Comments on WDFW Elwha Summer/Fall Chinook Hatchery Program

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Introduction.

The draft HGMP (Draft) is, as the Department acknowledges, incomplete. Among the missing elements necessary for a substantive technical review is a copy of the Elwha Monitoring and Adaptive Management Plan (EMAMP) that is referenced numerous times throughout the HGMP. Most of these references regard substantive monitoring objectives and quantitative indicators of program objectives. Absent the details that are presumably contained in the EMAMP, we cannot evaluate the merits of the sections of the Draft that rely on these references. It is equally clear that NOAA cannot evaluate whether the Draft merits the 4(d) take exemption for which the HGMP is an application without these and related kinds of details.

We, therefore, interpret the request for public comments on the Draft to be a request for constructive criticism and suggestions to improve the Draft. It is in this collegial spirit that we submit the following comments. We provide our comments primarily as general comments addressing issues or topics of general concern that we think are of the most importance to revising the Draft and making the program a genuine integrated conservation program. Specific comments are provided on a few specific points in sections 1 and 6 of the Draft to help illustrate some of the deficiencies described in the general comments as they occur in the HGMP template. These are by no means meant to be exhaustive but rather we hope that the general comments will sufficiently indicate the primary kinds of changes and added detail we believe should be added, and we trust that these comments are taken in the constructive spirit intended.

General Comments.

The decision to pattern the purpose, goals, and objectives of the Elwha Chinook program after the temporal division recommended by the Hatchery Science Review Group (HSRG) in its review of the EFRP (Hatchery Science Review Group, Review of the Elwha Fish Restoration Plan and Accompanying HGMPs, January 2012) viz., Preservation, Recolonization, Local Adaptation, Full Restoration phases, is overall a sound one. However, it is important to take into account the fact that there is not a sharp division between the first three phases, and that consequently objectives relevant to a later phase such as Recolonization or Local Adaptation may need to be accommodated during the preceding phases(s). Evidence of upstream migration of Chinook and winter steelhead since the start of the removal of Elwha Dam in the fall and winter of 2011/2012 suggest that recolonization will occur during the Preservation stage, and since natural reproduction is expected to occur as a result of natural spawning upstream of Elwha Dam, it should also be expected that local adaptation will begin to occur, and this must be considered in the shaping and conduct of the program during the Preservation phase.

In view of the degree of uncertainty regarding the speed with which each of these first three stages may occur, it does not seem likely that NOAA Fisheries will grant a 4(d) take permit for the entirety of the expected duration of the Chinook program. We therefore are supportive in principal of the Department's request for coverage "only through the Preservation and Recolonization Phases…" (Draft, page 4). Rather, given the uncertainties regarding the duration of each of these initial phases, it seems wisest to request coverage for a short term of no more than five (5) years, and to plan from the outset to revise the HGMP in light of the monitoring data that should be collected during this time period. Then, an appropriately revised HGMP should be submitted and the duration of this second HGMP should be based on the status of the Chinook population at that time and the performance of the hatchery program over the initial five-year period.

The fundamental purpose of the Preservation phase is "to ensure an adequate number of fish survive the dam removal process to effectively preserve and restore currently extant fish populations in the watershed", including to "[m]aintain the integrity of the existing salmonid

genetic and life history diversity before during and after dam removal…" (HGMP, Section 1.16, page 10). Much is made in the Draft specifically with regard to the Chinook population of the need for the program in order to preserve the genetic diversity of the remnant Elwha Chinook summer/fall population. Yet, the HGMP provides no specifics whatsoever regarding extant levels of genetic diversity that are important to preserve, nor the kinds of genetic data that should be monitored. If the primary purpose of the program is to preserve extant genetic variation, that variation should be described and the appropriate parameters and their threshold levels identified: e.g., marker types and names of loci, heterozygosity/gene diversity, number of alleles. Without identifying these genetic parameters and their current levels in the population, it will not be possible to determine whether the program is succeeding in preserving these, nor is it really possible to determine how the program should best be conducted to insure that the requisite diversity is maintained. We note that the HSRG has made the same point in its review of the EFRP (e.g., HSRG Review, Table 2-6, page 16).

