Comments on National Marine Fisheries Service Proposed Evaluation and Pending Determination re: Skagit River Steelhead Fishery Resource Management Plan

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Introduction

In November 2016 the Skagit Indian Tribes and Washington Department of Fish and Wildlife (the Co-Managers) submitted to NMFS a resource management plan ("RMP") for a Skagit River steelhead fishery. Since Skagit steelhead are an ESA-listed threatened stock whose recovery is critical to the survival and recovery of the Puget Sound steelhead DPS, NMFS must evaluate the RMP closely to determine that the proposed harvest regime will not prevent or unduly delay the rebuilding of the wild Skagit steelhead population.

We consider the possibility of either lethal commercial, ceremonial, and subsistence harvest or recreational catch and release ("C&R") fishing consistent with the obligations of the ESA an open question. But we also believe that it is possible to impose some level of fishing mortality on the Skagit population during the rebuilding period provided that it is appropriately crafted, implemented, and monitored.

Unfortunately, both the RMP and the Proposed Evaluation and Pending Determination (PEPD) fail to provide the kind of detailed analysis that is necessary to assure the public that implementation of the RMP will not place the wild Skagit steelhead population ("population") at unnecessary risk. We urge NMFS to withdraw the PEPD and develop an Environmental Impact Statement regarding the development of the co-managers' plan for harvest of the population.

The idea of conducting directed harvest of an ESA-listed Puget Sound steelhead population, whether lethal tribal or recreational catch and release (C&S) is controversial on its face. Many members of the interested public consider it questionable to impose harvest mortality on any ESU, DPS, or component population that is depressed significantly below levels of abundance and diversity considered necessary for recovery. This is clearly the case for the Skagit population, whose recent abundance is approximately18% of the abundance estimated by the Puget Sound Technical Recovery Team (TRT) to be necessary for viability (Hard et al. 2015), as admitted in the RMP and the PEPD. Further, the Skagit population is acknowledged to be the linchpin for the continued survival and eventual recovery of the Puget sound DPS and, as noted in the RMP, comprises "about 38% of the total return of natural-origin winter steelhead to Puget Sound" (RMP page 1), a total (DPS) return that is less than 4% of the abundance of the DPS at the end of the 19th century as estimated by the TRT (Hard et al. 2015) and independently by Gayeski et al. (2011).

Further, the RMP proposes to manage Skagit-origin steelhead as an independently managed component of the Puget Sound DPS, instead of according to the current DPS-wide approach that imposes a harvest rate limit of 4.2% on the DPS.

Three outstanding issues that are likely to affect management of Skagit steelhead are the absence of a final, or even a draft Recovery Plan for Puget Sound steelhead, the potential designation of the Skagit River as a Wild Steelhead Gene Bank (WSGB), pursuant to the Washington State Steelhead Management Plan of 2008, and current plans by the Washington Department of Fish and Wildlife (WDFW) to approve recreational fisheries targeting steelhead in other DIPS within the DPS. Any of these is likely to require significant, but unknown, restrictions on the kind, amount, and location of harvest of wild Skagit steelhead. Approval of the RMP is therefore controversial because it may include actions (and commit state and/or federal funding to implement) that are in conflict with WSGBs and/or provisions of the Recovery Plan. Since the deadline for completion and finalization of the Recovery Plan is December of 2018, the time between now and then would be better spent further examining scenarios and harvest control rules that may be capable of being harmonized with requirements of the Plan.

We note general and specific shortcomings of the RMP and PEPD below that provide additional evidence as to the controversial nature of NMFS approval of the RMP thus further supporting the need for a NMFS to require the RMP to undergo a full NEPA evaluation.

<u>Inadequacies of the RMP and PEPD.</u>

We limit the majority of our comments on specifics of the RMP and PEPD to bullet points.

Data inadequacies:

1. Appendix A of the RMP provides a table of brood year spawners and recruits for a majority of brood years (BYs) from 1978 to 2007. There are missing data for Bys 1990 to 1993 and for Bys 1996-7. In the Appendix attached to our comments, we analyze spawner and recruit data for the same population from a data set provided to colleagues at Trout Unlimited by Skagit tribal biologists in January of 2015 that contains no missing spawner data for BYs 1990 to 1993. Moreover this data set also includes annual age composition data and annual data on proportions of repeat spawners. The RMP provides none of this latter data, nor any details on how recruits were calculated. It also appears that the spawner-recruit estimates were conducted on the data in the Appendix A table ignoring the missing spawner data. It is important that the co-managers explain how the problems posed by the missing data were addressed with regard to the conduct of run reconstruction and stock-recruit model estimation. All of which renders it nearly impossible for the public to fully evaluate the results reported in the RMP.

