Northwest Indian Fisheries Commission
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April 21, 2021

Ms. Lynne Barre, Branch Chief
Office of Protected Resources Division
National Oceanic and Atmospheric Administration Fisheries
7600 Sand Point Way NE
Seattle, WA 98115

Re: Tribal Salmon Fisheries Interactions with Southern Resident Killer Whales

Dear Ms. Barre:

We are providing the following summary and attachments as the basis for the Protected Resources Division to assess the tribal fishing impacts associated with this proposed 2021 – 2022 Puget Sound Chinook Harvest Plan on endangered Southern Resident Killer Whales (SRKWs).

Since time immemorial, the tribes have been the stewards of all species that comprise the Puget Sound ecosystem. This was further recognized and upheld in the landmark federal court decision, *United States v. Washington (1974),* known as the Boldt Decision, which upheld tribal treaty fishing rights, and recognized tribes as co-managers of the resource, together with the State of Washington. Tribal co-management is governed by the tribes' commitment to support salmon rebuilding efforts while also ensuring that tribal treaty fishing rights--the right of taking fish at all usual and accustomed grounds and stations--is protected and maintained.[1]

The 2021 – 2022 Puget Sound Chinook Harvest Plan provides a framework for the State of Washington and Puget Sound treaty tribes to collectively and individually manage Puget Sound Chinook stocks. Contained within this plan are management unit profiles for each of the fifteen primary Chinook management units that are governed by the Puget Sound Salmon Management Plan. These profiles specify the management objectives in terms of harvest controls and escapement objectives that the seventeen Puget Sound treaty tribes will follow as they implement salmon fisheries during the duration of this proposed plan. Outlined in Attachment 1 are the proposed management objectives from this plan.

These Puget Sound Chinook salmon management objectives are part of the considerations for the coast wide Chinook salmon fishery management program implemented under the Pacific Salmon Treaty between United States and Canada[2]. In 1999, the United States and Canada adopted an

[1] Full text of treaties signed between United States of America and Indian Tribes can be accessed here: https://nwifc.org/member-tribes/treaties/
[2] Full text of Chinook Agreement between the United States of America and Canada can be accessed here: https//www.psc.org/publications/pacific-salmon-treaty/

abundance-based approach for Chinook salmon. Under this approach all Chinook salmon fisheries from Southeast Alaska to Central Oregon are managed collectedly to meet stock conservation obligations. The approach was refined in 2008 and 2018 to address continued conservation concerns for Puget Sound Chinook and other stocks. Coast wide, this approach has resulted in an increasingly larger portion of total run size being transferred to terminal areas. For Puget Sound and Georgia Strait Chinook salmon this transition to abundance-based management has kept the total abundance of returning Chinook through its waters stable at about 586,000 fish annually (Figure 1).

The coast wide Pacific Salmon Treaty (PST) Chinook agreement provides certainty and stability to the harvest distribution of Chinook salmon. It is our anticipation that the proposed Puget Sound Chinook Harvest Plan when coupled with the current PST Chinook salmon agreement will provide a fishing pattern like that observed over the past ten years. For the footprint of Puget Sound tribal fisheries, the average annual impact on Chinook salmon is split approximately 77/23 between terminal and pre-terminal fisheries. In pre-terminal fisheries the predominance of Chinook salmon harvest occurs in fisheries directed at species other than Chinook salmon (e.g., sockeye, pink, or chum salmon) and/or times and areas where the likelihood of an encounter with SRKWs would not be expected or rare.

SRKWs are a revered species and like salmon, share a special cultural and spiritual connection with the Puget Sound treaty tribes. Like salmon, marine mammals such as SRKWs are a trust resource as they are part of the natural resources within the tribes' usual and accustomed areas.[3] This is a revered and honored species, and is not harassed. It is a tribal belief that if you protect the orca, then they will protect you.

Both the Endangered Species Act and the Marine Mammal Protection Act define "take" as harm, harass or kill. When assessing "take" upon SRKW, we remind NOAA of its trust responsibly to ensure that tribes do not bear a disproportionate burden for the conservation of listed species.[4] We do not think there is demonstrable harm from the proposed treaty fishery, or that all other means of conservation from non-tribal impacts or less restrictive alternate means have been explored. In 2010, an independent science panel expert panel concluded that it seems unlikely that the summer period would be the most critical period where Chinook salmon abundance affected SRKW vital rates.[5] The recovery plan for the SRKWs developed by NOAA in 2008 identified 5 factors for decline: prey availability, pollution/contamination, vessel effects (physical disturbance), oil spills

[3]United States v. Washington, 129 F. Supp. 3d 1069 (W.D. Wash. 2015) ("Quileute I"), aff'd in part, rev'd in part sub nom. Makah v. Quileute et al., 873 F.3d 1157 (9th Cir. 2017) ("Quileute II"), reh'g denied, No. 15-35824, Dkt. 99, 2018 WL 3964238 (9th Cir. Jan. 19, 2018), petition for cert. filed, No. 17-1592 (U.S. May 21, 2018).

