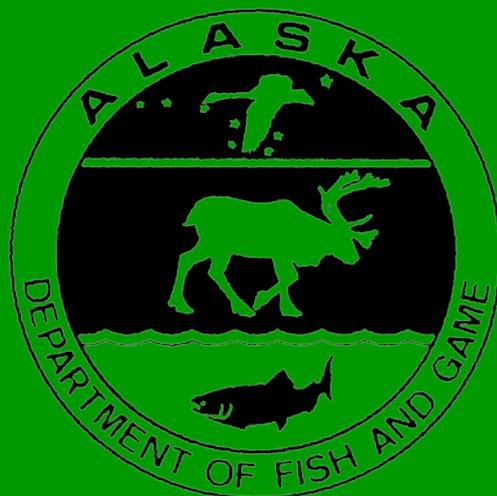
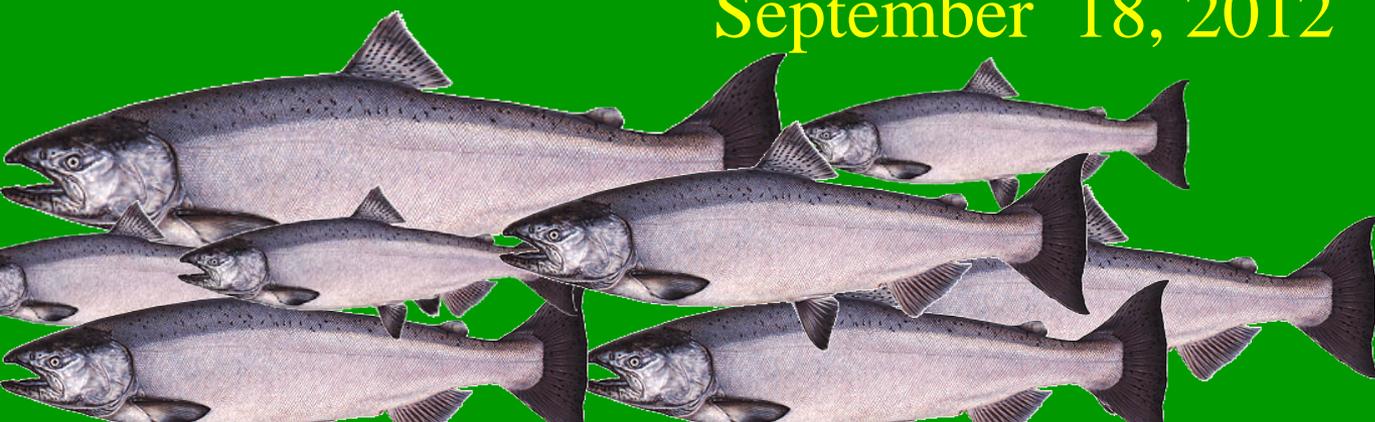


Comments and Suggestions to the Expert Panel on the Draft Final Report Entitled “THE EFFECTS OF SALMON FISHERIES ON SOUTHERN RESIDENT KILLER WHALES”



Prepared by the Alaska Department of Fish and Game
September 18, 2012



General Comments

Overall the Draft Report Was Well Done and Provided Some Important Insights. Such as:

- predicted changes in Chinook salmon abundance caused by fisheries are unlikely to increase the risk of extinction of the SRKW population (from lines 1328-1336)
- while the average of the observed population growth rate of SRKWs is 1% annually, there is a chance that the core rate is actually $< 0\%$ AND at the same time a chance that the core rate is actually above the delisting threshold of 2.3% (from lines 450-451)

Our Interpretation of the Report

Growth-rate criterion used for delisting is biologically inappropriate, and that an abundance-based criterion should be used instead.

- the population growth rate is a weak metric of SRKW population recovery and should be reassessed as a delisting criterion (from lines 1253-1260)
- abundance of SRKWs has not been declining, but has been increasing in the previous four decades (from lines 417-420, 429-430)
- an actual recovery of the SRKW population without any future reduction in catches of Chinook salmon is inevitable (from lines 184-187)

Growth Rate vs Abundance Criterion

- *“The panel believes that the existing delisting criterion of 2.3% growth rate is unlikely to be achieved given current circumstances or by reducing Chinook fisheries, but if current trends continue SRKW will eventually increase to a point where a reappraisal of their status would lead to downlisting or delisting.”* lines 184–187
- *“ ... the choice of 2.3% growth rate as a downlisting criterion should be re-assessed.”* line 1259–1260

We agree.

- The consequence of an abundance based criterion is that no reduction in catches of Chinook salmon would be needed to reach a biological recovery.
- Consequences of keeping the growth-rate criterion is the significant chance (an estimated 40% or more chance) of never delisting SRKWs against an arbitrary standard regardless of how large their population becomes, or regardless how great the reductions in catches of Chinook salmon.