Inadequacies of analysis:

2. No information is provided concerning the procedures and methods by which total annual spawning escapement is estimated.

The RMP refers to the use of index reach surveys. But no details are provided on where the index reaches are, how they were chosen, whether or not they are regularly re-evaluated as to how well they represent un-surveyed reaches they provide proxies for, and how accurately the index reach counts themselves are. No confidence intervals or other measures of the uncertainty in the escapement counts are provided or even discussed. There is some concern among individuals familiar with the Skagit that in many years spawner escapements may actually be over-estimated. It is critical that these issues are addressed before any run reconstruction data and subsequent analyses of them can be properly evaluated. The PEPD ignores these issues altogether.

3. Repeat spawners.

The RMP provides no data on the proportions of repeat spawners in the run reconstruction data provided in Appendix table A-1, nor elsewhere in the RMP, nor does the PEPD. Yet, the TRT has clearly emphasized the importance of repeat spawners to the resilience and recovery of the Puget Sound DPS (Hard et al. 2015). Moreover, the proportion of repeat spawners is a fundamental component of steelhead life-history diversity, and thus directly relevant to the evaluation of the consistency of the RMP with VSP criteria. It is critical that any harvest plan specifically consider the impact of any harvest removals on maintaining the current level of repeat spawning and rebuilding the proportion of repeat spawners to minimal levels (proportions of total returns and total spawners) recommended by the TRT or by the Recovery Plan. This failure also supports our assertion that it is premature to approve the current RMP, or any similar plan, prior to the approval of a final Recovery Plan later in 2018.

4. Run-timing: Protection and recovery of the early returning component of the run ("early-wild").

The RMP and PEPD merely pay lip-service to the critical issue of the rebuilding and recovery of the early-return timed portion of Skagit wild steelhead. River entry and upstream migration from mid-November through February historically constituted ~60% of the total steelhead return (Figure 1). This component has been reduced to less than 20% (Figure 2), primarily by fisheries targeting the former large, non-native, Chambers Creek ("Early Winter") Hatchery returns. The RMP proposes to begin tribal commercial and ceremonial and subsistence (C&S) fisheries starting in early December. The PEPD claims this as protective of early-wild steelhead by the puzzling assertion that "treaty fisheries would not target early returns but rather be implemented to access steelhead across the entire adult winter steelhead return period" (while delaying any non-tribal recreational fisheries until February 1 or later) (page 18). The fact that tribal fisheries may be conducted throughout the entire return period is irrelevant to the critical issue of the impact of that fishery during the early period of that return. It is obvious that the proposed tribal fisheries will be the only fisheries directly impacting early-wild steelhead. The critical question that is completely un-addressed by either the RMP or the PEPD is what is the likely magnitude of these impacts. For this reason alone the PEPD should be withdrawn and the co-managers required to explain in detail how fisheries will be configured so as to assure a timely rebuilding of the early-wild proportion of the total return to some minimal level, specified in a final Recovery Plan.

A definition for early-return steelhead in Washington has to include what the historical evidence indicates as the return time and spawn time of winter steelhead in the Skagit Basin, how wild and hatchery steelhead have been defined and managed in Washington for more than 30 years, and at what time periods harvest has been targeted in the Skagit Basin as a mechanism that has depleted early-return steelhead and their important contribution to the diversity and former productivity of wild winter steelhead:

1) Wild winter steelhead historically made entry to the Skagit Basin in commercially fishable numbers by November 15th (Wilcox 1898), were noted to have made entry at Finney Creek in January (Ravenel 1902), and began to spawn by early February in the lower Sauk River (Riseland 1907).