[4] Secretarial Order 3206: American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act (June 5, 1997)

[5] Hilborn, R., S.P. Cox, F.M.D. Gulland, D.G. Hankin, N.T. Hobbs, D.E. Schindler, and A.W. Trites. 2012. The Effects of Salmon Fisheries on Southern Resident Killer Whales: Final Report of the Independent Science Panel. Prepared with the assistance of D.R. Marmorek and A.W. Hall, ESSA Technologies Ltd., Vancouver, B.C. for National Marine Fisheries Service (Seattle. WA) and Fisheries and Oceans Canada (Vancouver. BC). xv + 61 pp. + Appendices.

and acoustical effects. The tribal fishing activities covered by the Puget Sound Chinook Harvest Plan intersects with the following three factors:

Prey Availability

Chinook salmon are the primary prey species for Southern Resident Killer Whales,[6] and prey availability is considered one of the limiting factors for SRKW recovery.[7] However, addressing prey availability and increasing Chinook abundance does not mean solely seeking greater reductions in commercial harvest and limiting fishing opportunity. While it may seem logical to reduce harvest of Chinook to provide more prey for killer whales, harvest in the Salish Sea has a negligible impact on prey availability compared to other threats. We also note that while Chinook may be the main prey species for SRKW, coho and chum are also important components of their diet in Puget Sound, particularly in the late summer, fall, and winter.

A significant portion of the fisheries in the Salish Sea take place in terminal areas after the fish have escaped killer whale predation. The remaining harvest takes place in preterminal areas; however, that harvest is not occurring in the same times and places that whales seem to be feeding. As such, it is increasingly apparent that the greatest competition for Chinook salmon in the Salish Sea comes from pinnipeds.[8,9] Moreover, an independent science panel found that foregoing harvest of Chinook in ocean fisheries would have little benefit to SRKW.[10] The panel cited a number of reasons why foregone harvest would not ultimately contribute to the available prey base for SRKW, including competition with other predators, the mixed-stock composition of the fisheries (i.e. not all stocks in the fisheries are important to Southern Residents), and the low harvest rate (approximately 20%) along with the mixture of mature and immature fish in those fisheries.[11] The latter reference is significant in that Southern Resident Killer Whales tend to eat large adult Chinook (i.e. fish between 3 – 5 years old).

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[6] Hanson M.B., Baird R.W., Ford J.K.B., Hempelmann-Halos J., Dornick D.M.V., Candy J.R., Emmons C.K., Schorr G.S., Gisborne B., Ayers K.L., Wasser S.K., Balcomb K.C., Balcomb-Bartock K., Sneva J.G., and Ford M.J. (2010) *Species and stock identification of prey consumed by endangered southern resident killer whales in their summer range*. Endangered Species Res 11:69-82.

[7] NMFS. 2008e. *Recovery Plan for Southern Resident Killer Whales (Orcinus orca).* NMFS. Northwest Region, Seattle, Washington.

[8] Chasco, B., I. Kaplan, A. Thomas, A. Acevedo-Gutiérrez, D. Noren, M. Ford, M. Hanson, J. Scordino, S. Jeffries, S. Pearson, K. Marshall, and E. Ward. 2017. *Estimates of Chinook salmon consumption in Washington State inland waters by four marine mammal predators from 1970 to 2015*. *Can. J. Fish. Aquat. Sci*. 74 (8): 1173-1194.

[9] Chasco, B., I. Kaplan, A. Thomas, A. Acevedo-Gutiérrez, D. Noren, M. Ford, M. Hanson, J. Scordino, S. Jeffries, K. Marshall, A. Shelton, C. Matkin, B. Burke, and E. Ward. 2017. *Competing tradeoffs between increasing marine mammal predation and fisheries harvest of Chinook salmon*. Scientific Reports. 7: 15439.

[10] Hilborn, R., S.P. Cox, F.M.D. Gulland, D.G. Hankin, N.T. Hobbs, D.E. Schindler, and A.W. Trites. 2012. *The Effects of Salmon Fisheries on Southern Resident Killer Whales: Final Report of the Independent Science Panel.* Prepared with the assistance of D.R. Marmorek and A.W. Hall, ESSA Technologies Ltd., Vancouver, B.C. for National Marine Fisheries Service (Seattle. WA) and Fisheries and Oceans Canada (Vancouver. BC). xv + 61 pp. + Appendices.

[11] *Id.*

Our analysis of the effects of fishing on salmon availability is similar to the one we provided last year. For this analysis, we combined FRAM stocks into coarser aggregate stocks using the state-space model developed by Shelton et al. 2019[12]. The code was developed by NOAA and WDFW analysts (Carey, Dapp, Satterthwaite, and Ward) for use in federal waters of the West Coast and adapted for our use in Puget Sound. We estimate kilocalories (kcal) per fish with the following method. Fork lengths calculated by FRAM were transformed into kcal according to the formula kcal = 0.000011 * (fork length ^ 3.122) (O'Neill et al. 2014, formula 15). Adult Chinook in this analysis have on average between 3,944 kcal/fish and 10,944 kcal/fish depending on the area.[13] The daily energy requirements for SRKW have been estimated based on sex, maturity, and metabolic rate during average speeds while engaged in different activities.[14] Adult males eat somewhere around 15 to 16 Chinook a day; adult females are estimated to eat 9 to 13 adult Chinook each day. Estimates of the amount of prey needed for SRKW vary considerably based on assumptions of the overlap in time/space of Chinook and SRKW, cohort size of the fish, selectivity of capture, and the fraction of energy that comes from Chinook.[15]

Chinook abundance in the U.S. portion of the Salish Sea (i.e., Puget Sound) for each of the three FRAM time steps were compared both with and without preterminal tribal fisheries for the years 1992 - 2018. The analysis was also completed after removing 85% of the Fraser River early Chinook stock to simulate the predicted effects of the Big Bar rock slide[16] in our retrospective analysis. These abundance estimates in numbers of fish were converted to kilocalories based on the component stocks and their estimated caloric values from O'Neill et al. 2014. Those caloric estimates were then compared against the estimated upper and lower bound of caloric need for the population.

