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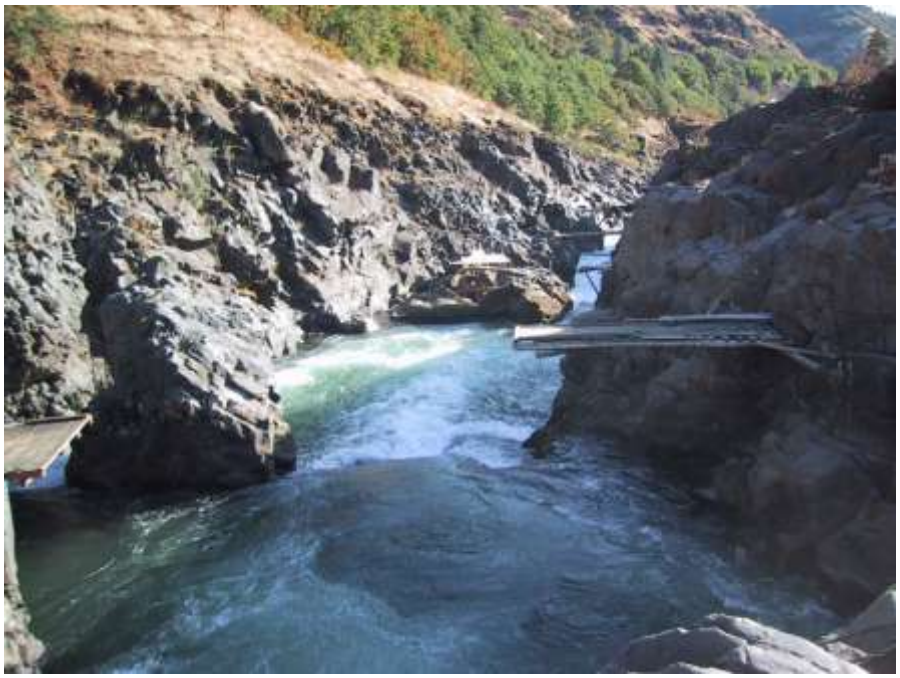
Step Two Response Review of the Yakama Nation's Klickitat River Anadromous Fisheries Master Plan

(Project #1988-115-35)



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Step Two Response Review of the Yakama Nation's Klickitat River Anadromous Fisheries Master Plan

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Background

At the Northwest Power and Conservation Council's January 7, 2013 request, the ISRP conducted a review of the Yakama Nation's response to the ISRP's Step 2 review of the *Klickitat River Anadromous Fisheries Master Plan* (project 1988-115-35). The Yakama Nation proposes to improve the existing Klickitat Hatchery near Glenwood, Washington and construct a hatchery and acclimation facility at Wahkiacus at river mile 17. These proposed actions are intended to build upon completed project activities including improvements made to the Lyle Falls Fishway and broodstock collection facility as well as the Castile Falls Fishway and escapement monitoring facility. The facilities are intended to support programs for spring Chinook, fall Chinook, steelhead, and coho. The Yakama Nation believes that the location of the Wahkiacus facility will allow release of hatchery coho and fall Chinook to the lower river and thus limit adverse impacts on native fish species. In addition, a potential acclimation site for summer steelhead has been identified for McCreedy Creek, but the Yakama Nation states that these facilities will be built only if steelhead are unable to naturally re-colonize stream habitat above Castile Falls. In addition, the Master Plan explains that habitat improvements occurring in conjunction with the proposed project are expected to benefit bull trout and Pacific lamprey as well as steelhead and spring Chinook.

The ISRP completed its Step One review of the Klickitat Master Plan in 2008 (ISRP 2008-6; also see ISRP 2005-7). Overall in Step One, the ISRP found that the 2008 Master Plan was a well-balanced, relatively thorough plan that included a number of progressive and positive attributes. The ISRP recommended that the master plan met ISRP scientific review and Three-Step review criteria with a qualification that elements of the steelhead and spring Chinook natural and artificial production plans need a more detailed explanation. In September 2012, the ISRP completed a review of the Yakama Nation's revised master plan and supporting documents intended to meet Step 2 criteria and the ISRP's 2008 qualifications (ISRP 2012-12). Based on the information submitted, the ISRP stated that the 2008 qualifications were not sufficiently addressed and requested a response on three production components: 1) Segregated Steelhead Harvest Program, (2) Integrated Steelhead Supplementation and Conservation Program, and (3) Integrated Spring Chinook Harvest Program.