2) Wild and hatchery steelhead have been defined by their supposed run-timing and spawn-timing differences regarding the Skagit Basin (and elsewhere in Washington) as indicated by WDFW (2004) in a draft EIS for a "Lower Skagit" hatchery rearing pond: *"The Skagit River Hatchery winter steelhead are the targeted population for recreational and tribal fisheries ... the hatchery steelhead stock has been selected over the decades of development to return to the Skagit River primarily in December and January, and begin spawning by mid January. The return timing of the hatchery steelhead stock occurs one month before the initial return of the native wild winter steelhead stock ... Wild origin winter steelhead have been defined as those fish that spawn after March 15...* (and) *steelhead of hatchery origin that spawn in the wild are defined as those fish spawning before March 15, for management purposes on the Skagit (Woodin et al. 1984)."* However, as clearly indicated in Figures 1-4 wild steelhead historically returned in significant numbers in the same time period as indicated for hatchery steelhead, and even as greatly depleted as they have more recently become remain a component of the tribal catch in December, January, and February. It has also become apparent during both WDFW and independently done spawning surveys in the Skagit Basin that wild winter steelhead in some Mid Skagit tributary creeks begin to spawn as early as January (McMillan 2015; and 2016), or otherwise spawned early enough to spawn with hatchery steelhead in the Mid Skagit Basin (Pflug et al. 2013).

3) Several decades of 80%-95% harvest rates targeting early-return hatchery steelhead have occurred in Washington (SASSI 1994; McHenry et al. 1996). Wild steelhead can't sustain such harvest rates. The consequences of this are evident in the historical comparisons of Skagit River steelhead sport catch in 1955 and 1956 determined from punch card returns by

Washington Dept. of Game at a time when most returning steelhead were wild, and as then compared to the sport fishing methods used to sample wild steelhead in the Skagit River from 2008 to 2011 for acoustic tracking and genetic analysis (Pflug et al. 2013). As can be seen from Figure 1, the historical returns of wild steelhead numerically comprised 60% of the total sport catch from December through February in 1955 and 1956. Figures 2 and 3 provide a percentile comparison of the loss of early-return wild steelhead that has occurred in a comparison of the monthly sport catch in 1955 and 1956 to the sport catch for the acoustic tracking and genetics study from 2008 to 2011. The December through February sport catch of wild steelhead in the Skagit River is now less than 20% of what it historically was, and while 50% of the catch historically occurred prior to early February, now 50% of the catch does not occur until about mid-March, 1.5 months later. This would particularly impact steelhead requiring longer migration time to reach uppermost basin areas as well as those steelhead throughout the basin that historically spawned early.

Figure 1.

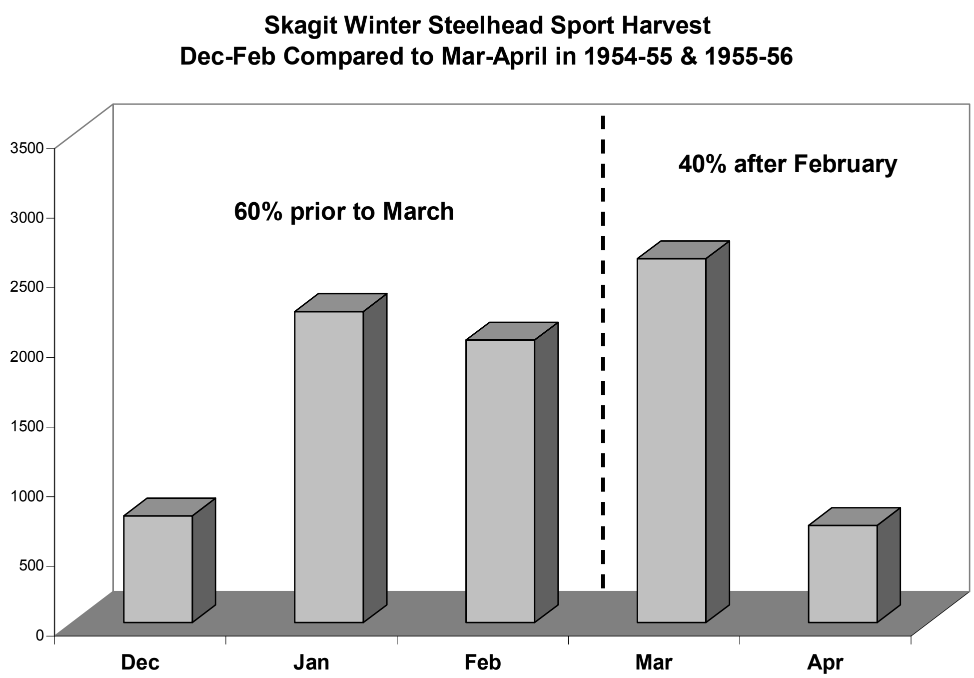


Figure 2.

