

**Abstracts of Scientific Documents Submitted to the Commission for
the 2011 Annual Meeting: Forecast of Pacific Salmon Production in
the Ocean Ecosystems under Changing Climate**

by

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Abstracts of Scientific Documents Submitted to the Commission for the 2011 Annual Meeting: Forecast of Pacific Salmon Production in the Ocean Ecosystems under Changing Climate

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This document is a compilation of abstracts of scientific documents submitted to the Commission between adjournment of the 2010 Annual Meeting and September 30, 2011. The compilation is organized into sections. The first section lists the document number and title according to six topics (Section 1). The first five topics are the five research components of the 2011-2015 NPAFC Science Plan:

- (1) migration and survival of juvenile salmon in ocean ecosystems
- (2) climate impacts on Pacific salmon production in the Bering Sea (BASIS) and adjacent waters
- (3) winter survival of Pacific salmon in North Pacific Ocean ecosystems
- (4) biological monitoring of key salmon populations
- (5) development and application of stock identification methods and models for management of Pacific salmon

For convenience, one more topic was added:

- (6) Other topics

Individual documents may pertain to more than one topic and, therefore, may be listed more than once. The second section lists the document number and title according to the country that submitted the document (Section 2). The third section lists abstracts of documents in order of document number (Section 3).

For consideration at the 2011 CSRS meeting, a total of 36 new documents and one revised 2010 document was submitted. Seven documents related to research on juvenile salmon, seven documents related to research on climate impacts on salmon in the Bering Sea and adjacent waters, two documents related to research on salmon winter survival, 15 documents related to research on biological monitoring of key populations, nine documents related to research on development and applications of stock identification methods and models for management, and 13 documents related to other topics were submitted. In total, two documents were submitted by Canada, 11 documents were submitted by Japan, five documents were submitted by Korea, eight documents were submitted by Russia, and 11 documents were submitted by the United States.

Section 1. Documents (number, title) Listed by Topic

1. Migration and Survival Mechanisms of Juvenile Salmon in Ocean Ecosystems

- [Doc. 1300](#) Southeast Alaska Coastal Monitoring (SECM) survey plan for 2011
[Doc. 1313](#) United States cruise plan for BASIS on the R/V *Oscar Dyson*, August – September 2011
[Doc. 1314](#) United States cruise plan for the Gulf of Alaska Project aboard the F/V *Northwest Explorer*, July – October 2011
[Doc. 1315](#) Trawl survey plans for Pacific salmon marine life period studies in the far eastern seas in summer and fall 2011 by Russia
[Doc. 1316](#) United States pelagic trawl survey plan for the northern Bering Sea shelf, August – September 2011
[Doc. 1332](#) Basic results of juvenile Pacific salmon study in coastal waters of Kamchatka during summer, 2004-2007, and 2010
[Doc. 1342](#) Annual survey of juvenile salmon, ecologically-related species, and environmental factors in the marine waters of southeastern Alaska, May-August 2010

2. Climate Impacts on Pacific Salmon Production in the Bering Sea (BASIS) and Adjacent Waters

- [Doc. 1267 Rev. 1](#) Proposed cruise plans of Japanese research vessels for salmon in the North Pacific Ocean in 2011
[Doc. 1313](#) United States cruise plan for BASIS on the R/V *Oscar Dyson*, August – September 2011
[Doc. 1315](#) Trawl survey plans for Pacific salmon marine life period studies in the far eastern seas in summer and fall 2011 by Russia
[Doc. 1316](#) United States pelagic trawl survey plan for the northern Bering Sea shelf, August – September 2011
[Doc. 1330](#) Changes in size, age, and intra-annual growth of Anadyr chum salmon (*Oncorhynchus keta*) from 1962-2010
[Doc. 1332](#) Basic results of juvenile Pacific salmon study in coastal waters of Kamchatka during summer, 2004-2007, and 2010
[Doc. 1348](#) The summer 2011 Japanese salmon research cruise of the R/V *Hokko maru*

3. Winter Survival of Pacific Salmon in North Pacific Ocean Ecosystems

- [Doc. 1301](#) Trawl survey plan for Pacific salmon marine life period studies in North Pacific Subarctic Frontal Zone in winter-spring 2011
[Doc. 1331](#) Composition and structure of epipelagic nekton and plankton communities in the western parts of Subarctic Frontal Zone in winter-spring 2011 (Result of 2011 research cruise of R/V *TINRO*)

4. Biological Monitoring of Key Salmon Populations

- [Doc. 1267 Rev. 1](#) Proposed cruise plans of Japanese research vessels for salmon in the North Pacific Ocean in 2011
[Doc. 1300](#) Southeast Alaska Coastal Monitoring (SECM) survey plan for 2011
[Doc. 1308](#) Results of 2010 salmon research by the *Oshoro maru*
[Doc. 1313](#) United States cruise plan for BASIS on the R/V *Oscar Dyson*, August – September 2011
[Doc. 1314](#) United States cruise plan for the Gulf of Alaska Project aboard the F/V *Northwest Explorer*, July – October 2011

- [Doc. 1315](#) Trawl survey plans for Pacific salmon marine life period studies in the far eastern seas in summer and fall 2011 by Russia
- [Doc. 1316](#) United States pelagic trawl survey plan for the northern Bering Sea shelf, August – September 2011
- [Doc. 1330](#) Changes in size, age, and intra-annual growth of Anadyr chum salmon (*Oncorhynchus keta*) from 1962-2010
- [Doc. 1331](#) Composition and structure of epipelagic nekton and plankton communities in the western parts of Subarctic Frontal Zone in winter-spring 2011 (Result of 2011 research cruise of R/V *TINRO*)
- [Doc. 1332](#) Basic results of juvenile Pacific salmon study in coastal waters of Kamchatka during summer, 2004-2007, and 2010
- [Doc. 1333](#) Recoveries of coded wire tag for chum salmon in Korea in 2010
- [Doc. 1337](#) Monitoring of *Aeromonas salmonicida* in chum salmon (*Oncorhynchus keta*) from Namdae River, Korea
- [Doc. 1341](#) High seas salmonid coded-wire tag recovery data, 2011
- [Doc. 1342](#) Annual survey of juvenile salmon, ecologically-related species, and environmental factors in the marine waters of southeastern Alaska, May-August 2010
- [Doc. 1348](#) The summer 2011 Japanese salmon research cruise of the R/V *Hokko maru*