We also examined available kilocalories from coho and chum, as these become increasingly important prey species for SRKW from late summer into the fall and winter months. Available kilocalories of coho by time step in Puget Sound was estimated for the years 2010 – 2019 (we did not perform the analysis for all years back to 1992 for coho as we did with Chinook, but enough years were analyzed to provide a representative sample). Total number of 3-year-old coho returning to Puget Sound fishery by time step were estimated with postseason FRAM (i.e., no natural mortality is applied). It is also worth noting that FRAM only estimates 3-year-old adults, not other cohorts that may be available to SRKW.

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[12] Shelton, A.O., Satterthwaite, W.H., Ward, E.J., Feist, B.E. and Burke, B. (2019) Using hierarchical models to estimate stock-specific and seasonal variation in ocean distribution, survivorship, and aggregate abundance of fall run Chinook salmon. Canadian Journal of Fisheries and Aquatic Sciences 76(1): 95-108.

[13] O'Neill, S.M., Ylitalo, G.M. and West, J.E. (2014). Energy content of Pacific salmon as prey of northern and southern resident killer whales. Endangered Species Research 25: 265-281

[14] Noren, Dawn P., "Estimated field metabolic rates and prey requirements of resident killer whales" (2011). Publications, Agencies and Staff of the U.S. Department of Commerce. 296.

[15] Chasco, B., I. Kaplan, A. Thomas, A. Acevedo-Gutiérrez, D. Noren, M. Ford, M. Hanson, J. Scordino, S. Jeffries, K. Marshall, A. Shelton, C. Matkin, B. Burke, and E. Ward. 2017. Competing tradeoffs between increasing marine mammal predation and fisheries harvest of Chinook salmon. Scientific Reports. 7: 15439.

[16] Chuck Parken, Department of Fisheries and Oceans Canada, personal communication.

The average weight of fish each year was estimated by taking the annual average kg/fish observed from landing receipts[17]. Returning abundances in number of fish was converted to kilograms and then the estimated kilocalories per kilogram from O'Neill et al. 2014 was applied to estimate the total available kilocalories each year and time step both before and after Puget Sound preterminal tribal fisheries.

For chum salmon a similar analysis was performed for the years 1992 – 2019. As with coho, the average weight of chum landed each year was estimated in kilograms, then the kilocalories/kilogram from O'Neill et al. 2014 was used to estimate total kilocalories of chum available each year. The analysis was performed with the total number of chum returning to Puget Sound both with and without tribal preterminal fisheries removals. That provided an estimate of the kilocalories available each year as well as what would have been available had preterminal tribal fisheries not taken place.

Comparison of take in U.S. fisheries to estimated prey needs of Southern Residents within the Salish Sea:

Using these numbers, we can compare take in U.S. fisheries to estimated prey needs of Southern Residents within the Salish Sea. Comparing reductions in abundance from fisheries to the estimated annual consumption of the entire SRKW population in kcals using Noren 2011[18], we are able to show that abundance of important prey species is affected much more by interannual variation than by preterminal tribal fisheries. Using Noren's estimates of daily prey energy requirements and the demographics of the SRKW population, we estimate that the entire population of whales requires between 11,309,105 kcals (lower bound) and 13,572,557 kcals (upper bound) per day. Those estimates were expanded by the number of days in a FRAM time step to estimate the population need: time step 1 (7 months, lower bound: 2,407,896,833 kcal, upper bound: 2,889,823,595 kcal), time step 2 (2 months, lower bound: 687,970,524 kcal, upper bound: 825,663,884 kcal) and time step 3 (3 months, lower bound: 1,031,955,786 kcal, upper bound: 1,238,495,826 kcal). Chinook in Puget Sound are most limiting, relative to the caloric needs of the SRKW population in time step 1 (October – April) (Figure 2). Abundances in kcals for time step 1 have varied from a low of 3,321,525,349 kcals of Chinook in Puget Sound in 1995 to a high of 6,236,127,936 kcals in 2003. That can be compared to removals in time step 1 that have ranged from a low of 1,245,292 kcals in 1998 to a high of 95,766,790 kcals in 1992. In other words, the changes in available kilocalories due to interannual variability in abundance are an order of magnitude greater than the changes due to harvest (i.e., billions compared to millions). The available kilocalories from Chinook in the other two time steps are generally substantially higher than the caloric needs of the whales, though without an estimate of foraging efficiency it is difficult to put those values into their proper context.

[17] Treaty Online Catch Accounting System data query on April 1, 2020.
[18] Noren, Dawn P., "Estimated field metabolic rates and prey requirements of resident killer whales" (2011). Publications, Agencies and Staff of the U.S. Department of Commerce. 296.

In some years, Chinook availability would be less than the estimated caloric needs of SRKW in the winter (time step 1). This is the case in our retrospective analysis, applying the reduction to account for the Big Bar slide, in 1994 – 1996, 2000, 2007 – 2009, 2012, and 2018, or nine out of the twenty-five years. However, it is important to remember that coho and chum add to the available calories for SRKW. In the winter time step (October – December), available kilocalories from coho have ranged from 534,443,305 kcals to 2,859,860,439 kcals. The low of 534,443,305 kcals was during the coho disaster of 2015; the next lowest value is 1,079,092,885 kcals. From 1992 – 2019, chum has contributed between 1,573,010,883 kcals (2019) and 14,234,305,732 kcals (2002) during the winter time period (October – April). So, comparing the estimated need and a conservative estimate of available salmon in a year of low abundance across species (i.e., taking the lowest observed value of each species in our analysis and comparing it to upper bound of the estimated population need in time step one still yields over two times the caloric need). This result is virtually the same whether there is fishing or not (i.e., preterminal removals from treaty tribal fisheries are such a small portion of overall abundance).

