Independent Multidisciplinary Science Team (IMST)

State of Oregon

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October 1, 2013

Dave Jepsen
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3406 Cherry Avenue, NE
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Dear Dave,

In your June 6, 2013 letter, you requested the Independent Multidisciplinary Science Team (IMST) to review and assess the scientific and technical underpinnings of the Oregon Department of Fish and Wildlife's (ODFW) document titled *Coastal Multi-Species Conservation and Management Plan* (June 2013 draft).

The IMST's completed review is attached. In the review, the IMST offers several constructive comments on overarching and specific issues. There are strong aspects to the plan, and IMST compliments ODFW for its serious effort. We had a limited time to provide this review, and hence we could not get into specific background material used in development of the Plan to ensure accuracy of statements, etc. The IMST finds the plan to be a well-developed and serious approach to conservation and recovery of Oregon's coastal salmonids. We appreciate the rather holistic approach used by the plan. That is, a multi-species plan that incorporates a broad perspective of what such plans should encompass. We also appreciate that ODFW took our previous recommendations concerning needed elements in recovery/conservation plans seriously.

Sincerely,

Carl Schreck
Co-Chair, IMST

Nancy Molina
Co-Chair, IMST

cc with attachment
Tom Stahl
Ed Bowles

IMST Review of Oregon Department of Fish and Wildlife's
***Coastal Multi-Species Conservation and Management Plan* (*June 5, 2013 draft*)**

Released on October 1, 2013

Independent Multidisciplinary Science Team
Oregon Plan for Salmon and Watersheds
http –//www.fsl.orst.edu/imst

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Citation: Independent Multidisciplinary Science Team. 2013. IMST Review of Oregon Department of Fish and Wildlife's Coastal Multi-Species Conservation and Management Plan (June 5, 2013 draft). Oregon Watershed Enhancement Board, Salem, Oregon.

Review Preparation: This review was prepared by the IMST based on an initial draft by an IMST subcommittee: Bob Hughes, subcommittee chair, and Carl Schreck with Kathy Maas-Hebner providing administrative support. Tom Stahl and Dave Jepsen (ODFW) described the scope of the plan process the agency used to develop the conservation presented the request at the IMST's April 24, 2013 meeting. Dave Jepsen was also present at the IMST's September 30, 2013 meeting to discuss the Team's findings. The IMST discussed and unanimously (Molina absent from vote) adopted the final review at its September 30, 2013 meeting.

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ACRONYMS

CMP	Coastal Multi-Species Conservation and Management Plan
ESA	Endangered Species Act
GRTS	Generalized Random Tessellation Stratified survey design
HUC	Hydrologic unit coding
IMST	Independent Multidisciplinary Science Team
ODFW	Oregon Department of Fish and Wildlife
OWEB	Oregon Watershed Enhancement Board
PFMC	Pacific Fisheries Management Council
SMU	Species Management Unit

INTRODUCTION

The Independent Multidisciplinary Science Team (IMST) reviewed the document titled *Coastal Multi-Species Conservation and Management Plan* (June 5, 2013 draft; hereafter referred to as the "CMP") at the request of the Oregon Department of Fish and Wildlife (ODFW; letter from Dave Jepsen dated June 6, 2013). This review addresses whether the CMP's approach and analyses are credible and consistent with accepted scientific standards, whether CMP assumptions are supported by best available science, and whether uncertainties are characterized adequately. IMST approached these issues from the perspectives of ODFW's Native Fish Conservation Policy goals.

We appreciate the opportunity to offer our comments. There are strong aspects to the CMP, and IMST compliments ODFW for its serious effort. We had a limited time to provide this review, and hence we could not get into specific background material used in development of the CMP to ensure accuracy of statements, etc. The IMST finds the CMP to be a relatively well-developed and serious approach to conservation and recovery of Oregon's coastal salmonids. We appreciate the rather holistic approach used by the CMP. That is, it is a multi-species plan that incorporates a broad perspective of what such plans should encompass. We also appreciate that ODFW took our previous recommendations concerning needed elements in recovery/conservation plans seriously (CMP pages 97–98) and tried to better incorporate climate change and human population growth into the CMP. However, we have major concerns that the CMP places excess faith in hatcheries, makes multiple assumptions with minimal data if any, limits discussion to the pressures that ODFW can regulate thereby omitting major land use and socioeconomic pressures, and limits its focus to salmonids thereby omitting other taxa that are vulnerable to most of the same pressures and are potentially at risk. Although a clear coastal monitoring plan is sorely needed, we recognize that it is too big a task to be incorporated in the CMP.

This review consists of three sections, *Overarching Issues, Specific Comments,* and *General Comments*. In the *Overarching Issues* section IMST provides extended discussion of several topics that arose repeatedly during review of the CMP.