5. Development and Application of Stock Identification Methods and Models for Management of Pacific Salmon

- [Doc. 1312 Rev. 1](#) Proposed otolith marks for brood year 2011 salmon in Japan
- [Doc. 1317](#) Proposed thermal marks for salmon from Canada, brood year 2011
- [Doc. 1318 Rev. 1](#) Proposed thermal marks for brood year 2011 salmon in Alaska
- [Doc. 1319](#) Proposed otolith marks for brood year 2011 salmon in Russia
- [Doc. 1327](#) Releases of otolith marked salmon from Alaska in 2010
- [Doc. 1335](#) Otolith thermal mark for brood year 2010 and proposed thermal marks for brood year 2011 chum salmon in Korea
- [Doc. 1340](#) Marked salmon production by the hatcheries of Russia in 2011
- [Doc. 1343](#) Forecasting pink salmon harvest in southeast Alaska from juvenile salmon abundance and associated environmental parameters: 2010 returns and 2011 forecast
- [Doc. 1347](#) Releases of otolith marked salmon from Japan in fall of 2010 and spring of 2011

6. Other Topics

- [Doc. 1309](#) Cruise plans of Japanese research vessels involving incidental takes of anadromous fish in the North Pacific Ocean in 2011
- [Doc. 1310](#) Incidental catches of anadromous fish by Japanese research vessels in the North Pacific Ocean in 2010/2011 Fiscal Year
- [Doc. 1311](#) Japanese salmon research under the NPAFC Science Plan 2011-2015
- [Doc. 1320](#) Report of the Research Planning and Coordinating Meeting, April 11-19, 2011
- [Doc. 1328](#) Comparison of pelagic fishing gear in coastal waters of southeastern Alaska
- [Doc. 1329](#) Biostatistical information on salmon catches, escapement and enhancement production in Russia in 2010
- [Doc. 1334](#) Korean research plan for salmon in 2012
- [Doc. 1336](#) Korean salmon catch statistics and hatchery releases in 2010-2011
- [Doc. 1338](#) Alaska salmon hatchery releases, commercial fishery catch statistics and sport fishery harvest statistics for 2010 season

[Doc. 1339](#)

Canadian enhanced salmonid production during 1978-2010
(1977-2009 brood years)

[Doc. 1344](#)

Japan salmon commercial fisheries catch statistics for 2010

[Doc. 1345](#)

Preliminary 2010 salmon enhancement production in Japan

[Doc. 1346](#)

Japanese bibliography in 2010-2011 for NPAFC Science Plan

Section 2. Documents (number, title) Listed by Country

Canada

- [Doc. 1317](#) Proposed thermal marks for salmon from Canada, brood year 2011
[Doc. 1339](#) Canadian enhanced salmonid production during 1978-2010 (1977-2009 brood years)

Japan

- [Doc. 1267 Rev. 1](#) Proposed cruise plans of Japanese research vessels for salmon in the North Pacific Ocean in 2011
[Doc. 1308](#) Results of 2010 salmon research by the *Oshoro maru*
[Doc. 1309](#) Cruise plans of Japanese research vessels involving incidental takes of anadromous fish in the North Pacific Ocean in 2011
[Doc. 1310](#) Incidental catches of anadromous fish by Japanese research vessels in the North Pacific Ocean in 2010/2011 Fiscal Year
[Doc. 1311](#) Japanese salmon research under the NPAFC Science Plan 2011-2015
[Doc. 1312 Rev. 1](#) Proposed otolith marks for brood year 2011 salmon in Japan
[Doc. 1344](#) Japan salmon commercial fisheries catch statistics for 2010
[Doc. 1345](#) Preliminary 2010 salmon enhancement production in Japan
[Doc. 1346](#) Japanese bibliography in 2010-2011 for NPAFC Science Plan
[Doc. 1347](#) Releases of otolith marked salmon from Japan in fall of 2010 and spring of 2011
[Doc. 1348](#) The summer 2011 Japanese salmon research cruise of the R/V *Hokko maru*

Republic of Korea

- [Doc. 1333](#) Recoveries of coded wire tag for chum salmon in Korea in 2010
[Doc. 1334](#) Korean research plan for salmon in 2012
[Doc. 1335](#) Otolith thermal mark for brood year 2010 and proposed thermal marks for brood year 2011 chum salmon in Korea
[Doc. 1336](#) Korean salmon catch statistics and hatchery releases in 2010-2011
[Doc. 1337](#) Monitoring of *Aeromonas salmonicida* in chum salmon (*Oncorhynchus keta*) from Namdae River, Korea

Russia

- [Doc. 1301](#) Trawl survey plan for Pacific salmon marine life period studies in North Pacific Subarctic Frontal Zone in winter-spring 2011
[Doc. 1315](#) Trawl survey plans for Pacific salmon marine life period studies in the far eastern seas in summer and fall 2011 by Russia
[Doc. 1319](#) Proposed otolith marks for brood year 2011 salmon in Russia
[Doc. 1329](#) Biostatistical information on salmon catches, escapement and enhancement production in Russia in 2010
[Doc. 1330](#) Changes in size, age, and intra-annual growth of Anadyr chum salmon (*Oncorhynchus keta*) from 1962-2010
[Doc. 1331](#) Composition and structure of epipelagic nekton and plankton communities in the western parts of Subarctic Frontal Zone in winter-spring 2011 (Result of 2011 research cruise of R/V *TINRO*)
[Doc. 1332](#) Basic results of juvenile Pacific salmon study in coastal waters of Kamchatka during summer, 2004-2007, and 2010
[Doc. 1340](#) Marked salmon production by the hatcheries of Russia in 2011

United States

- [Doc. 1300](#) Southeast Alaska Coastal Monitoring (SECM) survey plan for 2011
- [Doc. 1313](#) United States cruise plan for BASIS on the R/V *Oscar Dyson*, August – September 2011
- [Doc. 1314](#) United States cruise plan for the Gulf of Alaska Project aboard the F/V *Northwest Explorer*, July – October 2011
- [Doc. 1316](#) United States pelagic trawl survey plan for the northern Bering Sea shelf, August – September 2011
- [Doc. 1318 Rev. 1](#) Proposed thermal marks for brood year 2011 salmon in Alaska
- [Doc. 1327](#) Releases of otolith marked salmon from Alaska in 2010
- [Doc. 1328](#) Comparison of pelagic fishing gear in coastal waters of southeastern Alaska
- [Doc. 1338](#) Alaska salmon hatchery releases, commercial fishery catch statistics and sport fishery harvest statistics for 2010 season
- [Doc. 1341](#) High seas salmonid coded-wire tag recovery data, 2011
- [Doc. 1342](#) Annual survey of juvenile salmon, ecologically-related species, and environmental factors in the marine waters of southeastern Alaska, May-August 2010
- [Doc. 1343](#) Forecasting pink salmon harvest in southeast Alaska from juvenile salmon abundance and associated environmental parameters: 2010 returns and 2011 forecast