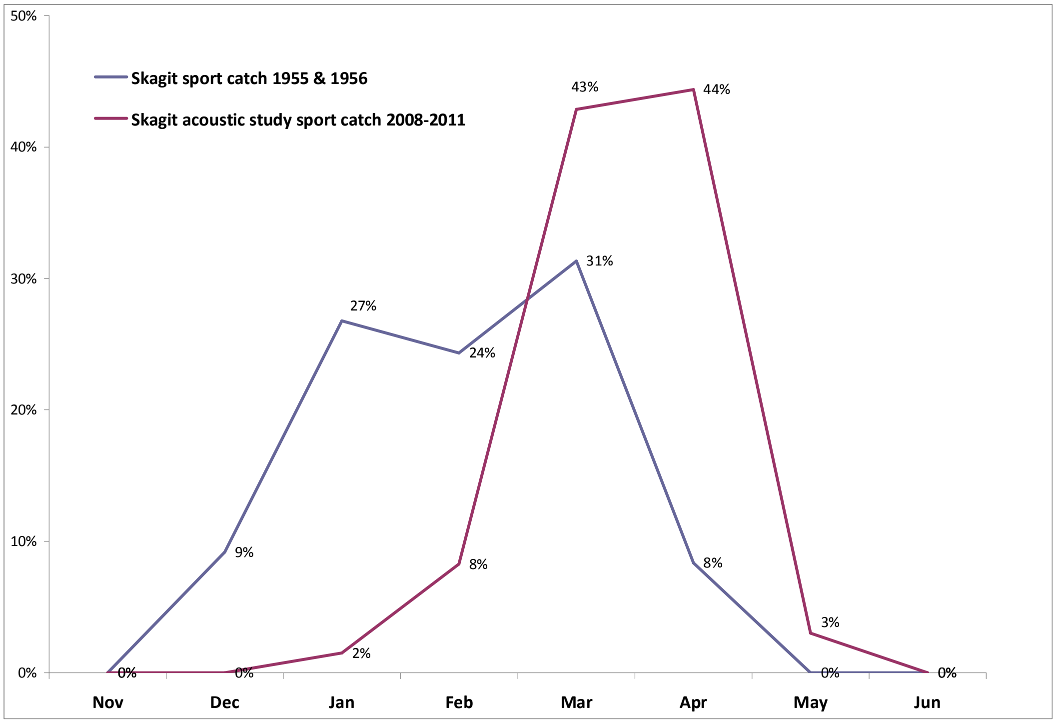


Figure 3.