On January 4, 2013, the Yakama Nation provided the following Step 2 response documents:

- Yakama Nation Response to the Independent Scientific Review Panel's Step Two Review of the Yakama Nation's July 2012 Klickitat River Anadromous Fisheries Master Plan (ISRP 2012-12)
- Appendix A. 2012 Klickitat Master Plan Decision Matrix for Skamania Steelhead Program
- Appendix B. 2012 Klickitat Master Plan Decision Matrix for McCreedy Creek Program

- Appendix C. Klickitat spring Chinook: Integrated program description, analysis, and implementation schedule

The ISRP's review below is organized using the Yakama Nation's response outline.

Recommendation

1. Segregated Steelhead Harvest: Response Requested

The ISRP requests a response from the sponsors that addresses the questions raised below concerning the segregated steelhead harvest program. The Master Plan has two goals for steelhead: to provide harvest opportunities to tribal and non-tribal members through a segregated hatchery program and to enhance or restore natural populations in the future through habitat restoration and supplementation. More information is needed on how a balance between conservation and harvest objectives will be achieved. There is not enough information to conclude that the proposed segregated steelhead hatchery can be operated in a manner that protects and conserves the ESA-listed natural populations in the Klickitat. Data are presented that suggest the current program, which involves out-planting of out-of-basin Skamania steelhead in the Klickitat, has had a low genetic impact on natural steelhead. What is needed, however, is a description of the yearly research, monitoring, and evaluation efforts that will be employed to ensure this determination remains valid in the future. Along with this description of methods there should also be an explanation of how data will be used to help determine if the program should be maintained as is, or changed from its current design. It would be very helpful if explanatory text, similar to the spring Chinook appendix, could be produced for the segregated hatchery program. Such a document could be used to address the questions raised in this review.

2. McCreedy Creek Steelhead Supplementation: Meets Scientific Review Criteria (Qualified)

Questions raised in the ISRP comments below can be addressed in the Step Three review.

3. Spring Chinook Integrated Harvest and Colonization: Meets Scientific Review Criteria (Qualified)

The ISRP appreciated the thorough explanation of this project provided in the sponsor's Appendix C. A few questions about this program, however, still remain. These can be addressed in the Step Three review.

Comments on Responses to ISRP Qualifications

R.1 Segregated Steelhead Harvest Program

R1.1. ISRP 2012 comment: Need to describe logic/decision criteria for maintaining this program vs. integrated program as described in 2008 plan. A segregated program is not consistent with the Recovery plan.

The Klickitat steelhead harvest program continues to change from the one conceptualized in the 2008 Master Plan. The 2012 Master Plan abandons the integrated harvest strategy presented in the 2008 Master Plan and instead proposes a "local" segregated program. In 2013, this strategy was again changed and the current proposal is to continue a segregated hatchery program by scatter-planting "out-of-subbasin" steelhead into the Klickitat River. The critical issue is not which of these proposals will be implemented, but how the selected alternative will achieve harvest objectives and at the same time meet ESA protection goals for natural populations. For example, significant fish passage improvements and habitat restoration efforts have taken place in the Klickitat subbasin. These efforts are expected to increase the carrying capacity of natural-origin steelhead. At the same time, artificial production is being used to augment steelhead harvest. If NORs are harvested along with hatchery-origin steelhead, conservation goals and the full value of restoration efforts may not be reached due to adverse impacts on NOR abundance. The Master Plan has two goals: to provide harvest opportunities to tribal and non-tribal members and to enhance or restore natural populations of steelhead. It appears that these goals are incompatible. Consequently, more information is needed on how a balance between conservation and harvest objectives will be achieved.

The ISRP read the 2009 recovery plan for steelhead in the mid-Columbia Gorge ESU and also read the EIS documents prepared for the Master Plan. In both cases the identification of threats to the natural population was general and qualitative in description rather than specific and quantitative. Consequently, the basis for selecting one harvest augmentation option over another is not clear. There is not enough information to conclude that any of the proposed steelhead hatchery and harvest programs could be operated in a manner that would protect and conserve the ESA listed natural populations in the Klickitat.

