	8	0	0	3	0	0
	1993	12	17	12	0.54	27	0	0	0	39	0	34	0	0	0	0	0
	1992	37	19	18	0.78	43	4	0	0	44	0	9	0	0	0	0	0
	1991	30	17	19	0.86	33	1	0	0	43	0	23	0	0	0	0	0
Steelhead	2001	0															
	2000	0															
	1999	0															
	1998	0															
	1997	0															
	1996	0															
	1995	0															
	1994	0															
	1993	0															
	1992	0															
	1991	0															

Prey categories are EU=euphausiids, CO=copepods, AM=amphipods, CR=crab larvae, SQ=squids, PT=pteropods, FI=fish, PO=polychaetes, CH=chaetognaths, GE=gelatinous zooplankton (coelenterates, ctenophores, and salps), OTH=other groups, and UNID=unidentified material.