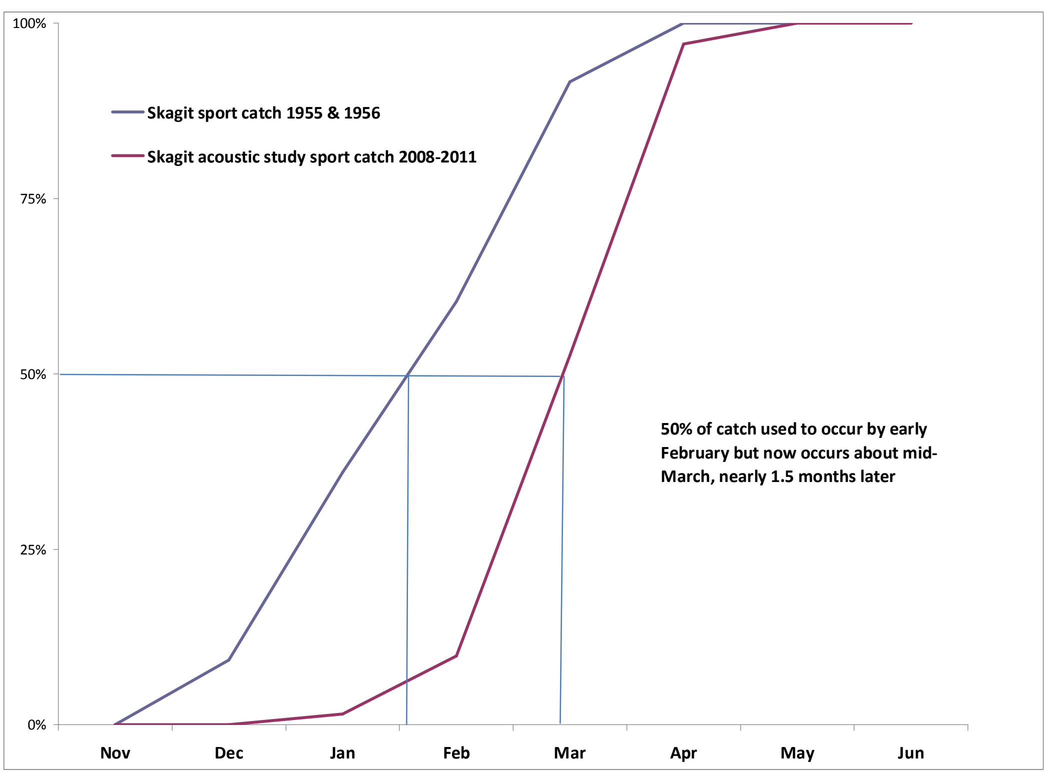
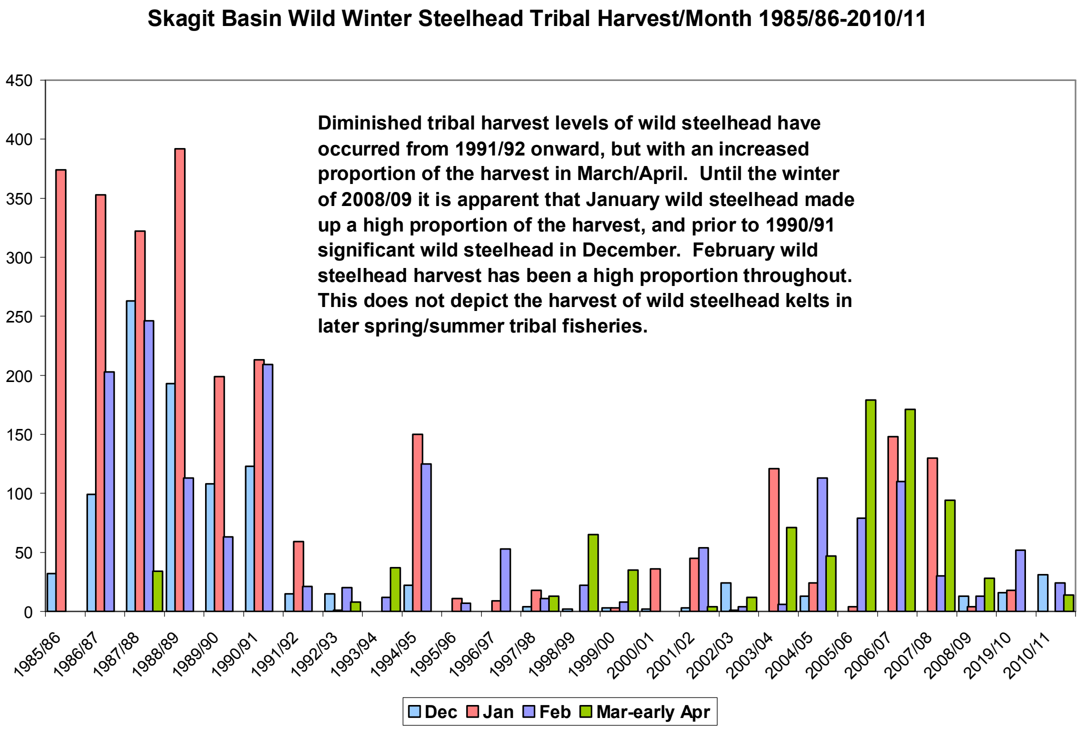


Figure 4.



As shown in Figure 4, the Skagit tribal fisheries from 1985/86 to 2010/11 have particularly harvested early-return wild steelhead in December, January, and February [data as provided to Bill McMillan from the Upper Skagit tribe (UST 2011)]. As previously indicated, this has similarly occurred in the sport fisheries with the resulting consequences of greatly depleted early-return wild steelhead in the Skagit Basin.

5. The RMP asserts without justification that the Skagit stock-recruit data (from BYs 1978 to 2007) shows cyclic behavior, ignoring the evidence that the time series is not stationary.