OVERARCHING ISSUES

Species Coverage

The CMP is quite uneven relative to the depth of coverage for the various species or SMUs involved. For example, it is particularly shallow in its consideration of cutthroat and chum. Reasonable explanations are offered for this differential coverage (lack of information and assumption that the SMU is healthy for the former and low occurrence for the latter). But, that does not preclude a responsibility for ensuring that indeed cutthroat populations are not at risk or that chum populations have the capacity to persist, even at low levels. With regard to cutthroat, the CMP would benefit from convincing data that we are not in a position like we were with salmon before Nehlsen et al. (1991) surveyed district fish biologists. Recall that everyone thought that salmon populations in general were healthy even though they knew that locally they were in trouble. It wasn't until a large-scale (West Coast) survey was conducted that we recognized that species as a whole were at risk of extinction. Lower counts of sea-run cutthroat at Winchester Dam could be taken as a warning. And, because it is likely that anadromous cutthroat trout can produce resident fish and vice versa, that could imply that there are fewer resident fish in the North Umpqua as well.

An investment portfolio disperses risks and gains across many different types of investments that are all unlikely to fluctuate to the same degree and in the same direction to typical market shocks. The same is true of the multitude of wild salmonid populations and life histories (Schindler et al. 2010). However the CMP places hatchery fish and harvest in nearly all basins. This is a constant stressor, not a portfolio, strategy—especially with the knowledge that hatcheries and harvest increase risk at sea and on spawning grounds. A sliding harvest scale seems reasonable, but in an investment portfolio, selling in good years restricts large gains and selling in bad years locks in losses. The same seems true for salmonids. Harvest in poor years reduces recovery potential and increased harvest in good years precludes potentially large gains necessary for boom-bust fish populations.

Although the focus of the CMP (and of ODFW) is salmonids, the agency has the responsibility of monitoring and managing other fish species. As a result of research by university and contract researchers, two new fish species have been documented recently in Oregon coastal rivers (Markle et al. 1991; Kettratad & Markle 2010), as have the effects of non-native piscivores on native prey fish (Hughes & Herlihy 2012). Little is known about the distribution, status, and trends of populations of cottids, cyprinids, and petromyzontids—let alone aquatic amphibians. An improved survey design and aquatic vertebrate sampling could provide such information at a reasonable cost—and perhaps forestall future federal ESA listings and use restrictions.

Habitat Importance and Management

Of the various factors that could be managed for achieving recovery or conservation goals, harvest and hatcheries are considered much more thoroughly than are the other options. There are management actions proposed for both of these factors. Several meaningful (but general) actions are proposed for improving habitat on pages 94–100. However, no basin-specific actions are proposed regarding habitat rehabilitation or protection even though habitat is at least as important as harvest or hatcheries to conservation of the SMUs. The CMP basically implies that the reader trust that ODFW will do good things relative to habitat since the descriptions of activities to be undertaken are strategies, not tactics. In addition, ODFW has been surveying hydromorphology in coastal streams since 1997 and has concluded that coast-wide some habitat variables are relatively stable—but still declining in some intensively logged regions (Anlauf et al. 2011). It would be wise to use more of these data in developing management and rehabilitation plans.

There is little recognition or discussion of the limiting effects on salmonids of ocean conditions, natural catchment conditions, land use, land cover, or road density—presumably because ODFW does not regulate or manage those factors. Nonetheless, it is important to assess and link land use factors with salmonid production to understand and encourage their better management because such factors often account for much of the variability in fish indicators (Van Sickle et al. 2004; Sály et al. 2011; Marzin et al. 2013). Focusing on local, versus landscape pressures, are likely to have minimal effect and result in unwise use of funds if the landscape pressures are most limiting.

Climate Change and Human Demographics

We commend ODFW for the considerations of climate change and human population growth. However, candidly, those sections are too superficial to provide sufficient useful guidance in a conservation plan. Many statements are made but they appear to be based more on contentions that should be considered hypotheses. What is needed are contentions based on some sort of actual analyses. We recognize that extant climate change models currently are coarse-scaled. However, they may not be more coarse-scaled than many of the population risk models used in recovery planning that form the basis of much of the CMP. The CMP would benefit scientifically if there were some analyses presented that considered various climate change scenarios and management actions could be made more resilient by implementing the precautionary principle.

In light of the figures on pages 21 & 22, Figure 2f indicates both (a) that a slight majority of the public favor *some* limits and (b) that the public does not fully understand that agriculture, forestry, and development often fundamentally conflict with healthy salmonid populations and avoidance of ESA listings. We (IMST, ODFW) need to be much more forthright about these fundamental conflicts (e.g., Lackey 2003, Kaufmann & Hughes 2006; Limburg et al. 2011; Czech 2013). It would increase the scientific credibility of the CMP to include a paragraph or page here regarding the fundamental conflicts between salmonid production and economic and population growth. Regional economic growth may out pace human population growth. For example, because so much of the Coast Range is in forest, what would the impact on salmonids and their habitat be if logging rates significantly increased again to meet economic demands? Likewise, future national and international demands on ocean salmon fisheries are not taken into account. Therefore using 'human population and economic growth', not just "human population growth" is appropriate (e.g. Lackey et al. 2006; Limburg et al. 2011).

