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COMPREHENSIVE BACKGROUND INFORMATION FOR SENATE BILL 205

THE NEED FOR A DEDICATED RESEARCH & RESTORATION CHINOOK SALMON ENDOWMENT FUND

By AS 44.09.085, the Chinook salmon is the State fish of Alaska. Chinook salmon is an important staple food for Native villages of Alaska and they are an economically important species for a number of commercial fisheries and a prized sport fishery resource. While Chinook salmon populations in Alaska have undergone significant shifts in abundance during the past 40 years, a number of stocks critically important to subsistence and commercial harvests have sharply declined in the past decade.

In certain regions, such as the Yukon River, Kuskokwim River and Unalakleet River watersheds, Chinook salmon constitute the mainstay of the subsistence diet and are critically important to the subsistence economy and cultural continuity of the more than sixty villages in these regions.

Eight of the 14 currently listed "stocks of concern" are Chinook salmon stocks, as defined by the Alaska Board of Fisheries in 5AAC 39.222. A stock of yield concern is defined as "a concern arising from a chronic inability, despite the use of specific management measures, to maintain expected yields, or harvestable surpluses, above a stock's escapement needs; a yield concern is less severe than a management concern" (5 AAC 39.222(f)(42)).

Table 1. Current stocks of concern

Stock	**Species**	**Concern Level**	**Year began**
Norton Sound subdistrict 1 (Nome)	Chum	Yield	2000
Norton Sound subdistrict 2 (Golovin)	Chum	Yield	2000
Norton Sound subdistrict 3 (Moses Point)	Chum	Yield	2000
Norton Sound subdistrict 4 (Shaktoolik)	***Chinook***	***Yield***	***2004***
Norton Sound subdistrict 5 (Unalakleet)	***Chinook***	***Yield***	***2004***
Yukon River	***Chinook***	***Yield***	***2000***
Kvichak River	sockeye	Yield	2001
Susitna River (Yentna)	Sockeye	Yield	2008
Chuitna River	***Chinook***	***Management***	***2011***
Theodore River	***Chinook***	***Management***	***2011***
Lewis River	***Chinook***	***Management***	***2011***
Willow and Goose Creeks	***Chinook***	***Yield***	***2011***
Alexander Creek	***Chinook***	***Management***	***2011***

McDonald Lake	Sockeye	Management	2009

Recent declines of salmon abundance have caused severe hardship in a number of regions and anxiety for the fishery-dependent communities of Alaska. Limited commercial fishing on Chinook salmon has occurred in recent years and earnings have deteriorated sharply. Poor Chinook salmon returns can exacerbate allocative tension and conflict between fishery user groups competing for a fully allocated fishery resource.

In the Arctic- Yukon-Kuskokwim region, poor runs of Chinook salmon, plus concurrent declines of chum salmon, have led state and federal agencies to declare fishery disasters in 1997, 1998, 2000, 2001, 2002, 2008 and 2009.

Table 2. Fishery disasters in the AYK region

Watershed	Years	Declaration source	Declaration type
Kuskokwim River Watershed	1997 1998 2000 2001 2002	State	Economic Fish Disaster
Norton Sound Watershed	2000 2001 2002	State	Economic Fish Disaster
Yukon River Watershed	1997 1998 2000 2001 2002	State	Economic Fish Disaster
Yukon River Watershed	2008 2009	Federal	Commercial Fishery Failure
Kuskokwim Region	1997	Federal	Commercial Fishery Failure
Yukon, Kuskokwim and Norton Sound	2000	Federal	Fisheries Disaster