These estimates looked at fisheries catches throughout the U.S. portion of the Salish Sea. However, taking both time and area into account in estimating the potential for fisheries to compete with whales is also important. This can be examined by comparing recent years' averages of preterminal fisheries by fisheries management area and time step in the Fishery Regulation Assessment Model (FRAM) and comparing that with SRKW sightings (Figure 3). The results show very little overlap in most of these fisheries in time and area with observations of killer whales. The analysis also shows the majority of SRKW sightings in Management Area 7—this is consistent with evidence from prey samples that upwards of 80% - 90% of the Chinook eaten by SRKW in the Salish Sea are of Fraser River origin.[19]

By contrast, pinnipeds in the Salish Sea are estimated to have eaten almost twice as many Chinook in 2015 as have killer whales.[20] Pinnipeds, especially harbor seals, have increased from low levels in the 1970s to much higher levels today. California sea lions increased from virtually none to more than 2,000 individuals and harbor seals have increased from about 2,000 individuals in 1970 to over 16,000 today. Over that same time period, pinniped predation on Chinook is estimated to have increased from 68 metric ton of Chinook to 625 metric ton. Harbor seals were estimated to consume 1.1 million Chinook in the 1970s compared to 8.6 million fish today. In a related study, the authors note, "Our results suggest that at least in recent years, competition with other marine mammals is a more

[19] Hanson M.B., Baird R.W., Ford J.K.B., Hempelmann-Halos J., Dornick D.M.V., Candy J.R., Emmons C.K., Schorr G.S., Gisborne B., Ayers K.L., Wasser S.K., Balcomb K.C., Balcomb-Bartock K., Sneva J.G., and Ford M.J. (2010) *Species and stock identification of prey consumed by endangered southern resident killer whales in their summer range*. Endang Species Res 11:69-82.

[20] Chasco, B., I. Kaplan, A. Thomas, A. Acevedo-Gutiérrez, D. Noren, M. Ford, M. Hanson, J. Scordino, S. Jeffries, S. Pearson, K. Marshall, and E. Ward. 2017. Estimates of Chinook salmon consumption in Washington State inland waters by four marine mammal predators from 1970 to 2015. *Can. J. Fish. Aquat. Sci*. 74 (8): 1173-1194.

important factor limiting the growth of this endangered population than competition with human fisheries."[21]

Vessel Effects (physical disturbance)

NOAA has identified vessel effects present two main risks to SRKW: direct vessel strikes and behavioral change.[22] More recently, NOAA has had a growing concern over harassment from commercial and recreational whale watching vessels and boaters.[23] The physical disturbance created by close vessel approaches has been found to change SRKW behavior and disrupt foraging activities.[24] This is detrimental to SRKW as the summer months within Puget Sound is when concentration of large Chinook salmon is at its peak. However, total avoidance of vessel activity when SRKWs are present within Puget Sound is impossible. Puget Sound and the Georgia Basin have become a highly urbanized region with countless private docks, numerous marinas, and several major international ports.

Comparison of spatial/temporal overlap between tribal fishing and SRKWs

The tribes' pre-terminal Chinook salmon catch and SRKWs foraging areas have little overlap as indicated earlier during the discussion of prey availability and shown in Figure 3. The assessment of potential impact from tribal fishing activity from the perspective of vessel effect from these same fisheries shows the same minimal impact on SRKWs. The footprint for the tribal salmon fisheries was defined in terms of boat days as measured by unique fish ticket. This allows for a spatial/temporal assessment of tribal boat days against SRKW sightings within Puget Sound (Figure 3). Assessing the potential of interaction utilizing these two data sets indicates that there is little overlap. This assessment indicates that the greatest interaction by tribal fisheries yields an average of 2.5 vessels per day, in comparison to an estimated average 15 vessels engaged in whale watching interact with the whales daily.[25] Another comparison to gain perspective of the minimum threat the tribal fishing fleet presents to the SRKW is fleet size. The recent 5-year average tribal fleet size as defined by unique fisher tickets is 755 which is low in comparison to cargo and passenger vessels of over 300 tons or more that transit Washington waters in this same time frame. Washington Department of Ecology data indicates that for this size vessel class there is an

[21] Chasco, B., I. Kaplan, A. Thomas, A. Acevedo-Gutiérrez, D. Noren, M. Ford, M. Hanson, J. Scordino, S. Jeffries, K. Marshall, A. Shelton, C. Matkin, B. Burke, and E. Ward. 2017. *Competing tradeoffs between increasing marine mammal predation and fisheries harvest of Chinook salmon*. Scientific Reports. 7: 15439.
[22] NMFS. 2008e. *Recovery Plan for Southern Resident Killer Whales (Orcinus orca).* NMFS. Northwest Region, Seattle, Washington
[23] NOAA, 2017. Reducing Disturbance from Vessels to Southern Resident Killer Whales: Assessing the Effectiveness of the 2011 Federal Regulations in Advancing Recovery Goals. NOAA Technical Memorandum NMFSOPR-58.
[24] Lusseau, D., D. E. Bain, R. Williams, and J. C. Smith. 2009. Vessel traffic disrupts the foraging behavior of southern resident killer whales *Orcinus orca*. Endanger. Spec. Res. 6:6211-221.
[25] NOAA, 2017. Reducing Disturbance from Vessels to Southern Resident Killer Whales: Assessing the Effectiveness of the 2011 Federal Regulations in Advancing Recovery Goals. NOAA Technical Memorandum NMFSOPR-58.

average of over 2,100 vessels entries and transits per year for Puget Sound waters.[26] The tribal fleet and its associated fishing activity is a minor component of the overall potential vessel effects that are occurring upon the SRKW within Puget Sound.