Section 3. Document Abstracts (numerical order)

Doc. 1267 Rev. 1 Proposed cruise plans of Japanese research vessels for salmon in the North Pacific Ocean in 2011

Masa-aki Fukuwaka

Three Japanese salmon research vessels have been tentatively scheduled to conduct scientific research in the North Pacific and Bering Sea in 2011. (1) The *Hokko maru* will conduct research with a surface/midwater trawl and hook-and-line to obtain information on the distribution, abundance and some biological characteristic of summering salmon in the Bering Sea from late July to early August. (2) The *Oshoro maru* will conduct research with gillnets, longline, and hook-and-line to obtain data on the distribution and ecology of salmon and other pelagic fishes in the western North Pacific in May and late July to early August. (3) The *Kaiun maru* will conduct research with gillnets to obtain data on the distribution and ecology of neon flying squid, salmon, and other pelagic fishes in the western and central North Pacific from late June to early August. Gillnet operations will use gillnets less than 2.5 km in length.

Doc. 1300 Southeast Alaska Coastal Monitoring (SECM) survey plan for 2011

Joseph A. Orsi, Molly V. Sturdevant, Emily A. Fergusson, William R. Heard, and Edward V. Farley

The Southeast Coastal Monitoring (SECM) project was initiated in 1997 by the Alaska Fisheries Science Center, Auke Bay Laboratories, to study the habitat use and early marine ecology of juvenile (age-0) Pacific salmon (*Oncorhynchus* spp.) and associated epipelagic ichthyofauna in Southeast Alaska. The SECM surveys are conducted off government and chartered research vessels in the vicinity of Icy Strait (58° N, 135°W) and sample fish, zooplankton, nutrients/chlorophyll, and physical water properties using a surface trawl, plankton nets, and an oceanographic profiler. In 2011 SECM research surveys are scheduled to continue at 13 core stations in Icy Strait during four monthly intervals from late May to late August and also at four stations in the Gulf of Alaska. The 2011 SECM survey plan reflects what was accomplished at the inception of the project in 1997, and the additional survey year will extend the biophysical time series to 15 years.

Doc. 1301 Trawl survey plan for Pacific salmon marine life period studies in North Pacific Subarctic Frontal Zone in winter-spring 2011

Olga S. Temnykh, Svetlana V. Naydenko, and Igor I. Gelbov

The trawl survey plan is presented for the cruise of the R/V *TINRO* (TINRO-Centre) for studies of the marine life period of Pacific salmon in the North Pacific Subarctic Frontal Zone during February 15 - April 15, 2011. The major objectives of the survey are the following: (1) determination of the current state of Pacific salmon in the pelagic ecosystems of Pacific waters; (2) elucidation of the position and role of Pacific salmon in the trophic structure of the epipelagic zone; (3) evaluation of pelagic ecosystems status, as well as oceanic and overall ecological conditions in Pacific waters during winter-spring, 2011; and (4) estimation of salmon mortality during the fall-winter period. The outline of materials, methods, survey timing, and theoretical background are provided.

Doc. 1308 Results of 2010 salmon research by the *Oshoro maru*

Yoshihiko Kamei, Keiichiro Sakaoka, Naoki Hoshi, Takuzo Abe, Keiri Imai, and Shogo Takagi, and T/V Oshoro maru

In order to accumulate oceanographic and biological data (including salmonids) and to clarify the oceanic structure and marine ecosystem, the T/V *Oshoro maru* conducted oceanographic observations and fishing surveys in the Northwest Pacific Ocean along the 155°E longitude line during Cruise #215 in May 2010,

and in the central North Pacific Ocean along the 165°E longitude line and in the area of the Aleutian Islands during Cruise #216 in June-July 2010.

Thirteen oceanographic observations and four gillnet surveys were conducted along 155°E during Cruise #215 in May. The Polar Front was observed in the vicinity of 43°-45'N and subtropical and subarctic water were mixed intricately in the Transition Domain. Pink and chum salmon were abundant at 43°-04'N and 41°-44'N, but pink salmon were more numerous. The fork length (FL) of chum salmon collected by research gillnet (C-gear) ranged between 460 and 700 mm, and the size of pink salmon ranged between 320 and 470 mm FL. Most (94.4%) chum salmon were adult fish.

Fourteen oceanographic observations and five gillnet surveys were conducted along 165°E during Cruise #216 from late June to early July. The Polar Front was observed in the vicinity of 45°-45'N. The Subarctic Boundary was observed in the vicinity of 41°N. The Transition Domain was thought to be located between 41°N and 45°-45'N. Forty-three chum, 317 pink, and 11 coho salmon were collected by gillnet. Almost all the salmonids were collected at 46°-27'N, most of which were pink salmon. Fork length of chum salmon collected by research gillnet (C-gear) ranged between 330 and 660 mm, and the size of pink salmon ranged between 410 and 500 mm FL. Adult chum salmon were collected only at 46°-27'N.

To collect enough salmon samples, including fresh blood and various tissues, six surface longline and fifteen hook-and-line operations were conducted during Cruise #215 and #216-Leg 2 and 3.

In total, 34 sockeye, 122 chum, 555 pink, 61 coho, and four Chinook salmon, and 11 steelhead were collected in the five research areas during the two cruises.

Doc. 1309 Cruise plans of Japanese research vessels involving incidental takes of anadromous fish in the North Pacific Ocean in 2011

Fisheries Research Agency

Five Japanese research vessels are scheduled to conduct scientific research for pelagic fishes in the North Pacific in 2011. There are some possibilities of incidental catch of salmon during these cruises. In the case of gillnet operations, the length of the gillnet will be less than 2.5 km.

Doc. 1310 Incidental catches of anadromous fish by Japanese research vessels in the North Pacific Ocean in 2010/2011 fiscal year

Masa-aki Fukuwaka

Japanese research vessels conducted scientific fishing operations to assess Pacific saury and other pelagic fishes using midwater trawls, drift gillnets, and saury dip net in the western and central North Pacific in the 2010/2011 fiscal year. These scientific operations have the possibility of incidental catch of anadromous fish. During these research surveys, a total of 424 salmonids, including 41 chum, 376 pink, 5 coho, and 2 Chinook salmon, was caught in the summer of 2010 and the winter of 2011.

Doc. 1311 Japanese salmon research under the NPAFC Science Plan 2011-2015

Fisheries Agency of Japan

The 2011-2015 NPAFC Science Plan has defined its research theme, "Forecast of Pacific salmon production in the ocean ecosystems under changing climate," with five research components. It is a high priority for Japanese salmon research to explain and forecast the annual variation of salmon production, corresponding to this new Science Plan theme. The primary goal of our research is to accomplish sustainable salmon fisheries with the conservation of wild and hatchery stocks in the North Pacific ecosystems. The Japanese research consists of four components: (1) juvenile salmon studies, (2) high-seas

salmon studies, (3) monitoring of major salmon populations, and (4) development and application of stock identification techniques and forecast model.