A further concern is that the CMP consistently lumps the threats of climate change and human demographics throughout. While both of these major threats do carry a large amount of uncertainty, they pose distinctly different problems for the species of concern. Additionally in places in the CMP the treatment of these topics tends to be somewhat light compared to other sections (e.g. pages 112–113). Climate change tends to pose a region wide threat (although the impacts will be different depending on location), while human demographic changes (e.g. increased urbanization in coastal areas) will likely be more localized. Regarding predicting human demographic changes, it might be worth reviewing work by Kline and others (e.g. Kline et al 2003), and considering whether those projections (or further work in that area specific to the region considered in the CMP) could be coupled with estimates of sensitivity of the various SMU's being estimated to more fully incorporate the human demographic shifts in the CMP.

Hatcheries

Elimination of some hatchery liberations makes sense from a conservation perspective. What is not as convincing is the assumption that it is okay to continue business as usual regarding hatchery liberations in several major watersheds. IMST recognizes that there is controversy concerning whether or not hatchery fish reduce wild fish fitness. The preponderance of evidence suggests that they do. Regardless, if the CMP is indeed a conservation plan, then even if this contention is controversial, it would be scientifically prudent for ODFW to manage to ensure that risk is minimized. Hatchery management options could be proposed that pose various levels of risk to an SMU. This could be grounded on a hatchery management plan for the coastal hatcheries that considers the system as a whole. That could lead to outcomes that are driven by top-down goals and objectives. This is different from hatcheries operating more or less independently where the overall outcomes become the sum of local objectives rather than an overarching global objective. Additionally, focusing concern with hatchery fish on straying and effects at spawning grounds tends to preclude consideration of their effects at sea in competition for limited food—especially when the ocean is a major limiting factor.

IMST appreciates the dilemma ODFW has in trying to rehabilitate wild salmonid populations versus providing consistent harvest opportunities through use of hatchery fish. This is a tough balancing act. Nonetheless, there is a clear contradiction between increasing hatchery production to sustain increased harvest versus decreasing hatchery production and harvest to decrease the risk to wild salmonids. Therefore, much stronger arguments are needed than are provided given the fiscal and ecological costs of hatchery production relative to other fiscal needs of ODFW, the genetic costs of hatchery fish straying to spawning grounds, and increased feeding competition in freshwater (e.g., Nickelson et al. 1986; Nickelson 2003; Pearsons 2008; Naman & Sharpe 2012; Tatara & Berejikian 2012), in estuaries, and at sea (e.g., Daly et al. 2012; Kaeriyama et al. 2012; Naish et al. 2008; Ruggerone et al. 2012). If ODFW does not regard feeding competition at sea to be a serious, potentially limiting, factor in wild salmonid production, what research is needed to support or negate that hypothesis? What does the existing science suggest regarding wild fish conservation? What lessons have been learned from lower Columbia River, California, Washington, British Columbia, Alaska, and Asian hatchery releases?

It would be scientifically and socioeconomically prudent for ODFW to conduct a rigorous economic analysis of the long-term ecological and socioeconomic costs and benefits of its state and federal hatchery and habitat rehabilitation programs, especially in regards to wild fish conservation.

Learning about and watching salmon develop from fertilized eggs to fry is a useful and interesting classroom exercise. However, it is more scientifically appropriate for the classroom instruction to include both fish rearing and fish ecology so that students develop an understanding of ecosystem rehabilitation and conservation versus technological arrogance that hatcheries and hatchery fish are a long-term replacement for wild fish and relatively intact ecosystems and ecosystem processes (Meffee 1992). In other words, it is important that the classroom hatchery fry program be incorporated into holistic ecosystemic instruction.

Predation

Because of a paucity of literature on the subject, the section concerning predators is supported by little science. There is a paucity of information on predation rates in general, particularly for the juvenile stage. In addition, we do not know whether population-level effects ascribed to predation are due to additive versus compensatory mortality. The question that needs to be answered is whether or not salmonids eaten by a predator were on a trajectory towards death due to some other factor (e.g., disease, hooking injuries, lack of proper smoltification, or contaminant load) and hence became “easy prey”. We are also unaware of studies that demonstrate that predator control effectively increases adult returns. Given that predator control (e.g., hazing) is an action supported by the state, to make this practice scientifically defensible requires that its effectiveness be studied. The CMP recognizes this but if or how it will be accomplished is not presented.