Direct physical encounters of SRKWs.

Tribal fishing in pre-terminal areas within Puget Sound is predominately directed at salmon species with Chinook salmon catch being incidental which should limit direct physical encounters with SRKWs. This is confirmed by spatial/temporal assessment of tribal fishing activity and Chinook salmon catch with SRKW foraging areas (Figures 3 and 4). These findings also are consistent with studies regarding the number of direct physical encounter incidents committed by vessel type from 2006 to 2015. Data reported by Seely (2016) indicated that commercial fishing vessels account for a small percentage of the contacts, averaging less than 2% annually.[27] This is similar to the results of other research which did not specify commercial fishing vessels as a separate category, but rather lumped all other vessel types together that were not associated with direct watching activities, this catch all category represented a minor component of the overall observed interactions.[28]

Acoustical Effect

Acoustic disturbance impacts SRKW in areas such as observed behavioral modification, communication interference, and masking of echolocation.[29] These impacts are generally associated with vessel type and proximity to marine mammals.[30] Acoustical disturbance being sourced to vessel propulsion, sonar, and/or depth finders. Potential impacts from tribal fishing activity are generally limited to vessel propulsion as the use of sonar and depth finders is not part of the standard practice for tribal pre-terminal fisheries.

Tribal pre-terminal fishing activity predominately occurs in time and areas outside SRKW active feeding areas. Comparison against reported sighting and "hotspots" for SRKWs as identified by NOAA show minimal overlap with tribal salmon fisheries (Figure 3). In addition, the average boat days associated with tribal fisheries is low throughout the year and researchers have found that SRKWs are more likely to remain foraging in low boat

[26] Washington Department of Ecology, 2018. Vessel Entries and Transits for Washington Waters. Publication 18-08-001.
[27] Seely, E. 2016. Final 2016 Soundwatch Program Annual Contract Report: Soundwatch Public Outreach/Boater Education Project. The Whale Museum, Friday Harbor, Washington.
[28] Giles, D.A., R. Cendak, and K.L Koski. 2010. Measuring vessel compliance with Washington State vessel regulations and Be Whale Wise boating guidelines. Contract number AB133F-07-SE-3026. 66 pages.
[29] Ferrara, G.A., T.M. Mongillo, L.M. Barre. 2017. Reducing disturbance from vessels to Southern Resident killer whales: Assessing the effectiveness of the 2011 federal regulations in advancing recovery goals. NOAA Tech. Memo. NMFS-OPR-58, 76 p. pp. 3
[30] Noren, D.P., A.H. Johnson, and A. Larson. 2009. Close approaches by vessel elicit active behaviors by Southern Resident Killer Whales. Endanger. Species Res. 8:179-192.

density conditions.[31] Our assessment is that the potential for acoustical impacts to SRKW from tribal fishing is limited, like that for physical encounter impacts. This is not unexpected as tribal pre-terminal fisheries within Puget Sound are predominately targeting species other than Chinook salmon. It is our expectation that the temporal and season footprint observed in recent years for tribal fisheries will not change significantly over the duration of this proposed plan.

In summary, the aggregate Chinook salmon returning to Puget Sound and the Georgia Basin has been stable at levels above the caloric requirements of the current SRKW population and summer time frame has not been shown to be a critical period where Chinook salmon abundance affects SRKW vital rates. Additionally, the tribes believe that the tribal fisheries have a limited potential for impact on SRKWs and represent a minor component of the overall "takes" occurring within Puget Sound waters. We look forward to successful collaborative efforts with the Protected Resources Division NOAA in assuring conservation goals of the Endangered Species Act will be achieved for SRKWs. If you have further questions, please feel free to contact Craig Bowhay, NWIFC Director of Fishery Programs at (360) 438-1180 ext. 310 or cbowhay@nwifc.org.

Sincerely,

Lorraine Loomis

Lorraine Loomis
Chairperson

cc: Barry Thom, Regional Administrator, NOAA Fisheries West Coast Region
Kelly Susewind, Director, Washington Department of Fish and Wildlife
NWIFC Commissioners

Attachments (5)