This assertion is by way of an excuse to manage harvest on the basis of point estimates of stock-recruit-derived management parameters based on the entire data set. As discussed in detail in the attached Appendix, both change-point analyses and dynamic linear time-series model analyses provide strong evidence that the time series is not stationary. There are several reasons to expect that stock-recruit time series data for Pacific salmon and steelhead over the period from the mid-1970s to the mid-2000s, will not be stationary. These include known regime changes in the northeast Pacific where juvenile salmon and steelhead rear and mature, and in the case of the Skagit, large increases in the release of Chambers Creek Hatchery steelhead smolts throughout the 1980s and 1990s (described in Pflug et al. 2013). It is now common to examine stock-recruit model productivity parameters (e.g., the Ricker or Beverton-Holt model alpha parameters) as time-varying, by employing random walks, lag-1 autocorrelations, or Kalman filters (e.g., Dorner et al. 2008, Lierman et al. 2010, Su & Peterman (2014), Petermain et al. 2016) to evaluate the extent and magnitude of non-stationarity that may be present in the data. Results of such analyses can significantly affect the estimation of management parameters. The simple fact is that the Skagit data show strong evidence of non-stationary that cannot be ignored by the unsubstantiated claim that the data exhibit cyclic behavior.

6. The RMP and PEPD employ an inappropriate standard to evaluate the risk that proposed harvest regime may have on the Skagit population and thereby also on the MPG and the entire DPS in view of the critical role of the Skagit in the recovery of the entire DPS.

The RMP determines a Critical spawner abundance level of 500 total spawners throughout the basin, based on various approaches to estimate the quasi-extinction level discussed by the TRT (Hard et al. 2015). The RMP contrasts this with the spawner abundance estimated by the TRT as necessary to attain Viability, which is 44, 619. The RMP then in effect treats the critical abundance level as a target floor and asserts that recovery will not be impaired so long as harvest does not reduce the total population to this level! The PEPD simply accepts this claim without independent evaluation. In effect, the RMP proposes that fisheries will not prevent recovery as long as the total population remains above spawner levels estimated as necessary to prevent depensation. This is inconsistent with recovery and gradual rebuilding toward viable population levels.

The RMP proposes to harvest any return of wild steelhead of 4000 or less at 4% (so long as the return is not estimated to be as low as 500). This would, in effect, permit incidental harvest impact in marine water from fisheries targeting other species to occur with little or no change, which appear to average 120 steelhead annually but have been as high as nearly 600 in recent years (RMP, Table 4, page 13).

The proposed harvest rates increase steadily at pre-season-estimated total returns above 4000 (PEPD Table 4, page 14), allowing a 10% harvest rate when total returns are above 4000 but below the current nominal escapement goal of 6000! Thus, for a return of 6000 that would barely attain the escapement goal if unfished, 600 could be removed. When returns are below 8000 but above 6000, a 20% harvest rate would be applied. Thus, it would require a return of 7500 to achieve the nominal escapement goal (7500*0.2 = 1500; 7500-1500 = 6000). Returns greater than 8000 would be harvested at 25%.

These calculations ignore the impact of these harvest rates on the proportion of repeat spawners. Taking these into account along with the rebuilding of the early-wild component, and assuring minimum levels of annual spawner abundance in major tributaries, will most likely require any allowable harvest rates to be lower than those proposed. None of these kinds of considerations are addressed in the RMP, and NMFS uncritically ignores them in the PEPD.

7. The RMP fails to account for the need to attain tributary-specific minimal levels of annual spawners.

Further, there is a need to identify minimum spawner escapement goals for each major tributary in the Skagit system in order to assure that all major spawning and rearing areas are fully seeded. This would include, at a minimum the following: Nookachamps Creek, Bacon Creek, Diobsud Creek, Cascade River, Sauk River, Suiattle River, Whitechuck River, Illabot Creek, Day Creek, and Finney Creek. The RMP and PEPD dismiss this critical issue with the claim that managing harvest of Skagit steelhead at the aggregate river basin (management unit) level is necessitated by lack of DIP (demographically independent population)-specific data. This is inconsistent with a precautionary approach appropriate to an ESA-listed population. There are credible ways to estimate risk-averse interim spawner escapement targets for major tributaries that can apply in the near-term and be refined by research and monitoring activities. Again, these require a final Recovery Plan. But TRT documents and current GIS data provide the means for making interim estimates.

