

**Project Title:** Yukon River Juvenile Chum Salmon Genetic Stock Analysis

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**Project Period:** 2003 - 2007

**Study Location:** Yukon River

**Introduction:** In western Alaska, chum salmon (*Oncorhynchus keta*) are critical for subsistence, commercial, and cultural reasons. Over the last couple of decades, declines in chum salmon returns in some western Alaskan drainages prompted various disaster declarations by the Governor of Alaska and federal agencies (Nelson 2011). In addition, chum salmon fisheries on the Yukon and Kuskokwim Rivers have been complicated in recent years by various restrictions designed to limit the take of Chinook salmon, which are currently at very low abundance (ADF&G 2013).

The summer and fall Yukon River chum salmon runs are managed by the Alaska Department of Fish and Game (ADF&G) to provide for escapement and maximize harvest opportunity. Summer-run chum salmon generally spawn in the lower to middle reaches of the Yukon drainage whereas fall-run chum salmon are typically larger and generally spawn in spring-fed regions of the middle to upper reaches in Alaska and Canada. The middle region of the Yukon drainage includes the Tanana and Koyukuk Rivers, which have both runs of chum salmon. The summer run of chum salmon has averaged 1.8 million fish between 2000 and 2012 and the fall run has averaged 864 thousand fish over the same time period (JTC 2013; Kathrine Howard, ADF&G, Anchorage, AK. Pers. commun., August 2013), although there is variation in the two run strengths between years. Concern about fall-run chum salmon abundance in some years has resulted in reduced subsistence fishing opportunities and has created challenges in fulfilling treaty obligations with Canada that specify escapement objectives (Bue et al. 2009).

To date, there is very little information about the survival of juvenile Yukon River chum salmon in their freshwater or saltwater environments (AYK SSI 2006). Juvenile chum salmon 5 | Page outmigrate from the Yukon River in the spring (Hillgruber and Zimmerman 2009) and are found in the pelagic waters on the eastern Bering Sea shelf during summer and fall months (Farley et al. 2009). Juvenile chum salmon have been collected as part of annual United States BeringAleutian Salmon International Surveys (BASIS) in the eastern Bering Sea since 2002. A previous genetic stock composition analysis of the 2002 juvenile chum salmon based on allozyme markers (Farley et al. 2004) determined that a

substantial proportion of juvenile chum salmon samples collected in this area were from the Yukon River; however, samples from other years remained unanalyzed. The 2002 year samples were collected between lat. 55-65°N, an area ranging from south of the Kuskokwim River to Norton Sound. Genetic analysis showed that the genetically distinct Yukon River fall-run chum salmon stocks were located predominantly north of lat. 60°N. Given the genetic similarity among coastal Bering Sea chum salmon populations (summer stocks) and the difficulty of genetically distinguishing lower river Yukon and Kuskokwim chum salmon summer runs, the genetic analysis of the 2003-2007 juvenile chum salmon focused on samples collected between approximately lat. 58-64°N, an area for which juvenile chum salmon are likely to be from the Yukon River and for which relative abundances between summer- and fall-run juvenile indices may more likely correlate with adult Yukon River returns.