Doc. 1312 Rev. 1 Proposed otolith marks for brood year 2011 salmon in Japan

Shunpei Sato and Masaya Takahashi

In Japan, otolith marks have been used for migration, growth, and survival surveys of juvenile salmon in coastal waters, and for offshore migration surveys in the Okhotsk Sea, North Pacific Ocean, and Bering Sea. In addition, hatchery origins of maturing adults are determined using otolith marks to evaluate their homing migrations and abundance. The proposed otolith marks for the 2011 brood year salmon include 55 discrete thermal patterns and two ALC (alizarin complexone) patterns. We plan to mark approximately 221 million chum, 31.7 million pink, 3.2 million masu, and 30 thousand sockeye salmon at 40 hatcheries. The thermal marking pattern is presented as the hatch code notation. As the base mark, two rings in the first band have been adopted to distinguish Japanese chum and pink salmon from other stocks since the 1999 brood year stock was released. All thermal rings are induced by cooler temperature exposures. The ALC marks are used for chum and pink salmon surveys by the Hokkaido Salmon and Freshwater Fisheries Research Institute, Hokkaido Research Organization.

Doc. 1313 United States cruise plan for BASIS on the R/V Oscar Dyson, August –September 2011

Edward V. Farley, Jr.

Scientists from the National Marine Fisheries Service (NMFS), Marine Ecosystem and Stock Assessment (MESA) Program, BASIS group will conduct a survey during fall 2011 within the southeastern Bering Sea to provide key ecological data on the pelagic ecosystem. Primary objectives of the survey will include the following: (1) collect biological information on ecologically important fish species, and (2) describe the physical and biological oceanographic conditions of southeastern Bering Sea waters.

Doc. 1314 United States cruise plan for the Gulf of Alaska Project aboard the F/V Northwest Explorer, July – October 2011

Jamal H. Moss

Scientists from the National Marine Fisheries Service (NMFS), Pacific Marine Environmental Laboratory, and the University of Alaska will conduct a survey during summer and fall 2011 within the southeastern and central Gulf of Alaska (GOA) to provide key ecological data on the pelagic ecosystem, examine oceanographic transport mechanisms, lower trophic level production, and age-0 marine fish and juvenile salmon distribution and condition. Primary objectives of the survey will be to: (1) collect biological information on ecologically important fish species, and (2) describe the physical and biological oceanographic conditions of the GOA.

Doc. 1315 Trawl survey plans for Pacific salmon marine life period studies in the far eastern seas in summer and fall 2011 by Russia

Olga S. Temnykh and Alexander V. Zavolokin

Russian salmon research cruise plans include summer cruises in Pacific waters off the Kuril Islands, Okhotsk Sea, and western Bering Sea to investigate the coastward migration of maturing salmon stocks. Surveys in 2011 are planned in Pacific waters by the R/V TINRO in June-July and in the southern Okhotsk Sea by R/V TINRO in August-September. The western Bering Sea will be surveyed by the R/V Professor Kaganovsky in June-July. The major purpose of these studies is to estimate Pacific salmon abundance and biomass for short-term forecasting of the magnitude of salmon returns.

Doc. 1316 United States pelagic trawl survey plan for the northern Bering Sea shelf, August – September 2011

James M. Murphy

Scientists on board the *F/V Bristol Explorer* will survey the northern Bering Sea shelf from 17 August to 22 September, 2011, for a total of 35 charter days. The objective is to collect information on pelagic fish and oceanographic information in the coastal region to support scientific investigations of Yukon River juvenile Chinook salmon and broader scientific objectives on pelagic species distribution and ecosystem structure. Adaptive pelagic rope trawl sampling (mid-water or surface) will be conducted to validate species composition of acoustic targets. Biological data collected from trawls will include species catch composition by weight and number. Catches will be subsampled for length frequency distributions, food habits, and fish condition. Genetic tissues will be collected from all Chinook salmon and from a subsample of chum salmon.

Doc. 1317 Proposed thermal marks for salmon from Canada, brood year 2011

Susan DiNovo, Jeff Till, and David O'Brien

Thermal marking continues to play an important role for both research and fisheries management in Canada. Canada plans to thermally mark approximately 61 million Pacific salmon for release in 2012. Thermal marking will include 38 thermal marks applied at 13 hatcheries with marked salmon released at 39 locations. The plan is similar to that of the 2010 brood year released in 2011.

Doc. 1318 Rev. 1 Proposed thermal marks for brood year 2011 salmon in Alaska

Dion S. Oxman and Ron Josephson

In Alaska, mass-marking of salmon using otolith thermal marking is an effective research and management tool applicable to a variety of situations. For brood year 2011, approximately 56 million sockeye, 700 million pink salmon, 590 million chum, 9 million coho, and 8 million Chinook salmon will be marked at 20 different hatcheries using 68 thermal marks.

Doc. 1319 Proposed otolith marks for brood year 2011 salmon in Russia

Elena Akinicheva and Vladimir Volobuev

Otolith marking of salmon of brood year 2011 will be conducted in four regions of the Russian Far East: Kamchatka, Sakhalin, Magadan, and Khabarovsk. Marking will be carried out using two methods: thermal and “dry.” The type of application will be determined by the possible options available and particular water supply of the incubated embryos at hatcheries in the Far East. The most common method of marking will be the “dry” method – it will be used on 83% of salmon at hatcheries. Salmon will be otolith-marked at 26 hatcheries. In total, 29 otolith marks will be used.

Doc. 1320 Report of the Research Planning and Coordinating Meeting, April 11-19, 2011

NPAFC Committee on Scientific Research and Statistics

The NPAFC Committee on Scientific Research and Statistics (CSRS) held its annual Research Planning and Coordinating Meeting (RPCM) on April 11-19, 2011, by email. The group included 13 participants from the five member countries and 30 advisors.

Research plans for 2011 and cruise activities were reviewed. Canada maintains an offshore salmon research program conducted off the west coast of British Columbia and southeast Alaska and an inshore program in the Strait of Georgia and Puget Sound. Russia's survey plans include cruises in northwestern North Pacific, southern Okhotsk, and western Bering Sea. Japan anticipates cruises in the northwestern North Pacific and central Bering Sea. The US survey plans include cruises in northern southeast Alaska, southeastern and central Gulf of Alaska, and eastern Bering Sea. Research operations will be conducted in

late winter-spring through fall, though most cruises will be conducted in the summer and fall. Exchanges of scientific personnel and biological samples were reviewed and updated.