Since some degree of recolonization appears to already be occurring, local adaptation is likely to be occurring as well and the program needs to insure that this process is not being interfered with by program activities, such as broodstock collection. This requires some dedicated research and associated monitoring of the population (both hatchery and wild), that should include the identification and use of genetic markers that may reflect selection and local adaptation, such as SNP's and MHC genes. It also requires careful consideration of the scale of the hatchery's brood program itself, which on the face of it appears to be entirely too large.

The survival data from the program raise a serious concern whether the program, as it has been conducted to date, has been successful in preserving the genetic diversity of the extant Chinook population and its fitness for life in the wild. The poor survival of both hatchery yearling and subyearling releases is suggestive of a severe loss of fitness. This overall loss of fitness is likely further exacerbated by the high level of releases (in excess of 2.5 million subyearlings annually) that are required to obtain the number of adult returns to the hatchery needed to sustain the program at its current size (1700 adult broodstock). The fact that the current Elwha population has retained its genetic distinctness from other population within the Puget Sound ESU is entirely consistent with its having become highly domesticated.

The recent documentation by Beamish and colleagues of a wide disparity in the survivals of hatchery and wild fall Chinook in southern Georgia Strait (Beamish et al. 2012) is further cause for concern regarding the past performance of the Elwha Chinook program, and indicates a need for directed research on the survival of juvenile Chinook in the Elwha nearshore. Yet, Section 12 of the Draft identifies no research, and merely indicates that research needs will be identified in the EMAMP.

It seems imperative that the program be altered so as to significantly reduce the level of domestication. This likely requires at least two actions: a reduction in the size of the program and the planned incorporation of natural-origin (non-F1) returning adults into the hatchery broodstock sufficient to attain a minimum target level of pNOB. The minimum levels of pNOB and the time and methods required to achieve this should be given the highest priority in the revision of the HGMP in conjunction with the timely involvement of members of the HSRG and/or NOAA Fisheries Conservation Biology Division genetics staff (e.g., Jeff Hard or Mike Ford). Consideration should also be given to genotyping all hatchery broodstock and conducting parentage analyses of as many returning adults as possible to evaluate relative reproductive success of hatchery adults spawning in the wild (within pHOS limits that also need to be identified and monitored).

In regard to the number of broodstock, in addition to the above concerns and issues, it would appear to be more consistent with the Preservation strategy that the program be sized so as to achieve a minimum viable annual population size (Nb) in the hatchery on the order of no more than 500 including a minimum number of NOR's to attain or exceed a minimum level of pNOB. This will require consideration of how best to mark hatchery-origin progeny so that they can be identified at least before they are spawned, and preferably sooner. A similar minimum viable population size for the wild-spawning population, with maximum permissible levels of pHOS (also on the order of at least Nb = 500), that the hatchery program is primarily intended to support needs to be identified. These two population sizes – a maximum hatchery broodstock population meeting minimum pNOB standards, and a minimum viable naturally-spawning population meeting maximum allowable pHOS standards (or the two combined meeting PNI

standards) – together determine the overall size of the conservation hatchery program during the first two phases while at the same time facilitating local adaptation.

The conservation purpose of the Chinook program – to preserve specified, quantitative levels of genetic diversity, constrain the risks of domestication selection, and facilitate the local adaptation of naturally spawning Chinook recolonizing the Elwha basin upstream of Elwha Dam – should be the sole focus of the HGMP during at least the initial ten years. Accordingly, the HGMP should not endorse conjectures about the expected size of the rebuilt population and potential levels of MSY escapement. These have no direct bearing on how best to carry out and achieve the delimited, short-term conservation objectives. Supporting to the minimal extent possible the achievement and maintenance of a minimum viable Nb in the naturally-spawning population should be the sole purpose of the program.

It is also imperative to consider how to mark all or at least a significant subset of coded-wire-tagged hatchery releases in order to allow for the analysis of current harvest impacts, as recommended by the HSRG (Review, page 31). At the same time WDFW and the tribal co-managers should encourage US representatives to the Pacific Salmon Treaty to work to require all commercial fisheries to monitor their catches for CWTs so that adipose clips will not be required. In addition (or as a possible alternative), an effort should be made to include Elwha Chinook in the regional Genetic Stock Identification database, so that harvest impacts can be evaluated on the basis of GSI. These need to be included explicitly in Section 12 (Research) of the final HGMP.

