



# United States Department of the Interior

OFFICE OF THE SECRETARY  
Office of Environmental Policy and Compliance  
500 NE Multnomah Street, Suite 356  
Portland, Oregon 97232-2036



Carol Joyce  
National Marine Fisheries Service  
Salmon Recovery Division  
1201 N.E. Lloyd Boulevard, Suite 1100  
Portland, OR 97232

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Dear Ms. Joyce

The Department of the Interior (Department) has reviewed the Notice of Availability of the Draft Yakima Subbasin Salmon Recovery Plan and Supplement to the Plan; Endangered and Threatened Species Recovery Plans. We offer the following comments.

## **General Comments**

### Population definition

Independent populations identified for purposes of recovery planning for steelhead in the Yakima basin followed the guidance and definitions provided by McElhany et al. 2000:

...an independent population is a group of fish of the same species that spawns in a particular lake or stream (or portion thereof) at a particular season and which, to a substantial degree, does not interbreed with fish from any other group spawning in a different place or in the same place at a different season. For our purposes, not interbreeding to a "substantial degree" means that two groups are considered to be independent populations if they are isolated to such an extent that exchanges of individuals among the populations do not substantially affect the population dynamics or extinction risk of the independent populations over a 100-year time frame.

The Viable Salmonid Population (VSP) approach described by McElhany et al. (2000) and used in the draft Recovery Plan is applied to populations identified in this manner. McElhany et al. (2000) and Interior Columbia Basin Technical Recovery Team (ICBTRT) (2003) acknowledged the complications that arise in designating steelhead populations when both resident and anadromous life history forms are present, as occurs in places in the Yakima basin with steelhead and rainbow trout. They note conditions under which co-occurring life history forms might be part of a single population for purposes of VSP analysis. This includes areas where spawning groups of the two forms are sympatric in time and space and the two forms interbreed, with the subsequent observed phenotypic variation occurring within a single population. This appears to be the case in at least the upper Yakima *O. mykiss* population where the draft Recovery Plan reports several observations of interbreeding between anadromous and resident fish. In

identifying independent populations of steelhead in the Yakima basin the ICBTRT (2003) also noted that “there is substantial gene flow between resident and anadromous *O. mykiss* in this region.” In their 2005 updates to population delineation for the interior Columbia Basin Evolutionarily Significant Units (ESU), McClure et al. (2005) cited Pearson et al. 1998, whose work occurred in the Yakima basin, in concluding that there is evidence of substantial interbreeding between resident and anadromous forms of *O. mykiss*. They concluded that the evidence “suggests that generally resident fish should be included in the ICBTRT-delineated populations of *O. mykiss*, unless local information indicates they should be regarded separately.” Finally, McElhany et al. (2000) note that for steelhead, sockeye and coastal cutthroat “(I)t is clear that for all three species there have been periods when the two life history forms would have been considered part of the same population;”.

At the time the ICBTRT was identifying independent populations for the purpose of applying the concepts of VSP, both resident and anadromous *O. mykiss*, where they co-occur, were being considered for listing as part of a single ESU. NMFS concluded that where the two life forms of *O. mykiss* co-occur and had the ability to interbreed they should be considered as one ESU under their ESU policy. The ICBTRT made population delineations at that time without making distinctions between resident and anadromous populations, and, as noted above, later determined that generally both life forms, where they co-occur, should be considered part of a single population. In the Yakima, four independent populations were identified, at least two of which had substantial resident components, but these were not separated into anadromous and resident populations.

Subsequently, in December 2005, NMFS determined that only the anadromous *O. mykiss* in the Mid-Columbia and several other steelhead ESUs would be listed as Distinct Population Segments (DPS) under the Endangered Species Act. At that time NMFS noted that they continued to conclude that co-occurring resident *O. mykiss* were part of the steelhead ESU, as ESUs were defined under their ESU policy. The primary distinction identified at that time between groups identified as ESUs and those identified as DPSs was that DPSs need not be reproductively isolated. Rather they were distinguished based on physical, physiological, ecological, and behavioral factors. With respect to reproductive isolation, NMFS concluded that all organisms that belong to a DPS must interbreed when mature (at least on some time scale), but that not all organisms that share some reproductive exchange with members of the DPS must be included in the DPS. Consequently it appears that the population concept under VSP, which calls for “substantial” reproductive isolation, is more akin to the concepts which are used to describe ESUs than those used to delineate DPSs.

Given the data available at least for the upper Yakima population and perhaps the Naches population as well, the identified VSP population should include both life history forms. This complicates the analysis since using the entire *O. mykiss* population to evaluate the four VSP criteria would yield an assessment of the viability of the total population but not of the listed DPS segment, which is the segment of interest. Some alternative approach to evaluating the viability of these anadromous sub-populations is needed. McElhany et al. (2000) suggest that extinction risk models can be used to look at sub-populations but they require that the degree of reproductive isolation be truly known.

### Extinction Risk Curves

There are several figures in the draft Recovery Plan that plot extinction risk as a function of population abundance and productivity. The figures show curves of what are described as constant extinction risks as a function of various combinations of abundance and productivity. There are curves for each population that show different combinations of productivity and abundance that would result in an extinction risk of 25% over 100 years, 5% over 100 years and 1% over 100 years. The curves are generated by applying a set of mathematical functions to existing data. This process was generally described in Willamette/Lower Columbia Technical Recovery Team (WLC-TRT 2003). Applying the algorithms described by WLC-TRT (2003) generates a smooth curve where all of the points on the curve have the same probability of extinction. The curves for the 25% probability level in the draft Recovery Plan are examples of the output. The curves at the 5 and 1 percent levels though are “truncated” by applying a minimum “floor” population size to each population based on the results of the historic intrinsic potential analysis. As a result the curves do not actually plot a constant risk of extinction as calculated by the process outlined by WLC-TRT (2003). Rather, once the curve reaches the population “floor”, with respect to abundance, the risk of extinction begins to decline as you move further to the right on the horizontal leg of the curve and is no longer constant. For Basic populations this adjustment is based primarily on genetic concerns with small populations but for the others it is a subjective assessment that extinction risk is too high if the population doesn’t reach some minimum threshold that is informed by the historic intrinsic potential analysis. The curves should be redrawn to show the constant risk lines calculated by the process outlined in WLC-TRT (2003). The subjective thresholds can then be added. The resulting figures would then show the constant risk thresholds as calculated by the objective extinction risk process and the adjustment felt warranted by the subjective historic potential analysis.

### Redd Count Data

Redd counts, where they are available, are used to estimate abundance and, indirectly, productivity. The problems associated with redd counts are pointed out in the draft Recovery Plan and the very significant discrepancies between dam counts and redd counts are acknowledged. It appears in most case that the redd count data is largely unreliable as a means for estimating the absolute abundance of the various populations with any degree of precision or accuracy. Given this, we suggest that until additional work is done to determine if redd counts are sufficiently accurate and precise they not be used to estimate abundance and productivity. It should also be noted that for the Upper Yakima population abundance and productivity estimates are based on Roza Dam counts which means they are not comparable to the other three populations in the basin.

### Verifying Abundance and Productivity Estimates

Estimates of abundance and productivity are made for each population in the basin with productivity measured in two ways. The calculations made to generate these estimates are, for

the most part unclear. In most cases the actual data and methodologies used to generate the estimates are not sufficiently described to allow for verification of the estimates. In some cases the methodology is simply described as using data from various tables with no specific identification of what data was used or what calculations were made. In other cases the methods are described but the analysis period is not. Using a standard analysis period and fully describing the calculations made would be helpful in understanding how the estimates were made.

### Storage Dam Fish Passage

There are several references in the draft Recovery Plan and the NMFS Supplement to providing fish passage at one or more of the Yakima Project storage dams. Passage at Cle Elum Dam is mentioned several times in the two documents as an action that should occur to assist with recovery. Passage at Tieton Dam is also mentioned in several locations but it is generally recognized as being more technically difficult and perhaps not feasible. Passage at Bumping, Keechelus and Kachess is less consistently discussed. The draft Plan indicates that passage at Keechelus and Kachess is “necessary” for steelhead recovery while passage at those sites is not discussed in Table 1 of the Supplement. The Yakima Sub-basin Plan, which is incorporated by reference, looked at passage at Cle Elum and Bumping Lake dams.

There is little analysis in the draft Recovery Plan about the benefits that would accrue from passage at the dams. Coarse estimates of the number of accessible stream miles above each dam have been made (Reclamation 2003). The Yakima Sub-basin Plan in evaluating storage dam fish passage at Cle Elum and Bumping Lake concluded that the Ecosystem Diagnosis and Treatment (EDT) model could not be used predict the rate or eventual success of recolonization of the reopened habitat but suggested that supplementation would be needed to create spawning runs into the newly opened habitat. It appears then that supplementation action should be coupled with the proposed storage dam fish passage actions.