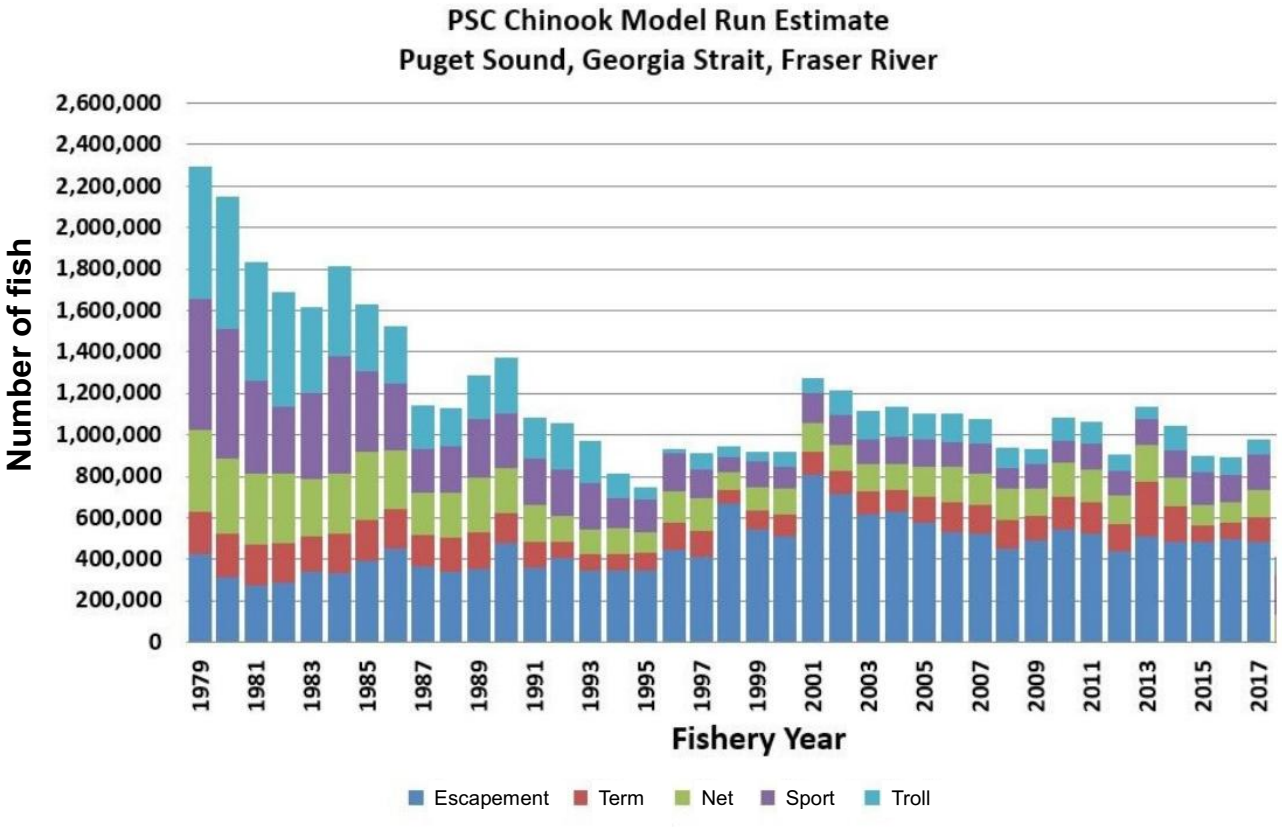
[31] Giles D. and R. Cendak. 2010. An Assessment of Vessel Effects on the Cohesion State of Southern Resident Killer Whale Groups and Measuring Vessel Compliance with Boating Guidelines. Contract number AB 133F-07-SE-3026. 56 pages.

Attachment 1

Table 1. Puget Sound Chinook salmon management objectives for fishery year 2021. Objectives are specified as escapement-based objectives or as either Total, Southern U.S. (SUS), or pre-terminal SUS (PT SUS) exploitation rate limits.

Management Unit	Exploitation Rate Ceiling
Nooksack River North/Middle Fork South Fork	10.5% SUS ER
Skagit Summer/Fall [1] Upper Skagit summer-run Sauk summer-run Lower Skagit fall-run	17% SUS
Skagit spring-run [1] Upper Sauk Upper Cascade Suiattle	10.3% SUS
Stillaguamish River [2] - Unmarked - Marked	22% Total / 8% SUS max 12% SUS
Snohomish River [1] Skykomish summer-run Snoqualmie fall-run	8% SUS ER
Lake Washington – Cedar River fall-run [3]	13% PT SUS [4]
Green River fall-run [3]	13% PT SUS [4]
White River spring-run	22% SUS
Puyallup fall-run [3]	13% PT SUS [4]
Nisqually	49% Total (47% + ≤2% for experimental selective fishery)
Skokomish fall-run	50% Total
Mid-Hood Canal	12.4% PT SUS[5]
Dungeness	10% SUS
Elwha	10% SUS
Western Strait of Juan de Fuca – Hoko River [6]	10% SUS

[1] In 2021, these stocks are below their LAT and, in addition to the ER limits presented, conservation considerations are an additional management expectation to improve stock status.
[2]In 2021, Stillaguamish Populations are below LAT defined by the Co-Managers and with the NOR component forecasted below 400 CET as defined by NOAA, therefore conservation considerations may need additional management actions.
[3] Hatchery Escapement goals are an additional management consideration for harvest of these stocks.
[4] Based on the pre-season forecasts for Lake Washington, Green River, and Puyallup River, the ER ceiling for the pre-terminal fisheries will be 13% PT SUS. Discussions between co-managers and NOAA regarding natural escapement objectives for 2021 are still ongoing.
[5] This is a one-year agreed to management objective.
[6]Although not part of the Puget Sound Chinook salmon ESU, Hoko River Chinook management objectives are a management consideration for Puget Sound co-managers.