The Working Group on Salmon Marking provided information from email correspondence on the status of the otolith mark database and proposed mark plans for brood year 2011. All otolith mark conflicts have been resolved, so no redundant mark patterns are scheduled to be released for brood year 2011. The Working Group on Salmon Tagging reported on discussions by email regarding the update of the tagging database, high-seas tagging experiments for the 2011 field season, and newly reported disk-tag recoveries.

The Secretariat provided information on two topics. Several email announcements calling for abstracts for the workshop, "Explanations for the High Abundance of Pink and Chum Salmon and Future Trends," have been sent. Abstracts were due by May 31. A list of invited speakers has been selected and support for their travel secured. On another topic, the original 22 CSRS-related recommendations of the Performance Review have reduced to 10 with approval of the CSRS Chairperson and CSRS Points of Contact. The draft List of Actions (LoA) based on the 10 prioritized recommendations has been developed by the Secretariat in cooperation with the CSRS Chairperson. It was anticipated the draft LoA will be circulated to the CSRS Points of Contact in early May for their review.

Doc. 1327 Releases of otolith marked salmon from Alaska in 2010

Dion S. Oxman and Ronald P. Josephson

In Alaska, mass-marking of salmon using otolith thermal marking is an effective research and management tool for a variety of situations. This document reports the otolith mark patterns applied to hatchery-raised salmon stocks released in Alaska during 2010. It includes five species of salmon from brood years 2008 through 2010. Release numbers, mark patterns, and release locations are summarized.

Doc. 1328 Comparison of pelagic fishing gear in coastal waters of southeastern Alaska

James M. Murphy and Thomas L. Rutecki

During August 1998 scientists from the Auke Bay Laboratory conducted a study in the coastal waters of southeastern Alaska to compare a rope trawl modified for fishing at the surface with a floating gillnet of variable mesh size for sampling juvenile sablefish (*Anoplopoma fimbria*) and juvenile salmon (*Oncorhynchus* spp.). Species composition, catches, and average fish size differed between the rope trawl and gillnet catches. A total of 257 fish and squid representing 11 species was captured with rope trawl gear, whereas gillnet sampling resulted in the capture of 89 fish representing six species. Nearly twice as many species were present in rope trawl catches than gillnet catches and this difference is believed to reflect higher selectivity in gillnet sampling gear. Although juvenile salmon catch was higher using the rope trawl, juvenile sablefish catch was higher using the gillnet. Average fork lengths of juvenile salmon were higher in gillnet catches. Average fork length of juvenile sablefish was higher in rope trawl catches, but the difference in length between gear types was not significant

Doc. 1329 Biostatistical information on salmon catches, escapement and enhancement production in Russia in 2010

Pacific Research Fisheries Center (TINRO-centre)

Commercial, subsistence, and sport catch statistics for 2010 are summarized by species, region, and month. In total, 326,581.99 tonnes of salmon was caught in commercial fisheries in Russia in 2010. Most of the catch comprised pink (62%) chum (27%), sockeye (9%), and coho (2%) salmon. Hatchery releases of salmon fry and smolts in the Russian Far East numbered 1,033,529.77 thousand fish. Most of the hatchery releases were chum (58%), pink (41%), and sockeye (1%) salmon.

Doc. 1330 **Changes in size, age, and intra-annual growth of Anadyr chum salmon (*Oncorhynchus keta*) from 1962-2010**

Alexander V. Zavolokin, Vladimir V. Kulik, and Yuri N. Khokhlov

Inter-annual changes in body size, age composition, and intra-annual changes in growth of Anadyr chum salmon collected in 1962-2010 were studied. From the 1960s to the 2000s, body size of Anadyr chum salmon significantly decreased and the average age of spawners slightly increased. Annual growth dynamics showed different patterns. Estimated from measuring intersclerite distances on scales, first-year growth of Anadyr chum salmon samples collected in 1962 to 2007 was enhanced. After the first year, growth was reduced. The greatest reduction occurred in the third (ages 0.3 and 0.4) and fourth (age 0.4) years. Intra-annual scale increments showed that growth reduction after the first year occurred both in over-wintering and foraging areas. This contrasts with the wide-spread suggestion that chum salmon size decreased due to a poor foraging conditions during the winter period. Based on published results and our data, it seems the growth of at least two salmon species (chum and pink salmon) changed similarly in recent decades. Hence there are some large-scale factors that influenced these species and had an effect in the vast areas of the North Pacific and marginal seas. Our results don't corroborate the decisive importance of density-dependent interactions for Pacific salmon productivity in the last 50 years. Negative correlations between some climatic indices (ocean surface temperature, ground air temperature, and heat content of North Pacific Ocean) and scale increments of Anadyr chum salmon in the second, third, and fourth year zones suggest that warming of North Pacific may have adverse impact on chum salmon growth after the first year of life. Chum salmon growth reduction after the early marine period may be a mixture of increasing abundance of Pacific salmon combined with warming ocean.

Doc. 1331 **Composition and structure of epipelagic nekton and plankton communities in the western parts of Subarctic Frontal Zone in winter-spring 2011 (Result of 2011 research cruise of R/V *TINRO*)**

Igor I. Glebov, Svetlana V. Naydenko, Natalya A. Kuznetsova, Elena V. Kurenkova, Aleksey A. Khoruzhiy, Roman G. Ovsyanikov, Ksenia V. Padchenko, and Sergie P. Dudkov

Results of the trawl survey on the R/V *TINRO* in the western part of Subarctic Frontal Zone in winter-spring 2011 are considered. The data on abundance and biomass of nekton and jellyfish were received for two epipelagic layers: 0–30 m (<30 m depth) and 31–60 m. Data on vertical distribution of Pacific salmon during the winter-spring period in a layer 0–120 m were obtained. In the 0–30 m epipelagic layer the overall pink and chum salmon abundance was estimated to be 81.2 and 47.9 million fish; in the 31–60 m epipelagic layer — 81.2 and 7.79 million fish, respectively. These studies confirm that in conditions of a vertical isotherm salmon (mainly pink and small-size chum salmon) use nearly the entire upper hundred-meter layer during the winter-spring period. The spatial distribution and biological state of salmon in two epipelagic layers are considered in detail. The data on the composition and structure of plankton communities for two epipelagic layers, 0–50 and 0–200 m, are presented. The zooplankton biomass in winter-spring 2011 was lower than in 2010, but was up to the standard of 2009. It can be connected with distinctions of oceanological conditions during the period from February to April in 2009, 2010, and 2011.