Recreational Harvest and Hooking Mortality

It would be useful if the topic of potential mortality of wild fish caught in the recreational fishery that were released back into either marine or freshwater were discussed. This relates to the importance of angling as a risk factor and could affect how that fishery is managed. We recognize that ODFW has observers who estimate mortality of released wild fish, but what confidence is there in those data? If there is error in those data, then how are the models adjusted to account for that? There are many harvest management options available that could be more protective of wild fish than the current practice of being allowed to only keep adipose clipped fish. For example, would it be more beneficial for wild fish if regulations required anglers to keep the first wild fish caught and had to quit angling for the day at that time, thereby decreasing the number of wild fish experiencing hooking mortality? A thorough review of by catch damage to wild fish is needed, as is a thorough discussion of hatchery and harvest goals versus holistic ecological goals regarding wild fish and the ecosystem processes supporting them.

Monitoring

There are several concerns with monitoring made evident in the CMP. It would be useful to include a graph depicting coast-wide adult abundances, catches, and hatchery releases (with confidence limits) through time of each of the species targeted in the CMP. What is the big picture? Effectiveness monitoring of hatcheries is also needed. How will the effects of specific increases or decreases of hatchery releases and harvest rates on wild fish in the various basins be evaluated scientifically without an appropriate monitoring system? A carefully designed effectiveness monitoring program also is needed for assessing habitat improvement projects. How much effectiveness monitoring is funded by OWEB and the Western Oregon Stream Restoration Program relative to the number and types of projects and what indicators are used? It is unwise to assume those projects are effective without rigorous monitoring (e.g., Thompson 2006; Roni et al. 2008). What is the current monitoring capacity, and what monitoring capacity is needed to provide the rigorous data needed for informing management decisions? How will measurable criteria for triggering emergency harvest rules be assessed with insufficient monitoring? Given insufficient resources, how will monitoring options be prioritized? What opportunities exist for collaborative monitoring with other state agencies? Add detail to what new methods, collaborations, and analyses are needed.

Overall Completeness of the Plan

Overall, we suggest providing a much better rationale or better data for defining “healthy populations” given the ignorance of reference conditions or lack of reference data. (However, see Meengs & Lackey (2005) who estimated runs of 290,000-517,000 Chinook salmon from cannery and aboriginal data.) Humans, at least in the USA, seem to be positively biased regarding resource assessments, especially when we lack quantitative data (Stoddard et al. 2006). Even with quantitative data, what constitutes a good or healthy condition is a subjective decision and a sliding scale depending on location (Hughes et al. 2004; Stoddard et al. 2006; Paulsen et al. 2008).

Additional glaring omissions in the CMP are the potential effects of toxic contaminants. We recognize that effects of contaminants are extremely difficult to assess, particularly at the population level. Further, measures to reduce toxic effects are extremely complex. What if, in reality, effects of contaminants on SMU health are as important a limiting factor or even a more important limiting factor, than is harvest? Also consider the interaction effects of elevated temperatures, reduced dissolved oxygen, and increased toxins on disease, growth, and fitness.

GENERAL COMMENTS

- What is the overriding goal of the CMP? If it is to increase the abundance, production, richness and distribution of wild salmonids, something other than largely maintaining the status quo is in order. One alternative is to focus hatchery releases on fewer basins and leave others unstocked. However it would be wise to treat the entire hatchery and harvest program as an adaptive management issue incorporating hypotheses, monitoring, trigger points, and altered management as data indicate it is needed.
- It seems incorrect that it is impossible to alter the effects of life-stage specific productivity in the ocean. Loading a food limited system with hatchery fish would reduce food availability for wild fish and attract predators. That would certainly alter life-stage specific productivity of wild fish.
- Wherever (e.g., page 82 regarding winter steelhead) the CMP states that “monitoring” or “evaluations” will be done, are there explicit plans for these? From a scientific perspective, this is not a rigorous way to convince the reader that they will be sufficient or appropriate to achieve the desired ends.
- It would be useful to include a graph depicting coast-wide adult abundances, catches, and hatchery releases (with confidence limits) through time of each of the species targeted in the CMP.
- Explain how the effects of specific increases or decreases of hatchery releases and harvest rates on wild fish in the various basins will be evaluated scientifically.
- There appears to be a need for much better information about anadromous and resident cutthroat trout, which can only be obtained via monitoring.
- Is there a role for university, other public cooperators, or contractor research and monitoring? Can volunteer monitoring be increased and improved?
- What is being proposed for assessing chum salmon historical populations along the Oregon coast?
- Concerning models, the scientific credibility of the quantitative analyses presented would be enhanced if there were a discussion of uncertainty and how that problem was handled.
- The CMP very appropriately has an implementation section. To be scientifically meaningful there needs to be a timeline for accomplishing the various actions. There also needs to be a consideration of consequences if the timeline is not met as planned and what would be done in those cases. The CMP is very vague in many areas; statements such as “are needed”,

"will be done", and "will be looked at" do not instill much confidence if how and when information is not provided.

