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Abstracts of Scientific Documents Submitted to the Commission for the 2019 CSRS Meeting

by

NPAFC Secretariat

Suite 502, 889 West Pender Street
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Submitted to the

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Abstracts of Scientific Documents Submitted to the Commission for the 2019 CSRS Meeting

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Suite 502, 889 West Pender Street
Vancouver, BC, V6C 3B2 Canada

Keywords: Pacific salmon, status of salmon and steelhead, North Pacific Ocean, technologies, management, information systems, NPAFC Science Plan, International Year of the Salmon (IYS)

This document is a compilation of abstracts of new and revised scientific documents submitted to the Commission between adjournment of the 2017 Annual Meeting and April 20, 2018. The compilation is organized into three sections.

Section 1 lists the document number and title according to the research themes in the NPAFC Science Plan 2016–2020 (Doc. 1665) to "understand variations in Pacific salmon productivity in a changing climate".

(1) Status of Pacific Salmon and Steelhead Trout
(2) Pacific Salmon and Steelhead Trout in a Changing North Pacific Ocean
(3) New Technologies
(4) Management Systems
(5) Integrated Information Systems

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.

Section 2 lists the document number and title according to the country that submitted the document. Documents submitted by CSRS working groups are also listed in this section.

Section 3 lists abstracts of documents in order of document number.

Documents submitted during the specified time period include 42 new documents, two revised documents in 2018, and one revised document in 2016 before the meeting for a total of 45 documents. Including all the submitted documents (n=45), 23 documents related to status of Pacific salmon and Steelhead trout, 16 documents related to Pacific salmon and Steelhead trout in a changing North Pacific Ocean, 21 documents related to new technologies, nine documents related to management system, 12 documents related to integrated information system, and 12 related to other topics. Of the 45 documents, seven were submitted by Canada, 11 by Japan, four by Korea, six by Russia, 13 by the United States, three by Working Groups, and one by the Secretariat.

Section 1. Documents (number, title) Listed by Research Themes of the NPAFC Science Plan 2016–2020

1. Status of Pacific Salmon and Steelhead Trout

Doc. 1647 (Rev. 3) High Seas Salmonid Coded-Wire Tag Recovery Data, 2012, 2014–2015

Doc. 1764 (Rev. 1) Proposed Otolith Marks for Brood Year 2018 Salmon in Japan

Doc. 1807 (Rev. 1) Preliminary Cruise Plan of the R/V *Professor Kaganovskiy* to Study the Ocean Ecology of Pacific Salmon in the Winter in the Gulf of Alaska

Doc. 1815 Report of the 2019 International Year of the Salmon North Pacific Working Group Meeting

Doc. 1816 Report of the 2019 International Year of the Salmon North Pacific Steering Committee Meeting

Doc. 1821 Preliminary Statistics for 2018 Commercial Salmon Catches in Japan

Doc. 1822 Preliminary 2018 Salmon Enhancement Production in Japan

Doc. 1824 Proposed Otolith Marks for Brood Year 2019 Salmon in Japan

Doc. 1826 Japanese Bibliography in 2018 for NPAFC Science Plan

Doc. 1827 Microsatellite Identification of Sockeye Salmon Rearing in the South Central Bering Sea During Summer 2018

Doc. 1828 Korean Salmon Catch Statistics and Hatchery Releases in 2018–2019

Doc. 1829 Korean Research Plan for Salmon in 2019

Doc. 1834 Russian Trawl Survey Plans for Pacific Salmon Marine Life Period Studies in 2019

Doc. 1835 Russian Bibliography Publications Linked to the NPAFC Science Plan in 2018

Doc. 1836 Biostatistical Information on Salmon Catches, Escapement and Enhancement Production in Russia in 2018

Doc. 1837 Canadian Salmon Catch and Enhanced Salmon Production in 2017 and 2018

Doc. 1840 Canadian Juvenile Salmon Surveys in 2019–2020

Doc. 1841 Update on Canadian Research Relevant to the 2016–2020 NPAFC Science Plan

Doc. 1842 Proposed Thermal Marks for Salmon from Canada, Brood Year 2019

Doc. 1843 Releases of Otolith Marked Salmon from Canada in 2018

Doc. 1847 Annual Survey of Juvenile Salmon, Ecologically-Related Species, and Biophysical Factors in the Marine Waters of Southeastern Alaska, May–August 2017

Doc. 1852 United States Bibliography of Publications Linked to the NPAFC Science Plan

Doc. 1853 United States National Research Plan 2019

2. Pacific Salmon and Steelhead Trout in a Changing North Pacific Ocean

Doc. 1807 (Rev. 1)	Preliminary Cruise Plan of the R/V *Professor Kaganovskiy* to Study the Ocean Ecology of Pacific Salmon in the Winter in the Gulf of Alaska
Doc. 1815	Report of the 2019 International Year of the Salmon North Pacific Working Group Meeting
Doc. 1816	Report of the 2019 International Year of the Salmon North Pacific Steering Committee Meeting
Doc. 1820	Results of 2018 Salmon Research by the *Oshoro maru*
Doc. 1825	The Summer 2018 Japanese Salmon Research Cruise of the R/V *Hokko maru*
Doc. 1826	Japanese Bibliography in 2018 for NPAFC Science Plan
Doc. 1829	Korean Research Plan for Salmon in 2019
Doc. 1835	Russian Bibliography Publications Linked to the NPAFC Science Plan in 2018
Doc. 1837	Canadian Salmon Catch and Enhanced Salmon Production in 2017 and 2018
Doc. 1838	Juvenile Salmon Migration Observations in the Discovery Islands and Johnstone Strait in British Columbia, Canada in 2018
Doc. 1841	Update on Canadian Research Relevant to the 2016–2020 NPAFC Science Plan
Doc. 1845	Northern Bering Sea Surface Trawl and Oceanographic Survey Plan, 2019
Doc. 1846	Southeast Alaska Coastal Monitoring Survey Plan for 2019
Doc. 1848	2018 Pink Salmon Harvest Forecast Models from Southeast Alaska Coastal Monitoring Surveys
Doc. 1852	United States Bibliography of Publications Linked to the NPAFC Science Plan
Doc. 1853	United States National Research Plan 2019

3. New Technologies

Doc. 1781 (Rev. 1)	High Seas Salmonid Coded-Wire Tag Recovery Data, 2016–2017
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Doc. 1815	Report of the 2019 International Year of the Salmon North Pacific Working Group Meeting
Doc. 1816	Report of the 2019 International Year of the Salmon North Pacific Steering Committee Meeting
Doc. 1817	Proposed Thermal Marks for Brood Year 2019 Salmon in Alaska
Doc. 1818	Releases of Otolith Marked Salmon from Alaska in 2018
Doc. 1823	Releases of Otolith Marked Salmon from Japan between Summer of 2017 and Spring of 2018
Doc. 1826	Japanese Bibliography in 2018 for NPAFC Science Plan
Doc. 1829	Korean Research Plan for Salmon in 2019
Doc. 1830	Otolith Thermal Mark for Brood Year 2018 and Proposed Thermal Marks for Brood Year 2019 Chum Salmon in Korea
Doc. 1831	Population Genetic Structure of Chum salmon (*Oncorhynchus keta*) from Republic of Korea
Doc. 1832	Marked Salmon Production by the Hatcheries of Russia in 2018