As noted in the past, the Bureau of Reclamation (Reclamation) currently has insufficient authority to construct fish passage facilities at any of the storage dams. Reclamation is currently working on a feasibility study to determine if passage at Cle Elum or Bumping is feasible. Should passage at one or both of those sites be determined to be feasible, Congressional authorization and appropriations would still be required before work could proceed. With respect to implementation, the likelihood that these activities would occur is unknown as is the potential schedule with which they would occur.

### **Specific Comments**

Specific comments on October 19, 2005 draft Yakima Subbasin Salmon Recovery Plan and NMFS March 10, 2006 Supplement to the Plan

**Page 1 Paragraph 1** - At the time the plan was drafted both resident and anadromous *O. mykiss* were being considered for listing as part of a single ESU. Since that time the resident fish have been dropped from consideration and a DPS including only anadromous fish has been listed. The implications of this decision on the analysis in the document should be considered. In particular it appears that independent salmonid populations, as defined in the VSP, should include resident *O. mykiss* as recommended by the ICBTRT.

**Page 2 Paragraph 1** - How does the definition of recovery used in this plan relate to the concept outlined in the Endangered Species Act (ESA)? Species may be listed under ESA if they are in danger of extinction (endangered) or likely to become endangered in the foreseeable future (threatened). It appears that the term “viable population” sets a different standard, negligible risk of extinction over 100 years, than contemplated in ESA. The apparent differences between these standards should be discussed in the draft Recovery Plan and the potential implications of selecting the “negligible risk” standard outlined.

**Page 5 Paragraph 3** - Although dam counts are cited in the document for both Prosser and Roza Dams they do not appear to be used for assessing adult steelhead population abundance, except for numbers over Roza Dam into the upper Yakima basin. Instead, the recovery plan relies on steelhead redd counts that are conducted inconsistently and are known to be inaccurate, with substantial redd undercounting. How realistic is it to use redd counts for estimating steelhead abundance and productivity for the Yakima basin steelhead populations? We request that adult steelhead counts over Prosser Dam can be incorporated and used more effectively as a check on the abundance levels derived using the redd count method.

**Page 5 Paragraph 4** - Given the complicated interaction between *O. mykiss* which are members of the DPS and those that are not, how will productivity be measured if some steelhead are produced by non-DPS members and some DPS members produce offspring that are not part of the DPS? This problem can be avoided if all *O. mykiss* are considered to be part of the identified “demographically independent population” used in the VSP analysis. That creates a problem though, in that the analysis then assess the viability of the population which includes all *O. mykiss* and not the sub-population of steelhead-only, which is the listed unit under ESA.

**Page 6 Paragraph 1** - The plan states that the goal of recovery actions is to maintain diversity by carefully managing and/or minimizing 1) introduction of exotic species, 2) artificial propagation, and 3) harvest pressures. Further minimization of effects to steelhead by managing these factors seems unlikely because these actions have, for the most part, already been implemented in the Yakima Basin (e.g. cessation of hatchery steelhead propagation and steelhead fishery closure in Yakima Basin, etc).

**Page 9 Paragraph 3** - Tuck (1995), which is not included in the literature cited, provides mostly anecdotal evidence regarding smolt losses in irrigation canals prior to and shortly after the turn of the century. It doesn't provide an analysis upon which a determination can be made that these losses were the "major cause" of declines. This would require considerably more data on life stage specific mortality than is available. It is more accurate to indicate that one of the causes of mortality at that time was entrainment.

**Page 9 Paragraph 4** - The recovery plan states that steelhead enter the Yakima River later than other populations due to low flows and high temperatures in the lower river in September. However, no evidence is presented to show that this is an alteration from historic conditions in the basin. In addition, effects from altered steelhead immigration timing into the Yakima River may not be that severe since this timing does not affect the typical life history behavior of holding in the lower river during the colder months of December through January.

**Page 10 Paragraph 2** - NMFS' DPS determination makes all migratory *O. mykiss*, irrespective of parentage, members of the DPS and all non-migratory *O. mykiss*, again irrespective of parentage, are excluded. The complications noted here about the interactions between DPS and non-DPS members needs to be addressed in this recovery plan.

**Page 12 Paragraph 1** - How do the categories of extinction risk relate to the statutory definition that an endangered species is one which is "in danger of extinction"?

**Page 12 Paragraph 2** - It should be noted that given the complicated interactions between *O. mykiss* that are members of the DPS and those that are not, the assumptions behind the models that suggest minimum population sizes based on genetic concerns should be scrutinized carefully. Where the primary assumptions aren't met the models should be rejected.

**Page 12 Paragraph 2** - Should be noted that because in some areas not all members of the DPS are produced by members of the DPS and some members are produced by non-DPS parents, spawner to spawner ratios in those areas may not reflect the productivity of steelhead parents.

**Page 13 Paragraph 1** - The minimum population sizes are predicated primarily on genetic concerns. This raises some complications in populations where both DPS and non-DPS members interbreed. In those cases either all adults that interbreed need to be considered in assessing genetic risks or some evidence of breeding isolation for the segment to be considered should be provided. The text references ICBTRT 2004 but two references are provided in the literature cited section, 2004a and 2004b so it is unclear which is the correct citation. The 2004a citation does briefly discuss the rationale for the minimum population size of 500 individuals but references the reader to McClure et al. 2003. That paper references the discussion in McElhany et al. 2000. In all of these sources the primary considerations associated with minimum population size are genetic. McElhany et al. 2000, in discussing minimum viable population sizes, caution that the estimates "are based on models of single, reproductively isolated populations" and that "the genetic parameters that form the basis for the ... recommendations were estimated from data obtained from only one species (*Drosophila meloangaster*)...". Given that we are dealing with steelhead populations that seem to interbreed with each other and are thought to breed, in some areas, with the more abundant resident *O. mykiss* populations, the gene flow issues that form the basis for the minimum population size estimates are likely not of concern. Applying the 500 individual minimum population size then to populations believed to interbreed with other *O. mykiss* is not appropriate.

**Page 13 Paragraph 1** - The population size classes for the Yakima basin were apparently determined based on the historic intrinsic potential analysis. This analysis should be provided so the data used and the assumptions made can be evaluated. For some populations where there are

large numbers of non-DPS *O. mykiss* present, the assumptions made about their affect on intrinsic potential for DPS *O. mykiss* is of substantial interest and importance. Their presence could significantly affect the abundance of members of the DPS. In some areas then the intrinsic potential analysis for steelhead may not actually reflect the achievable (or historic) productivity if there are large numbers of resident *O. mykiss*. Adjustments must be made to correct for this problem where warranted. For example in the upper Yakima there are large numbers of non-DPS *O. mykiss* such that DPS portion of the population may be more appropriately classified as intermediate or basic.

**Page 15 Paragraph 1, 2, & 3** - As noted here spatial structure and diversity are closely related. Because of the complication in parts of the basin with the presence of large numbers on non-DPS *O. mykiss*, evaluation of these two VSP parameters should account for this.

**Page 15 Paragraph 4** - The factor for evaluating the distribution and number of spawning areas is relative and relies on an incomplete data base for historical conditions. This leads to the question of "how much is enough?" If that question can be answered then a relative measurement is not needed. The reference to "historical distribution" should be changed to "estimated potential steelhead spawning habitats".

**Page 16 Paragraph 2 & 3** - In discussing gaps and the effect of gene flow in steelhead, the analysis apparently doesn't account for the fact that in parts of the basin gene flow occurs between DPS and non-DPS members. The presence of non-DPS individuals who interbreed with DPS members may mediate the presence of what appear to be gaps to gene flow based solely on spawning locations for DPS members.

**Page 19 Paragraph 2** - Since many of the cited sources cite each other it would be more appropriate to cite the original source of the data and analysis in outlining what factors are limiting factors. This would ensure that the best available science is used in making the referenced determinations of limiting factors.

**Page 20 Paragraph 1** - The document states that adult steelhead counts have increased in the Yakima Basin above Prosser Dam from an average of 843 wild adults before 1999 to an average of 2,805 adults for the period 1999 through 2005. But despite this more than 3 times increase in average run size since 1999, the recovery plan cites spawner:spawner productivity rates as being 0.60 for Toppenish Creek and 0.58 for both the Naches and Yakima populations. If productivity rates are in fact this low the population numbers above Prosser Dam should be decreasing substantially from year to year instead of increasing over time. How does the plan explain the observed population increase above Prosser Dam since 1999 if productivity rates are this low?

**Page 20 Paragraph 2** - The mean percentage of radio-tagged steelhead passing Prosser Dam between 1990 and 1992 and spawning in Satus Creek, Toppenish Creek, Naches River, and Upper Yakima was reported as being 48%, 31.6%, 13.3%, and 7.1%, respectively. These numbers should be corrected to 48%, 11%, 32%, and 3%, respectively as cited in Hockersmith et al. 1995. The remaining 6% were tracked to spawning areas in the mainstem Yakima below Roza Dam and in Marion Drain.