In the 2013 response to the ISRP, the Yakama Nation indicated that they had conferred with NOAA Fisheries and the Washington Department of Fish and Wildlife about which hatchery steelhead program should be implemented. Both agencies concurred with the proposal to continue scatter planting hatchery Skamania River steelhead smolts into the Klickitat. Supporting letters or memoranda from these agencies should be included in this step review to help clarify why this approach was chosen as the preferred augmentation strategy.

The ISRP anticipates that empirical information may not be available to determine which harvest augmentation program should be used. If true, this level of uncertainty must be reflected in the Master Plan, HGMP, and decision tree. Also the types of information that might be used to evaluate the status of the natural population and the effect of the hatchery program

on the natural population need to be adequately identified. The response provided does recognize the challenge in general but is not specific enough in describing the types of data to be collected and how they will be used to evaluate the impact of the hatchery program on the natural steelhead populations.

R1.2. ISRP 2012 comment: Decision criteria for guiding a segregated harvest program are inadequate. The primary guidepost is the proportion of smolts with hatchery parentage (< 5%). At a minimum, performance standards should be established for NOR abundance, Recruits/Spawner, and the proportion of hatchery-origin steelhead on the spawning grounds (pHOS).

It is clear from their response that the sponsor understands the types of data necessary to evaluate whether natural steelhead populations in the Klickitat will be put at risk due to a segregated hatchery program. Results are presented from ongoing monitoring that examines the potential effects of hatchery steelhead on NORs. These data suggest that the current program may have a low impact on natural steelhead. What is needed, however, is a description of the yearly research, monitoring, and evaluation efforts that will be employed to make this determination in the future. Along with this description of methods, there should also be an explanation for how collected data will be used to help determine if the program should be maintained as is or changed from its current design. In other words, what performance standards are in place for NOR abundance, Recruits/Spawner, and pHOS, and what will happen when performance standards are not met?

The degree of introgression between out-of-basin Skamania River steelhead and Klickitat NORs was identified as the primary factor that would determine if the steelhead segregated harvest program should be continued, stopped, or altered. It was stated that annual surveys would be conducted to regularly assess this statistic. As presently designed, this metric may underestimate the amount of introgression that is occurring. This possibility exists because introgression is being evaluated in samples of smolts produced by both winter and summer run steelhead. Little introgression is expected to occur between those Skamania summer steelhead that spawn in late winter and Klickitat winter steelhead that spawn somewhat later. Consequently, sampling a mixture of natural smolts produced from both summer and winter runs obscures the amount of introgression that may be occurring in native summer run steelhead.

Genetic surveys by Narum et al. (2006) and more recently by the Yakama Nation and CRITFC (unpublished data) may allow a more refined approach. They discovered that six to seven genetically distinct natural steelhead populations exist in the Klickitat. Some of these are likely to be more vulnerable to introgression than others, depending on where out-of-basin Skamania fish are planted. Examining the degree of introgression, that is hybridization of native fish with planted Skamania fish, in individual populations could be used to assign a specific level of risk to each natural population. This could be accomplished by sampling juveniles or smolts leaving individual tributaries or by collecting tissue samples from out-migrating smolts at Lyle Falls or

some other downstream location. If introgression levels consistently exceed 5% in any tributary then the sponsors will need to outline an approach for selecting an alternate course of action.

While such surveys provide important data, they do not fully expose all the possible effects of having out-of-basin steelhead potentially spawning with locally adapted fish. For example, spawning between these two types of fish could produce ill-adapted juveniles that would not survive to the smolt stage, as noted by Narum et al. (2006). Or, hatchery females may spawn in inappropriate places or times. If true, such reproductive interference is expected to reduce the overall productivity of Klickitat NORs. The ISRP is also concerned that a 5% incidence of introgression would indicate pHOS levels exceeding 5% given that higher mortality is expected in less adapted hybrid progeny. How will these potential impacts be measured?