Doc. 1332 **Basic results of juvenile Pacific salmon study in coastal waters of Kamchatka during summer, 2004–2007, and 2010**

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Basic results of juvenile Pacific salmon research, provided by KamchatNIRO in coastal waters of West and East Kamchatka in May–August 2004–2007 and 2010, are demonstrated. Two new constructions of the trawl – 33.6/56 m and 33.6/72 m – have been worked out by KamchatNIRO especially for this research. As a result, an optimal method of fishing was suggested and optimal trawl models and time for

trawl surveys were proposed for each particular district. Fish fauna composition, density distribution and feeding by mass fish species were studied in order to estimate interspecies interactions in epipelagic nekton communities of Kamchatka coastal waters. New data about distribution, migration and time of juvenile salmon emigration to open sea waters were obtained. Dynamics of juvenile salmon biological parameters, age composition, physiological condition and gametogenesis in early marine period of life was studied. New data on hydrometeorology, coastal phyto- and zooplankton in Kamchatka, necessary to provide characterization of environmental conditions of juvenile salmon feeding habitat, were obtained.

Doc. 1333 Recoveries of coded wire tag for chum salmon in Korea in 2010

Kwan Eui Hong and Ki Baik Seong

Korea has released CWT tagged juvenile chum salmon since 2003 and 15 CWT chum salmon were recovered at Namdae-cheon and harbor of coastal area (set net) during the spawning seasons in 2010. Among 15 chum salmon, 7 salmon were female and 8 were male. Most salmon sampled were age 4 (66.6 %) and age 5 (33.4%), which were released in 2007 and 2006.

Doc. 1334 Korean research plan for salmon in 2012

Kwan Eui Hong, Dheul Ho Lee, and Ki Baik Seong

Salmon are political resources due to the characteristics of transboundary distribution and economic importance. The interest in chum salmon biology in Korea increased since the establishment of the Yangyang Salmon Station (formerly Cold-water Fish Research Center) of Korea Fisheries Resources Agency in 2011. The enhancement program of chum salmon was expanded and chum salmon were transplanted to 18 streams on the coast of the Korean Peninsula. However, ecological research on salmon species was very limited until recently due to the lack of a research program. Though the involvement in the North Pacific Anadromous Fisheries Commission (NPAFC) requires scientific investigation on salmon research of each member nation, the conspicuous increase in research funding was not achieved. Oceanic environments have been rapidly altered by climate change during the last few decades and ocean ecosystems including salmon populations will be modified under the global warming situation. Especially, research is needed for stocks at the southern boundary of distribution, such as Korean chum salmon. Major areas for Korean research on salmon in 2012 will include the following studies.

1. Adult salmon with disc tags will be released to investigate the coastal migration route and timing of Korean chum salmon. Salmon will be recaptured in set net fisheries located in eastern coastal areas of Korea.
2. Studies to reveal the mechanisms of mass mortality of chum salmon during their early life in rivers and coastal areas in conjunction with fluctuations in return rates (i.e., identify prey and predator species of juvenile salmon, estimate survival rates, monitor environmental factors, examine growth rates of wild and hatchery juvenile salmon, and investigate optimum release timing).
3. Monitoring climate change effects on salmon distribution, migration route, and abundance by examining conditions in Korean waters and the western North Pacific Ocean and its effects on chum salmon.
4. Otoliths will be thermally-marked to provide information on growth, survival, and hatchery origins of 2012 releases.
5. Stock identification using parasites as biological tags, and mitochondrial DNA and microsatellite DNA analyses will be continued to reveal the genetic relationship between Korean chum and chum salmon originating from other countries.
6. The cherry salmon release program will be expanded, and stomach contents examined to investigate prey competition between cherry salmon and other fish species in marine environments.
7. International cooperative research in the North Pacific will be continued.

Doc. 1335 Otolith thermal mark for brood year 2010 and proposed thermal marks for brood year 2011 chum salmon in Korea

Kwan Eui Hong and Ki Baik Seong

Korea released 6.5 million and 8.1 million thermal marked chum salmon in March 2010 and 2011, respectively. The marks were 3,1,2H for 2010 (2009BY) and 3,2,1nH for 2011 (2010BY). We will mark approximately 6.0 million chum salmon in BY 2011, which covers about 50% of release of BY 2011 chum salmon at Namdae-cheon (river). Chum salmon will be marked at the Cold-water Fish Research Center using only one thermal mark (3,3H).

Doc. 1336 Korean salmon catch statistics and hatchery releases in 2010-2011

Kwan Eui Hong and Ki Baik Seong

Catch statistics by area and region in 2009 and 2010 by Republic of Korea are presented. The total catch of chum salmon was 49,760 fish or 133.8 metric tonnes in 2009, and 58,591 fish or 146.4 metric tons in 2010. The total number of chum salmon fry released was 17,194 thousand fish in 2010 (2009 brood) and 20,900 thousand fish in 2011 (2010 brood).

Doc. 1337 Monitoring of *Aeromonas salmonicida* in chum salmon (*Oncorhynchus keta*) from Namdae River, Korea

Rungkarn Suebsing, Yong-Seok Kim, Kwan Eui Hong, and Jeong-Ho Kim

In this study, 665 chum salmon (*Oncorhynchus keta*) were caught from Namdae River during 2006 and 2010, and monitored for typical *Aeromonas salmonicida*, a causative bacterium of furunculosis. Four hundred and forty adults and 225 artificially hatched fry pools were examined by PCR using the typical *A. salmonicida*-specific *vapA* gene primers. The results demonstrated that 43.2% of the samples (287/665 samples) were PCR-positive, implying that typical *A. salmonicida* infection is prevalent among chum salmon in Korea. From the PCR-positive samples, 20 typical *A. salmonicida* isolates were recovered and their biochemical characteristics corresponded with those of known typical *A. salmonicida*. Moreover, phylogenetic analysis with entire *vapA* gene sequences suggested that Korean isolates were closely related with European isolates of Atlantic salmon. More studies are necessary to resolve this relationship in detail.

Doc. 1338 Alaska salmon hatchery releases, commercial fishery catch statistics and sport fishery harvest statistics for 2010 season

Eric C. Volk and Ronald P. Josephson

Alaskan hatcheries released approximately 1.6 billion fish in 2010. Of the fish released, 55% were pink salmon and 39% were chum salmon. Hatcheries in Prince William Sound contributed 52% and hatcheries in Southeast Alaska contributed 36% of the fish released. The Alaska salmon harvest of all species combined for 2010 totaled 171.8 million fish, which was well above the preseason forecast of 138 million, and the 11th largest salmon harvest. In 2010, pink salmon catch was 107.7 million compared to the preseason projection of 69 million. The statewide chum harvest of 18.4 million was slightly above the ten-year average harvest of 17.7 million. Coho catches of 4.0 million were only slightly lower than the forecast of 4.4 million. Sockeye salmon were expected to yield a harvest of 45.8 million fish and provided 41.3 million fish. The Chinook catch of 385,000 was below average. The preliminary estimate for the total value of Alaska's 2010 harvest is \$534 million.