**Page 20 Paragraph 4** - A reference is made to the historic spatial distribution but no citation is provided. If this distribution is assumed based on best professional judgment or the historical intrinsic potential analysis then that should be stated.

**Page 21** - What does the scale represent on the x-axis for figure 2.2?

**Page 21 Paragraph 2** - In the calculation of the 1.75 multiplication factor to estimate spawner abundance from redd counts the text states that 1.2 females per redd was used as cited in Freymond and Foley 1985. However in the footnote on this page the number 1.2 redds per female is cited from this reference. Females per redd and redds per female are two different things and would result in a different multiplication factor for abundance per redd. Please clarify and ensure that the proper calculation is used.

The multiplication factor of 1.75 was derived and cited as a way of estimating spawner abundance from redd counts. However, this number does not appear to be used subsequently in the document to derive estimates of spawner abundance from redds. Instead some complicated "expansion" factor (page 27 paragraph 1) was used to estimate spawner abundance from redd counts. This number should either be removed from the document or should be explained more fully to allow the reader to calculate and understand how the "expansion" factor and hence, spawner abundance, was derived from redd counts.

**Page 22 Table 2.1** - These factors suggest that the abundance and productivity estimates reported earlier should be viewed with a healthy degree of skepticism. Using the 1.75 expansion coefficient, redd counts in 2005 yield a spawning population of about 635. Steelhead counts at Prosser were about 3,400 and even adjusting for fish that moved above Roza, where no redd counts were made, the total ladder count would be about 3150 or about 5 times higher than the estimate based on redd counts. This suggests that redd counts significantly undercount spawning steelhead or that there is significant pre-spawning mortality or that large numbers of returning steelhead adults don't spawn. If either of the latter two conditions is correct then the calculated productivity rates are far too low at least to the returning adult stage.

**Page 22 Paragraph 1** - The recovery plan needs to provide a better explanation as to why adult steelhead counts above Prosser Dam significantly exceed abundance estimates derived from redd counts. Simply acknowledging that redd counts are subject to undercounting and inaccuracy given high flows and turbid conditions during the spawning period in tributaries and lack of spawner surveys entirely in some mainstem reaches does not explain how the discrepancy between redd count estimates and adult ladder counts are dealt with.

**Page 22 Paragraph 2** - Given the acknowledged and evident problems with redd counts it isn't clear why Satus Creek redd counts are thought to be the data to observe trends in steelhead numbers in the Yakima basin. It seems that Prosser dam counts have fewer sources of error and would be better for that purpose.

**Page 23 Table 2.2** - Since Toppenish Creek includes both *O. mykiss* that are part of the DPS and some that are not it isn't clear how identification was done to ensure that the individuals used in this analysis were all members of the DPS.

**Page 24 Paragraph 2** - As noted it is unclear what conclusions, if any, can be drawn from the data in Table 2.3. For example, while Ahtanum fish passed the latest they had the shortest travel time in 2005. The mean travel time for Toppenish fish was 4 days more than Satus fish but the mean passage date was 18 days later suggesting a combination of factors potentially at work involving both travel time and run timing.

**Page 25 Paragraph 2** - Hockersmith et al. (1995) data show that steelhead use habitat in several locations in the Yakima Basin that are not surveyed for redds (e.g. mainstem Yakima below Roza Dam, the Union Gap Reach, etc.). These steelhead should be accounted for as part of the total adult abundance estimates for the Upper Yakima or Naches River populations. However, since only redd counts are used to calculate adult abundance estimates these fish will remain uncounted and will not be included in abundance and productivity estimates for these populations.

**Page 26 Paragraph 3** - It may be worth noting that if the historic populations sizes cited earlier are used along with the estimated 90% decline by about 1900, then recent runs have been 100+% ( $20,800 \cdot 1.1 = 2,080$ ) to 25+% ( $100,000 \cdot 0.1 = 10,000$ ) of the run size near the turn of the century.

**Page 27 Paragraph 1** - An estimate of 454 spawners was calculated for the Satus Creek population based on average redd counts of 172 for the period 2001-2005 by applying "expansions" and survival rates shown in Table 2.2. What expansions are shown in this table that allows for this calculation? It is unclear what the term "expansion" is referring to and how it is calculated. On page 21, the recovery plan derived a multiplication factor of 1.75 to estimate spawner abundance from redd counts. If the 1.75 multiplication factor is applied to the 172 average redds found in Satus Creek between 2001-2005, the estimated spawner abundance should be 301 fish according to this estimation procedure outlined. However, the recovery plan calculated 454 spawners for this population. Explain the expansion factor calculation so that the reader can actually understand it.

**Page 27 Paragraph 1** - It is unclear how the productivity estimates were derived for each of the Yakima populations. For example, the 454 spawners estimated for the Satus Creek population were supposed to produce an average of 471 spawners, for a productivity of 1.04. How was the number 471 calculated? Given the importance of the abundance and productivity estimates to recovery criteria it is extremely important that these estimates be defensible and accurate to the greatest extent practicable. As these estimates are presented in Section 2.5.2 of the document (pages 27-36), they do not appear to be defensible since their derivations are not specified.

**Page 27 Paragraph 1** - The period of analysis between populations should remain consistent. For both the Satus and Toppenish Creek populations average redd counts from 2001 to 2005 were used in the analysis. However, for the Yakima population (adult counts above Roza) the period of analysis was from 2000 to 2004 (see page 33), even though data through 2005 was available. Furthermore, adult counts above Prosser Dam were analyzed for the period 1999 to 2005 (see page 20). To make data more comparable and representative it is typical to use the same period of record if the data is available.

**Page 27 Paragraph 1** - It is unclear how Satus Creek productivity was calculated from the data in Tables 2.1 and 2.2. It is also unclear what time period is being used since not all returns have occurred from the most recent spawning years.

**Page 27 Paragraph 1** - Please explain the discrepancy between Prosser Dam counts and the abundance estimates derived using the redd count data for the four populations in the Yakima Basin. For example, mean adult steelhead abundance over Prosser Dam equals 2,805 for the period 1999-2005 (pg 20), while the total spawning adult abundance estimate equals only 1,559 using mean redd counts for the Satus Creek (454 spawners, pg 27), Toppenish Creek (549 spawners, pg 29), Naches River (412 spawners, pg 31), and Upper Yakima River (144 adults, pg 33) populations respectively. The plan does not do an adequate job of accounting for the destination of the remaining 1,246 fish that passed over Prosser Dam (i.e. 2,805 minus 1,559 = 1,246 fish). Did all of these fish fall back? Do recovery planners think that these fish migrated upstream and didn't spawn? Did they spawn in some unaccounted for spawning reach such as the Union Gap reach of the mainstem Yakima or below Roza Dam?

**Page 27 Figure 2.4** - Based on the Prosser-Wild ladder count data in Table 2.1 and the age distribution data in Table 2.6 spawner:spawner ratios for the entire run for the years 1996-2001 average 2.9 with a median of 3.0. It's not clear how each individual population can be at or below 1.0 but the entire run is about 3.0.

**Page 27 Paragraph 1** - This refers to lambda as the slope of the line for the 4-year running average of spawner counts extrapolated from redd counts but the period of time over which this 4 year running average is calculated is not given. If it is the period 2001-2005 (period cited in opening sentence) then the line has two data points and the slope of the line using Satus counts is actually positive, although only slightly so.

**Page 27 Figure 2.4** - The VSP parameter that addresses productivity is the intrinsic productivity of the population. (See ICBTRT 7/05 page 18) This is the maximum productivity the population expresses at relatively low abundance when density dependence is not being experienced. The values being used here appear to be realized productivities. Estimates of intrinsic productivity are provided in Appendix E. Based on the analysis outlined above and other analyses (Cramer et al. 2004) the values expressed here are not the recent maximum productivities which have been suggested as one possible estimate of intrinsic productivity. It is perhaps also worth noting that data in Cramer et al. (2004) suggest that assuming that density dependence is not a significant factor for Yakima steelhead may be in error.

**Page 29 Paragraph 6** - Again, the recovery plan estimates 549 adult steelhead spawners and a productivity rate of 0.60 in Toppenish Creek from an average redd count of 156 redds. However, the recovery plan states "Significant undercounting was assumed for this population because of frequent inaccessibility or low visibility of redds." The plan then states that "These abundance and productivity estimates fall far short of the 5% extinction risk threshold". If significant redd undercounting is known to occur then the abundance and productivity estimates should also be significantly underestimating these VSP parameters and would be expected to fall far short of risk thresholds.

**Page 30 Paragraph 3** - Is there any indication that entry timing delay is having the identified impacts? With hatchery populations this kind of selective pressure quickly changes the run timing. Given that early returning fish are still returning after 100+ years of irrigation diversions it appears that the possible selective pressures against it are not great. It should also be noted that at page 141 a statement is made indicating that what little data is available doesn't indicate this is a significant problem.