Additionally, direct releases of hatchery-origin steelhead smolts may increase straying and the occurrence of residualism or freshwater residency. Residual trout, originating from hatchery releases of smolts, will compete for food and space with native steelhead and thus could further reduce their productivity. Many residuals are also maturing males and therefore represent an underappreciated source of introgression. Consequently, estimates of the number of residual trout originating from the Skamania releases, adjacent to release locations, should be made. It is important to do this because residualism is something that has been successfully dealt with in other hatchery steelhead programs. If it turns out that it is a problem, some possible solutions appear to be available. For example, Clarke et al. (2010, 2011) reported that straying and residualism could be reduced by volitionally releasing steelhead smolts from acclimation ponds and removing male juveniles that delayed emigration from the ponds.

The sponsors indicated that their existing monitoring program already collects data needed for a natural-origin brood table and for examining recruits per spawner. Given that these data are available now, they should be used to develop a recruitment curve for steelhead to estimate their life cycle productivity and to produce a spawning escapement goal for natural origin steelhead.

> ***R1.3. ISRP 2012 comment: A timeframe and protocol needs to be established to transition from scatter planting steelhead from out-of-basin to releases of within-basin segregated hatchery steelhead from the Klickitat Hatchery.***

The project sponsors have plans to continue to use direct releases of out-of-basin Skamania River hatchery smolts to continue their steelhead harvest augmentation program. Currently, there are no plans to alter this program unless introgression levels between Skamania and Klickitat steelhead exceed 5% over a set period of years. The sponsors also state that the Washington Department of Fish and Wildlife administers the 90,000 Skamania smolt release program which is part of the U.S. v. Oregon Management Agreement. Any changes to the program will have to be approved by the U.S. v. Oregon Policy Group.

The question, however, was not directed toward the policy or administrative procedures that would need to be considered prior to altering the current program. Instead, the ISRP is

interested in how the current program would be transitioned, if the need arose, into either an integrated NOR or local segregated HOR program. The decision tree appears to indicate that broodstock for both of these programs would be collected at Lyle Falls and that these fish would be spawned and reared at the Klickitat Hatchery. Other details are lacking. For example, of the two options, which one is preferred and why? Would a transition into either of these options have distinct phases with described end points? How will factors that cannot be controlled by the sponsors such as global warming, decadal cycles, La Niña and El Niño influence the transition period and modifications to the Master Plan? How would monitoring and evaluation procedures currently employed be modified to assess the effects of this new approach on harvest and natural steelhead abundance? Presenting details, such as these, will provide the sponsors with a plan, or at least a good starting point if and when the decision is made to transition away from using scattered releases of out-of-basin steelhead smolts to augment harvests.

R.2 Integrated Steelhead Supplementation/Conservation Program

ISRP 2012 comment: The ISRP concludes that active management of colonization rates above Castile Falls requires a thorough evaluation of adult abundance and spawning distribution above and below the falls and an adequate understanding of recruitment dynamics of the steelhead population. Additionally, before initiating an integrated supplementation program, consideration should be given to alternative active management, for example, translocation of adults and egg plants to gain an understanding of spawning areas, smolt production potential, and migration behavior of returning adults from smolts produced above Castile Falls. The ISRP acknowledges that the Master Plan anticipates that a decision to proceed with supplementation would involve consultations with the National Marine Fisheries Service (NMFS) and Washington Department of Fish and Wildlife (WDFW). The ISRP believes that a better understanding of the population is required before an informed decision can be reached. Step 2 of the Master Plan should develop details of the monitoring and evaluation that is taking place that can guide evaluation of the capacity of the reaches above Castile Falls and fish counting at Castile Falls. Step 2 should also provide a time-frame for conducting preliminary stock recruitment analysis to determine capacity and colonization rates and provide details on the opportunities for alternative active management of colonization rates.

The removal of passage barriers at Castile Falls numbers 4/5 and 10/11, in 2005, opened up 80 kilometers of potential salmonid habitat in the upper Klickitat basin. Monitoring facilities were included as part of the fish passage improvements and in 2012 a video system was installed at falls 10/11 to provide continuous fish counts. In addition, habitat restoration projects, designed to improve productivity, are taking place above Castile Falls. This is new habitat, and its productivity and colonization potential are poorly understood. Steelhead adults that migrate past the falls will be allowed to spawn and will be counted annually. The initial period of natural colonization will be modified by 2020 if steelhead passage at Castile Falls has not exceeded 150 adults in at least one year or if mean passage from 2012 – 2020 is <120 adults. If the program

