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Ecology of Pacific Salmon: Introduction

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A key component of the program goal of the Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative (AYK SSI) is to "..understand the trends and causes of variation in abundance and fisheries..." of Pacific salmon(AYK SSI 2006). To achieve this goal, information concerning population biology, freshwater ecology, marine ecology, and population dynamics is needed to understand the variables controlling population abundance and trends. The papers in this section were selected to address these topics and divided into two broad habitat-based themes: freshwater and marine.

The freshwater ecology theme contains papers that examine habitat, food supply, and energetics of juvenile salmon in streams and rivers, population genetics, conservation of genetic diversity, and the role of environmental variation in controlling salmon productivity. Freshwater ecology and the role of habitat in controlling salmon populations in the AYK region have received little attention in the past by researchers (AYK SSI 2006). A primary goal for this section was to begin to remedy this significant knowledge gap. In organizing this section, we invited papers from those who have worked on these topics both in the region and from elsewhere. Bradford et al. (2009, this volume) discusses the production of juvenile Chinook salmon *Oncorhynchus tshawytscha* in the upper Yukon River relative to habitat. Wipfli (2009, this volume) then discusses the role of food supply in controlling growth and productivity of juvenile salmonids in streams and the connection to nutrients imported by adult salmon migrating from marine waters. Beauchamp (2009, this volume) links food supply, temperature mediated metabolism, and food capture ability to examine growth potential using bioenergetic modeling. Then, Nemeth et al. (2009, this volume) focuses on the role of habitat in controlling the freshwater productivity of salmon with an examination of habitat/salmon productivity relations in two Norton Sound rivers.

The genetics section begins with Utter et al. (2009, this volume) who review the current state of knowledge concerning population structure of salmon throughout the AYK region. Waples (2009, this volume) discusses the importance of maintaining genetic variability to conserve salmon. Beacham et al. (2009, this volume) present population structure of chum salmon *O. keta* and discuss opportunities of identifying stock of origin

in mixed-stock fisheries. Finally, Gilk et al. (2009, this volume) reports on an AYK SSI funded study aimed at describing previously unrecognized ecotypic variation in chum salmon in the Kuskokwim River.

The second theme on ecology shifts the focus to estuarine and marine habitats. Hillgruber and Zimmerman (2009, this volume) review what is known about juvenile salmon as they migrate through estuarine and nearshore habitats in the AYK region. Farley et al. (2009, this volume) and Myers et al. (2009, this volume) discuss salmon data collected in the Bering Sea and North Pacific Ocean. Ruggerone and Nielsen (2009, this volume) discuss marine growth and survival of AYK salmon in response to both climate and competition with hatchery salmon. Continuing this discussion of carrying capacity and growth in the marine environment, Eggers (2009, this volume) reconstructs the possible biomass of salmon in high seas habitats using return and capture data from rivers surrounding the Pacific Ocean. Finally, Royer and Grosch (2009, this volume) presents data concerning variability in marine habitats.

As described throughout this section, knowledge gaps remain concerning the ecology of salmon populations in the AYK region. Continued, multi-disciplinary research is needed to investigate the role of physical habitat, climate induced environmental variability, and biological response in salmon populations if we are to meet the goals of AYK SSI and improve our ability to predict the abundance of salmon returning to the AYK region.

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