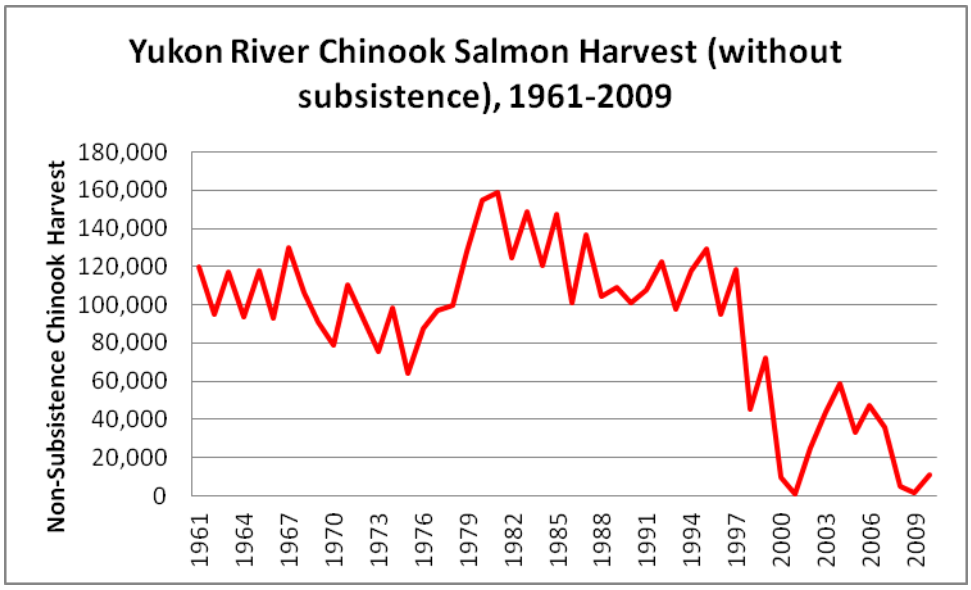
YUKON RIVER

Beginning in the late-1990's, the Yukon River Chinook salmon stocks entered a period of, steep decline, which appears to be worsening at this time. This sharp decline is evidenced by the following:

- Escapement goals to Canada, where approximately 50% of the total run spawns, were not met in 2007, 2008, or 2010. (JTC, 2011?)

- Commercial harvests of Chinook salmon has been largely or completely curtailed in four out of the last five years, and the same is expected for 2012. While overall

commercial fishery earnings on the Yukon may be small when compared to other commercial salmon fisheries in the state, the income is quite significant to residents of the region where cash incomes are scarce. Chinook have historically represented approximately 65% of the commercial fishery revenue on the Yukon (1977-2011 average) however in the past 4 years, this has shrink to only 15% of the fishery value. (Bue, et.al., 2011)



- Despite having some of the highest subsistence dependence and lowest incomes in the state, state and federal managers have had to implement numerous subsistence harvest restrictions each year in an effort to reach minimum escapement targets. Due to these poor runs and fishery restrictions, **subsistence harvest of Chinook Salmon for the period 2008 to 2010 declined 22%** compared to the period 1982-1997 (JTC, 2011) and for the years 2008, 2009 and 2010 the subsistence harvest of Chinook salmon on the Yukon River has fallen below the amount necessary for subsistence (ANS) by the Alaska Board of Fisheries (ANS = 45,500-66-704 Chinook salmon, 5 AAC 01.236). The 2011 subsistence harvest estimates are not yet available, however it is highly likely that the harvest once again fell below the amount needed.

- ADFG has documented a decrease in the proportion of large Chinook salmon returning (Hamazaki, 2009) and also decreasing trends in the proportion of returning 6- and 7-year old Chinook salmon (Howard, Hayes and Evenson, 2009).

- Most significantly, the key measure of productivity shows that the Yukon Chinook salmon runs which spawned in the years 2002 – 2004, whose offspring have now returned to the river as adults— have a productivity around **one return per spawner** (see Figure 1, Spaeder and Catalano, 2011)

    - That means that in the **absence of any fishing**, the population is just barely able replace itself, with each spawner producing, on average, one prodigy surviving to return to the spawning grounds. **With harvest, the population is**

below replacement.