PSC Chinook Model Run Estimate
Puget Sound, Georgia Strait, Fraser River
Number of fish
2,600,000
2,400,000
2,200,000
2,000,000
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
Fishery Year
Escapement
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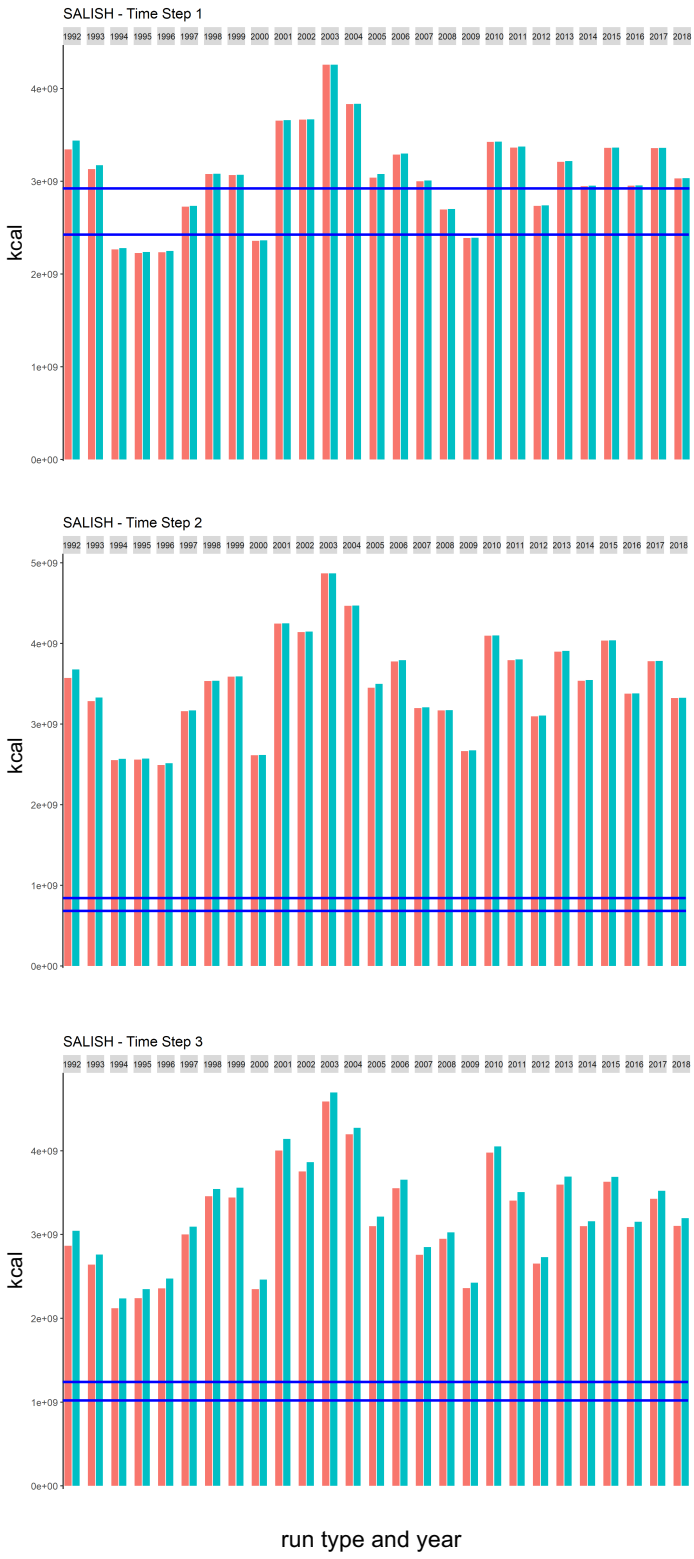
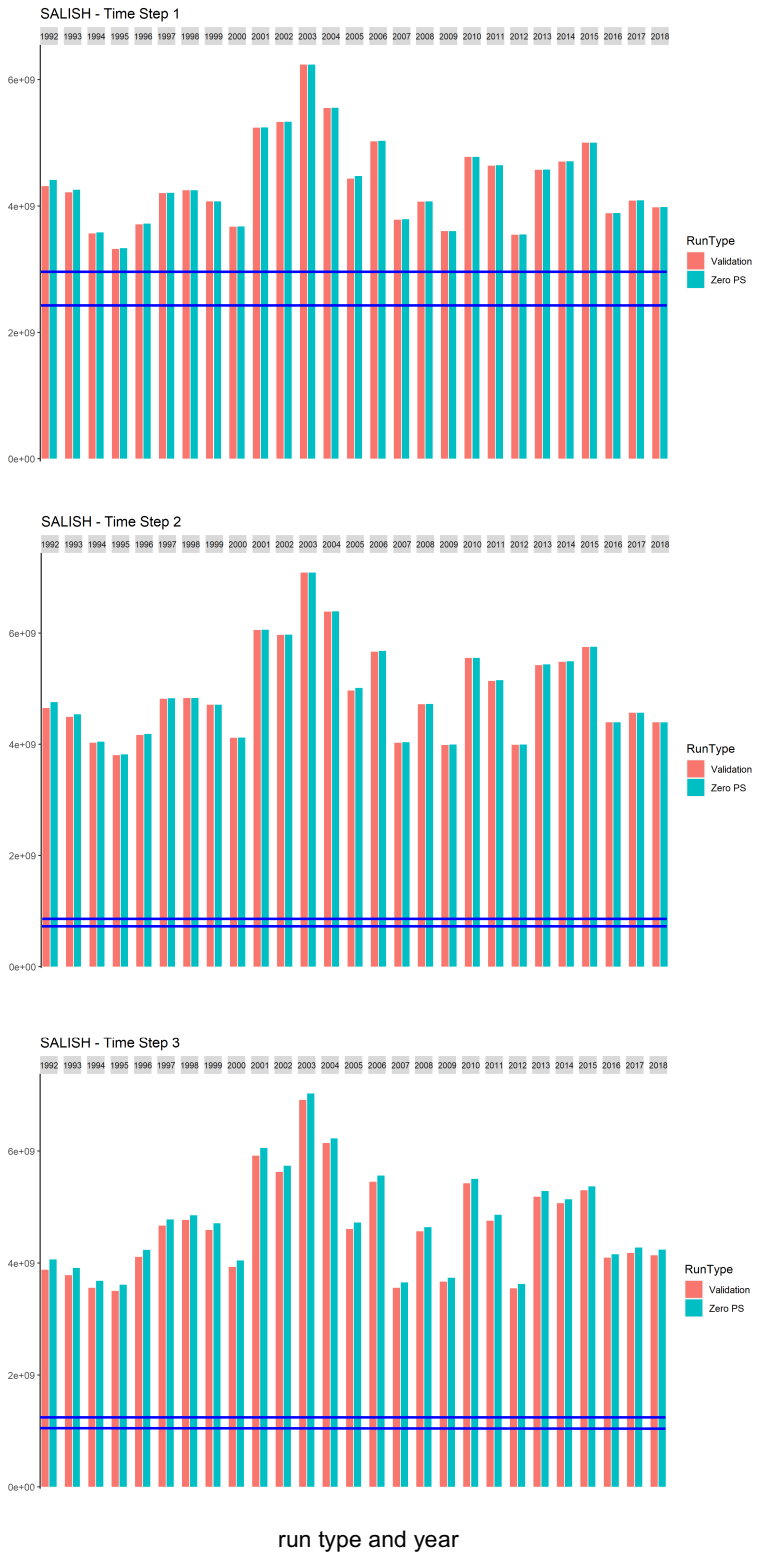
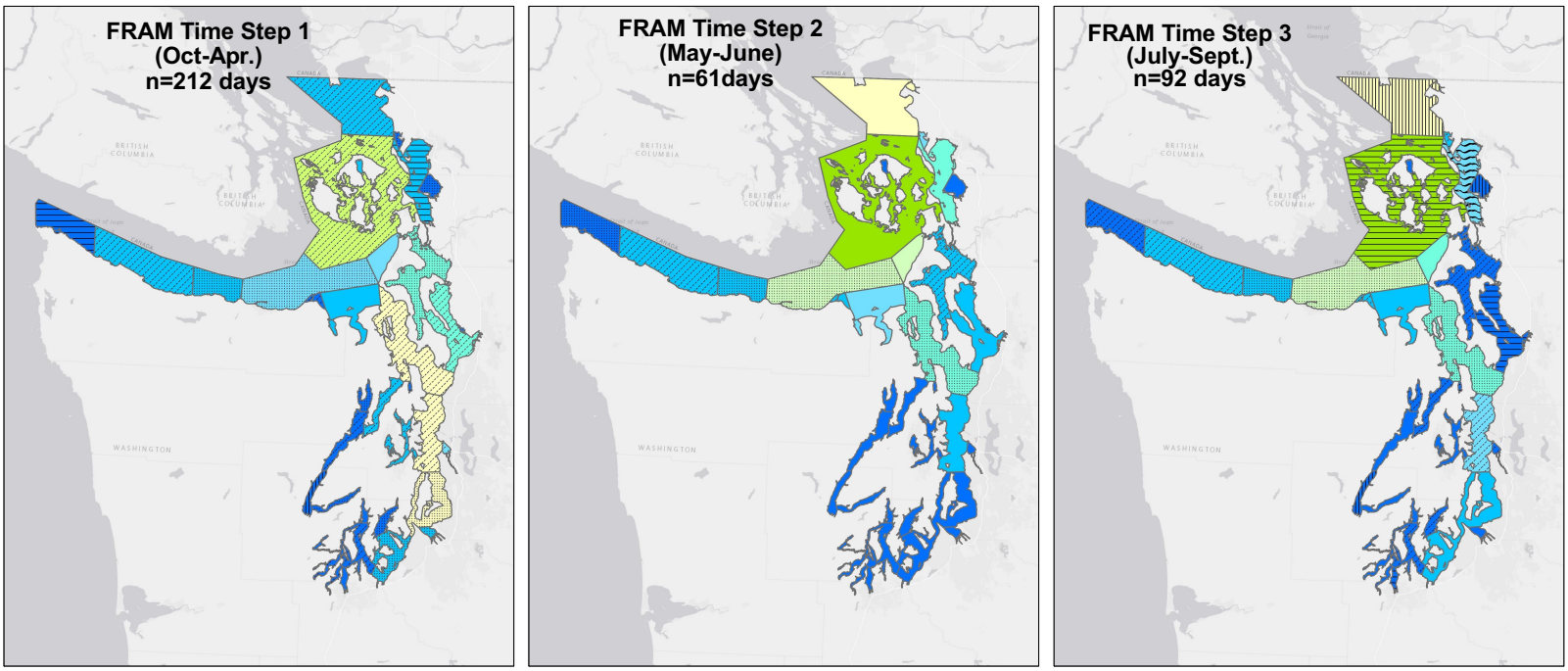
without 85 % of Fraser Early Chinook run



original run



AR008514


FRAM Time Step 1
(Oct-Apr.)
n=212 days
FRAM Time Step 2
(May-June)
n=61days
FRAM Time Step 3
(July-Sept.)
n=92 days
SRKW Sightings (2006-2017)
0 SRKW Obs. per month
>0-3 SRKW Obs. per month
>3-10 SRKW Obs. per month
>10-30 SRKW Obs. per month
>30-100 SRKW Obs. per month
>100-300 SRKW Obs. per month
>300-1,000 SRKW Obs. per month
>1,000 SRKW Obs. per month
Avg. Tribal Effort (2009-2019)
0 Boats per Time Step Duration Days
>0-0.1 Boats per Time Step Duration Days
>0.1-1.0 Boats per Time Step Duration Days
>1.0-2.5 Boats per Time Step Duration Days
>2.5-5.0 Boats per Time Step Duration Days
>5.0-10.0 Boats per Time Step Duration Days
>10.0 Boats per Time Step Duration Days