fails to meet the 120-150 fish passage goals, would the failure be attributed to a problem with passage or abundance? That is, was it because steelhead were not sufficiently attracted to the upstream area, or that too few fish were available in downstream reaches to seed the upstream area? Some discussion is needed about how this potential issue would be resolved because two different courses of corrective action could be taken, depending on the answer to the above question. If adult abundance below the falls is relatively high, but few fish migrate over the falls, then attempts to improve passage might be a suitable response. On the other hand, if abundance is consistently low and passage seems adequate then some form of supplementation above the falls may be appropriate. As it currently stands, the only action proposed is to collect 35 to 40 NOR steelhead annually at Castile Falls. These fish would be used as broodstock for an integrated steelhead program that would take place above Castile Falls. A component of this plan calls for the establishment of a mobile acclimation site at McCreedy Creek.

The 2012 Klickitat Master Plan provides general details on how escapement and productivity will be monitored. In the 2012 ISRP Step Two Review of the Klickitat River Anadromous Fisheries Master Plan, additional details were requested on: 1) how the abundance and distribution of steelhead spawning above Castile Falls would be determined, 2) how the recruitment dynamics of steelhead spawning above Castile Falls would be estimated, 3) how the carrying capacity of reaches above the falls for steelhead would be evaluated, and 4) when capacity and colonization rates for this area would ascertained. The video system at Castile Falls will be used to record the number of adults entering this portion of the Klickitat. No current plans are in place to determine the spawning distribution of these fish. The sponsors are encouraged to develop methods for quantifying and characterizing this distribution on an annual basis. Without knowing how much of the upper watershed is being used by the fish, it will be difficult to appraise carrying capacity for steelhead. The sponsors state that smolt monitoring will take place and data from this effort will be used to help evaluate productivity. Additional details about this effort would have been helpful. For example, the location of the juvenile trap, how long it will be operated, the types of data taken on the juveniles, the types of tags or marks that might be applied, and how trap efficiency will be assessed should be briefly described. Scales, lengths, and weights taken on migrating juveniles would provide ancillary information about the capacity of the environment to produce steelhead.

Planned efforts to measure physical habitat attributes above Castile Falls and some effectiveness monitoring sponsored by the Salmon Recovery Funding Board (SRFB) will help determine capacity. Also, since the ability to monitor adult arrival has only recently been established, the ISRP agrees that additional data need to be collected before assessments of natural colonization and smolt production can take place. This first assessment is scheduled to occur in 2020 or shortly thereafter. Some discussion about approaches other than an integrated hatchery program to supplement steelhead above Castile Falls would enrich the Master Plan. Translocation of adults from Lyle Falls is problematic because it would be difficult to determine which NOR steelhead intercepted there, or elsewhere in the lower Klickitat, might be destined for Castile Falls. However, the use of eyed eggs or juvenile plants into areas above Castile Falls would be possible alternatives if the parent fish were collected at Castile Falls. Additionally,

translocations of adults collected at Castile Falls to upper watershed areas might also be employed. Explanations for why these options were not considered would be useful.

R.3 Integrated spring Chinook Harvest Program

ISRP 2012 comment: The information of primary interest to the ISRP includes:

- ***a more detailed presentation on how the long-term PNI of >0.67 is to be achieved (various choices of pHOS and pNOB will provide an equivalent PNI)***
- ***justification for the rate of broodstock mining from the natural population***
- ***a succinct statement of the life stage survivals needed for natural and hatchery spring Chinook to achieve the program design***
- ***an assessment of the needed improvement from current conditions***
- ***a well-defined schedule for the transition from present segregated program is needed***

Appendix C provides a detailed and well-explained description of how the integrated spring Chinook Program is scheduled to progress. Four phases are planned. The project sponsors ran a series of models to estimate how Proportionate Natural Influence (PNI) would change from one Phase to the next. These changes were shown in two figures which provided pHOS as well as PNI values for each Phase. The approximate PNI can be calculated by using the following formula:

$$PNI = pNOB/(pNOB + pHOS)$$

Where, PNI equals Proportionate Natural Influence, pNOB equals the proportion of the broodstock made up of natural origin adults, and, pHOS equals the proportion of the natural spawning population made up of hatchery origin adults.