- While the ocean tributaries not assessed in the CMP (A-1-1) may have weak salmonid populations, that doesn't *a priori* mean that they are not important to SMU health. Because of potential limiting factors associated with the other basins that may not be as prevalent in smaller systems, the smaller populations could be at less risk than some of the populations in the larger systems, depending on how important those limiting factors are. For example, there might be less risk due to hatcheries, exposure to contaminants in estuaries, or harvest. To be scientifically conservative, the CMP should at least aim at providing an understanding of the importance of these populations to overall SMU health.
- Does the HK scoring system (page 100) assume linearity? Does it assume linearity between different metric scores (the calculated scores)? Is there evidence that they are indeed linear? Or, how would non-linearity be handled?
- The CMP correctly states that ecosystem processes need to be assessed. It then indicates that this should be done by OWEB and land management agencies. How will ODFW ensure that these other agencies will do these assessments and how will ODFW ensure the quality and usefulness of the information contributed by others?
- Regarding causal pathway and threat (Table 22), how will interaction of factors be handled?
- It is good that precautionary adjustments to the population abundance goals were made. How were these made and what assurance is there that they are adequate?
- We note that the IMST lacks sufficient expertise in population modeling. Our review, therefore, may have been superficial from a quantitative perspective, particularly of material in Appendix II.
- Why are the Risk Scores (Table A-II: 7 & 8) for both "historical habitat lost" and "non-linear distribution" not of equal weight (size of category). How is the reader to know that the size of each category wasn't arbitrarily assigned? How would or could the size of a category contribute to more or less risk in decision making?
- Regarding monitoring (A-5:3), "New Work" is mentioned to "measure juvenile outmigrants into estuaries". This would provide an index of in-river survival. In addition, what is needed is also a measure of the number of fish leaving the estuary so an estimate of survival can be calculated.

Overall Document

IMST feels that the document would benefit from a careful editing to correct grammatical, spelling, and logical errors. The IMST did not have sufficient time to list specific editorial comments in this review. Explicitly defining terms, either in the text or in a glossary would be helpful. Only a few examples of areas needing careful editing are presented here:

- For "habitat", indicate whether you mean physical, chemical, or biological habitat, or all three, or water quality, structural habitat, or biological habitat, or all three.
- Define and explain what is meant as "watershed condition".
- Page 127 – 'stream' not "steam"; 'fourth' not "forth"
- 'to' is preferable to 'in order to' and 'use' is preferable to 'utilize'
- Page 189 – 'in selected standard index sites' not "in a selected of standard index sites"
- Page 191 – 'will be estimated', not "will be estimate". 'coded wire tags' not "a coded wire tags"
- Page 197 – 'Pacific' not "pacific"

SPECIFIC COMMENTS

- Page 8, 1st bullet – How does ODFW define a "fishing crisis"? What is the assessment used to determine if a fishing crisis is occurring and when it is over?
- Page 10, 1st paragraph – Is climate change going to affect desired status?
- Page 11, last paragraph – Are fall Chinook present in the Nestucca, Little Nestucca, Yaquina, and Coos Rivers? If so, will the increase of spring Chinook in the Nestucca and new releases in the other three systems have an impact on fall Chinook production?
- Page 13, 2nd & 3rd bullets – There appears to be a contradiction between sliding scale harvest (bullet 2) and strata consistent harvest regulations (bullet 3). Please clarify.
- Page 14, Winter Steelhead, 5th bullet – Why was 10% chosen as the upper limit?
- Page 15, Predation Action – What science is the assumption "…predators may possibly be limiting wild populations" based on?
- Page 15, Bullet "studies of impact to wild population impacts" – Good!
- Page 16, Implementation, 1st bullet – Excellent!
- Page 16, Implementation, 2nd bullet – Why was 12 years chosen?
- Page 19, 2nd paragraph – Is having the Species Management Units and population boundaries the same in the CMP, biologically defensible?
- Page 19, Status Assessment – Is "diversity" explained subsequently?
- Page 20, Conceptual Framework – Will actions for one species or one life history type affect others?
- Page 20, 1st bullet – Is this true for chum and coho?
- Page 20 – Be consistent and avoid the appearance of bias in word choices. If hatcheries and harvest may create a risk, then predation may create a risk. If predation represents a risk, hatcheries and harvest represent a risk. If hatcheries and harvest represent potential conservation risk, then habitat change represents potential conservation risk. If habitat changes and predators are or represent risks, then hatcheries and harvest are or represent risks.