In the latter 1970s to early 1980s two reports indicated the importance that smaller tributaries of the Skagit Basin then had for steelhead: 1) Skagit River Basin steelhead spawning surveys from 1978 to 1981 found that 65%-80% of all steelhead spawning found was in the tributary creeks (Phillips et al. 1981a); and 2) genetic differences among steelhead trout populations in 1979 within the Skagit River drainage were examined by means of electrophoretic analysis of fish tissue proteins. It was found that gene frequency differences between individual tributary samples were very significant (P <.0001) and contributed the greatest variability of all sample comparisons from those collected in the Skagit River (Phillips et al. 1981b). These combined findings from that historical era of 35-40 years ago indicate that Skagit River tributary streams were vital to overall wild steelhead productivity and genetic diversity. They provide the earliest baseline of where most steelhead spawned and the widespread genetic diversity within the basin at that time. This early Skagit genetics work was later cited by Phelps et al. 1994, confirming the findings of the great genetic diversity that can occur within a river basin.

Parkinson (1984) found widespread significant genetic differences in British Columbia steelhead and noted that, "Genetic variation was present between steelhead populations in geographically adjacent streams, implying that gene flow is restricted over very short distances in this species." He further indicated:

"The pattern of genetic variation reported here reflects an underlying stock structure that has to be considered in the management of this species. The presence of differences between adjacent streams supports the conclusion of straying, and genetic studies in various anadromous salmonid species which indicate that little interchange of individuals takes place between adjacent streams. Adjacent populations should therefore be managed as separate stocks.

The adaptive significance of marginal (small) populations came to be the subject of Scudder (1989) in which he indicated:

"... ecologically marginal habitats are characteristically spatially diverse and temporarily unstable. Selection in these is for colonization ability and adaptation to a diverse array of density-independent factors. Centripetal gene flow from these marginal areas at times of contraction increases the genetic diversity of the central populations, wherein selection usually favours density-dependent factors. Thus, central genetic diversity is found in the most ecologically versatile species. Marginal populations have a high adaptive significance to the species as a whole, and marginal habitat conservation, preservation and management is one of the "best" ways to conserve the genetic diversity and resources of fish species. Marginal habitats are an essential prerequisite for the maintenance of this diversity and versatility."

Riddle (1991) further went on to explain the stock concept and necessary recognition of the great breadth of genetic diversity in Pacific salmon, their adaptations to diverse habitats, and the impact of harvest management:

"The rich biological diversity in salmonids has been recognized for centuries and has been a central premise in managing salmon fisheries in this century (the "Stock Concept"). But recently, as in many other biological resources (FAO, 1981; Oldfield, 1989), increased concern has been expressed about the loss of biological diversity and the impact of harvest management on Pacific salmon ... Multiple resource management principles, such as sustainable economic development (WCED, 1987), will increase harvest and environmental issues involved in salmon management decisions. Evidence for global climate changes increases uncertainty about future salmon production ... Unfortunately, in many salmon management decisions, the non-biological interests have taken precedence over the biological resource (Wright, 1981; Fraidenburg and Lincoln, 1985; Walters and Riddell, 1986). Each of these may have been a responsible decision, but in aggregated they create a serious biological problem through the gradual but steady erosion of biological diversity ...

Riddle (1991) went on to explain:

"... Patterns of historical colonization following glaciation, adaptation to local spawning and rearing environments, and recent anthropogenic impacts have resulted in fragmented spatial distributions of locally adapted spawning populations (reviewed recently in Altukhov and Salmenkova, 1991; Taylor, 1991). Biological diversity within the Pacific salmon species naturally forms a hierarchical organization (Fig. 2).

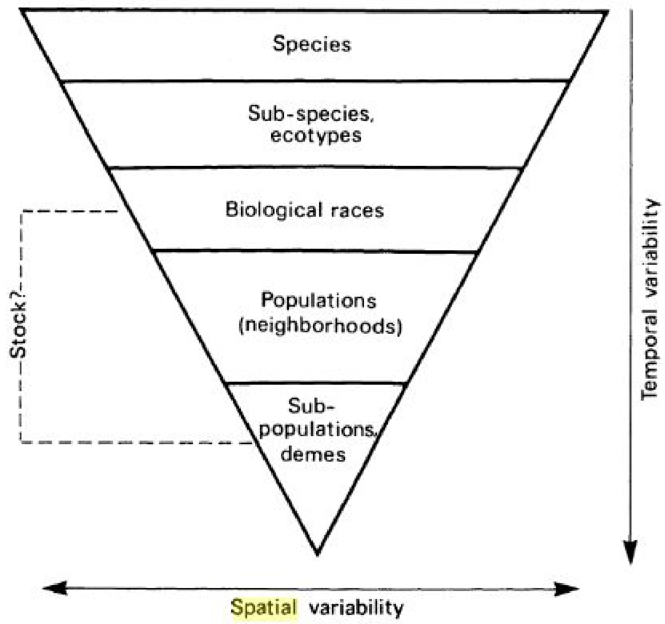


Figure 2. Schematic representation of the hierarchical organization of genetic diversity in Pacific salmon. The inverted triangle emphasizes that locally adapted, and largely reproductively isolated sub-populations or demes are the basic unit of diversity in these species. Varying definitions of "stock" would place this term in the range identified by the dashed lines.