Doc. 1833	Proposed Otolith Marks for Brood Year 2019 Salmon in Russia
Doc. 1835	Russian Bibliography Publications Linked to the NPAFC Science Plan in 2018
Doc. 1838	Juvenile Salmon Migration Observations in the Discovery Islands and Johnstone Strait in British Columbia, Canada in 2018
Doc. 1839	Recoveries of High Seas Tags and Tag Releases from High Seas Research Vessel Surveys in 2018 and the Winter of 2019
Doc. 1841	Update on Canadian Research Relevant to the 2016–2020 NPAFC Science Plan
Doc. 1849	Salmon Scale Wiki—an Interactive Online Protocol for Estimation of Chinook Salmon (*Oncorhynchus tshawytscha*) Scale Ages
Doc. 1851	High Seas Salmonid Coded-Wire Tag Recovery Data, 2017
Doc. 1852	United States Bibliography of Publications Linked to the NPAFC Science Plan
Doc. 1853	United States National Research Plan 2019

4. Management Systems

Doc. 1807 (Rev. 1)	Preliminary Cruise Plan of the R/V *Professor Kaganovskiy* to Study the Ocean Ecology of Pacific Salmon in the Winter in the Gulf of Alaska
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5. Integrated Information Systems

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Doc. 1839	Recoveries of High Seas Tags and Tag Releases from High Seas Research Vessel Surveys in 2018 and the Winter of 2019

Doc. 1841	Update on Canadian Research Relevant to the 2016–2020 NPAFC Science Plan
Doc. 1851	High Seas Salmonid Coded-Wire Tag Recovery Data, 2017
Doc. 1852	United States Bibliography of Publications Linked to the NPAFC Science Plan
Doc. 1853	United States National Research Plan 2019

6. Other Topics

Doc. 1807 (Rev. 1)	Preliminary Cruise Plan of the R/V *Professor Kaganovskiy* to Study the Ocean Ecology of Pacific Salmon in the Winter in the Gulf of Alaska
Doc. 1808	Preliminary Cruise Plan of the Research Vessel Professor Kaganovsky to Study the Ocean Ecology of Pacific Salmon in the Northwestern Pacific Ocean in Winter 2019
Doc. 1809	Proposed Cruise Plans of Japanese Research Vessels for Salmon in the North Pacific Ocean in 2019
Doc. 1810	Cruise Plans of Japanese Research Vessels Involving Incidental Takes of Anadromous Fish in the North Pacific Ocean in 2019
Doc. 1815	Report of the 2019 International Year of the Salmon North Pacific Working Group Meeting
Doc. 1816	Report of the 2019 International Year of the Salmon North Pacific Steering Committee Meeting
Doc. 1819	Incidental Catches of Anadromous Fishes by Japanese Research Vessels in the North Pacific Ocean in 2018
Doc. 1826	Japanese Bibliography in 2018 for NPAFC Science Plan
Doc. 1829	Korean Research Plan for Salmon in 2019
Doc. 1835	Russian Bibliography Publications Linked to the NPAFC Science Plan in 2018
Doc. 1852	United States Bibliography of Publications Linked to the NPAFC Science Plan
Doc. 1855	Incidental Catches of Salmonids by U.S. Groundfish Fisheries in the Bering Sea/Aleutian Islands and the Gulf of Alaska, 1990–2018

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

Canada

Doc. 1827	Microsatellite Identification of Sockeye Salmon Rearing in the South Central Bering Sea During Summer 2018
Doc. 1837	Canadian Salmon Catch and Enhanced Salmon Production in 2017 and 2018
Doc. 1838	Juvenile Salmon Migration Observations in the Discovery Islands and Johnstone Strait in British Columbia, Canada in 2018
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Doc. 1842	Proposed Thermal Marks for Salmon from Canada, Brood Year 2019
Doc. 1843	Releases of Otolith Marked Salmon from Canada in 2018

Japan

Doc. 1764 (Rev. 1)	Proposed Otolith Marks for Brood Year 2018 Salmon in Japan
Doc. 1809	Proposed Cruise Plans of Japanese Research Vessels for Salmon in the North Pacific Ocean in 2019
Doc. 1810	Cruise Plans of Japanese Research Vessels Involving Incidental Takes of Anadromous Fish in the North Pacific Ocean in 2019
Doc. 1819	Incidental Catches of Anadromous Fishes by Japanese Research Vessels in the North Pacific Ocean in 2018
Doc. 1820	Results of 2018 Salmon Research by the *Oshoro maru*
Doc. 1821	Preliminary Statistics for 2018 Commercial Salmon Catches in Japan
Doc. 1822	Preliminary 2018 Salmon Enhancement Production in Japan
Doc. 1823	Releases of Otolith Marked Salmon from Japan between Summer of 2017 and Spring of 2018
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Doc. 1825	The Summer 2018 Japanese Salmon Research Cruise of the R/V *Hokko maru*
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Republic of Korea

Doc. 1828	Korean Salmon Catch Statistics and Hatchery Releases in 2018–2019
Doc. 1829	Korean Research Plan for Salmon in 2019
Doc. 1830	Otolith Thermal Mark for Brood Year 2018 and Proposed Thermal Marks for Brood Year 2019 Chum Salmon in Korea
Doc. 1831	Population Genetic Structure of Chum salmon (*Oncorhynchus keta*) from Republic of Korea

Russia

Doc. 1808	Preliminary Cruise Plan of the Research Vessel Professor Kaganovsky to Study the Ocean Ecology of Pacific Salmon in the Northwestern Pacific Ocean in Winter 2019
Doc. 1832	Marked Salmon Production by the Hatcheries of Russia in 2018
Doc. 1833	Proposed Otolith Marks for Brood Year 2019 Salmon in Russia
Doc. 1834	Russian Trawl Survey Plans for Pacific Salmon Marine Life Period Studies in 2019
Doc. 1835	Russian Bibliography Publications Linked to the NPAFC Science Plan in 2018
Doc. 1836	Biostatistical Information on Salmon Catches, Escapement and Enhancement Production in Russia in 2018

United States

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Doc. 1855	Incidental Catches of Salmonids by U.S. Groundfish Fisheries in the Bering Sea/Aleutian Islands and the Gulf of Alaska, 1990–2018

CSRS Working Groups

Doc. 1815	Report of the 2019 International Year of the Salmon North Pacific Working Group Meeting
Doc. 1816	Report of the 2019 International Year of the Salmon North Pacific Steering Committee Meeting
Doc. 1839	Recoveries of High Seas Tags and Tag Releases from High Seas Research Vessel Surveys in 2018 and the Winter of 2019

Secretariat

Doc. 1807 (Rev. 1)	Preliminary Cruise Plan of the R/V *Professor Kaganovskiy* to Study the Ocean Ecology of Pacific Salmon in the Winter in the Gulf of Alaska

Section 3. Document Abstracts (numerical order)

Doc. 1647 (Rev. 3) **High Seas Salmonid Coded-Wire Tag Recovery Data, 2012, 2014–2015**

