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United States Bibliography of Publications Linked to the NPAFC Science Plan

by

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United States Bibliography of Publications Linked to the NPAFC Science Plan

Abstract

This bibliography lists original papers and documents published since June 2019 to May 2020 by United States scientists and/or their collaborators in relation to the 2016–2020 NPAFC Science Plan. The bibliography includes seven articles with abstracts, corresponding to the five research themes 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; 4) Management systems; 5) Integrated information systems.

Bibliography

Theme 1: Status of Pacific Salmon and Steelhead Trout

Fergusson, E.A., J.M. Murphy, and A.K. Gray. 2020. Southeast Alaska coastal monitoring survey: salmon trophic ecology and bioenergetics, 2018. NPAFC Doc. 1893. 38 pp. National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS), Alaska Fisheries Science Center, Auke Bay Laboratories, Ted Stevens Marine Research Institute (Available at https://npafc.org).

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 2018. This annual survey, conducted by the Southeast Coastal Monitoring (SECM) project, marks 22 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. Up to 13 stations were sampled monthly in epipelagic waters from May to August. 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. Coded-wire tags were recovered from two juvenile coho and eight 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 68% of the juvenile chum and 24% of the juvenile sockeye salmon. Of the 14 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.

Masuda, M.M., V.J. Tuttle, and T. Holland. 2020. High seas salmonid coded-wire tag recovery data, 2012, 2018. NPAFC Doc. 1890. 47 pp. National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS), Alaska Fisheries Science Center, Auke Bay Laboratories, Ted Stevens Marine Research Institute, and National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS), Northwest Fisheries Science Center (Available at https://npafc.org).

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 (RMIS) database. This document lists recovery data for 325 coded-wire tagged salmonids not previously reported to the PSMFC/RMPC RMIS database. 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) (68 Chinook salmon [*O. tshawytscha*] in 2018 and 1 previously unreported Chinook salmon from 2012), 2) the U.S. rockfish trawl fishery in the central GOA in 2018 (27 Chinook salmon), 3) the U.S. groundfish trawl fisheries in the eastern Bering Sea-Aleutian Islands as sampled by NPOP observers in 2018 (17 Chinook salmon), and 4) the U.S. at-sea Pacific hake (*Merluccius productus*) trawl fishery in the North Pacific Ocean off Washington and Oregon in 2018 (212 Chinook salmon) as sampled by observers from the At-Sea Hake Observer Program.

Murphy, J.M., E.A. Fergusson, A. Piston, S. Heinl, and A.K. Gray. 2020. Southeast Alaska coastal monitoring survey cruise report, 2018. NPAFC Doc. 1894. 23 pp. National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS), Alaska Fisheries Science Center, Auke Bay Laboratories, and Alaska Department of Fish and Game (Available at https://npafc.org).

Surface trawl and oceanographic data were collected within the northern region of Southeast Alaska (SEAK) as part of the 2018 Southeast Alaska Coastal Monitoring (SECM) survey. SECM surveys have been conducted annually since 1997 to monitor the status of juvenile salmon and ocean conditions in SEAK. Eight stations were sampled in the strait habitat at monthly intervals along two transects (Icy Strait and Upper Chatham Strait) during 2018. Four stations were added in Stephens Passage (inshore habitat) in 2018 to provide additional insight into the early marine ecology of Chinook salmon. Fish, zooplankton, water, and temperature and salinity data were collected at each station using a surface rope trawl, bongo nets, and a conductivity-temperature-depth (CTD) sensor. Surface temperatures increased and salinities decreased over the summer growing season in both inshore and strait habitats; however, salinities were consistently lower in Stephens Passage due to the freshwater discharge of the Taku River. Average temperature in the strait habitat (May–August, upper 20m) was 9.22°C, just below the long-term average of 9.33°C. A total of 1,026 salmon and 29,612 non-salmon fish species (primarily Pacific herring) were captured during 76 rope trawl hauls. Average catch rates and sizes of juvenile salmon were below average in strait habitats during 2018. Peak catch rates of juvenile Chinook and coho salmon occurred in Stephens Passage during June. Juvenile sockeye salmon also had their peak catch rates in Stephens Passage but their peak catch rates occurred in August. The low average size of sockeye salmon within Stephens Passage during August likely reflects the presence of the late out-migrating sub-yearling migratory phenotype. Peak catch rates for juvenile pink and chum salmon both occurred in strait habitats during July. Five coded-wire-tags (CWTs) were recovered from juvenile Chinook salmon in the inshore habitat (Stephens Passage) and three of the tags were from the Douglas Island Pink and Chum, Inc. (DIPAC) hatchery. Two CWTs were recovered from Coho salmon and both were from the DIPAC

