

United States National Research Plan 2015

by

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ABSTRACT

The United States identified the following research plans that reflect the five research components identified under the NPAFC Science Plan for 2011-2015 “Forecast of Pacific Salmon Production in the Ocean Ecosystems under Changing Climate”. 1) Migration and survival mechanisms of juvenile salmon in ocean ecosystems; 2) Climate impacts on salmon production in the Bering Sea and adjacent waters (BASIS); 3) Winter survival of Pacific salmon in Pacific Ocean ecosystems; 4) Biological monitoring of key salmon populations; 5) Development and applications of stock identification methods and models for management of Pacific salmon.

UNITED STATES NATIONAL RESEARCH PLAN

The United States identified the following research plans that reflect the five research components identified under the NPAFC Science Plan for 2011-2015 “Forecast of Pacific Salmon Production in the Ocean Ecosystems under Changing Climate”.

U-1: Migration and Survival Mechanisms of Juvenile Salmon in the Ocean Ecosystems

Research activities will take place primarily in the coastal waters of the Gulf of Alaska from Southeast Alaska to western Kodiak Island and in the eastern Bering Sea, north of 60°N to the Bering Strait. Activities include:

- (1) repeated measurements of the habitat, and stock-specific life history characteristics of salmon from their early marine residence period to their later migration through coastal waters;
- (2) fine-scale field studies that focus on aggregations of salmonids to look for specific processes or factors that influence their distribution, behavior, and growth;
- (3) studies on diet overlap and prey selectivity among salmon and other fishes;
- (4) genetic stock-identification studies of juvenile, immature, and maturing salmon;
- (5) monitoring of thermally marked salmon;
- (6) studies of growth and size of juvenile and immature salmon;
- (7) modeling salmon production based on interannual variability in early marine salmon survival and growth;
- (8) describing the trophic dynamics of juvenile salmon and their predators in coastal waters;
- (9) bioenergetic models of juvenile salmon growth; and

- (10) archival tagging of immature and maturing salmonids.

Research in the coastal area of the Gulf of Alaska was initiated in 1995. A coastal monitoring activity was initiated in Southeast Alaska during 1997 to examine the extent of seasonal (May–October) interactions between hatchery and wild stocks of salmon, their potential impact on marine carrying capacity, and the use of juvenile catch data and associated biophysical parameters to forecast pink salmon run strength. These Gulf of Alaska investigations will continue in 2014.

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

Research activities encompass those listed under U-1 with emphasis on monitoring biological and physical environments over a number of years to understand the impact of climate change and variability on salmon and groundfish (walleye pollock, Pacific cod, sablefish, rockfish) in the Bering Sea and adjacent waters.

The Bering Sea program in western Alaska began in 1999. Particular focus of the western Alaska research was placed on monitoring effects of climate on growth, migration, and distribution of juvenile Bristol Bay sockeye salmon as they migrate in the coastal waters of the eastern Bering Sea. In 2002 research activities expanded into the northeastern Bering Sea to examine impacts of climate change and variability on Arctic, Yukon, and Kuskokwim salmon stocks. The expansion was, in part, due to the NPAFC research program titled Bering Aleutian Salmon International Survey (BASIS).

The United States will continue this BASIS research cruise in 2015. In addition, the United States started a 3-year collaborative project between the ADFG and Auke Bay Laboratories of NOAA Fisheries. This project will run a cruise to build upon prior juvenile salmon surveys conducted in the northern Bering Sea. Both Bering Sea cruises will address the NPAFC-BASIS themes that will research the following four questions:

- (1) How will climate change and climate cycles affect anadromous stocks, ecologically related species, and the Bering Sea ecosystem?
- (2) What are the key climatic factors affecting cyclical changes in Bering Sea food production and pelagic fish communities?
- (3) How will climate change and climate cycles impact the available salmon habitat in the Bering Sea?
- (4) How will climate change and climate cycles affect Pacific salmon carrying capacity within the Bering Sea?

U-3: Winter Survival of Pacific Salmon in the North Pacific Ocean Ecosystem

The United States does not have plans to conduct winter surveys in the North Pacific Ocean. The United States endorses winter research and will continue to seek partnerships and funding to improve our understanding of Pacific salmon overwinter energetics and factors affecting winter survival.

U-4: Biological Monitoring of Key Salmon Populations

Research activities under this component are addressed in U-1 for key salmon populations. The key populations monitored during the ocean surveys include:

- (1) Southeast Alaska pink, chum, and Chinook salmon – Southeast Coastal Monitoring (SECM) project;
- (2) western Alaska Chinook and chum salmon – Yukon River, northern Bering Sea (BASIS Program).
- (3) NMFS Auke Creek Weir – southeast Alaska weir located in Auke Bay, Alaska. For the last 30 years, this continues to provide a comprehensive accounting of all salmon species including pink, chum, sockeye, and coho salmon transiting between Auke Lake and Auke Bay. Population trend patterns are being used to understand potential effects of long-term climate changes.
- (4) NMFS Little Port Walter Marine Station – research hatchery releasing approximately 150,000 age-1 Chinook salmon smolts annually. Data from our 36-plus years of Chinook salmon hatchery releases provide one of the most comprehensive resources available for tracking stock distribution and survival trends.

The United States will continue to monitor catch and escapement (where available) and hatchery releases for salmon populations returning to the Pacific Northwest and to coastal Alaska river systems. These data have been provided each year to NPAFC for use in the annual Statistical Yearbook.

U-5: Development and Applications of Stock Identification Methods and Models for Management of Pacific Salmon

Research activities under this component are designed to find and apply markers capable of identifying populations of salmon migrating in the North Pacific Ocean and Bering Sea. Markers include both the application of thermal 'tags' to otoliths of hatchery fish as well as the naturally occurring DNA variation that describes wild populations. Otolith protocols are well established. A continuing task for genetics laboratories is to develop standardized methods of genetic analysis among Parties. This standardization has been conveniently leveraged by collaboration among agencies and universities working on Pacific Salmon Commission studies. Both of these data types assist in identifying the origins of stocks harvested in mixed-stock fisheries and in determining the oceanic distribution of the stocks.

In addition to continued monitoring of thermally marked salmon in research activities outlined above and in U-1, the United States will also continue to collect and report on high-seas coded-wire tags (CWT) recovered from both the Bering Sea and North Pacific Ocean. These CWT recoveries come from research surveys by NPAFC member Parties and from salmon caught as bycatch in US Gulf of Alaska and Bering Sea-Aleutian Islands groundfish fisheries.