**Page 31 Paragraph 3** - Given that the Naches River population abundance estimate is derived from only 2 years of spotty redd surveys conducted in only a small portion of the Naches Basin, how confident should the reader be in the recovery plans estimate of 412 spawners in the Naches River population? Since only 2 years of data were analyzed for this population, it would be expected that the variance of this estimate could be very large. The recovery plan should attempt to produce confidence estimates for the abundance and productivity calculations for each of the Yakima Subbasin steelhead populations.

**Page 31 Paragraph 3** - It is not clear how a spawner to spawner ratio was calculated from a single annual redd survey or what is meant by an "average" number of spawners.

**Page 31 Paragraph 7** - The discussion about Distribution Across Habitat Types is confusing. It indicates that steelhead are present in 4 types and may have utilized 2 more prior to dam construction. What the 4 are that are occupied and what the 2 are that are not is unclear. It goes on to conclude that the moderate risk of extinction is a result of a reduction in the potential use of 2 of the 4 currently being used but not the 2 where use has been eliminated. The discussion should identify what 4 Level IV ecoregions are now occupied and which 2 are not. It should clearly explain how continued occupancy of 4 ecoregions results in a moderate risk of extinction for the Distribution across habitat types criteria.

**Page 32 Paragraph 3** - Williams et al. 1996 describe the normative ecosystem as a continuum from just slightly better than existing conditions to pristine. In that context it isn't clear what "substantially normative flow regime" means or what it means to not be normative.

**Page 32 Paragraph 4** - It is not clear that the introgression has reduced the genetic variation in the population, nor is it clear that the uniqueness of the Ahtanum MSA reduces the variation of the population. Loxterman and Young 2003 are cited previously providing measures of heterozygosity, how did the Naches compare to other steelhead populations? While there is speculation that a genetically unique MSA has been lost in the Tieton no evidence is presented. It would perhaps be instructive to look at the remaining non-DPS *O. mykiss* in the Tieton which likely bred with any DPS population that was previously there.

**Page 32 Paragraph 6** - According to the recovery plan "a major selective change acting on the Naches population is a shift in the adult in-migration timing". Has there really been a shift in the timing of in-migration for this upper basin stock? It seems that elevated temperatures in the lower Yakima River in late summer should have little impact on in-migration timing in upper

basin populations given the typical steelhead life history strategy of holding in the lower river until late winter or early spring before migrating to upper basin areas.

**Page 32 Paragraph 6** - The section on Change in natural processes and impacts speculates about potential affects to steelhead but no data is provided to suggest that the hypothesized changes have or are occurring.

**Page 33 Paragraph 3** - The plan calculates that the Upper Yakima population returns an average of 83 spawners from the average 144 adults that pass upstream of Roza Dam by applying juvenile survival and adult return rates similar to those used for Toppenish Creek that are displayed in Table 2.2 on page 23 of the recovery plan. However, Table 2.2 has nothing to do with adult return rates, it deals exclusively with juvenile survival rates to Prosser Dam and downstream Columbia River mainstem dams. Please clarify this calculation. Is the plan referring to Table 3.1 (in the next chapter on page 61)? If so, the writers should say so and organize the data in a more clear and concise fashion.

**Page 33 Paragraph 4** - The document states that trend counts at Roza Dam are positive since 1985 with a slope ( $\lambda$ ) of 1.51. However, the recovery plan then discounts this positive trend and the resulting discrepancy between  $\lambda$  and estimated productivity (0.58) based on spawner to spawner ratios as a result of straying into the upper Yakima subbasin as run sizes increase over time. Perhaps the recovery plan should evaluate more closely the methodology used in calculating productivity in the document before attempting to explain away data that indicates positive trends in population productivity.

**Page 33 Paragraph 4** - The data used to estimate productivity for this population appears to be dam passage counts at Roza Dam. For the other populations redd counts were used. As noted in the draft Plan the two methods yield significantly different population estimates. Since estimates of spawners forms the foundation of the productivity estimates and the methods for making such estimates varies for this population, the productivity estimate for the upper Yakima population is not directly comparable to the estimates for the other populations.

**Page 33 Paragraph 4** - This indicates that steelhead adult returns increased rapidly in 2001 and 2002. It seems unlikely then that the productivity measured as spawner:spawner was in the range reported. Populations could not increase rapidly, as dam counts show, if productivity was well less than 1.0 as reported. It seems likely instead that intrinsic productivity for this population is likely well over 1.0 which affects the risk of extinction on the abundance/productivity figure.

**Page 33 Paragraph 4** - If the increase in productivity shown based on  $\lambda$  is a result of straying from other parts of the basin then the conclusion that this is a demographically independent population should be reexamined. Additionally figure 2.6 shows a productivity of about 2.5 rather than 1.5 as reported in the text.

**Page 34 Paragraph 2** - A citation should be provided for the estimate of adult and sub-adult non-DPS *O. mykiss*. The figure quoted appears to be for adults in the mainstem of the Yakima River and doesn't include non-DPS *O. mykiss* adults or sub-adults in the tributaries.

**Page 34 Paragraph 2** - Pearsons et al. 2004 does not discuss the productivity of the resident rainbow trout population. The correct citation may be Pearsons et al. 1994. There the term "productivity" is used in a different sense than has been used in this document. Their meaning was more along the lines of "carrying capacity" rather than spawner:spawner productivity.

**Page 34 Paragraph 2** - Field observations of interbreeding again call into question the definition of a demographically independent population of steelhead in this area.

**Page 34 Paragraph 2** - It is not clear what competitive affects between the two forms of *O. mykiss* juveniles would be expected. Competition between all juvenile *O. mykiss* would be expected but the hypothesized competition between one form and the other doesn't appear to have any basis. The large number on non-DPS *O. mykiss* in this population and the hypothesized "severe" competitive effects provide additional rationale for not using currently realized productivity as a surrogate for intrinsic productivity for this population.

**Page 34 Paragraph 2** - If the hypothesized affects were true then one might expect a more even split amongst the forms found in tributaries which is not the case.

**Page 34 Paragraph 2** - The rationale for concluding that the presence of a "high" population of non-DPS *O. mykiss* with which DPS members breed represents a high risk of extinction based on abundance and productivity is unclear.

**Page 34 Paragraph 3** - The discussion about Spatial structure and diversity is unclear. It refers to an ICBTRT map that is not referenced or provided and then indicates that some of the areas on the map may be in error. The recent radio tracking study has tracked tagged steelhead into Wenas Creek, Umtanum Creek, Wilson/Naneum Creek, Cherry Creek, Taneum Creek, Swauk Creek, multiple forks of the Teanaway River and the lower Cle Elum River. Steelhead have also been located in the mainstem and spawning there is presumed. Based on the version of the MSA map at the end of the document this would cover as many as 10 of the 11 MSAs.

**Page 34 Paragraph 3** - Non-DPS *O. mykiss* are present throughout this area. Since this criterion is intended to address the spatial structure and diversity parameters and all *O. mykiss* below the impassable barriers share a common genetic legacy, it would seem reasonable to include all *O. mykiss* in the area in this assessment. This is part of the issue as to whether or not the steelhead in the Upper Yakima are a demographically independent population, not linked to the more abundant non-DPS resident rainbow trout. If all *O. mykiss* in the upper Yakima are part of one demographically independent population then the conclusion which is best supported by the available data is that this factor rates a very low risk of extinction. This modification should be made.

**Page 35 Paragraph 2** - See comment above. It should also be noted that the "historic" spawning habitat mentioned here is not all historic habitat in the sense that there are verifiable, documented records of spawning by anadromous steelhead. The habitat rather is that which was expected to have been used. It would be better to portray this habitat as such.

**Page 35 Paragraph 4** - See comment above. Given the data cited here it is unclear how the conclusion was reached. The data indicates that anadromous steelhead are present from below Roza Dam and in Umtanum Creek up to high elevation areas in the Teanaway River. There is general speculation about loss of juvenile steelhead rearing habitat but given the distribution of non-DPS juvenile *O. mykiss* throughout the area it does not appear to be well supported by the existing data.

**Page 35 Paragraph 4** - The recovery plan states that a few steelhead may be spawning below Roza Dam based on data from Karp et al. 2003, 2005. This assumption of a few fish spawning below the dam may be incorrect. Fish tracked below Roza Dam from the Karp et al. data were tagged at Roza Dam on their way upstream and a few either fell back or purposefully chose to spawn below the dam. No information was presented in Karp et al. to estimate how many untagged steelhead used the mainstem Yakima River below Roza Dam. Further, data from Hockersmith et al. 1995 indicated that 3 out of 5 steelhead tagged at Prosser Dam that subsequently migrated to the upper Yakima River between 1990 and 1992 spawned in the mainstem Yakima River below Roza Dam. This indicates that the habitat below Roza Dam may be an area selected by steelhead for spawning, and that spawning may be occurring in this area in greater numbers than are currently assumed.