Doc. 1339 **Canadian enhanced salmonid production during 1978-2010
(1977-2009 brood years)**

J. Wilkinson, C. Lynch, and J.R. Irvine

The Salmonid Enhancement Program (SEP) in British Columbia, Canada was initiated in 1977 to rebuild stocks and increase catch through the expanded use of enhancement technology. The program currently comprises approximately 150 projects which produce chinook (*Oncorhynchus tshawytscha*), coho (*O. kisutch*), chum (*O. keta*), pink (*O. gorbuscha*), and sockeye (*O. nerka*) salmon, as well as small numbers of steelhead (*O. mykiss*) and cutthroat trout (*O. clarki*). Projects include hatcheries, fishways, spawning and rearing channels, and small classroom incubators, and range in size from spawning channels releasing nearly 100 million juveniles annually, to schools with classroom incubators that release fewer than one hundred. Data from facilities that operate outside the direction of SEP are not included in this report. Steelhead and cutthroat are a provincial government responsibility, but some enhancement takes place at SEP facilities under a cooperative arrangement. Steelhead and cutthroat numbers in this report do not include releases from facilities operated by the Freshwater Fisheries Society of British Columbia.

Doc. 1340 **Marked salmon production by the hatcheries of Russia in 2011**

Elena Akinicheva, Vladimir Volobuev, and Evgey Fomin

The process of salmon marking has been carrying out over 15 years in the hatcheries in the Russian Far East. First of all it is aimed at the estimation of hatchery effectiveness. The release amount of marked juvenile salmon has been considerably increased during the last years, due to the mass marking in the Sakhalin-Kurile region, the place where many hatcheries in Russia are located. Approximately 520 million marked juvenile salmon have been released by the hatcheries in the Far East in 2011. In total, the salmon marking has been carried out at 26 hatcheries of Russia, including the 14 hatcheries in the Sakhalin-Kurile region, 5 hatcheries in Kamchatka, 4 hatcheries in Magadan, and 3 hatcheries of the Khabarovsk region.

Doc. 1341 **High seas salmonid coded-wire tag recovery data, 2011**

Adrian G. Celewycz and Jamal H. Moss

Information on high seas recoveries of salmonids (*Oncorhynchus* spp.) tagged with coded-wire tags (CWTs) has been reported annually to the International North Pacific Fisheries Commission (1981-1992) and to the North Pacific Anadromous Fish Commission (NPAFC, 1993-present). Data from these CWT recoveries are also reported into the Regional Mark Information System Database maintained by the Regional Mark Processing Center (RMPC, <http://www.rmpec.org>) of the Pacific States Marine Fisheries Commission (PSMFC). This document lists recovery data for 61 CWT salmonids that will be reported to PSMFC/RMPC for the first time. These 61 CWTs were recovered from the 2008, 2009, and 2010 U.S. groundfish trawl fishery in the Gulf of Alaska (41 Chinook salmon, *O. tshawytscha*), the 2009 and 2010 U.S. groundfish trawl fishery in the eastern Bering Sea-Aleutian Islands (13 Chinook salmon and 1 coho salmon, *O. kisutch*), and from 2010 US research vessel operations in the Gulf of Alaska (3 Chinook salmon and 3 coho salmon,). Recovery information is also presented for 9 new recoveries of Chinook salmon tagged with agency-only wire tags (not CWTs).

Doc. 1342 **Annual survey of juvenile salmon, ecologically-related species, and environmental factors in the marine waters of southeastern Alaska, May-August 2010**

Joseph A. Orsi, Emily A. Fergusson, Molly V. Sturdevant, William R. Heard, and Edward V. Farley, Jr.

Juvenile Pacific salmon (*Oncorhynchus* spp.), ecologically-related species, and associated environmental (biophysical) data were collected from the marine waters of the northern region of southeastern Alaska in 2010. This annual survey, conducted by the Southeast Coastal Monitoring (SECM) project, marks 14 consecutive years of systematically monitoring how juvenile salmon utilize in marine ecosystems, and was implemented to identify the relationships among biophysical parameters that influence habitat use,

marine growth, predation, stock interactions, and year-class strength of juvenile salmon. This report also contrasts the 2010 findings with selected biophysical parameters from the prior 13 sampling years. Up to 13 stations were sampled in epipelagic waters monthly, totaling 21 sampling days, from May to August. Fish, zooplankton, surface water samples, and physical profile data were typically collected during daylight at each station using a surface rope trawl, conical and bongo nets, a water sampler, and a conductivity-temperature-depth profiler. Surface (3-m) temperatures and salinities ranged from approximately 9 to 14 °C and 17 to 32 PSU from May to August. More than 39,000 fish, representing 26 taxa, were captured in 67 rope trawl hauls fished from June to August. Juvenile salmon comprised about 97% of the total fish catch. Juvenile pink (*O. gorbuscha*), chum (*O. keta*), sockeye (*O. nerka*), and coho (*O. kisutch*) salmon occurred in 71-87% of the trawls, while juvenile Chinook salmon (*O. tshawytscha*) occurred in 9% of the hauls. Unusually high numbers of juvenile salmon were captured in strait habitat in both June and July, although CPUE was greatest in June for all species except sockeye salmon. Coded-wire tags were recovered from 15 juvenile coho salmon and one juvenile Chinook salmon from hatchery and wild stocks originating in southeastern Alaska and Washington. Alaska enhanced stocks were also identified by thermal otolith marks from 67% of the chum and 16% of the sockeye salmon examined. Onboard stomach analysis revealed predation on highly abundant juvenile salmon by adult coho salmon, a common predator, and adult pink salmon, a rare predator. Biophysical measures from 2010 differed from prior years, in many respects. May integrated (20-m) temperature anomalies were generally positive and salinity anomalies were generally negative; in particular, the positive May temperature anomaly was the highest on record. Zooplankton monthly total densities were near longterm averages, reversing the trend for strongly positive anomalies over the past four years. For juvenile pink, chum, and sockeye salmon, low condition residuals in June were followed by small size and low energy density in July. Regional biophysical data from SECM are used in conjunction with basin-scale biophysical parameters to forecast pink salmon harvest in southeastern Alaska. Long-term monitoring of key stocks of juvenile salmon on seasonal and interannual time scales will enable researchers to understand how growth, abundance, and ecological interactions affect year-class strength of salmon and to better understand their roles in North Pacific marine ecosystems.