- Pages 21 & 22, Figure 2 – Do these survey results reflect views of Oregonians in general or only the coastal community? If the latter, would the broader view of Oregonians affect the results in graphs 2e) and 2f)?
- Pages 23 & 24, Chum – So, given the lack of information, why aren't chum considered at risk?
- Page 24 – Briefly explain the uniqueness of the North Umpqua winter steelhead population (migration distance, smolt age, age at maturity) as well as the uniqueness of its habitat.
- Page 25 – Briefly explain why chum abundance and distribution has been severely reduced and diminished, respectively.
- Pages 26, Figure 3 – Is the decline in coho from the 1950s through the 1990s mainly a result of harvest, ocean conditions, a combination of the two, or multiple other factors? Please indicate the likely cause of the rebound in coho (i.e., is it a result from changes in commercial harvest under PFMC's Amendment 13 and not instream habitat improvement). Why did fall Chinook spawners increase in the decades coho decreased?
- Page 27, Figure 5 – Figure 5 is not referenced anywhere in the text. Explain the increased hatchery releases of spring and fall Chinook over the past 40 years given the reduced releases of coho and summer and winter steelhead.
- Page 29, Figure 7 – How do the numbers for coho compare with those in Figure 3 if one applies the mortality shown in Figure 8? Is this how the pre-harvest abundance was calculated?
- Page 32, 1st paragraph – Good!
- Page 38, 4th bullet – ODFW indicates that the true status of chum is not well understood. But, has the status likely decreased and where does the precautionary principle come into play for chum?
- Page 38, 2nd to last line – why was ≤ 2.5 chosen for populations and strata?
- Page 39, 1st full paragraph – Good!
- Page 39, Table 8, footnote "a" – Which is more conservative? The federal or the state ESA?
- Page 39 – What are the social benefits?
- Page 45, 1st paragraph – In the statement "*The basis for improvement of Chinook and winter steelhead is improved confidence, with more data, in the next assessment*", it is unclear what improved confidence, with more data means. What if improved confidence suggests more problems for the fish?
- Pages 47 & 48 – If feasible, it would be useful to use a relative risk approach for these assessments to make them more objective (e.g., Paulsen et al. 2008; Van Sickle & Paulsen 2008).

- Page 48 – Discuss the interaction effects of elevated temperatures, reduced dissolved oxygen, and increased toxins on disease, growth, and fitness.
- Page 49 – What is proposed for reducing smallmouth bass numbers in the Umpqua River?
- Page 50, Chum – How and when will historical chum salmon population structure be assessed?
- Page 50, Chum, 4th bullet – What evidence is there to demonstrate that hazing is effective?
- Page 50, for Winter & Summer Steelhead, 1st bullets – What, exactly, does "re-balance risk" mean?
- Page 51 – Given that data are insufficient for cutthroat trout, maintaining the existing level of data collection is insufficient.
- Page 52 – A summary of what past research on salmonid hatchery releases have shown regarding their effects on wild fish at sea as well as in freshwater would help establish the scientific basis for this discussion. What is considered too high a percentage of hatchery-originating spawners in the wild, and why? How was that percentage determined? What is considered significant and insignificant risks of hatchery fish spawning in the wild and why?
- Page 52, Paragraph 5, 2nd sentence – What science is this assumption based on?
- Page 53, 2nd bullet – "rare species" is unclear.
- Page 53, 4th bullet – "retention" is unclear here.
- Page 58, 1st bullet – Why are hatchery fish released for research purposes exempt from being marked? What research uses unmarked hatchery fish and how many fish are involved?
- Page 60, 2nd to last paragraph – Why release any hatchery unfed fry given their poor survival rates?
- Page 60, last paragraph, 1st line – Good!
- Page 62 – Why would hatchery competition be less in a large bay, such as the Coos? How is this known and is it supported by research data? Why are hatchery releases considered to be small in the Coquille? Presumably the release rates are relative to the size of the system, the numbers of wild fish in the systems, and the numbers and timing of hatchery releases.
- Page 63 – What has past monitoring of hatchery fish on spawning grounds revealed? How will greater monitoring improve on the earlier monitoring? What level of hatchery fish spawning in the wild is considered too high, what is considered a sufficient reduction, and how are these levels determined?