**Page 35 Paragraph 5** - Data supporting the contention that there has been a significant shift in the proportions of the two life forms of *O. mykiss* in the upper basin should be provided or cited. It is also not clear what the biological basis is for the conclusion that the current mix of anadromous and resident life forms presents a high risk of extinction to the anadromous form.

**Page 35 Paragraph 6** - The suggested changes in the phenotypical characteristics of the listed species should be supported with data or citations. As currently written it describes differences between individuals in the DPS and those that are not.

**Page 35 Paragraph 7** - Based on the data cited it appears that the conclusion is unsubstantiated. The studies to date indicated that heterozygosity is higher in this population than elsewhere suggesting a higher level of genetic variation. That this may be due to previous out-of-basin hatchery plants is not relevant in simply measuring the variation in the existing, listed population. What would be relevant would be data suggesting that the introgression which may have occurred has resulted in a decrease in total genetic variation in the population but no such data is provided.

**Page 36 Paragraph 2** - It is postulated that a "major selective change" has occurred in this population although data concerning such a change is not presented. While changes in physical conditions, such as flow regime and temperatures, have occurred, whether these have had a selective effect, major or otherwise, are simply unknown. Effects to migration rates are postulated but no data is provided concerning current or historic rates. While some of the effects outlined here are reasonable hypotheses they should be labeled as such rather than as known or proven facts.

**Page 45 Paragraph 5** - It should be recognized that actions of Federal agencies are generally authorized by Congress and the President and funds to carry out the programs come from the

same place. It would be more appropriate to indicate that the Corps carried out a flood control program at the direction of Congress and with funds appropriated by them that had deleterious effects on listed species. Administrative agencies generally do not undertake large programs or projects independent of Congressional direction.

**Page 47 Paragraph 3** - Environmental baseline is a term of art in the context of the Endangered Species Act. Since this recovery plan is being developed pursuant to the Act the term should be used as defined in the Act and regulations.

**Page 47 Paragraph 4** - Winter operations take into account a variety of factors including downstream flow needs, storage of runoff and flood control. While storage is a key factor in winter operations there are some constraints so it may be more appropriate to indicate that winter operations maximize storage within other operational constraints. In the summer, irrigation flows are not maximized rather the reservoirs are operated to meet irrigation demands up to the limits of the entitlements in that year.

**Page 47 Paragraph 4** - Sweeping statements are made relative to flow regimes that are not accurate across the entire basin. For example flows in the Naches and Bumping Rivers largely mimic natural flow regimes.

**Page 48 Paragraph 3** - Adult steelhead migrate upstream primarily during the winter and early spring when operations at the identified sites generally provide for upstream passage. Even at Easton the past ladder closures have generally not occurred while adult steelhead are migrating.

**Page 48 Paragraph 2** - Citations for Johnson et al. 1986 and Rinella et al. 1992 are provided to document that the lower Yakima River receives large volumes of warm, sediment- and pollutant-laden water from irrigation drains. These citations were from studies that occurred well before recent efforts by irrigation districts to improve water quality, and are now outdated and somewhat inaccurate. The Roza Sunnyside Board of Joint Control (RSBOJC) initiated a water quality improvement program in 1997 for drains and wasteways in the lower Yakima River that has been largely successful at improving water quality in the lower Yakima River. This water quality improvement effort was not mentioned in the recovery plan. The recovery plan should provide more updated information on these water quality improvements.

**Page 48 Paragraph 3** - There is some data on false attraction of steelhead into the listed waterways that should be cited. It has not generally been identified as a significant problem although the impacts of false attraction on steelhead in the Yakima basin has received little attention. As such, impact assessments are, to large extent, speculative.

**Page 52 Paragraph 2** - Evidence regarding steelhead historical spawning above Bumping and Tieton dams is referred to but not provided. It should be appropriately cited. Flows in the Tieton and Bumping rivers appear to be adequate for adult steelhead migration during the winter and spring but passage at the Yakima-Tieton Diversion Dam may be a problem. Currently modifications to the fish passage facilities at that dam are scheduled for 2006.

**Page 52 Paragraph 2** - Based on the maximum size of rainbow trout captured in the stilling basin below Tieton Dam in October 2005 (Ackerman 2005), the fish observed in Wildcat Creek, which enters the Tieton just below the stilling basin, may have been a rainbow or steelhead. The size of the fish would not be definitive enough to make such a determination.

**Page 52 Paragraph 2** - The connection between sediment trapping above Tieton Dam and spawning gravel availability below the dam is unclear. Spawning gravels are available for spring Chinook below Keechelus, Cle Elum and Bumping Dams despite the sediment trapping that occurs in these reservoirs.

**Page 52 Paragraph 5** - As noted earlier, operations in the summer and winter are constrained by a variety of factors so winter storage is not maximized nor are summer irrigation deliveries.

**Page 52 Paragraph 5** - The statement that flows are asynchronous during much of the year is untrue.

**Page 53 Paragraph 2** - The presumption that *O. mykiss* are displaced or killed by high flows in the lower Naches during flip flop is unsupported by actual data. Field observations suggest the flip flop flows in the lower Naches may open up side channels and off-channel areas which may be used by juvenile steelhead.

**Page 53 Paragraph 5** - Flows in the Cle Elum River appear adequate for adult steelhead migration throughout the winter. Flows are not substantially different than the flows that spring Chinook experience during fall spawning. The speculation that few telemetered steelhead have entered the Cle Elum River because of low flows seems unfounded.

**Page 53 Paragraph 5** - The impacts of winter flows on juvenile steelhead rearing environments is largely unknown. It is worth noting that resident *O. mykiss* numbers in the upper Yakima River appear to be relatively good suggesting that the rearing environment for juvenile *O. mykiss* is adequate.

**Page 53 Paragraph 6** - As we noted in our previous comments on the sub-basin plan, salmon passage data available for Roza Dam from the early 1950's shows that steelhead did pass Roza Dam after the end of the irrigation season as well as in the early spring. These data indicate that passage for steelhead was potentially blocked for short periods each year, but not blocked completely for several successive years. Data on water surface elevations in the Roza pool for the years 1939-1958 should be provided to substantiate the claim being made here.

**Page 53 Paragraph 6** - As noted above, the effect of Roza Dam on steelhead passage prior to construction of the powerplant in 1958 is unknown. It is unclear why it is assumed that Roza prevented "most" steelhead bound for the upper basin from reaching their destination. Even if the ladder did not operate until mid-March, most steelhead pass Roza in March, April and May to the upper basin. Most of these fish would have been able to pass with little to no delay.

**Page 54 Paragraph 1** - The Roza pool elevations fluctuate in the fall during the period when screen maintenance is done. The pool is moved from the full pool ladder to the low pool ladder

over a couple of days. It is refilled 4-6 weeks later over about a day. The pool is full in March when the irrigation season begins and so doesn't fluctuate.

**Page 54 Paragraph 2** - It is unclear when and to what extent low flows inhibit movement of steelhead and bull trout.

**Page 54 Paragraph 3** - The relatively large numbers of non-DPS *O. mykiss* in the upper Yakima River do not suggest that *O. mykiss* fry are swept from the upper river or killed. While Martin et al (1994) did hypothesize about why they collected few young of the year *O. mykiss*, their techniques were designed to sample adult fish and did not sample young of the year fish in a quantitative manner.

**Page 54 Paragraph 4** - Martin and Pearson (1994) (in Pearson et. al. 1994) did report that growth rates, as determined by length-at-age, for rainbow trout in the Yakima River mainstem were lower than in some other Northwest streams and rivers. As noted, they speculated that this might be due to "(U)nnaturally high flows ... during the summer rearing time period..." but did not reach a firm conclusion. They also reported that growth rates in the upper Yakima basin tributaries, where unnaturally high summer flows do not occur, were lower compared to some other streams in the Northwest as well. Martin et al. (1994) (in Pearson et. al. 1994) reported that the difference in rainbow trout densities between the Yakima River and the other Northwest streams and rivers may be explained by the relatively low productivity in the Yakima River. They reported total dissolved solid levels, to which productivity is directly related, were higher in the other river basins by a factor of 2 to 6 times in comparison to the Yakima. This may also be a factor with respect to growth rates. While Martin et al. (1994) speculated that the assumed lower survival might be due to flow related factors they cautioned that "further research needs to be conducted prior to any statements about carrying capacity or limiting factors can be adequately addressed or discussed." Neither Martin et al. (1994) or Martin and Pearson (1994) actually measured mortality rates of *O. mykiss* before age 1.

**Page 54 Paragraph 4** - This suggests that the authors did not actually measure mortality of juveniles in the side channels. If that is the case it should be explicitly stated that their conclusions were not reached by actually surveying the side channels for dead fish.

**Page 55 Paragraph 1** - While many square feet of stream bed are dewatered during flip flop it seems inappropriate to categorize this as "many miles of stream bed" as no stream reaches are actually dewatered. Nelson (2005) reported that while aquatic invertebrate populations are affected by reservoir operations immediately below the dams, conditions return to expected conditions in relatively short distances (1.6 - 6 miles).