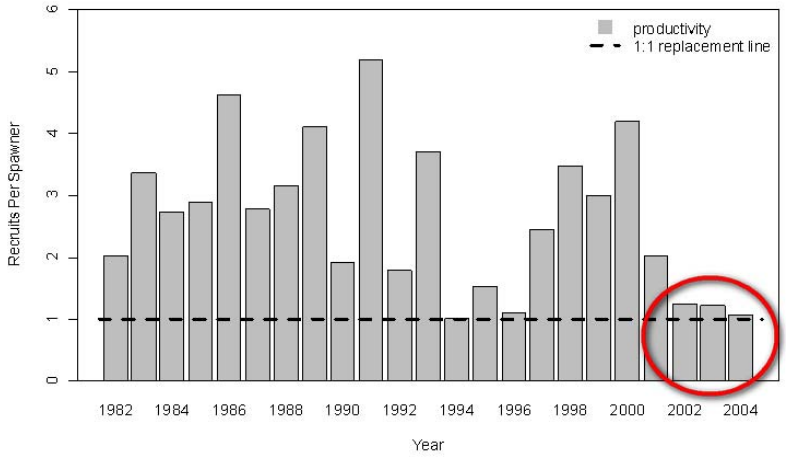


Figure 1. Brood-year productivity (recruits per spawner; bars) for Yukon River Canadian-Origin Chinook salmon, 1982-2004. Productivity was estimated by dividing the sum of returns from a given brood year by the escapement that produced them. Brood year is defined as the year of the escapement that gave rise to the subsequent returns. For example, the 1982 brood year productivity estimate was the sum age 3-7 salmon that returned from 1985 – 1989, respectively, divided by the escapement in 1982. Productivity from the 2004-2010 brood years were not estimable because those cohorts have not yet fully returned to the river. The horizontal dashed line depicts the productivity required for the population to replace itself. Source: Spaeder and Catalano, 2011

In summary, the Yukon River populations which sustained an average combined commercial and subsistence harvest of over 150,000 Chinook salmon from the 1960's to the 1990's, is now no longer able to consistently meet the Amounts Necessary for Subsistence nor have we met escapement and treaty obligations to Canada in 3 out of the last 5 years.

KUSKOKWIM RIVER

The Kuskokwim River hosts the largest subsistence fishery for Chinook salmon in the state (Fall, et. al., 2009). A similar pattern of steep decline has occurred for Kuskokwim River Chinook, as evidenced by the following:

- The 2010 and 2011 Chinook runs are the lowest recorded in 35 years.
- In 2010 and 2011, abundance was not sufficient to meet escapement goals in the region, despite some restrictions to the subsistence fishery.
- The recently completed ADFG Kuskokwim Chinook run reconstruction- funded by the AYK Sustainable Salmon Initiative – documents that the Kuskokwim stocks are in the worst shape than the Yukon Chinook. This key measure of productivity shows that the Kuskokwim River Chinook salmon runs which spawned in the years 2004-2006, whose offspring are just now returning to the river as adults - have productivity well below one return per spawner. That means that in the absence of any fishing, the population is not even replacing itself.