If any two values are known in this type of relationship, it is possible to calculate the third. When that is done, the pNOB values obtained by using the broodstock schedule described in Appendix C do not match those that would have had to exist to produce the PNI values shown on Figures 1 and 2. For example, in Figure 1, in Phase 4, a pHOS of 27% is shown along with a PNI of 66%. To obtain a PNI of this level a pNOB value of ~ 52% is necessary. Yet the pNOB value for Phase 4 should equal 179/549 or ~33%. Similarly, Figure 2 shows a PNI of 79% and a pHOS of 21% in Phase 4. To obtain the PNI value in this figure, a pNOB value of ~79% would be needed which is considerably greater than the 33% value the broodstock schedule suggests would occur. A reduction in pHOS values could achieve the PNIs shown. A pHOS of 17% with a pNOB of 33% would give a PNI of 66%. Likewise, a pHOS of approximately 8.8% under a pNOB of 33% would yield a PNI of 79%. An explanation is needed for how the model results produced higher than expected PNIs when pNOB was set at 33%.

Despite this discrepancy, Appendix C does describe steps that will be taken to reduce pHOS values and increase pNOB over time in an effort to achieve a PNI of 66%. The amount of "mining" of NORs to achieve N_1 line objectives is expected to be around 13%. A justification for

this relatively low fraction, based on a viability analyses, should be presented. Table 6 in the Appendix presents assumptions about survival from one life stage to another. The SAS values for NORs range between 4.3 to 5.3% and are almost an order of magnitude greater than those expected to occur in H_1 and H_2 fish. Any supplemental data to support these relatively high SAS values would be helpful.

In general, the appendix does a good job of describing the changes needed to improve the integrated spring Chinook program and presents a schedule and triggers for when these changes would occur. The ISRP agrees with the sponsors that smolt quality is likely to improve because of reduced rearing densities and disease culling. However, the incidence of minijacks may not decline as expected. Recent work by Don Larsen and colleagues at the Cle Elum Supplementation Research Facility indicates that integrated programs may produce higher levels of minijacks than segregated ones. Thus, the occurrence of minijacks is an important factor that should be measured.

Comments on Responses to ISRP Specific Comments (SC)

SC-1. Decision Trees

The spring Chinook Appendix C was very helpful. It clearly explained the steps that will be taken to transition from the existing segregated program to an integrated program. The ISRP also appreciates the willingness of the sponsors to update the Klickitat Master Plan and spring Chinook HGMP with new actions and plans presented in the appendix. Plainly, the segregated program has underperformed when compared to other spring Chinook programs in this region of the Columbia River Basin. A few questions still remain, however. Will the size of the program be affected by higher than expected natural or hatchery SAS rates? Conversely, how will the program respond to uncontrolled environmental factors that may reduce overall spring Chinook productivity in the Klickitat? Finally, if SAS values do not improve under the new integrated program, what future actions might be implemented to increase productivity?

The steelhead decisions trees were less informative. It would be very helpful if explanatory text, similar to that provided in the spring Chinook appendix, could be provided for the segregated harvest augmentation program and for the above Castile Falls reintroduction program. These documents could be used to address the questions the ISRP has raised about both of these programs.

SC-2. Detail regarding steelhead recruit analysis and harvest

The sponsors recognize that some of the assumptions used in their analyses and modeling efforts will be replaced with new information gathered from ongoing monitoring and evaluation programs. Any assessment about implementing an integrated steelhead program above Castile Falls will be delayed until at least 2020 so that enough information about colonization rates and productivity can be gathered to help guide this decision. The ISRP hopes

that spawner distribution and the identification of possible limiting factors in this region can also be gathered to help with this decision. Modifications to the steelhead programs will be inserted into the steelhead HGMP and the Master Plan.