- Page 64, Spring Chinook – What is the hypothesized effect on wild fish of reduced North Umpqua hatchery releases and is this being researched?
- Page 65 – What level of hatchery steelhead on spawning grounds is considered too high, how will it be assessed, and what changes will be explored?
- Page 66 – What is the survival rate of hatchery steelhead smolts released in the South Umpqua?
- Page 67 – If it seems wise to eliminate the release of hatchery summer steelhead to reduce the risk of wild winter steelhead in the Wilson, is there any evidence that increased release of hatchery summer steelhead into the Nestucca has minimal risk to the wild winter steelhead population?
- Page 69 – IMST agrees with harvest management tools such as sliding scale, protective periods, limited entry, and daily and annual catch limits. Both daily and annual limits are useful because some anglers are much more efficient predators than most others. However, if hatchery decisions are driven by harvest goals, why not reduce harvest to conserve wild fish from both harvest and hatchery impacts?
- Page 71, Cutthroat trout – If abundance data have not been collected, how was status established? And how can harvest levels be supported?
- Page 75 – How might increased electronic data entry by anglers and computing capability by ODFW be used to acquire more data more rapidly?
- Page 77, item 1 – What are the restoration goals for populations of conservation concern?
- Page 77, item 3 – Why is maintaining hatchery production close to current levels an objective of the CMP? How can increased hatchery production decrease overall population risk?
- Page 78, Table 18 – Have models been run that would predict population trends at these various harvest levels?
- Page 78 – How much will the sliding scale slide for Chinook salmon and steelhead, and how will that level be determined?
- Page 79 (and page 171) – Why not further reduce or eliminate hatchery releases in the Elk to improve the condition of the wild salmon?
- Page 79, last paragraph, 2nd sentence – Good!
- Page 81 – If South Umpqua Chinook production is much less than that of the North Umpqua, is it wise to use the latter to forecast abundance in the former? They may be driven by markedly different limiting factors, and there is some evidence that South Umpqua numbers will be overly optimistic, just as ODFW index sites overestimated production when inferred coast wide for coho (Hughes et al. 2000).

- Page 81, 2nd paragraph – Good!
- Page 81, 3rd paragraph, 2nd to last sentence – "significantly reduced" Good!
- Page 81 & 82 – Statement *Neither of these fishery management groups explicitly considers the status…* Why not?
- Page 82, Chum, 2nd paragraph – Statement beginning *It is believed…* What is the belief based on? Is there any quantitative evidence that the Miami/Kilchis catch and release chum salmon fishery imposes little mortality?
- Page 86, 1st paragraph – Harvest length restriction is a good idea.
- Page 87, Cutthroat trout – How does ODFW know that cutthroat trout populations are healthy without data?
- Page 88, 3rd paragraph – IMST agrees with the mandatory return of salmon/steelhead tags or punch cards. Such data are essential for estimating angler harvest and the locations of that harvest.
- Page 89 – Professional opinions often tend to be positively biased (e.g., Lackey 2003; Stoddard et al. 2006). They should be based on data and relevant research results.
- Pages 94–106 – IMST agrees with prioritized, catchment-scale habitat improvement versus opportunistic local approaches.
- Page 96 – It would be useful to combine salmon, macroinvertebrate, and habitat surveys into a risk assessment (e.g., Van Sickle & Paulsen 2008).
- Page 99 – Be specific about the habitat forming processes and functions that will be improved and how they will be improved.
- Page 101, Table 20. What do the arrows mean? Please define in the legend or footnote.
- Page 106 – What are the ecosystem process assessment methodologies and how can their transferability be assured? Are processes assessed at the true watershed scale, or HUC watersheds, or HUC subwatersheds (as ODFW points out in footnotes 42 & 46, neither of the latter are true watersheds despite their names). If they are assessed at the true watershed scale, at what size of watershed?
- Page 102-105 – Most units are dark green, which means low discriminating power. Can the relative salmonid ecosystem value be more evenly distributed?
- Page 107 – Classifying limiting factors as in Table 21 is inaccurate. Temperature and sediments are physical as well as water quality factors; access may be altered by water quality (temperature, turbidity, dissolved oxygen, toxics). We suggest using turbidity versus sediments in water quality, including water quality barriers in access, using physical habitat structure versus physical, and using substrate versus gravel in the latter class.

- Page 109 – Agriculture and forestry also increase fine sediment loading. Are these included under rural roads?
- Page 110 – Mining and agriculture can also be major sources of toxics.
- Page 111 – It would be useful to indicate the loss of large wood and channel complexity in estuaries as a result of these multiple factors.
- Page 112-113 – Can "Climate Change and Human Population Growth" be partitioned into separate sections and be treated separately? These threats pose quite different problems as well as solutions for the species of concern.
- Page 112, 3rd paragraph – How were "precautionary upward adjustments" made?
- Page 112, 4th paragraph, 9th line – It is really sufficient? How can it be sufficient with out knowing the magnitude of changes?
- Page 113, 2nd paragraph, 1st line – Several documents can be referenced, but how will they be interpreted and the information applied?
- Page 117, Commitment – "as quickly as is practical" is very vague!
- Page 117 – What does ODFW see as the essential rehabilitation roles of other key state natural resource agencies and do those agencies agree?
- Page 121 – What is the rationale for assuming hatchery and wild harvest impacts are in the same proportion for river and ocean fisheries given the differing distributions and movement patterns of Chinook in the two systems?
- Page 134 – Why is there more noise in the model when peak counts are low and high?
- Page 138 – How and when are peak count index surveys conducted?
- Page 139 - Why did population estimates from pool counts change from 50% in 1993, to 65% in 1994-1999, to 80% in 2000-2005, to 95% in 2009?
- Page 139 – What is the rationale for inferring redd counts from a 4.8 mile reach of the Salmonberry to the entire Salmonberry?
- Page 145 – What historical and environmental conditions characterize the low and high outlier clusters of this Ricker curve? Such information may offer useful insights for management.
- Page 156 – What is the rationale for the risk categories in Table A-II-8?
- Page 157 – It seems as if the estimate of diversity should include a measure of hatchery influence.
- Page 162 – Can an estimate of estuary conditions be incorporated into the spatial structure estimate? It seems that many estuaries are degraded and potential bottlenecks.
- Page 163 – It is unclear why monitoring is infeasible or not proposed for several of these parameters and populations. The quality of the management is limited by the quality of the monitoring