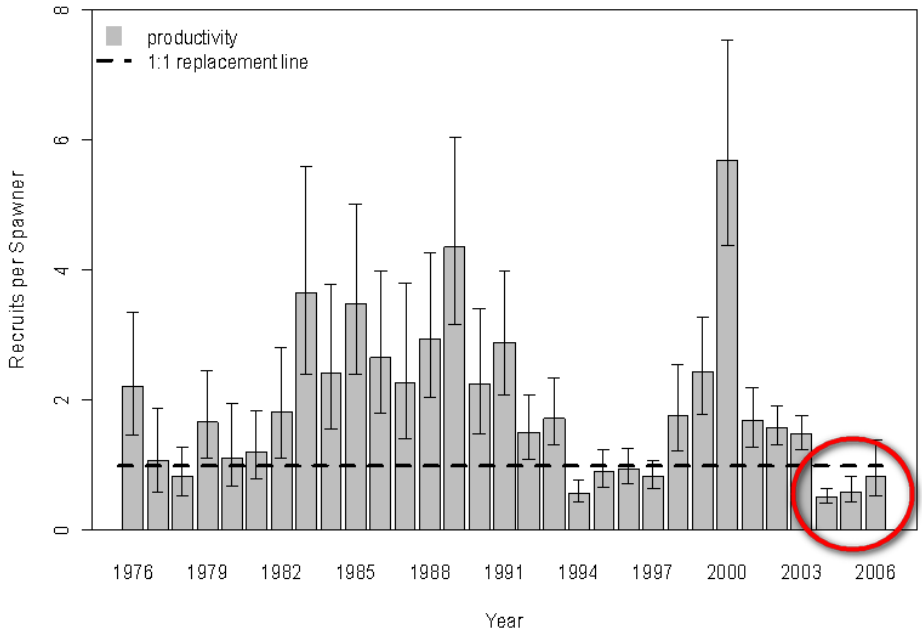


Figure 2. Brood-year productivity (recruits per spawner; bars; 95% CI) for Kuskokwim River Chinook salmon, 1976-2006. Productivity was estimated by dividing the sum of returns from a given brood year by the escapement that produced them. Brood year is defined as the year of the escapement that gave rise to the subsequent returns. *Source:* Spaeder and Catalano, 2011.

UNALAKLEET RIVER

The Unalakleet River produces the largest Chinook salmon run in Norton Sound, and continues to be in a period of sustained decline since 1999. There have been no directed commercial fisheries for Chinook salmon in eastern Norton Sound since 2000. Commercial harvests that averaged 7,118 Chinook salmon in the 1980's and 1990's averaged only 130 fish from 2000-2009 (Kent and Bergstrom, 2009). See figure 3, below.

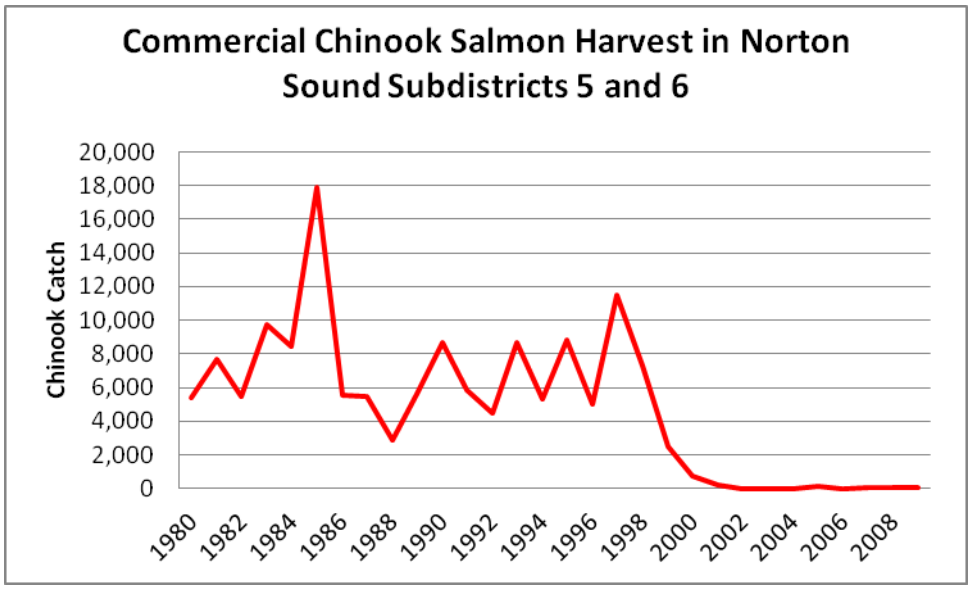


Figure 3. Commercial fishery harvest of Chinook salmon in eastern Norton Sound, fishery

subdistricts 5 (Shaktoolik) and 6 (Unalakleet).