**Page 55 Paragraph 3** - As noted earlier, operations at Roza Dam started in 1939 and steelhead and Chinook smolts have been migrating past the site for the last 65 years. While delay may occur at the site under some flow conditions, the affect of this possible delay on returns is unknown. In the low flow year of 2001 Reclamation occasionally modified gate operations to provide what was thought to be improved passage conditions and subordinated power to facilitate fish passage. The powerplant did run though, and generated power. For anadromous *O. mykiss*, subsequent adult returns from that year were not extraordinarily low and the percent

of the total basin run above Roza was at or above the long term median. If the hypothesized delay at Roza caused disproportionate mortality to fish emigrating from above it but not to fish emigrating from elsewhere in the basin, then the percent of returning adults to above Roza should fall in subsequent return years. This did not happen. While not conclusive, this does not suggest that operations at Roza result in substantial differential mortality for fish which must pass that site. It is also of interest that while outmigration flows at Roza were relatively low in 1993, 1994 and 1995 and very few anadromous *O. mykiss* returned to the Yakima basin in 1996, over 18% of the steelhead that did return went above Roza which is by far the highest percentage in the last 12 years. Again this doesn't suggest that gate operations at Roza result in substantial differential mortality for fish which must pass that site.

**Page 55 Paragraph 3** - Historical distribution of steelhead in streams of the upper Yakima basin is discussed here. This occurs in many places throughout the document but generally with no citation. The document could be improved if this discussion of historical distribution could be summarized in one location in the document and the references or data for the discussion included. Distinctions between actual historic information and information from the historic intrinsic potential analysis should be made as well.

**Page 56 Paragraph 4** - These large flow fluctuations occur for a matter of a few days and affect the bypass reaches, each about 11 miles long. Flows in the rest of the Yakima River are unaffected.

**Page 56 Paragraph 4** - We are unaware of any data suggesting that flow levels in the winter affect steelhead moving to winter holding habitats. Power is subordinated at both Prosser and Roza in the winter and steelhead move through the ladders at the flow levels that occur.

**Page 61 Paragraph 2** - As noted here and elsewhere in the report, many salmon and steelhead stocks had been reduced by better than 90% before the advent of the construction of large hydroelectric dams or irrigation storage dams.

**Page 61 Paragraph 3** - As noted, how all of these factors interact is unknown. In the Yakima basin it may be that the stocks of steelhead were depressed from historic levels to the levels now seen by the first few decades of the 20th century, depending upon the affect of commercial fishing and the actual size of the historic run. The estimate cited earlier in the report by Kreeger and McNeil (1993) and the ballpark estimate of a 90% reduction by the early 20th century means steelhead runs in the Yakima River in the early 20th century may have been similar in size to what has been observed in the last few years.

**Page 63 Last Paragraph** - It should be noted here that while potential threats have been identified they are poorly understood in terms of actual effects to the listed stocks. (See citation from Lackey pg 45)

**Page 65 Paragraph 1** - Numbers should be put on the description of reduced repeat spawning rates as "severely depressed". Are rates in the Yakima basin substantially different than rates in lower tributaries where kelts pass fewer dams?

**Page 68 Paragraph 1** - Species may be listed under ESA if they are in danger of extinction (endangered) or likely to become endangered in the foreseeable future (threatened). It appears that the term “viable population” sets a different standard, negligible risk of extinction over 100 years, than contemplated in ESA. The apparent differences between these standards should be discussed in the draft Recovery Plan and the potential implications of selecting the “negligible risk” standard outlined.

**Page 68 Paragraph 2** - This indicates that reaching recovery goals in the Yakima basin may not lead to DPS recovery. The converse is also true. It may be possible to reach recovery goals for the DPS without reaching all goals in the Yakima.

**Page 68 Paragraph 4** - The discussion here talks about increasing productivity. The term "inherent productivity" is also used in the VSP process. It should be clear whether the goal is to increase the inherent productivity of the populations or the realized productivity or both since these are different concepts.

**Page 69 Paragraph 3** - As noted in McElhany et. al. (2000), "The concepts and guidelines outlined in this document are therefore fairly general in nature. More specific guidelines can only be determined through detailed analyses of case specific information on particular regions and particular species." These additional analyses should be included or referenced in this section.

**Page 69 Paragraph 4** - If the 4 steelhead populations are independent then, based on a simple probability calculation, the outlined goal means the risk of extinction of the Yakima MPG must be considerably less than 0.1 % in order for the DPS to not be "threatened" with extinction. While this calculation is not absolutely correct for a variety of reasons ( see McElhaney et al. 2003), it gives a sense of the probabilities involved that no populations would exist in the Yakima MPG in 100 years.

**Page 69 Table 4.1** - A citation to the intrinsic potential analysis that was done for the Yakima basin would be helpful. Conversely the data used and the assumptions made could be included.

**Page 69 Table 4.1** - It will be difficult to meet the abundance and productivity recovery criteria outlined in Table 4.1 when redd counts used to estimate these VSP parameters significantly undercount redds in known spawning areas and don't account for spawning that occurs in other areas, such as mainstem Yakima River below Roza Dam, in the Union Gap and Wapato reaches, and in the Naches River mainstem.

**Page 70 Paragraph 1** - Starting with Satus Creek, all of the populations will be monitored by redd counts but it isn't clear how the various problems with steelhead redd counts will be overcome to yield reliably accurate and precise data from year to year.

**Page 70 Paragraph 4** - Criteria 3 on page 69 deals with "currently occupied major spawning areas". For the upper Yakima the goal includes areas not currently occupied above Cle Elum Dam.

**Page 74 Paragraph 4** - VSP requires that the populations being analyzed be demographically independent and not affected by the extinction risk of other populations. The discussion here talks about maintaining or re-establishing links between populations. This suggests that the data should be reexamined to determine which populations are demographically independent and which are not. This would involve looking at both DPS and non-DPS groups of *O. mykiss*.

**Page 75 Paragraph 2** - It would be helpful if the gaging station for this data were identified since flows at the Naches at Naches station have changed significantly with the purchase of the Wapatox powerplant. These changes would not show up in the data set chosen.

**Page 77 Table 5.1** - References to YRBWEP in the table should be changed to BOR. References to Storage Study should be changed to BOR. It should be noted that Reclamation is currently authorized to conduct a feasibility study. The study itself will not achieve the action identified.

**Page 78 Table 5.1** - Reference to the BOR Dam Passage Study should be changed to just BOR. The WDFW, YN, FWS and NMFS should be added to the list of implementers. It should be noted that Reclamation is currently authorized to conduct a feasibility study. The study itself will not achieve the action identified. It is not clear what is meant by the rating of high under Institutional Feasibility since there is currently no authority to take the action contemplated. We are unsure what benefits to bull trout are contemplated beyond a genetic connection.

**Page 78 Table 5.1** - As we noted in our March 15, 2005 letter concerning development of this plan, we are not aware of any options being proposed or discussed that would modify flip flop while allowing Reclamation to meet its other obligations in operating the Project. Consequently we think the Practical Feasibility and Institutional Feasibility should both be described as Low. SOAC doesn't have the authority to modify the flip flop flow regime. Many other parties, such as the irrigations districts and water contractors, will have a role in evaluating potential modifications.

**Page 81 Paragraph 1** - Citations for data sources concerning impacts to steelhead should be provided. The relative magnitude of the hypothesized impacts should also be discussed. For example to what extent has summer rearing habitat been altered on the upper Yakima and to what extent has distribution across habitat types been altered. What is the evidence of the "strong selective effects" on steelhead populations associated with the hypothesized effects to migration?

**Page 82 Paragraph 1** - There is a discussion about weed growth and fall Chinook spawning but its connection to steelhead is unclear.

**Page 82 Paragraph 2** - There is a discussion about ecosystem productivity and its affect on juvenile steelhead rearing but no citations are provided to suggest that the habitat is nutrient limited as a result of fewer allied species. Pearson et al. (1994) suggests that productivity, in terms of growth rates, may be limited but presents data that indicates this may be natural.

**Page 83 Paragraph 2** - Based on current distribution and abundance of both bull trout and *O. mykiss* in the basin Reclamation respectfully disagrees with the concluding sentence.

**Page 86 Paragraph 2** - In the section titled "Increase natural and artificial storage" replace the first sentence with, "This is primarily being addressed through the current Reclamation Storage Study." Modify the second sentence to begin - "For example, the Black Rock alternative in its current configuration would provide..."

**Page 86 Paragraph 3** - The Yakama Nation sued the United States. There is no evidence that Project operations were leading to the extinction of spring Chinook in the upper Yakima only that operations were adversely affecting those fish.

**Page 86 Paragraph 4** - Data to support the conclusion that steelhead have "suffered" under the flip flop operation as compared to pre-flip flop operations should be cited or provided. Prior to flip flop, sustained high flows occurred on the Yakima, Cle Elum, Tieton and lower Naches throughout the irrigation season when reservoir releases were made to meet entitlements. While peak flows were lower than occur under flip flop, flows were considerably higher than unregulated. Winter flows pre-flip flop were considerably lower than currently occur.