- Page 166 – Indicate why high and low harvest thresholds are inapplicable for steelhead.
- Page 168 – It seems as if basing Chinook mainstem harvest on the healthy North Umpqua population would be detrimental to the unhealthy South Umpqua population.
- Page 169 – Why is no monitoring anticipated for chum and cutthroat? How can they be managed and protected without data?
- Page 170 – The number of compliant miles and the number of dollars spent do not equate with a desired biological response if some other factor is limiting (Hughes and Noss 1992).
- Page 171 – What is the long-term effect of 10% hatchery fish on a spawning ground? Why risk wild Chinook populations by introducing non-native spring-run Chinook to the Yaquina and Coos Bays?
- Page 172 – What is the evidence that river fisheries targeting hatchery winter steelhead have low impacts on wild winter steelhead? What is the bycatch mortality? What is the evidence that habitat is the only other significant limiting factor?
- Page 172 – What are the mechanisms for isolating wild and hatchery summer steelhead on the North Umpqua?
- Page 173 – If it is impossible to assess impacts of hatchery fish on individual wild fish populations without intensive research, why not conduct that research on at least some populations? Such research is desperately needed given the size and costs of the hatchery program.
- Page 185 – Although biological indicators are stressed here, it is also necessary to assess biological, physical and chemical habitat and riparian and catchment land use. How is life history trait diversity associated with genetic diversity? How is it measured? What is the indicator for spatial structure and population connectivity?
- Page 186 – IMST supports a GRTS design, with various degrees of intensification depending on the question, for monitoring. What are the indicator populations?
- Page 187 – What evidence is there that these 8 (not 7) sites are both representative and a sufficient sample size? Presumably, they were hand picked for accessibility. How variable are the results among them?
- Pages 188 & 191 – How many random (GRTS?) juvenile surveys are conducted per summer? Why is only one (possibly two) estuary sampled? Are physical, chemical, and biological habitat monitored at these sites also? Given the bottleneck nature and importance of estuaries, more need to be monitored.
- Pages 189 & 138 – It is unclear whether there is one peak count model for all populations, or a different model for each basin. Figure A-II-8 suggests that different basins may operate somewhat independently. Why not use unbiased GRTS survey sites instead of index sites for developing peak count models?
- Page 190 – Why is sampling precision difficult to maintain in the Coquille?

- Page 192 – It would be wise for ODFW to evaluate the use of genetic bar coding to assess the presence and abundance of taxa in river systems. How representative and complete are the sampled pools? Is a GRTS design used or are pools hand picked?
- Page 193 – It seems that a GRTS design would be ideal for estimating spatial structure, productivity, and diversity. Why is it not used?
- Page 194 – Given the estimation error associated with index sites, why are they used and not GRTS? What is the evidence that chum distribution and abundance have been reduced more than those of other SMUs? What are the reasons this is presumed?
- Page 196 – Given their rarity, why is no sampling of spatial structure conducted for summer steelhead? This would be an ideal application of intensified GRTS sampling.
- Page 196 – How might these uncertainties be resolved?
- Page 199 – How will monitoring be prioritized? What opportunities exist for collaborative monitoring with other state agencies?
- Page 200 – Add detail to what new methods, collaborations, and analyses are needed. Effectiveness monitoring of hatcheries is also needed.
- Page 200 – IMST agrees that quantifying various types of error will improve PVA modeling.
- Page 201– Is habitat here physical habitat structure or physical habitat? Land use, economic growth, and population growth data are also needed.
- Pages 203 & 204. Will all management areas be sampled the same years or will a rotating panel design with a random start be used? What are the projected costs? Can volunteers, contractors and cooperative research units be used to reduce costs? Can resident non-salmonid aquatic vertebrates and macroinvertebrates be included?

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