Michele M. Masuda, Emily A. Fergusson, Jamal H. Moss, Casey Debenham, Joseph A. Orsi, James M. Murphy, Vanessa J. Tuttle, and Thomas Holland

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 (1993–present). Data from these CWT recoveries are also reported to the Regional Mark Processing Center (RMPC, http://www.rmpc.org) of the Pacific States Marine Fisheries Commission (PSMFC) for inclusion in their Regional Mark Information System database. This document lists recovery data for 481 CWT salmonids not previously reported to the PSMFC/RMPC. These CWTs were recovered from 1) the U.S. groundfish trawl fisheries in the Gulf of Alaska (GOA) as sampled by observers of the North Pacific Groundfish and Halibut Observer Program (NPGHOP) in 2015 (102 Chinook salmon [*O. tshawytscha*] and 1 coho salmon [*O. kisutch*]), 2) the U.S. rockfish trawl fishery in the GOA in 2015 (27 Chinook salmon), 3) U.S. trawl research in the GOA in 2014 (46 Chinook salmon and 1 coho salmon), 4) the U.S. groundfish trawl fisheries in the eastern Bering Sea-Aleutian Islands (BSAI) as sampled by observers of the NPGHOP in 2015 (11 Chinook salmon), 5) salmon excluder device testing in the BSAI in 2015 (3 Chinook salmon), 6) U.S. trawl research in the northern Bering Sea in 2012 (3 Chinook salmon), 2014 (4 Chinook salmon), and 2015 (5 Chinook salmon), 7) the U.S. at-sea Pacific hake (*Merluccius productus*) trawl fishery in the North Pacific Ocean off Washington and Oregon in 2014 (170 Chinook salmon and 5 coho salmon) and 2015 (49 Chinook salmon), and 8) the U.S. West Coast Catch Shares fishery off Washington, Oregon, and California in 2014 (54 Chinook salmon). No new CWT recoveries from foreign high seas research have been reported to the PSMFC/RMPC since 2010.

Doc. 1764 (Rev. 1) **Proposed Otolith Marks for Brood Year 2018 Salmon in Japan**

Tadayoshi Tojima, Motoyasu Kuwaki, and Shigehiko Urawa

Japan plans to mark approximately 388 million salmon of the 2018 brood year (246 million chum, 138 million pink, 3.7 million masu, and 150 thousand sockeye salmon) using 133 discrete thermal patterns and two ALC (alizarin complexone) patterns at 56 hatcheries. Two rings in the first band are adopted as the base mark to distinguish Japanese chum and pink salmon from other stocks.

Doc. 1781 (Rev. 1) **High Seas Salmonid Coded-Wire Tag Recovery Data, 2016–2017**

Michele M. Masuda, Emily A. Fergusson, 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 (1993–present). Data from these CWT recoveries are also reported to the Regional Mark Processing Center (RMPC, http://www.rmpc.org) of the Pacific States Marine Fisheries Commission (PSMFC) for inclusion in their Regional Mark Information System database. This document lists recovery data for 340 CWT salmonids not previously reported to the PSMFC/RMPC. These CWTs were recovered from 1) the U.S. groundfish trawl fisheries in the Gulf of Alaska (GOA) as sampled by observers of the North Pacific Groundfish and Halibut Observer Program (Observer Program) in 2016 (274 Chinook salmon [*O. tshawytscha*]), 2) the U.S. rockfish trawl fishery in the central GOA in 2017 (14 Chinook salmon), 3) U.S. trawl research in the GOA in 2016 (18 Chinook salmon and four coho salmon [*O. kisutch*]), 4) the U.S. groundfish trawl fisheries in the eastern Bering Sea-Aleutian Islands (BSAI) as sampled by observers of the Observer Program in 2016 (28 Chinook

salmon), and 5) the U.S. groundfish trawl fisheries in the eastern BSAI as sampled in the SeaShare Donation Program in 2017 (two Chinook salmon).

Doc. 1807 (Rev. 1) **Preliminary Cruise Plan of the R/V *Professor Kaganovskiy* to Study the Ocean Ecology of Pacific Salmon in the Winter in the Gulf of Alaska**

NPAFC Secretariat

R/V *Professor Kaganovskiy* is scheduled to conduct the first comprehensive survey of Pacific salmon in the Gulf of Alaska in February–March 2019. The main objectives of the expedition are to identify the stock specific rearing areas for all species of salmon, their abundances and their condition. Scientific group consists of 21 scientists from all the NPAFC member countries. A wide array of data and samples will be collected to study ecology of salmon wintering in the northeastern Pacific Ocean.

Doc. 1808 **Preliminary Cruise Plan of the Research Vessel *Professor Kaganovsky* to Study the Ocean Ecology of Pacific Salmon in the Northwestern Pacific Ocean in Winter 2019**

Alexey A. Somov

The document summarizes trawl survey plan for Pacific salmon marine winter life period studies in the western Subarctic front zone of North Pacific in 2019 by Russia (TINRO-Center). The outline of materials, methods, surveys timing and theoretical background is provided. According to NPAFC Doc. 1807, R/V *Professor Kaganovsky* is scheduled to conduct the first comprehensive survey of Pacific salmon in the Gulf of Alaska (GoA) in February–March 2019. To make winter monitoring program more comprehensive, it is decided to conduct epipelagic survey in the western Subarctic front zone of North Pacific out of Russia's EEZ in January 2019. The main objectives of the expedition are to identify the stock specific rearing areas for all species of salmon, their abundances, spatial distribution and their condition. Scientific group consists of 7 specialists from Russia. After the survey is finished, the vessel is heading to Vancouver, B.C. to take on board scientists from other NPAFC member countries. Then the vessel is heading to the GoA.

Doc. 1809 **Proposed Cruise Plans of Japanese Research Vessels for Salmon in the North Pacific Ocean in 2019**

Shunpei Sato, Kentaro Honda, Kengo Suzuki, Shigehiko Urawa, and Masa-aki Fukuwaka

Two Japanese research vessels are scheduled to conduct high-seas salmon surveys. The FRA research vessel *Hokko maru* will carry out a summer monitoring survey for salmon and their habitat in the central Bering Sea. The Hokkaido University training vessel *Oshoro maru* will accomplish salmon research in the western North Pacific Ocean in middle May 2019.

Doc. 1810 **Cruise Plans of Japanese Research Vessels Involving Incidental Takes of Anadromous Fish in the North Pacific Ocean in 2019**

Japan Fisheries Research and Education Agency

Japanese research vessels (Appendix table) are scheduled to conduct eight surveys for pelagic fishes and squids in the North Pacific Ocean in 2019 (Table 1). These surveys have a possibility of incidental salmon catch during the fishing operations with driftnets or trawl net. In the case of driftnet operation, the length of driftnets will be less than 2.5 km at the sea.

Doc. 1815 **Report of the 2019 International Year of the Salmon North Pacific Working Group Meeting**

International Year of the Salmon Working Group

The International Year of the Salmon Working Group (IYS-WG) met on January 20 & 21, 2019, at the Blue Horizon Hotel, in Vancouver, BC, Canada. The purpose of the meeting was to review progress made on IYS to date, including signature projects and next steps, discuss the implementation of the Theme Counsel Groups, and to determine the next steps of the IYS Working Group with respect to the development of research and outreach plans that reflect NPAFC priorities.