SC-3. Detail regarding determination of spring Chinook release sizes, recruits-per-spawner, and harvest

The 2012 Master Plan indicates that a variety of attributes, for example growth, survival, length, weight, and numbers released, will be assessed while the fish are under artificial culture. Also, the fish will be given a health exam prior to release. It is stated that at least 60 fish will be examined when making this evaluation. The ISRP assumes that this 60 fish value is per raceway or rearing container and consequently several hundred fish would have to be sacrificed just prior to release to complete this task. One of the key metrics that the project needs to investigate is the occurrence of minijacks. The ISRP recommends checking the maturation status of the fish used in the pathogen assessments to determine the incidence of early male maturation in project fish. The most sensitive test is to measure the plasma levels of the reproductive steroid ketotestosterone (Larsen et al. 2004). The sponsors agree to possibly do this testing in the future. If the expense of testing prevents it from being done now, the ISRP suggests consideration of a cheaper alternative method described by Campbell et al. (2003) and determine the gonadosomatic index (GSI) of sampled males. This method is not as accurate as the plasma assay, but it can be done by simple dissection and weighing. And, like the plasma method, it will give an estimate of the percentage of males that are likely to become minijacks. Initially, it might be prudent to perform both types of assays on the same fish to determine the relative sensitivity of the GSI method before relying exclusively on this procedure to detect early male maturation rates.

Currently, the effect of different release strategies on the occurrence of minijacks is being evaluated by documenting the return of minijacks to the hatchery. Research performed in the Yakima River, and elsewhere in the Columbia Basin, indicates that many of the minijacks produced by a facility never return to a hatchery (Beckman and Larsen 2005). Thus, using return numbers underestimates the production of such males by a project. Knowing the percentage of males that have adopted this life history strategy will help the sponsors to develop SARs, SAS, and R/S values. Even if minijacks do not return to spawn, they may compete for food and space with other stream salmonids. Consequently, having an estimate of their abundance may help in determining carrying capacity and limiting factors. .

Appendix C of the response includes new anticipated production estimates for spring Chinook. The productivity estimates appear to be more reasonable than those reported in the Master Plan. Appendix C also provides information on the proportions of the harvest that consists of hatchery and NOR spring Chinook, as requested.

SC-4. Information regarding balancing broodstock collection, hatchery smolt yield, and anticipated SAR with the harvest and stock conservation

The Appendix C response provides a detailed description of anticipated production during the transition to an integrated spring Chinook hatchery and thus adequately covers these issues.

SC-5. Summary and synthesis of ecological benefits of ongoing habitat restoration activities

A number of major habitat actions have been implemented in the Klickitat River to improve productivity of steelhead and spring Chinook. For example, major fish passage improvements have been made at Lyle and Castile Falls. For others see Table 6-2 in the 2012 Master Plan. Additional habitat work is occurring and two effectiveness monitoring programs using BACI designs are taking place. The sponsors have also identified where additional habitat restoration activities are needed. These efforts, plus the associated monitoring activities should provide information that can be used to ascertain the ecological benefits of these activities. This type of monitoring and evaluation is important.

SC-6. Confirmation of study design and statistical validation of tagging rates and tag recovery

A substantial number of marks and tags will be applied to project steelhead, spring Chinook, coho, and fall Chinook. These marks and tags are being applied to document survival, contribution to fisheries, and to separate hatchery from NORs. The sponsors supplied an updated table (Table 7-1; 2012 Master Plan) that lists the types of tags and marks that will be used per species. Statisticians, either employed by the Yakama Nation or CRITFC, will analyze the data obtained from tag and mark detections. The text was sufficient to conclude the Yakama Nation have considered the information needs to evaluate their programs. It would be helpful, however, to provide a reference to a document that describes the protocol for monitoring harvests.

SC-7. Information addressing the conditions of termination of supplementation above Castile Falls should also be outlined in the requested "decision tree"

The sponsors state that termination of a steelhead supplementation program above Castile Falls would have to consider treaty-reserved fishing rights and case law, ESA conservation objectives, federal mitigation obligations, and VSP criteria. Any judgment to cease such a program would also be a joint decision among the Yakama Nation, NOAA Fisheries, and the State of Washington.

Our question, however, was a request for the biological circumstances that might bring about a discussion to end the program. Two very different biological outcomes could lead to such a conversation. In the first one, the proposed supplementation program would produce a substantial number of adults returning to the basin. These fish along with NORs would completely colonize the upper basin and the carrying capacity for steelhead would be reached. In this instance, the sponsors may want to stop or decrease their supplementation program to

reduce the risk of domestication effects and over-seeding of the habitat. In the second case, the supplementation program could return fewer adults than would have been produced if none of the fish had been used as broodstock. A thorough discussion of what might be done, if either of these outcomes occurs, would help complete the planning process for the integrated steelhead program.

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