NUSHAGAK RIVER

The Nushagak River system is the fifth largest river in Alaska by volume of water discharged. The Nushagak River hosts the largest sport fishery for Chinook salmon in the United States, with the third-largest Chinook run in the country. In recent years the spawning escapement has reached the lower end of the escapement goal representing a lower than expected return. The commercial harvest of Chinook salmon has been 67% below the anticipated harvest, estimated based on an average exploitation rate of 35% in the Nushagak District commercial salmon fishery from 2003-2007. The commercial harvest in 2008 was one of the smallest harvests of Chinook salmon in the Nushagak District since 1966; only Chinook salmon harvests in 1999 (10,893), 2000 (12,055) and 2001 (11,568) have been smaller. (NMFS, 2009) The Nushagak River Chinook salmon run appears to have declined to a low point in 2010, where harvests were below average in all districts. (ADFG 2010)

ALEXANDER CREEK, Upper Cook Inlet

Alexander Creek once hosted a thriving sport fishery for Chinook salmon on the lower westside of the Susitna River, but recent returns to this river have fallen to perilously low levels. It is believed that northern pike were illegally introduced to a lake in the Susitna River watershed and have spread throughout the drainage, including into Alexander Creek and are the likely cause for the Chinook salmon's decline (ADFG, 2011). The sport fishery for Chinook salmon was closed by regulation in 2008 (see figure 4). The decline and closure of the sport fishery on Alexander Creek has likely resulted in increased fishing pressure on other area rivers that have Chinook salmon runs like Lake Creek, Deshka River and the Little Susitna River.

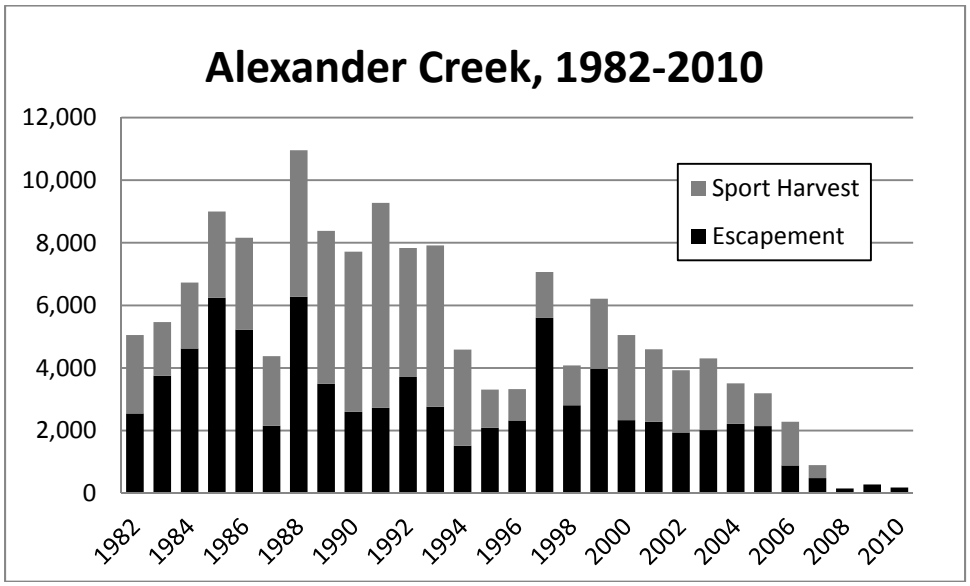


Figure 4. Sport harvest and escapement, Alexander Creek.

Discussion of fishery value in other fisheries

Statewide, the commercial value of Chinook salmon is relatively small as a proportion of all salmon landings (6.17% of the 2002-2011 average exvessel value) but in some areas of the State, Chinook is very important to the commercial fisheries. Nowhere is this relative importance more apparent than on the Yukon River, where commercial fishing is one of the few sources of cash in one of the most economically depressed areas of the State. Chinook salmon represents 66% of the commercial fishery value (1977-2011 average) and as much as 86% in the 1990's…a time when troubled chum salmon runs frequently limited commercial fishing opportunity in the fall season. However, this number has dropped to only 15% as poor returns have severely limited or closed commercial Chinook salmon fishing.