Doc. 1816 **Report of the 2019 International Year of the Salmon North Pacific Steering Committee Meeting**

International Year of the Salmon Working Group

This report documents the proceedings of the 2019 meeting of the North Pacific Steering Committee (NPSC) that took place from January 21–22 in Vancouver, Canada, to provide direction regarding the implementation of the International Year of the Salmon (IYS) in the Pacific basin. The NPSC is one of two basin-scale Steering Committees that provide direction to an IYS Coordinating Committee (CC) that in turn considers issues related to overall implementation of the IYS at the hemispheric scale. This was the third meeting of the NPSC. The agenda was supported by detailed discussion documents on overarching issues of concern to be considered at meetings of all three committees, the North Atlantic Steering Committee (NASC) met September 11&12, 2018 and the CC meeting will be sometime in spring 2019.

The meeting highlighted continued support for the IYS. With the launch of the website in October 2018, there have been several projects and events posted, which NPSC members found to be a reflection of the exciting momentum that the IYS has developed over the past year. Participants provided direction on ways to improve IYS communication and outreach, including the website and social medias, and provided feedback on the strategic implementation plan. There were presentations on planned and proposed IYS signature projects and very productive discussions on communications regarding the 2019 High Seas Expedition into the Gulf of Alaska. The NPSC agreed to move ahead with the addition to the IYS Theme Counsel Group Terms of Reference, which states that each TCG will consist of up to 15 experts, with no more than three from each member nation. There was also discussion about the current budget and funding strategies, and participants agreed that the NPSC needed to move forward quickly with targeted fundraising.

Doc. 1817 **Proposed Thermal Marks for Brood Year 2019 Salmon in Alaska**

Dion S. Oxman

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 2019, approximately 62 million sockeye, 952 million pink salmon, 729 million chum, 19 million Coho, and 9 million Chinook salmon will be marked at 26 different hatcheries using 111 thermal marks, six dry marks, and one strontium mark.

Doc. 1818 **Releases of Otolith Marked Salmon from Alaska in 2018**

Dion S. Oxman

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 2018. It includes five species of salmon from brood years 2016 and 2017. Release numbers, mark patterns, and release locations are summarized.

Doc. 1819 **Incidental Catches of Anadromous Fishes by Japanese Research Vessels in the North Pacific Ocean in 2018**

Shunpei Sato, Kengo Suzuki, and Shigehiko Urawa

Japanese research vessels conducted scientific fishing operations to assess the stock status of Pacific saury, and other pelagic fishes and squids using surface and midwater trawls, and drift gillnets in the western and central North Pacific Ocean (Japan Fisheries Research and Education Agency 2018). A total of 378 salmon including 181 chum, 151 pink, one sockeye, 40 coho, four Chinook salmon, and one steelhead trout was incidentally caught during the research surveys between June and September 2018 (Table 1).

Doc. 1820 **Results of 2018 Salmon Research by the *Oshoro maru***

Taichi Sato, Yuta Inagaki, Keiichiro Sakaoka, Keiri Imai, Maki Ohwada, Kenji Oguma, Kouki Sawada, and Shogo Takagi

In order to accumulate oceanographic and biological data (including salmonids) and to clarify the oceanic structure and marine ecosystem, T/V *Oshoro maru* conducted oceanographic observations and fishing surveys in the western North Pacific (along with the 155°E longitude line) and the Bering Sea. The survey was conducted during the cruise #054 in May, and cruise #056-Leg1 in June 2018.

Oceanographic observations and drift gillnet surveys were conducted along the 155°E during the cruise #054. Due to the unfavorable weather, only one drift gillnet survey was conducted, and no observation or survey was made from 41°45'N southward throughout the cruise this year.

A total of 357 salmonids was caught by gillnet survey, including 355 pink, 2 chum salmon. Other species such as steelhead and sockeye salmon were not caught during the cruise#054. The fork lengths (F.L.) of pink salmon collected by C-gear gillnet were all adult fish ranging between 318–406 mm.

To collect salmon samples including fresh salmon blood, otoliths, and various tissues extensively three hook-and-line gear samplings were conducted during the Cruise #056-Leg1 as well as the cruise #054. The predominant species caught by hook-and-line gear samplings during the cruise #056-Leg-1 were pink salmon (84 pink, 74 sockeye, 60 chum).

Doc. 1821 **Preliminary Statistics for 2018 Commercial Salmon Catches in Japan**

Yukiharu Gohda and Toshihiko Saito

The commercial catches in coastal and offshore areas of Japan in 2018 totaled 34.0 million fish (91.3 thousand metric tonnes), including 26.7 million chum (80.3 thousand metric tonnes) and 7.3 million pink (9.7 thousand metric tonnes) salmon (Tables 1, 2). The official specific statistics data may be available by the end of March 2020.

Doc. 1822 **Preliminary 2018 Salmon Enhancement Production in Japan**

Hiroaki Fukuzawa and Yukiharu Gohda

Four species of anadromous Pacific salmon (chum, pink, masu, and sockeye salmon) are currently enhanced in Japan. A total of 1,648 million fry, juveniles, and smolts were released from Japanese hatcheries in 2018 (Tables 1 and 2). The number of chum salmon fry released in the spring of 2018 was approximately 1,528 million fish. Japanese hatcheries also released 113 million pink salmon fry, 7,223 thousand masu salmon fry, juveniles and smolts, and 187 thousand sockeye salmon fry and smolts in the spring and fall of 2018.

In 2018, the number of adult salmon captured in rivers along the Japanese coasts was 4,222 thousand fish (Table 3), which corresponded to 11,108 metric tonnes in weight (Table 4). The dominant and second dominant species were chum and pink salmon, contributing 77.8% and 21.9% in numbers of all salmon captured in rivers, respectively. Adult masu salmon occur in rivers of both Hokkaido and Honshu, but the number of catches was not available in Honshu. The

number of adult masu salmon caught in rivers of Hokkaido was approximately 13.1 thousand fish. Anadromous sockeye salmon were caught in two rivers along the Pacific coast of Hokkaido, where the number of catches was 786 fish.

Doc. 1823 **Releases of Otolith Marked Salmon from Japan between Summer of 2017 and Spring of 2018**

Kazuyuki Yamaya, Motoyasu Kuwaki, and Shigehiko Urawa

This document provided information on Japanese otolith mark releases, including release site, date, number, and mark patterns with images. From October 2017 to July 2018, approximately 271 million chum, 113 million pink, and 2.3 million masu salmon, 246 thousand sockeye salmon (2017 brood year) with thermal marks or ALC (alizarin complexone) patterns were released or stocked in Japan. In addition, 387 thousand masu salmon smolts and 79 thousand sockeye salmon smolts (2016 brood year) with thermal marks were released in the spring of 2018. In the summer and fall of 2017, 306 thousand masu salmon juveniles and 30 thousand sockeye salmon juveniles (2016 brood year) with thermal marks were also released. Two thermal rings as base mark were adopted to distinguish Japanese chum and pink salmon from other stocks. The data are uploaded to the database on the website of NPAFC Working Group on Salmon Marking (http://wgosm.npafc.org/).