**Page 86 Paragraph 5** - Need to recognize that flip flop affects flows to the mouth of the Naches but below that point fixing flip flop may not alter conditions and flows or temperature could be unaffected. We are not aware of reasonable modifications that have been suggested that would provide suitable habitat, flow and temperature conditions in all regulated reaches of the river.

**Page 86 Paragraph 5** - It should be acknowledged here that modifications to flip flop will also have to allow Reclamation to meet its other Project obligations in operating the Yakima Project.

**Page 87 Paragraph 2** - Estimates of potentially available habitat above each dam are available and should be included. The supplement doesn't call for passage at Keechelus or Kachess but it is identified as "necessary" here. On page 34 there is speculation that steelhead may not have used the areas above these natural lakes to any great extent prior to dam construction. Passage at Tieton Dam is described as being of "low" benefit but it is called for in the NMFS supplement.

**Page 87 Paragraph 3** - The work of Stanford and Snyder should be described as a literature review and synthesis rather than performing studies.

**Page 88 Paragraph 1** - It is not clear how restoring side channels in the Wapato Reach would improve natural storage capacity since ground water is currently discharged in this reach all year.

**Page 88 Paragraph 3** - A decision to close the Easton ladder is usually made in early to mid-May with the ladder closed shortly thereafter. While the Easton ladder was closed in the past, it isn't clear how closing the ladder in mid-May would significantly affect steelhead since they move into the upper Yakima generally prior to then. The ladder has not been closed since 1996 and the Easton reach has been "open" to steelhead yet no radio tagged steelhead have ascended ladder.

**Page 92 Paragraph 1** - This makes reference to increased predation risk for juveniles and adults in the Yakima basin. Our understanding is that the data collected to date (Pearson et al. 2004) indicates little predation on outmigrant steelhead smolts in the Yakima basin and we are not aware of any predation data on adult steelhead in the Yakima basin.

**Page 93 Paragraph 3** - The populations of steelhead listed in the basin include those with genes from past out-of-basin stocks. The naturally spawning steelhead in the basin are all part of the listed DPS, irrespective of their current genetic makeup. Can you clarify how the listed populations threaten themselves.

**Page 93 Paragraph 4** - The section on Increased Gaps begins with a statement that increased gaps are assumed. The basis for this assumption should be provided. The section notes a presumed disproportionate decline in lower tributary spawners and indicates that there is more mainstem spawning than previously thought. It also notes higher mortality for mainstem spawners although the data for this conclusion is not in evidence. Finally it is previously noted that the steelhead population is likely not independent from the rainbow population but its effects on perceived gaps is not discussed.

**Page 94 Paragraph 4** - The recovery plan reports that all steelhead populations, especially the Upper Yakima and Naches River populations, are affected by an unnatural reduction in spring flows due to water storage in reservoirs. It should be noted that the Naches River, upstream of the Tieton River confluence, remains mostly unregulated due to the contribution of flows from unregulated tributaries and small amount of storage in the Bumping River system.

**Page 94 Paragraph 4** - While flood control releases may be made in some winters these releases are made through the outlet works not by spilling water over the spillways.

**Page 94 Paragraph 4** - In normal to above normal water supply years (about the 50th percentile) flood control operations continue in the spring and are not subsumed to water storage operations. In these above normal years space is maintained in the reservoirs during spring runoff to capture water and control downstream flooding.

**Page 94 Paragraph 4** - It should be noted that flood control operations only control runoff from basins above the storage dams; runoff from other tributaries is uncontrolled.

**Page 95 Paragraph 1** - In below normal years (below the 50th percentile) spring flood control operations do not occur. As a result modifying flood control operations and rule curves would have no affect on downstream flows or storage operations. Consequently, in moderate to low runoff years when operations might have there greatest affect on spring flows, modifying flood control operations would create no fisheries benefits.

**Page 95 Paragraph 1** - As noted above, since flood control operations have no affect on flows in moderate to low runoff years the benefits to steelhead from modifying flood control would accrue only in good to high runoff years when the benefits appear to be small.

**Page 95 Paragraph 3** - It should be acknowledged that while there are hypothesized impacts from these flow conditions to outmigrant steelhead there is actually little data available. What data is available, for Chinook and Coho, suggests that there is a positive flow/survival relationship for smolts in the Prosser to McNary reach but the relationship is relatively weak with increases in flow resulting in only slight increases in survival.

**Page 95 Paragraph 3** - Reclamation currently subordinates power at the Chandler powerplant during the spring. When flows fall to 1,000 cfs or less all power production ceases.

**Page 95 Paragraph 6** - It should be noted that most of the statements in the opening sentence on the section on Gene Flow are not well substantiated by actual data. The conclusion that introductions of hatchery rainbow trout contributed to a decline in numbers of the listed DPS and "invasion" of rainbow into former steelhead habitat appears to be based almost entirely on conjecture.

**Page 95 Paragraph 6** - As noted earlier, all steelhead in the upper Yakima are part of the listed stock as they currently exist. To suggest that the listed stock genetically threatens itself seems illogical. The genetic makeup of the population is what it is and they are either part of the DPS or not. This discussion also raises a question about one of the assumptions for the VSP analysis. The upper Yakima steelhead are identified as a demographically independent population. This information suggests that the steelhead in the upper Yakima are at least genetically linked to one or perhaps more non-DPS populations and may be demographically linked as well. If such is the case then the upper Yakima steelhead population is not an independent population.

**Page 97 Paragraph 1** - Steelhead radio tracking studies conducted by Reclamation and the Yakama Nation have tracked steelhead adults above the suspected barriers on lower Taneum Creek during 3 of the 4 years of the study. It is not clear how irrigation water delivered in Taneum Creek during the middle and latter parts of the irrigation season would cause a false attraction problem for steelhead which arrive after the end of the irrigation season.

**Page 97 Paragraph 2** - The discussion on storage dam fish passage does not match with the information in Table 1 of the NMFS Supplement.

**Page 97 Paragraph 4** - The Sulphur Creek Wasteway should be characterized as receiving drain water and operational wastewater not effluent.

**Page 109 Paragraph 3** - The first paragraph in the Section on Improve Flow Characteristics talks about late season flows on the lower Naches as a particular problem. It then includes a reference to previous steelhead spawning in that reach and the possibility of restoring it but spawning occurs at a time when late season flip flop flows are not a factor. It then talks about the time frame for improving flows but references spring and summer flows rather than the late season flip flop flows referenced in the first paragraph. Since late season flows are highlighted as a particular concern in the opening sentence references later to flows at other times of the year are confusing.

**Page 118 Paragraph 1** - As noted earlier, the radio tracking studies conducted since 2002 have detected steelhead in more than 3 of the MSAs during the spawning season.

**Page 119 Paragraph 3 Bullet 1** - There is little data on steelhead smolt travel times from above Roza to the mouth and no data on steelhead travel time/survival relationships from Roza to the mouth.

**Page 119 Paragraph 3 Bullet 1** - As noted earlier, there is actually little data on steelhead travels times, delays or survival/mortality associated with Roza Dam. As such, the magnitude of the hypothesized impacts and benefits that would accrue from the proposed action are largely unknown.

**Page 119 Paragraph 3 Bullet 1** - Total power generation would be affected by the proposed subordination which would affect BPA and the Roza Irrigation District.

**Page 119 Paragraph 3 Bullet 1** - As noted previously, the only analysis of a potential flow/survival relationships for steelhead in the basin is from Prosser Dam to McNary Dam. The relationship there, extrapolated from Chinook and Coho data, is positive but weak with small increases in survival associated with increases in flow. There is no data on flow/survival relationship at Roza Dam and no data on the effect of any delays at Roza on overall steelhead survival. Data from previous years does not support the idea that steelhead migrating from above Roza Dam experience a substantial amount of additional mortality associated with dam passage compared to other stocks of steelhead that do not pass Roza.

**Page 139 Last Paragraph** - Reclamations authorities under YRBWEP are spelled out in legislation and can not be modified without further legislation. SOAC is an advisory group whose responsibilities are laid out in Court decisions and law. They are not responsible for management of mainstem flows. Operation of the Yakima Project is vested with the Yakima Project manager.

**Page 140 Paragraph 5** - Many of the organizations discussed in this plan as potential implementation agencies, including Reclamation, have ongoing processes, which in some cases are mandatory, that are used in Program development. These can not be replaced or eliminated by a Regional Recovery Organization. There may also be problems with such an organization for Federal agencies who must comply with the Federal Advisory Committee Act (FACA).

**Page 141 Paragraph 5** - The proposal to develop a plan to modify Yakima Project infrastructure may require additional Congressional authorization and additional appropriations.