Doc. 1343 Forecasting pink salmon harvest in southeast Alaska from juvenile salmon abundance and associated environmental parameters: 2010 returns and 2011 forecast

Alex C. Wertheimer, Joseph A. Orsi, Emily A. Fergusson, and Molly V. Sturdevant

The Southeast Alaska Coastal Monitoring (SECM) project has been sampling juvenile salmon (*Oncorhynchus* spp.) and associated environmental parameters in northern Southeast Alaska (SEAK) annually since 1997 to better understand effects of environmental change on salmon production. A pragmatic application of the annual sampling effort is to forecast the abundance of adult salmon returns in subsequent years. Since 2004, juvenile peak salmon catch per unit effort (CPUE) from SECM, adjusted for highly-correlated environmental parameters, has been used to forecast harvest of adult pink salmon (*O. gorbuscha*) in SEAK. The 2010 forecast of 26.8 M fish was 15% higher than the actual harvest of 23.4 M fish. Six forecasts produced over the period 2004-2010 have been within 0-17% of the actual harvest, with an average forecast deviation of 7.9%. However, the forecast for 2006 did not follow this pattern. The simple CPUE forecast model indicated a downturn in the harvest, but the prediction was 209% higher than the actual harvest. These results show that the CPUE information has great utility for forecasting year class strength of SEAK pink salmon, but additional information may be needed to avoid “misses” such as the forecast for the 2006 return. For the 2011 forecast, model selection included a review of ecosystem indicator variables and considered additional environmental parameters to improve the simple single-parameter CPUE forecast model. The single parameter model was selected as the “best” forecast model for 2011. Juvenile pink salmon CPUE in northern SEAK accounted for 82% of the variability in annual harvest of SEAK pink salmon over the period 1997-2010. The 2011 forecast from this model, using juvenile salmon data collected in 2010, was 56.2 M fish, with an 80% bootstrap confidence interval

of 47-62 M fish. Over the past seven years, the use of the SECM time series of CPUE data and associated environmental parameters has largely been successful in forecasting year-class strength of pink salmon in SEAK.

Doc. 1344 Japan salmon commercial fisheries catch statistics for 2010

Hokkaido National Fisheries Research Institute, FRA

The total commercial catches of salmon in coastal and offshore areas of Japan in 2010 were 54.1 million fish, including 45.2 million chum salmon and 8.9 million pink salmon. The official catch statistics data may be available by the end of March 2012.

Doc. 1345 Preliminary 2010 salmon enhancement production in Japan

Kei Sasaki and Satoru Takahashi

Four species of Pacific salmon (chum, pink, masu, and sockeye salmon) are currently enhanced in Japan. A total of 2,012 million juveniles and smolts were released from Japanese hatcheries in 2010. Approximately 1,852 million chum salmon fry were released in the spring of 2010, almost the same level as in the previous year. Japanese hatcheries also released 145 million pink salmon fry, 14,894 thousand juveniles and smolts of masu salmon, and 345 thousand juveniles and smolts of sockeye salmon.

In 2010, the number of adult salmon captured in rivers along the Japanese coasts was 5,516 thousand fish, which corresponded to 17,776 metric tonnes in weight. The dominant and second dominant species were chum and pink salmon, contributing 84.1% and 15.8% in numbers of all salmon captured in rivers, respectively. Adult masu salmon are found in rivers of both Hokkaido and Honshu, but the number of them was not available for rivers in Honshu. The number of adult returns of masu salmon in Hokkaido was approximately 5.2 thousand fish. Anadromous sockeye salmon were caught in a few rivers in Hokkaido, and the number of catches was approximately 1.1 thousand fish.

Doc. 1346 Japanese bibliography in 2010-2011 for NPAFC Science Plan

Shunpei Sato, Toru Nagasawa, and Shigehiko Urawa

This bibliography listed original papers and documents published in 2010-2011 by Japanese scientists and their collaborators in order to review Japanese national researches for the 2011-2015 NPAFC Science Plan. The bibliography covered 26 papers with abstracts, corresponding to research components of the NPAFC Science Plan.

Doc. 1347 Releases of otolith marked salmon from Japan in fall of 2010 and spring of 2011

Shunpei Sato, Nobuaki Watanabe, Yasuyuki Miyauchi, Tooru Chiba, Masaya Iida, Yasutaka Okamoto, and Tsutomu Ohnuki

This document provided information of otolith mark releases from hatcheries in Japan, including release site, date, number, and mark patterns with images. In the spring of 2011, approximately 139.5 million chum, 25.1 million pink, 1.6 million masu, and 143 thousand sockeye salmon fry (2010 brood year) with thermal or ALC (alizarin complexone) marks were released from 19 hatcheries in Japan. The number of releases did not include otolith-marked chum salmon reared at two hatcheries in Iwate Prefecture, Pacific coast of northern Honshu, because the hatcheries were affected by an event on March 11, 2011. In the spring of 2011, 422 thousand masu salmon smolts and 58 thousand sockeye salmon smolts (2009 brood year) were released after they were thermally marked. In the fall of 2010, 459 thousand juveniles of otolith-marked masu salmon (2009 brood year) were also released. Two thermal rings as a base mark were adopted to distinguish Japanese salmon from other stocks. All mark release information is uploaded to the database on the website of NPAFC Working Group on Salmon Marking (<http://npafc.taglab.org>).

Doc. 1348 **The summer 2011 Japanese salmon research cruise of the R/V *Hokko maru***
Kentaro Morita, Shunpei Sato, Tomoki Sato, and Tsutomu Ohnuki

A summer high-seas research cruise to investigate the biology of Pacific salmon was conducted from July 20 to August 9 in the Bering Sea aboard the Japanese research vessel *Hokko maru*. Research cruise activities included the collection of data on oceanography, zooplankton, micronekton, salmonid fishes, and other organisms. A total of 3,662 salmonids was caught by trawls and angling. Chum salmon was the most abundant species (92.1%), followed by sockeye salmon (5.5%), chinook salmon (1.8%), pink salmon (0.6%), coho salmon (*O. kisutch*; 0.1%), and Dolly Varden charr (*Salvelinus malma*; 0.03%). Salmonids were measured with respect to fork length and body and gonad weights, they were sexed, and the scales were removed for age determination. Isotope, genetic, otolith, and lipid samples were obtained for future study. There were 49 chum salmon tagged with disk tags and released in the Bering Sea. From among fish released with disk-tags, 30 small chum salmon were released carrying archival tags. Age-specific catch per surface trawl (CPUE) from 17 fixed fishing stations from 2007 to 2011 are documented here.