Doc. 1824 **Proposed Otolith Marks for Brood Year 2019 Salmon in Japan**

Kazuyuki Yamaya, Motoyasu Kuwaki, and Shigehiko Urawa

Japan plans to mark approximately 392 million salmon of the 2019 brood year (250 million chum, 138 million pink, 3.7 million masu, and 150 thousand sockeye salmon) using 135 discrete thermal patterns and two ALC (alizarin complexone) patterns at 56 hatcheries. Two rings in the first band are adopted as the base mark to distinguish Japanese chum and pink salmon from other stocks.

Doc. 1825 **The Summer 2018 Japanese Salmon Research Cruise of the R/V *Hokko maru***

Kentaro Honda, Tomoki Sato, Shusuke Ueda, Yuuki Matsunami, Takaaki Abe, Itsuki Tatsuoka, Shunpei Sato, and Kengo Suzuki

A summer high-seas research cruise to investigate the biology of Pacific salmon was conducted from 23 July to 3 August 2018 in the Bering Sea aboard the Japanese research vessel *Hokko maru*. Research cruise activities included the collection of data on oceanography, zooplankton, micronekton, salmonids, and other organisms. In addition, seawater samples were collected for environmental DNA analysis. A total of 2,448 salmonids were caught by surface trawls (excluding a failed station) and hook-and-line at 17 monitoring stations and adjacent waters. Among those caught by trawls, chum salmon was the most abundant species (n = 1,930, 80.6%), followed by sockeye salmon (n = 403, 16.8%), Chinook salmon (n = 36, 1.50%), pink salmon (n = 20, 0.84%), and coho salmon (n = 6, 0.25%). Salmonids were measured with respect to fork length and body and gonad weights by sex, and the scales were removed for age determination. Isotope, genetic, otolith, stomach, and seawater samples were obtained for the future study. A total of 36 chum salmon were tagged with archival and disk tags and were released in the Bering Sea. Age-specific catch per unit effort by surface trawl and annual mean body weight of each ocean age of chum salmon during 2007–2018 are documented here.

Doc. 1826 **Japanese Bibliography in 2018 for NPAFC Science Plan**

Shunpei Sato, Masa-aki Fukuwaka, and Shigehiko Urawa

This bibliography listed original papers and documents published in 2018 by Japanese scientists and/or their collaborators to review Japanese national researches for the 2016–2020 NPAFC Science Plan. The bibliography includes 54 articles with abstracts, corresponding to five research themes of the NPAFC Science Plan.

Doc. 1827 **Microsatellite Identification of Sockeye Salmon Rearing in the South Central Bering Sea During Summer 2018**

Terry D. Beacham, Colin Wallace, and Shunpei Sato

Stock composition of sockeye salmon (*Oncorhynchus nerka*) caught in the southern central Bering Sea during a Japanese research cruise in the summer of 2018 was estimated through an analysis of microsatellite variation. Variation at 14 microsatellites was analyzed for immature sockeye salmon, and a 415-population baseline spanning Japan, Russia, Alaska, Canada, and Washington State was used to determine the stock composition of the fish sampled. Alaskan-origin sockeye salmon were the most abundant in the catch of immature individuals, comprising 71.5% of all sockeye salmon caught, with the catch dominated by sockeye salmon of Bristol Bay origin (67.5%). Russian-origin sockeye salmon accounted for 26.3% of the catch, while Canadian-origin salmon accounted for an average of 2.1% of the catch, with 388 individuals of the catch genotyped.

Doc. 1828 **Korean Salmon Catch Statistics and Hatchery Releases in 2018–2019**

Sukyung Lee, Chung Il Lee, and Na Ri Kim

Total catch of chum salmon was 95,993 fish or 240.2 metric tons in 2018. The total fries of chum salmon released was 10,950 thousand fish in 2019 (2018 brood year).

Doc. 1829 **Korean Research Plan for Salmon in 2019**

Chung Il Lee and Ju Kyoung Kim

Salmon are very important resources in biological, social, economic, and political aspect with characteristics of transboundary distribution and economic importance. The interest in chum salmon biology in Korea has been much increased since the establishment of the Inland Living Resources Center (formerly Yangyang Salmon Station) of Korea Fisheries Resources Agency in 1980s. The enhancement program for chum salmon has been expanded thereafter, so that chum salmon were transplanted 18 streams in the coast of the Korean Peninsula. More than 10 million fry salmon have been released every year since the 2000s. On the other hand, the ecological research on salmon species was very limited until recently due to the lack of research program. Although the North Pacific Anadromous Fisheries Commission (NPAFC) emphasizes the need for salmon research, the conspicuous increase in research funding was not achieved. Oceanic environments have been rapidly altered by climate change during the last a few decades and ocean ecosystems including salmon populations will be changed under the global warming situation. Especially, Korea is located at the southern limit of chum salmon distribution, and special attention and support for salmon ecology research is needed.

Doc. 1830 **Otolith Thermal Mark for Brood Year 2018 and Proposed Thermal Marks for Brood Year 2019 Chum Salmon in Korea**

Ju Kyoung Kim, Chan Hyeok Jeon, and Seong Min Yoon

Korea released 5.0 million and 2.7 million thermal marked chum salmon in March 2018 and 2019, respectively. The marks were 3,3nH (5.0million) for 2018 (2017BY) and 3,1,2H (2.5million) and 4n,2,3H (0.2million) for 2019 (2018BY). Korea will mark approximately 2.7 million chum salmon in BY 2019, which covers about 50–60% of release of BY 2018 chum salmon at Namdae-cheon and Wangpi-cheon (river). Chum salmon will be marked at two different hatcheries (Yangyang Hatchery and Uljin Hatchery) using two thermal mark.

Doc. 1831 **Population Genetic Structure of Chum salmon (*Oncorhynchus keta*) from Republic of Korea**

Eun Ah Kim and Sang Gyu Kim

Genetic structure of chum salmon (*Oncorhynchus keta*) was examined in a total of 465 samples collected from seven geographical groups by using ten microsatellite DNA markers. In Korea, populations included seven localities (Myeongpa River, Buk River, Namdae River, Yeongok River, Maup & Osip River, Wangpi River and Taehwa River) on the east side of the Korean Peninsula. The results of genetic diversity analysis are shown in Table 1. The mean Na (number of alleles) ranged from 12.70 (Maup & Osip River) to 21.70 (Namdae River). The H_O (observed heterozygosity) per populations ranged from 0.6466 (Yeongok River) to 0.7814 (Wangpi River). The H_E (expected heterozygosity) per populations ranged from 0.8060 (Myeongpa River) to 0.8204 (Maup & Osip River). In addition, the mean PIC (polymorphism information content) index ranged from 0.7834 (Wangpi River) to 0.8026 (Buk River). In conclusion, the analyses showed similar level of genetic diversity from between seven populations. The microsatellite markers revealed that genetic differentiation (F_{ST}) between populations is generally low (Table 2), suggesting a moderate level of gene flow taking place among those populations. In addition, the result of PcoA shows that Maup & Osip River and Wangpi River population are clearly distinguished from the others respectively (Figure 1).