The identification of the Preservation and Recolonization phases is driven largely by the concern that during and immediately following dam removals suspended sediment levels will frequently reach levels lethal to rearing juveniles and pre-spawning adults and that no refuges from high sediment levels exist in the Elwha basin downstream of Glines Dam. This is a hypothesis and there is some controversy among knowledgeable biologists surrounding it. This hypothesis needs to be explicitly articulated and monitoring designed, funded, and conducted to evaluate it. In the event that some levels of successful natural spawning and juvenile rearing occur during the dam removal period, these data must be linked back to the scale of the hatchery program so that the

program can be appropriately modified if it appears that significant successful natural spawning is occurring sooner than expected during this initial period.

The HGMP should also make clear whether or not it endorses the recommendation of the HSRG (HSRG Review, page 27) that all hatchery juvenile Chinook should be released from the hatchery and that the various plans for releasing juvenile Chinook upstream of Elwha Dam described in the EFRP have been abandoned. This seems to be implied in the Draft but not explicitly stated and it would be helpful for the HGMP to make this clear. We strongly support the HSRG recommendation.

Specific Comments.

Section 1.

1.6. Type of Program. "Integrated recovery". The HGMP here needs to be clear about whether it means by integrated recovery what the HSRG meant by this term, and if so, what specific levels of pHOS and pNOB the program will achieve, why, and how.

The parenthetical citing to section 2.2.3 for estimated levels of pHOS and 6.2.3 for pNOB is insufficient and inappropriate here. Section 2.2.3 does not discuss pHOS levels much less report any quantitative estimates of past or current levels of pHOS. Section 6.2.3 commits to no minimum levels of pNOB during the Preservation and Recovery phases.

The issue of the levels of pHOS and pNOB that are required in order that the program operates during the Preservation and Recovery phases as a valid integrated recovery program (as defined by the HSRG) is critical and needs to be addressed clearly here at the beginning of the HGMP.

1.7. The goals for each phase should first be informed by a determination of the minimum number of spawners in the wild that is required to maintain fitness of the remaining wild Chinook population. The hatchery program should be clearly subordinated to assisting in the attainment of this objective, within the constraints required by pHOS standards. Minimum viable annual spawner numbers (effective breeders, Nb) should be the guiding target. This should be noted and the requisite Nb number identified here at the outset. As noted in the General Comments above, a broodstock of 1700 spawners annually appears to be unjustifiably large. Further, the composition of the broodstock (with respect to F1 hatchery-origin and natural-origin) needs to be identified. In any case whatever number is decided upon a clear justification in terms of the conservation purposes needs to be provided.

1.7. Goal, Phase 1, Preservation. This needs an Adaptive Management provision to evaluate the *hypothesis* that sediment levels during dam removal may result "in a high probability of complete loss of native fish populations…". As noted in General Comments. several highly

qualified scientists dispute this claim. This concern needs to be explicitly acknowledged to be a hypothesis and appropriate monitoring to evaluate it identified.

“Hatchery program role”: The text is far too general and vague.

What is required, quantitatively, to “[m]aintain the genetic characteristics of the extant population” needs to be clearly stated, and if it is not known (as appears to be the case), specific plans for acquiring the information necessary to describe these characteristics need to be provided.

The “desired adult return levels” need to be stated explicitly and justified with respect to the conservation purposes of the program. The relationship of the specific desired levels of adult returns, to the preservation of the genetic characteristics of the population in particular need to described and justified. Why, for example, are 1700 adults required when far fewer hatchery spawners will suffice? The current escapement goal of 2900 needs to be reconsidered and revised in terms of NOR’s and in view of the conservation objectives of the program during the Preservation and Recolonization phases. An escapement of 2900 predominately F1 domesticated hatchery-origin adults is in direct conflict with the conservation objectives.

Phase 2, Re-colonization:

“hatchery program role”: “continue operation of the hatchery program, allowing returning hatchery fish to escape to spawning grounds to supplement natural spawning abundance”. This is too vague.

Reference should be made to specific threshold levels of pHOS (proportion of F1 spawners) and to the absolute number of Chinook spawners (Nb) in the wild. We have suggested how the program should be scaled in this regard in the General Comments above. We also recommend that the advice of the HSRG be sought to help determine these targets.

Phase 3, Local adaptation.

As noted above, the minimum "number of spawning adults" and associated pHOS standard required to initiative this phase should be identified at the outset of this subsection.