Chinook Abundance Comments

Retrospective Look at Observed SRKW Growth Rates and Chinook Abundance

- “ ... Chinook abundance would need to increase 25-40% to achieve SRKW population growth rates near 2.3% per year. There have only been 3-5 years out of the past 32 years in which Chinook abundance has been near those levels.” lines 1314–1317
- “ ... changes in coast-wide abundance of Chinook populations over the past 30 years, the period of time over which status of SRKW has been closely monitored, has been relatively modest: an approximate 16% decline in total abundance, but with a corresponding substantial 37% increase in terminal abundance (returns to freshwater) due to increased restrictions on marine fishery harvests.” lines 885–889

Effect of Increased Terminal Runs

- Essentially we have had the 40% increase (or nearly so) in the last 30 years that the panel projects would be needed to realize a 2.3% growth rate in SRKWs. Terminal runs to freshwater (available to whales at least from May through September) have at least increased by that rate. Yet a nominal growth rate of 2.3% has not been realized.

Competing Risk of Death Model

- *“Among other things, we showed that, under an assumption that killer whales consume an approximately constant number of Chinook salmon, the force of mortality associated with killer whales (and possibly also the forces of mortality for other pinniped predators) likely increases dramatically as abundance of Chinook salmon decreases.”* lines 1001–1004

Predator Efficiency

- This is classic predator-prey theory when the predator is so efficient that its stomach size is the limiting factor to the amount it ingests. Therefore, the abundance of prey is not limiting to how much the predator eats.
- The consequence of this satiation would be that no causation would exist between whale numbers, abundance of Chinook salmon, and fisheries regulation.

Harvest Reduction \neq Availability

- *“Recent analyses presented at the workshops explored whether reductions in Chinook harvest would increase food for SRKW and thus SRKW population rates of increase. These analyses have made the simple assumption that a certain number of Chinook foregone from the harvest will result in an equivalent increase in abundance of Chinook for SRKW. There are several reasons this assumption may not be true.”* lines 261–265
- There are a number of reasons this is likely untrue including stock specific maturation schedules, migratory paths and migratory timing.

Is the Focus on Chinook Abundance Myopic?

- Attempts to project SRKW growth rate as a function of Chinook salmon abundance in PVA modeling failed to capture the observed variation (process error) in abundance.
- The implication of such underestimation of process error is that other factors are just, or more important than salmon numbers in potentially determining vital rates of SRKWs.

Panel Recognized Other Factors Affect SRKW Vital Rates as Well

- *“... the Panel has some concerns that the uncertainty regarding future abundance has been under-represented in the PVA models, in particular involving processes of calving probability, stage-specific survival, and sex ratio at birth.”* lines 1204–1206

Will the Real Chinook Abundance Index Please Stand Up

- CTC Abundance Indices vs FRAM Indices vs Parken-Kope Indices vs ?
- Is there a better index out there?
- What stocks should be in the index?
- *“There are also concerns about whether the index of Chinook abundance accurately reflects the Chinook stocks most important to SRKW.” Executive Summary page iii*

SRKW Diet Comments

What Stocks Do the Whales Eat?

- *“Selectivity by Southern Residents on different stocks of Chinook salmon is poorly known, an important uncertainty both in terms of understanding which Chinook stocks they rely on, and in terms of energy intake, because the energy density of Chinook varies among stocks.” lines 587–589*

Some Elaboration Beyond the Description “poorly known” is Needed

- Don't just rely on model selection techniques. Use some existing knowledge and some logic.
- We can exclude some Chinook stocks based on their range and on genetic analyses of SRKW feeding events.
- During the summer in Puget Sound, the whales have concentrated their feeding almost exclusively on mature salmon bound for the Fraser River.

SRKW Summer Diet vs Winter Diet

- *“Diet information from SRKW in the summer indicates a heavy reliance on Chinook salmon. As Chinook abundance declines in the fall the diet data show that chum salmon and other species become more important. There is little winter diet data, but the data that do exist also suggest the importance of Chinook.”* lines 197–200

What is the Winter Diet Data?

- The Winter data consists of the observation of two Chinook salmon eaten off the coast of Washington by SRKWs.
- In truth, there is almost no information on winter diet at all, and “*the importance of Chinook salmon*” to the winter diet of SRKWs is essentially speculation.

SRKW Population Size Comments

SRKW Historic Population Size

- *“Demographic reconstruction showed that the largest known size was likely 96 animals in 1967, leading to the conclusion that the population size has not varied dramatically over the last 45 years” (lines 191–192).*
- *“The abundance of SRKW fluctuated between 60 and 100 individuals during 1975 to 2010.”*
line 417

What Caused the Decline?

- The actual range from 1974 through 2010 is 72 to 96 with 72 whales observed in 1974 (presentation by J. Ford, workshop 1).
- We know the reason for this decline — removals and incidental deaths from capture for the aquaria trade.

How Resilient are SRKW?

- *“Concerns about its (the SRKW population) future arise entirely from the current and recent size of the population and the potential impacts of future, unforeseen events on a population that lacks the resilience created by higher abundance.” lines 430-432*

Maybe More Resilient Than Assumed

- The Report contains no discussion of the resilience of this small population given its history, a history that included “pulse fishing” the population.
- Perhaps a population of multi-ton individuals is more resilient than expected from their small abundance alone.

Correlation vs Causation Comments

Left for the Panel Discussion