Doc. 1832 **Marked Salmon Production by the Hatcheries of Russia in 2018**

Elena Akinicheva, Vladimir Volobuev, Aleksey Yamborko, and Maksim Myakishev

As in the preceding years, the main aim of the hatcheries salmon marking in Russia is to evaluate numbers of hatchery-reared salmon returns. In recent years the basic part of juvenile salmon have been reared and marked at Sakhalin. Two methods were used for hatcheries marking: thermal (Munk et al., 1993) and "dry" (Safronenkov et al., 1999). In 2018, the percentage of marked salmon juveniles in Sakhalin region was 73.49 % of the total Russian release of marked juveniles. This is caused by the location of hatcheries, a large number of which (38) are located at Sakhalin and only 19 hatcheries in other regions of the Russian Far East.

Doc. 1833 **Proposed Otolith Marks for Brood Year 2019 Salmon in Russia**

Elena Akinicheva, Vladimir Volobuev, and Maksim Myakishev

Otolith marking of salmon of 2019 brood year will be conducted in five regions of the Far East: Kamchatka, Magadan, Sakhalin, Khabarovsk, Kuril and Primorsky regions. Marking will be carried out using two methods (thermal and "dry"). Their application will be determined by the possibilities and specificity of the water supply of incubated embryos at hatcheries of the Far East. The dominating method of marking will be a "dry" one—it will be used on the 75% of salmon hatcheries. Salmon will be marked at 28 hatcheries. Totally 32 otolith marks will be used.

Doc. 1834 **Russian Trawl Survey Plans for Pacific Salmon Marine Life Period Studies in 2019**

Olga S. Temnykh and Alexander N. Starovoytov

Two Russian research vessels are scheduled to conduct salmon surveys in summer and fall 2019. R/V *TINRO* will carry out a summer monitoring survey in the Pacific waters off Kuril Islands in June–July. The primary objectives are to collect biological information on plankton and nekton communities and describe the physical and biological oceanographic conditions in this region. The major purpose of these studies is the estimation of anadromous Pacific salmon abundance and biomass for short-term forecasting of their returns and possible catches on the coasts of the Sea of Okhotsk.

R/V *TINRO* and R/V *Professor Kaganovsky* will operate respectively in the western Bering Sea and in the southern Okhotsk Sea. The major purpose of these studies is the estimation of

catadromous Pacific salmon abundance for forecasting of their returns and possible catch in the next years.

Doc. 1835 **Russian Bibliography Publications Linked to the NPAFC Science Plan in 2018**

O.S. Temnykh, V.A. Shevlyakov, S.V. Naydenko, A.V. Bugaev, N.V. Klovach, V.V. Volobuev, E.V. Golub, A.M. Kaev, V.I. Ostrovsky, and A.A. Khoruzhiy

The current bibliography lists original papers published in 2018 by Russian scientists and their collaborators relevant to the 2016–2020 NPAFC Science Plan as well as other salmon studies. The bibliography lists 61 papers, corresponding mainly to the 3 key research components of the NPAFC Science Plan: 1) Status of Pacific Salmon and Steelhead Trout; 2) Pacific Salmon and Steelhead Trout in a Changing North Pacific Ocean; 3) New Technologies. Each publication is listed under one research component, although some of them are relevant to several components. The references are given with abstracts if papers included abstracts in English. Otherwise, they are listed without abstracts.

Doc. 1836 **Biostatistical Information on Salmon Catches, Escapement and Enhancement Production in Russia in 2018**

Klovach N.V., Temnykh O.S., Shevlyakov V.A., Lysenko A.V., Golub E.V., Burlak O.V., Bugaev A.V., Kaev A.M., Golovanov I.S., and Ostrovsky V.I.

Salmon catch (commercial, subsistence, and sport catch), average weights, hatchery releases, and escapement statistics for 2018 are provided.

Doc. 1837 **Canadian Salmon Catch and Enhanced Salmon Production in 2017 and 2018**

Mary E. Thiess, Joan Bateman, Shelee Hamilton, and Mark Beere

This document reports final catch estimates for 2017 and preliminary catch estimates for 2018 for the six major salmon species in British Columbia (B.C.) and Yukon fisheries. Catch is reported for commercial fisheries (numbers and total weight) in tidal waters, and recreational (numbers only) and aboriginal fisheries (numbers only) in tidal and non-tidal waters. Catches include non-Canadian origin fish caught in B.C. and exclude Canadian origin fish caught in fisheries outside B.C. This document also summarizes release information for salmon including steelhead trout from Fisheries and Oceans Canada (DFO) and Freshwater Fisheries Society of B.C. enhancement facilities in B.C. in 2017 and 2018.

Doc. 1838 **Juvenile Salmon Migration Observations in the Discovery Islands and Johnstone Strait in British Columbia, Canada in 2018**

Brett Johnson, Julian C.L. Gan, Sean C. Godwin, Martin Krkosek, and Brian P.V. Hunt

The Hakai Institute Juvenile Salmon Program has been monitoring juvenile salmon migrations in the Discovery Islands and Johnstone Strait since 2015 with the specific purpose to understand how ocean conditions experienced by juvenile salmon during their early marine migration impacts their growth, health and ultimately survival. We found that during the two of the warmest years of sea-surface temperature recorded in British Columbia waters, juvenile sockeye, pink, and chum left the Strait of Georgia one to two weeks earlier than previously. The temporal distribution of sockeye migration timing out of the Strait of Georgia north through the Discovery Islands was skewed right, indicating that many sockeye migrate together in late May and abundance tails off late into June and July. Pink and chum migrations are more protracted, lasting from early May to late July. Our results indicate that juvenile sockeye exit the Strait of Georgia en masse, likely in response to ocean temperature and foraging conditions. This report

summarizes migration timing, fish length and weight, sea-louse loads, purse seine catch composition, and ocean temperatures observed from the first four years of this research and monitoring program. Combining key variables from this research program with observations from freshwater and high-seas sampling will provide, for some stocks, a complete account of the conditions salmon experience during their migration from their natal river to the high seas. These measures will further our knowledge of what drives early marine mortality, and better our understanding of how salmon are adapting to climate change.

Doc. 1839 **Recoveries of High Seas Tags and Tag Releases from High Seas Research Vessel Surveys in 2018 and the Winter of 2019**

Working Group on Salmon Marking

In late July and early August 2018, tagging operations were conducted in the central Bering Sea by the Japanese R/V *Hokko maru*, and 36 chum salmon were released with FAJ/NPAFC disk tags and archival tags (AZBL, Biologger, DST-magnetic or Pop-up tags). During the Gulf of Alaska Expedition with the Russian R/V *Professor Kaganovskiy*, two coho salmon were captured by trawl operation using a live-box, and released with NPAFC disc tags into the eastern Gulf of Alaska in March 2019. During January to July in 2018, archived tag data were retrieved via the Argos satellite system from 10 pop-up satellite archival tags that were attached to Chinook salmon in Unalaska Bay, Alaska in October–November 2017.