hatchery. DIPAC chum salmon were the most abundant stock group in the strait habitat during June. The proportion of unmarked (wild) chum salmon (40%) and Northern Southeast Regional Aquaculture Association (37%) were highest in July. We plan to continue sampling the new stations that were added in Stephens Passage during 2018. We believe these stations hold significant promise for improving our understanding of the survival and early marine ecology of local Chinook salmon stocks. Both the size and abundance of juvenile salmon were below average in 2018. Pink salmon forecast models clearly indicate that low juvenile pink salmon abundance will contribute to poor harvests the following year. Models for the other species of salmon have either not been developed or do not provide a clear direction for how to interpret juvenile status. Developing meaningful models for other salmon species will be a priority for the SECM survey over the next several years.

Oxman, D.S. 2020. Proposed thermal marks for brood year 2020 salmon in Alaska. NPAFC Doc. 1878. 8 pp. Alaska Dept. Fish and Game, Juneau, Alaska, 99811, USA. (Available at https://npafc.org).

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 2020, approximately 63 million sockeye, 1 billion pink salmon, 837 million chum, 18 million Coho, and 9 million Chinook salmon will be marked at 27 different hatcheries using 116 thermal marks, seven dry marks, one salt, and one strontium mark.

Oxman, D.S. 2020. Releases of otolith marked salmon from Alaska in 2019. NPAFC Doc. 1879. 5 pp. Alaska Dept. Fish and Game, Juneau, Alaska. 99801. (Available at https://npafc.org).

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 2019. It includes five species of salmon from brood years 2017 and 2018. Release numbers, mark patterns, and release locations are summarized.

Working Group on Salmon Marking (WGSM). 2020. Recoveries of high seas tags and tag releases from high seas research vessel surveys in 2019. NPAFC Doc. 1916. 5 pp. Working Group on Salmon Marking, Committee on Scientific Research and Statistics (Available at https://npafc.org).

In late July and early August 2019, tagging operations were conducted in the central Bering Sea by the Japanese R/V *Hokko maru*, and 44 chum salmon were released with FAJ /NPAFC disk tags and archival tags (ARCGEO, DST-magnetic, and AZBL tags). Furthermore, 37 sockeye, eight chum, and three coho salmon were tagged with FAJ/NPAFC disk tags and released into the central Bering Sea. In 2019, one tagged recovery was reported from a chum salmon caught in Okhotsk Sea coast, Hokkaido, Japan on October 7, 2019. In addition, one coho salmon which originally tagged in the North Pacific Ocean (46º 00'N, 180º 00') and released on June 23, 2010, was recovered

in the Krutogorova River (55º01'N, 155º34' E) in western Kamchatka coast, Russia, on September 22, 2010.

Theme 4: Management systems

Schnaittacher, G.M., and R.E. Narita. 2020. Incidental catches of salmonids by U.S. groundfish fisheries in the Bering Sea/Aleutian Islands and the Gulf of Alaska, 1990–2019. NPAFC Doc. 1891. 10 pp. U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS), Alaska Fisheries Science Center, Fisheries Monitoring and Analysis Division (Available at https://npafc.org).

This report presents the estimated incidental catches and average weights of Pacific salmonids in U.S. groundfish fisheries off Alaska from 1977 through 2019. Estimated annual incidental salmon catches (all species combined) in 2019, were 390,126 salmon in the Bering Sea/Aleutian Islands (BSAI) and 30,300 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 1.82 kg in 2019 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 1.77 kg in 2019 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.