**Page 158 Paragraph 3** - Earlier in the plan a reduction in population size by around the turn of the century of about 90% was estimated. This suggests reductions since that time have been relatively modest. The current population levels for steelhead should be reported as a range commensurate with the earlier reported range of estimates of historic populations levels, from about 20,000 to 100,000. This would make the current range about 3-15%.

**Page 178 Section** - Update Chapter 10 to list all of the references cited in the document. References are frequently used in the recovery plan without providing the citation information. Examples; Watson (1990) pg. 21; Johnson et al. 1986 and Rinella et al. 1992(a) and 1992(b), pg 48.

**Page 194 Paragraph 4** - YRBWEP did not provide for the creation of SOAC. It did assign some tasks to SOAC but that body was created by the Water Master in the early 1980's. See discussion later in this section on page 195.

**Page 198 Paragraph 4** - Official title is, "Yakima River Basin Water Storage Feasibility Study"

**Page 198** - Relative to the section "Major Studies in the Basin"; while it's correct that EDT model refinement will occur, there is no emphasis on improving the EDT model for steelhead. The temperature model is focused primarily from Roza to Prosser dams; a mass-balance mixing approach is being used for the upper Yakima and upper Naches. The Storage Study will rely on Ecology's temperature model for the lower Naches and the irrigation district's temperature model for the lower Yakima below Prosser Dam. At this point in the planning process it is best to simply state that "several flow scenarios" will be evaluated without stating specifics such as, "spring flows, summer flows". The study is nearing the Plan Formulation phase where the specific alternatives will be defined and then analyzed.

Finally, in the last paragraph the first bullet "(1)" should be stated more broadly and perhaps could be combined with bullet "(2)". The main point is that both storage and direct delivery using Columbia River are being considered, as well as, additional in-basin storage using strictly Yakima water. An alternate sentence here could be, **"There are two aspects to the study: (1) diversion of Columbia River water to augment existing storage or delivered directly to willing irrigation entities in exchange for Yakima basin water, thereby reducing irrigation demand on the Yakima River water and improving Yakima Project stored water supplies, and (2)..."**

**Page 199 Paragraphs 3 & 4** - The Storage Study will not be defining biologically based flows for fishery needs. Such fishery criteria are needed; but beyond the scope of the study mainly due to time constraints. The criteria being used to compare all alternatives to existing flow conditions will be use of the, 1) EDT model, 2) sediment model and 3) the Decision Support System.

**Page 199** - Replace the second paragraph in the Study Approach section with:

The Storage Study has completed an appraisal assessment of the Black Rock alternative (December 2004), and released in June 2006 the appraisal assessment of the Yakima River Basin Storage Alternatives, which encompasses the Bumping Lake enlargement, Keechelus-to-Kachess pipeline and the Wymer reservoir alternatives. A decision on which alternatives will be carried forward into Plan Formulation for more detailed analysis will occur later in 2006.

**Page 202 Paragraph 1** - The methodology for generating the viability curves is not well discussed. The abundance and productivity parameters apparently came from existing data sets

although these are not identified. Extinction risks are associated with short-term environmental variability are then linked to these two parameters. This is apparently done through the estimates of variability and autocorrelation but how these were derived is also not clear.

**Page 202 Paragraph 1** - Separate viability curves were not generated for the 3 population size classes rather 1 curve was generated and then truncated at either 1000 or 2000 spawners for intermediate and large populations respectively. There does not seem to be any biological justification to conclude that combinations of abundance and productivity that yield a particular risk of extinction for basic populations yield a different risk of extinction for an intermediate or large population. There is no population size criterion in the calculation of extinction risk. These minimum population levels come from the historic intrinsic potential analysis and so are not strictly related to the risk extinction analysis.

**Page 203 Tables** - The age structure used for the R/S analysis doesn't comport with the age structure data provided earlier in the document.

**Page 219 Paragraph 2** - The hypothesized reduction in numbers compares well to some estimates of historic population size. Most of this reduction occurred prior to the early 20th century.

**Page 220 Table E.1** - Table E.1 of EDT results looks very similar to the table in the Yakima sub-basin plan for both anadromous and non-anadromous *O. mykiss*. The abundance numbers are close except for the historic estimates which are far different in the recovery plan than in the sub-basin plan. In discussing the Upper Yakima River Steelhead on page 225 the text indicates that the EDT model did not separate DPS members from non-DPS members in estimating population performance values. Does this mean that the results in Table E.1 are a combination of estimates for all *O. mykiss*? If that is the case the table caption should be modified to reflect that. There is also no indication what the phrase WITH GA means in the first column of Table E.1.

**Page 220 Table E.1** - The estimates of intrinsic productivity in Table E.1 generally are considerably higher than some of those used in the extinction risk analysis. They are also generated using a different stock recruitment model than used in the viability analysis. Since both approaches make estimates of intrinsic productivity the different approaches and different results should be reconciled.

## NMFS Supplement

**Page 28** - It isn't clear what is meant by the two sub-bullets under the fourth bullet. A BO does not "approve" an agency action, it simply transmits the Secretary's opinion as to whether or not he/she believes a proposed action will or will not result in jeopardy and/or adverse modification. The action agencies burden in the Sec.7(a)(2) process is spelled out in law and regulation. An additional burden is not placed on them with completion of a recovery plan.

**Page 29** - Fourth bullet refers to "MSA populations". This seems to be an inappropriate use of the term "population" unless there is but a single MSA.

Page 30 - We offer the following modifications to language in Table 1:

Population	Limiting Factor	Key actions
Naches	Altered hydrograph as a result of <del>BOR</del> flow regulation, in particular extremely high flows in the Tieton River in Sept.	<b>Explore options for modifying flip flop that would reduce extremely high September flows on Tieton. If acceptable alternatives identified, implement.</b>
	Lack of access to <del>historically</del> <b>potentially</b> productive habitats.	Continue passage improvements in Cowiche Creek and <b>continue passage feasibility study at Bumping Dam. Consider initiating passage feasibility study at Tieton Dam. If either is feasible seek authorization for construction.</b>
	<b>Periodic</b> poor smolt migration conditions in the Yakima River mainstem.	<b>Improve Yakima mainstem flows during juvenile migrations by water acquisition, efficiency improvements or both.</b> <del>increasing reservoir releases, reducing diversions or both.</del> <b>Consider additional subordination of</b> <del>In particular, subordinate</del> power diversions at Chandler during the juvenile migration period <b>when conditions are poor.</b>
Upper Yakima	Altered hydrograph as a result of <del>BOR</del> flow regulation.	<b>Explore options for modifying flip flop that would reduce extremely high August flows. If acceptable alternatives identified, implement.</b>
	Lack of access to <b>potentially</b> <del>historically</del> productive habitats.	Set winter flows based on “real time” conditions of storage, stream flow and precipitation. <del>no lower than flows set for spring Chinook salmon spawning and maintain these flows throughout the winter.</del>
	Channel simplification as a consequence of channel realignment for highway and levee construction.	Continue efforts to reconnect side channels.
	<del>Seasonal low flow problems –</del>	<b>Continue passage feasibility study at</b>

	<p><del>low winter flows below reservoirs, low flows below Roza Dam during juvenile migration, low flows in some tributaries.</del> <b>Lack of access to potentially productive habitats</b></p>	<p><del>Provide passage into Upper Cle Elum Dam</del> <b>and if feasible seek construction authorization.</b> Provide passage into Upper Yakima above Easton (all years), Manastash Creek, Nanum Creek and other tributaries as opportunities are available.</p>
	<p><b>Potential impediment to juvenile passage at Roza Dam.</b></p>	<p>Suspend power production, <b>as necessary</b>, at Roza Dam during the juvenile migration period <b>based on flow, passage conditions and biological monitoring.</b> <del>and</del> Evaluate the biological adequacy of <del>the existing</del> <b>subordination</b> flow targets below this dam and increase these targets as warranted.</p>
	<p><b>Periodic poor</b> smolt migration conditions in the Yakima River mainstem.</p>	<p><b>Improve Yakima mainstem flows during juvenile migrations by water acquisition, efficiency improvements or both.</b> <del>increasing reservoir releases, reducing diversions or both.</del> <b>Consider additional subordination of</b> <del>In particular, subordinate</del> power diversions at Chandler during the juvenile migration period <b>when conditions are poor.</b></p>

The Department appreciates the opportunity to comment on the subject documents. Reclamation is available to work with the National Marine Fisheries Service (NMFS) further to incorporate some of our comments into subsequent drafts. If there are any questions or concerns about these comments please contact Dave Kaumheimer, Bureau of Reclamation, at 509-575-5848, extension 232. If I can be of any assistance, please contact me at (503) 231-6157.

Sincerely,



Preston A. Sleeper  
Regional Environmental Officer

cc: Yakima Basin Fish and Wildlife Recovery Board  
128 N. 2<sup>nd</sup> Street, Room 408  
Yakima, WA 98901

Yakima Basin Joint Board  
470 Camp 4 Road  
Yakima, WA 98908

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