Doc. 1840 **Canadian Juvenile Salmon Surveys in 2019–2020**

Chrys-Ellen M. Neville and Jackie R. King

This document provides information on the juvenile salmon research surveys planned in both offshore and inshore areas of the North Pacific Ocean by Canada for fiscal year 2019–2020. The inshore program will conduct sampling in the Salish Sea (encompassing the Strait of Georgia and Puget Sound) whereas the offshore program will conduct sampling along of the continental shelf surrounding Vancouver Island (mid-summer) and on the northern migratory corridor for Fraser River Sockeye Salmon which includes Johnstone Strait, Queen Charlotte Strait and the continental shelf in southern Queen Charlotte Sound, (early summer and fall). These surveys are both part of long-term research programs that were initiated in 1997–1998, however in 2017 the offshore program began integrating with other pelagic research programs to develop a synoptic pelagic survey on the continental shelf off the west coast of Vancouver Island (King et al. 2019). This integrated survey will continue in 2019.

Doc. 1841 **Update on Canadian Research Relevant to the 2016–2020 NPAFC Science Plan**

J.R. Irvine, S. Akenhead, T. Beacham, C.M. Deeg, S.C.H. Grant, K.D. Hyatt, C. Holt, B.V.P. Hunt, B.T. Johnson, J. King, K.M. Miller, and C. Neville

This document summarises Canada's scientific research activities in relation to the 2016–2020 NPAFC Science Plan. The focus is on research activities planned by Canada during 2019/20 and results from recent studies not previously documented to NPAFC.

Doc. 1842 **Proposed Thermal Marks for Salmon from Canada, Brood Year 2019**

Jeff Till

Thermal marking continues to play an important role for both stock, hatchery, and fisheries management and research in Canada. Canada plans to thermally mark approximately 74 million Pacific salmon from the 2019 brood year for release in 2020/21. Thermal marking will include 59 different thermal marks applied at 17 hatcheries with marked salmon released at over 50 locations.

The plan is similar to the 2018 brood year marking plan, fish planned for release in 2019/20 (Till 2018).

Doc. 1843 **Releases of Otolith Marked Salmon from Canada in 2018**

Jeff Till

Thermal mass marking of salmon has, for a number of years, played an important role in stock, hatchery, and both fisheries and research management within Canada. This document follows up on previous documents outlining Canada's thermal marking proposals including those for brood year 2017 (Till 2018). It summarizes all thermally marked salmonids released from BC hatcheries in 2018 by species, hatch mark, facility, release location and release number.

Doc. 1845 **Northern Bering Sea Surface Trawl and Oceanographic Survey Plan, 2019**

James M. Murphy, Sabrina Garcia, Kris Cieciel, Brad Harris, and Ed Farley

The 2019 northern Bering Sea pelagic trawl and oceanographic survey is a multi-disciplinary research project conducted aboard a chartered fishing vessel, the F/V *Northwest Explorer*. The survey is scheduled to begin and end in Dutch Harbor, AK from August 27 and September 20, 2019 with a port call in Nome, AK on Sep 8, 2019. The survey will principally be conducted in support of the Alaska Sustainable Salmon Fund (AKSSF) funded project entitled the 'Northern Bering Sea Juvenile Chinook Salmon Survey Phase 2' and the Alaska Fisheries Science Center's Recruitment Process Alliance and Loss of Sea Ice research programs. Additional research objectives by AFSC, the Alaska Department of Fish and Game, U.S. Fish and Wildlife Service, University of Alaska, and the Alaska Pacific University will also be supported during the survey.

Doc. 1846 **Southeast Alaska Coastal Monitoring Survey Plan for 2019**

James M. Murphy, Andy Piston, Emily A. Fergusson, and Andrew K. Gray

This document outlines the survey plan for the Southeast Coastal Monitoring (SECM) project during 2019. The primary objective of SECM is to evaluate the status of the pelagic ecosystem including juvenile salmon (*Oncorhynchus* spp.) and other pelagic fish species in the northern region of Southeast Alaska. SECM surveys support research on the marine ecology of salmon, provide harvest forecast models for SEAK pink salmon (*O. gorbuscha*), and support ecosystem research in the Gulf of Alaska. SECM surveys will occur during monthly intervals from May to August, 2019 at 12 principal stations, and include surface trawl (Nordic 264) sampling for salmon and other pelagic fish species, bongo net sampling for zooplankton, and CTD data collection of temperature and salinity data (Figure 1; Tables 1 and 2). Primary funding support for the 2019 survey is provided by the Northern Fund of the Pacific Salmon Commission. Support for the participation of scientific staff from the Alaska Fisheries Science Center (AFSC), Alaska Department of Fish and Game (ADFG), Douglas Island Pink and Chum (DIPAC), and the Southern Southeast Regional Aquaculture Association (SSRAA) is provided by respective agencies (Table 3).

Doc. 1847 **Annual Survey of Juvenile Salmon, Ecologically-Related Species, and Biophysical Factors in the Marine Waters of Southeastern Alaska, May–August 2017**

Emily A. Fergusson, Jordan Watson, Andrew Gray, and Jim Murphy

Juvenile Pacific salmon (*Oncorhynchus* spp.), ecologically-related species, and associated biophysical data were collected from the marine waters of the northern region of southeastern Alaska (SEAK) in 2017. This annual survey, conducted by the Southeast Coastal Monitoring (SECM) project, marks 21 consecutive years of systematically monitoring how juvenile salmon

utilize marine ecosystems during a period of climate change. The survey was implemented to identify the relationships between year-class strength of juvenile salmon and biophysical parameters that influence their habitat use, marine growth, prey fields, predation, and stock interactions. Nine stations were sampled monthly in epipelagic waters from May to August (total of 13 sampling days). Fish, zooplankton, surface water samples, and physical profile data were collected during daylight at each station using a surface rope trawl, bongo nets, a water sampler, and a conductivity-temperature-depth profiler. Surface (3-m) temperatures and salinities ranged from approximately 8 to 12 ºC and 18 to 31 PSU across inshore and strait habitats for the four months. Integrated (top 20-m) temperatures and salinities ranged from approximately 7 to 11 ºC and 26 to 31 PSU. A total of 10,277 fish and squid, representing 17 taxa, were captured in 32 rope trawl hauls fished from June to July. Juvenile salmon comprised 4 and 51% of the catch in June and July, respectively. Abundance of juvenile salmon, especially juvenile pink salmon was very low in 2017. Coded-wire tags were recovered from four juvenile coho and one immature Chinook salmon, that all originated from hatchery and wild stocks in SEAK. Of the juvenile salmon examined for otolith marks, Alaska enhanced stocks comprised 79% of the juvenile chum (93 of 118) and 30% of the juvenile sockeye salmon (12 of 40). Of the 153 potential predators of juvenile salmon, no predation on juvenile salmon was observed. The long term seasonal time series of SECM juvenile salmon stock assessment and biophysical data is used in conjunction with basin-scale ecosystem metrics to annually forecast pink salmon harvest in SEAK. Long term seasonal monitoring of key stocks of juvenile salmon and associated ecologically-related species, including fish predators and prey, permits researchers to understand how growth, abundance, and interactions affect year-class strength of salmon in marine ecosystems during a period of rapid climate change.