"The goal of the Local Adaptation Phase is to maintain or increase life history diversity of wild populations through local adaptation …until minimal levels of spawner abundance, productivity, and distribution are met." Again, the target "minimal levels of spawner abundance, productivity, and distribution" should be identified in advance, as annual spawners Nb, returning NOR adults per NOR spawner, and outmigrating smolts per NOR spawner. The vague language of "minimal levels" needs to be replaced by specific numeric target levels.

Further, the quoted statement seems to erroneously imply that it can be known in advance what levels of "life history diversity" the Chinook population is capable of attaining. This appears to put the cart before the horse: what the hatchery program can legitimately claim to be able to assist with is to achieve minimum desirable, quantified levels of Nb in the wild, if necessary, and appropriately constrain pHOS to permit the recovering wild-spawning population to begin to adapt to local conditions. The diversity is likely to develop *after* the minimum level of Nb is attained for one generation. The goal of the hatchery program for this phase should therefore be stated simply as to help to secure annual levels of Nb that do not exceed specific levels and to have the hatchery meeting the requisite minimum levels of PNI.

"Hatchery program role": The numerical target level of Nb and the number of years or generations that this level is to be attained (with hatchery support, if necessary) should be simply stated. The numbers of NOB and HOB associated with the target Nb and the target PNI and pHOS levels follow simply from these, and should then be stated.

Phase 4, "self-sustaining exploitable population". The associated text implies that hatchery intervention will not cease until a recovered wild Chinook population, capable of sustaining harvest exploitation has been attained. This contradicts the concept of an "integrated recovery" hatchery program. There is likely to be a considerable lapse of time between the onset of the Local Adaptation Phase, when the requisite target level of Nb has been attained and the

development of a wild population of sufficient size and productivity to sustain some annual level of *directed* harvest mortality.

The text also implies that prior to the attainment of this phase (phase 4) the hatchery will serve a harvest augmentation purpose in addition to a recovery purpose. But this is not a stated goal of the program, nor should it be. "The goal of the Self-sustaining Exploitable Population is to ensure that viable, self-sustaining and exploitable population levels continue once desired values for all VSP and habitat parameters have been met and hatchery program are no longer needed to provide for recovery *or exploitation*" (emphasis added). The words "or exploitation" should be deleted.

Moreover, given the habitat conditions in the majority of the Elwha basin it is very probable that the Elwha population will recover to this robust condition well before the rest of the Puget Sound ESU does. It will require a special decision by NOAA to permit directed harvest of a component of the listed ESU. This should not affect the description of the hatchery program as a recovery program.

We agree that ESA coverage can only be sought for the program for the first two phases. However, as discussed in General Comments, we think it better to request coverage for no more than 5 years with the intention to renew after the performance of the program in the first five years has been evaluated, keeping with a true "adaptive management" approach.

1.8. Justification for the program.

"This program enhances the survival of Elwha Chinook, whose existence has been limited…to the lower 5 miles of its historic range." As noted in General Comments, the performance of the program as measured by the smolt-to-adult survival of the yearling and subyearling releases from the program cast serious doubt on this claim and should occasion a serious re-thinking about the nature and the scale of the program. The survival of individual hatchery yearlings and subyearlings has evidently not been enhanced. There is some reason to think that the scale and

past conduct of the program has driven survival down. The continuation of the level of performance of the program during the recent past is undesirable and unjustifiable.

1.10. “Performance Indicators” addressing benefits: Here we simply note, again, the vagueness and lack of specific, quantitative targets and thresholds to the listed “hatchery program objectives” and “program indicators”.

1.11. Expected size of program. We have already noted concerns regarding the proposed size of the hatchery program. “…up to 2,900,000 juveniles” appears unjustifiably large. In any event, assertions like “[t]he program is currently contributing to the Genetic Conservation phase …” are insufficient. Such assertions should be supported by quantitative data and relevant genetics argumentation.

Section 6 and in general. The HGMP fails to recognize and address the serious issue that fitness of the current hatchery-dominated stock has been driven extremely low. This makes continued release of large numbers of hatchery brood during phases 1 and 2 questionable as wild stock preservation.

Literature Cited.

Beamish, R.J., R.M. Sweeting, C.M. Neville, K.L. Lange, T.D. Beecham, and D. Preikshot. 2012. “Wild chinook salmon survive better than hatchery salmon in a period of poor production”. Environmental Biology of Fishes 94: 135-148.