In Prince William Sound, Chinook salmon are quite important to the drift gillnet fleet fishing on the Copper River flats. As a proportion of their total income, kings represent 13.75% of the drift gillnet fleet's overall exvessel earnings (1999-2008 average)(Botz, et. al., 2010), and are an especially important part of their early-season income. Copper River Chinook salmon, along with the early sockeye salmon, command a world reputation as one of the first fish to arrive in the spring. Media reports anxiously await the arrival of these fish each May as the first fishery opener approaches and fishermen can sometimes fetch 8 to 9 dollars a pound for these early fish.

Chinook salmon are an incredibly important fishery resource to the commercial troll fleet in southeast Alaska. Since 1996, the troller's annual harvest has averaged 230,718 Chinook salmon (Skannes, Hagerman and Shaul, 2011). In 2011, Chinook salmon comprised 46% of the $28.3 million exvessel value of all salmon species caught by trollers (Dale Kelley, Alaska Trollers Association, personal communication). The winter troll fishery is also an important source of fishery income for during the slower times of year and these fresh fish often fetch upwards of $30/pound or more in Seattle (see figure 5).

Figure 5. Fresh southeast Alaska troll-caught Chinook salmon at a Seattle fish market. (photo courtesy www.alaskaoutdoorsdirectory.com)

SPORT FISHERY

The sport fishery of Chinook salmon to Alaska is immense. While estimates for the dollar value of Chinook salmon to sport fishing is not available, total sport fishing and related expenditures in Alaska are estimated at $1.4 billion, annually (Southwick Associates, 2008). Beside the dollar value, of course, is the recreational value to Alaskans and the immeasurable value of the allure of

catching a world-record sized fish (see figure 6).

Figure 6. Les Anderson with his record 97 pound, 4 ounce Chinook salmon caught in the Kenai River on May 17, 1985. This State record still stands.

NEED FOR A DEDICATED CHINOOK SALMON RESEARCH FUND

Despite considerable declines in various regions of Alaska, there is no dedicated research program prepared to further address the Chinook salmon variations or work toward developing better tools for managers, except for the remaining work the AYK SSI funded with funds provided by the AK Legislature.

- ADF&G continues their in-river stock assessment work and in-season management.
- However, on its own, ADF&G in-season assessment and management is not capable of understanding the causes of the decline, or able to reliably forecast or produce a range of possible actions for responding to these declines.

To understand the trends and causes of variation in abundance of Chinook salmon, information concerning population biology, freshwater ecology, marine ecology, and population dynamics are needed to understand the variables controlling population abundance and trends.

Knowledge gaps remain across the State of Alaska indicating that a multi-disciplinary research effort is needed to investigate the role of physical habitat, climate induced environmental variability, and biological response in Chinook salmon populations if we are to meet the needs of Alaskans.

Until we better understand the drivers of the decline:

- We don't know if the ADF&G management approach is making things better or worse.
- We don't know if escapement goals are adequate.
- We don't know if declines are being driven by human impacts or by large scale environmental shifts in ocean productivity.
- We cannot forecast or respond to these major shifts in salmon abundance.

Funding is needed for an integrated science-based program of research focused on Chinook salmon.

- We need a dedicated program to understand and address the causes of the declines of Chinook salmon throughout both the freshwater and marine environments,
- This research program must draw on the best available peer-reviewed science, synthesizing information from diverse fields including: population biology, freshwater and marine ecology, oceanography, genetics, modeling and statistics.
- It must facilitate coordinated efforts among diverse partners in Native organizations, state agencies, federal agencies, universities and private sector.

This legislation would create a stable, long-term source of funding to support high quality interdisciplinary research to gain an improved understanding of, for example, the dynamics of marine ecosystems - essential to provide fisheries managers with better forecasts and improved responses to changing environmental conditions.

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