Riddle (1991) then explains the biological values of stock diversity and the consequences of loss of *any* spawning population:

"In a practical sense, the biological diversity presently observed is a non-renewable resource, and only an instant in the dynamic evolutionary process. The diversity has resulted from colonization events, innumerable events which changed genetic variation, and the differential fitness of individuals over past environments. Once a spawning population is lost, any unique traits it may have possessed are realistically gone forever. Consequently, the principal biological values are adaptedness in the existing populations, maintenance of population structures and the evolutionary process, and, very simply, maintaining the spatial and temporal basis for salmon production."

This provides further light into the importance of what was found within the Skagit Basin with the significant steelhead genetic diversity found at virtually every tributary creek sampled. It also points out the threats that fisheries can pose to retaining this diversity regarding harvest on small, vitally important steelhead populations that can be particularly acute during periods of overall low returns to a large, diverse stream basin such as the Skagit.

Recently, the Norwegian government has adopted a scientifically-based, tributary/population-specific approach to managing harvest of wild Atlantic salmon. This is described in some detail in Forseth et al. 2013, and is exemplified by Falkegard et al. 2014. Briefly, the approach consists of the following. Conservation limits are defined as the number of eggs deposited annually that produce maximum smolt production in each tributary. Egg deposition targets to achieve the conservation limits are estimated based on the age composition and age/size-specific female fecundity of returning adults in each tributary/population, and the basin area accessible to spawning adults. The conservation limit is expressed as number of eggs-per-square meter of spawner accessible basin area. The management target is then defined as attaining the conservation limit in at least three out of every four years. Fishing is constrained to achieve this. In the case when the conservation limit would not be attained even if no fishing occurs, the management action is no fishing. Falkegard et al (2014) illustrate the application of this approach and is included as an Appendix to these comments. **We strongly advocate this approach, which should be evaluated in a full EIS.**

8. The RMP fails to describe the methods by which pre-season adult returns are estimated, nor any data describing the accuracy of past forecasts.

Run forecasts for Pacific salmon can be notoriously difficult and prone to considerable error (Haseker et al. 2005, 2007, 2008, Peterman et al 2016). Critically evaluating the proposed pre-season estimation methods and associated uncertainty is fundamental to a meaningful evaluation of this RMP.

9. The RMP and PEPD fail to explain minimal desired levels of tribal C&S fishing.

The PEPD bends over backwards to accommodate tribal harvest interests and concerns, without clearly identifying what quantitatively is required for NMFS to meet/accommodate its federal tribal treaty trust responsibilities. The lack of specificity inevitably raises concerns that NMFS may be acting arbitrarily and capriciously with respect to its ESA obligations in approving the RMP. Presumably, if fisheries directly targeting ESA-listed steelhead are at all capable of being conducted without significantly impairing recovery, C&S fisheries have the first priority, followed by tribal commercial fisheries, followed by recreational catch-and-release (C&R) fisheries, followed by recreational lethal fisheries. The RMP and PEPD do not make any of these distinctions, but rather propose tribal commercial and C&S fisheries together with a non-tribal recreational C&R fishery.

The RMP and the PEPD should explicitly distinguish tribal commercial from tribal C&S fishing and identify what minimum level (total amount) of C&S fishing is required to meet trust obligations, when a harvestable surplus is expected. In fact, making these distinctions is critical to defining what total adult return constitutes a harvestable surplus with respect to each type of fishery. In other words, there is likely to be a minimal harvestable surplus sufficient to permit a specific level of C&S harvest, and successively greater harvestable surpluses sufficient to permit tribal commercial fishing in addition to a C&S fishery, and yet some greater surplus sufficient to add recreational C&R fishing. NMFS should explain why it has not done this and/or why it believes that it cannot do this.

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