Doc. 1848 **2018 Pink Salmon Harvest Forecast Models from Southeast Alaska Coastal Monitoring Surveys**

James M. Murphy, Alex C. Wertheimer, Emily Fergusson, Andrew Piston, Steve Heinl, Charles Waters, Jordan Watson, and Andrew Gray

Juvenile abundance indices from the Southeast Coastal Monitoring survey and ecosystem indicators are used to forecast harvests of Southeast Alaska (SEAK) pink salmon (*Oncorhynchus gorbuscha*). We describe the 2018 harvest forecast models and review the performance of the 2017 harvest forecast models. Goodness-of-fit statistics (AIC and AICc) and jackknife prediction errors were used to select the 2018 forecast models. Forecasts models were developed for the total harvest of pink salmon in SEAK and for the northern region of Southeast Alaska (NSEAK). Bootstrap confidence intervals (80%) of the model prediction were used as the forecast range. Two indices of juvenile abundance were considered in the 2018 harvest forecast models: $CPUE_{cal\_loc}$ (catch-per-unit-effort calibrated for sampling vessel and adjusted to balance sampling effort across transects or locations) and $CPUE_{ttd\_loc}$ (catch-per-distance-trawled adjusted to balance sampling effort across transects or locations). The model selected for total SEAK pink salmon harvest included the $CPUE_{cal\_loc}$ and the Icy Strait Temperature Index, and projected a harvest range from 10 M to 23 M with a point estimate of 13 M in 2018. The NSEAK pink salmon harvest model only included $CPUE_{cal\_loc,}$ and projected harvest range of 0–3 M with a point estimate of zero in 2018.

Doc. 1849 **Salmon Scale Wiki—an Interactive Online Protocol for Estimation of Chinook Salmon (*Oncorhynchus tshawytscha*) Scale Ages**

Beverly A. Agler, Lorna I. Wilson, and Rich Brenner

As part of a project to examine consistency in age estimates of Chinook salmon scales within Alaska, we created Salmon Scale Wiki, an interactive website designed to help standardize methods and to facilitate interaction and learning among scale readers. Scale readers throughout the state estimated age of 10,000 digital images of Chinook salmon scales using an online

application. Participants subsequently attended a workshop in Anchorage, Alaska to review project results and develop guidelines for estimating Chinook salmon scale ages from growth patterns. These guidelines were then incorporated into Salmon Scale Wiki, where scale readers can access information about Chinook salmon scales and stocks within Alaska. This website includes pages where readers learn about scale age estimation protocols, acquire training techniques, and explore images from a variety Alaskan Chinook salmon stocks. In addition, viewers learn how to develop quality control and quality assurance methods and improve data collection. The Wiki provides a glossary to encourage standardization of terms used to describe and explain the scale aging process.

Doc. 1851 **High Seas Salmonid Coded-Wire Tag Recovery Data, 2017**
Michele M. Masuda, Emily A. Fergusson, Jamal H. Moss, James M. Murphy, Vanessa J. Tuttle, and Thomas Holland

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 (1993–present). Data from these CWT recoveries are also reported to the Regional Mark Processing Center (RMPC, http://www.rmpc.org) of the Pacific States Marine Fisheries Commission (PSMFC) for inclusion in their Regional Mark Information System database. This document lists recovery data for 336 CWT salmonids not previously reported to the PSMFC/RMPC. These CWTs were recovered from 1) the U.S. groundfish trawl fisheries in the Gulf of Alaska (GOA) as sampled by observers from the North Pacific Observer Program (NPOP) in 2017 (179 Chinook salmon [*O. tshawytscha*]), 2) U.S. trawl research in the GOA in 2017 (four coho salmon [*O. kisutch*]), 3) the U.S. groundfish trawl fisheries in the eastern Bering Sea-Aleutian Islands (BSAI) as sampled by NPOP observers in 2017 (44 Chinook salmon), 4) U.S. trawl research in the northern Bering Sea in 2017 (one Chinook salmon), and 5) the U.S. at-sea Pacific hake (*Merluccius productus*) trawl fishery in the North Pacific Ocean off Washington and Oregon in 2017 (108 Chinook salmon) as sampled by observers from the At-Sea Hake Observer Program.

Doc. 1852 **United States Bibliography of Publications Linked to the NPAFC Science Plan**
National Oceanic and Atmospheric Administration and Alaska Department of Fish and Game

This bibliography lists original papers and documents published since June 2018 to May 2019 by United States scientists and/or their collaborators in relation to the 2016–2020 NPAFC Science Plan. The bibliography includes 10 articles with abstracts, corresponding to the five research themes of the NPAFC Science Plan.

Doc. 1853 **United States National Research Plan 2019**
National Oceanic and Atmospheric Administration

The United States identified the following research plans that reflect the five research components identified under the NPAFC Science Plan for 2016–2020 (NPAFC Doc. 1665): 1) Status of Pacific salmon and steelhead trout; 2) Pacific salmon and steelhead trout in a changing North Pacific Ocean; 3) New technologies; 4) Management systems; 5) Integrated information systems. The US refers to the Bering Arctic Subarctic Integrated Surveys (BASIS) throughout the document.

Doc. 1855 **Incidental Catches of Salmonids by U.S. Groundfish Fisheries in the Bering Sea/Aleutian Islands and the Gulf of Alaska, 1990–2018**

Gwynne M. Schnaittacher and Renold E. Narita

This report presents the estimated incidental catches and average weights of Pacific salmonids in U.S. groundfish fisheries off Alaska from 1977 through 2018. Estimated annual incidental salmon catches (all species combined) in 2018, were 325,642 salmon in the Bering Sea/Aleutian Islands (BSAI) and 25,517 salmon in the Gulf of Alaska (GOA).

Annual estimated numbers of Chinook salmon (*Oncorhynchus tshawytscha*) incidentally caught in the U.S. groundfish fisheries in the BSAI, have ranged from 8,222 individuals in 2000 to 130,000 individuals in 2007 and the annual average weight has ranged from 2.44 kg in 2016 to 5.21 kg in 1995. Annual estimated numbers of non-Chinook salmon have ranged from 14,417 individuals in 2010 to 715,628 individuals in 2005. Chum salmon (*O. keta*) typically account for over 95% of the non-Chinook salmon catch with an annual average chum salmon weight ranging from 1.92 kg in 2017 to 3.43 kg in 1995.

In the U.S. groundfish fisheries in the GOA, annual estimated numbers of Chinook salmon incidentally caught have ranged from 8,475 individuals in 2009 to 54,696 in 2010 and the annual average weight has ranged from 1.89 kg in 2016 to 4.60 kg in 1991. Annual estimated numbers of non-Chinook salmon have ranged from 1,274 individuals in 2012 to 64,792 in 1995. Chum salmon typically account for over 95% of the non-Chinook salmon catch where the annual average chum salmon weight has ranged from 2.16 kg in 1993 to 4.87 kg in 1999.

Incidental catches of Pacific salmonids in foreign and joint venture groundfish fisheries off Alaska are presented for 1977–1990. The last joint venture operation took place in 1990 in the BSAI, with an incidental catch of 152 salmon.
