

“The effects of climate change on oceans”

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Executive Summary:

As with all RFMOs, the North Pacific Anadromous Fish Commission (NPAFC) focuses on such interactions between climate change and oceans that effect conditions of fishery resources. Pacific salmon fisheries are of primary importance for the NPAFC member states. It supports about 2 million jobs in fishing and related industries.

Annual production of Asian and North American Pacific salmon and steelhead populations has undergone significant variability linked to climate change in recent decades. Adaptive fishery management needs improved fishery forecasts and enhanced understandings on linkages between climate variables and salmon stock conditions.

The 2011–2015 NPAFC Science Plan was adopted with the primary goal to explain and forecast annual variations in Pacific salmon production. NPAFC assessed progress made on the overarching research theme “*Forecast of Pacific Salmon Production in the Ocean Ecosystems under Changing Climate*” at an international symposium in Kobe, Japan, on May 17–19, 2015.

As revealed from NPAFC-related studies, climate change effects salmon ecosystems in the North Pacific in different ways. Change in extent and duration of seasonal sea ice along the shelf plays a key role in structuring ecosystems that alters geographic distributions of Pacific salmon.

Researchers observe northward shifts in fish distribution in a warming ocean. For example, there is a high abundance of juvenile pink and chum salmon in the Chukchi Sea in warm years. Continued warming may enable new salmon populations to become permanently established in the Arctic. At the same time, loss of cool water zones jeopardizes marine salmon distribution at the southern end of their present range.

The warming ocean can adversely affect Pacific salmon growth. Extended warming periods may decrease availability of lipid-rich zooplankton and forage fish resources and reduce energetic status of immature salmon that may negatively affect their survival.

The impact of climate changes on salmon will continue to be of increasing importance. The recently adopted 2016-2020 NPAFC Science Plan is aligned with the International Year of the Salmon (IYS) program developed in collaboration with PICES and NASCO. Scientific results from cooperative studies will reduce major gaps in knowledge with respect to the research theme “*Pacific salmon and steelhead trout in a changing North Pacific Ocean*”.

Change in the dominant species composition and distribution could affect location and timing of salmon fisheries. With variable environments, modifications to the timing and the size of juvenile fish at release will likely be required to optimize hatchery production. Models incorporating fish mortality and various environmental factors should improve the ability to forecast returns of salmon stocks. New scientific information will also contribute to effective protection of Pacific salmon by NPAFC member nations from illegal, unreported, and unregulated (IUU) fishing.