

NMFS RESPONSE TO REVIEWS of Anadromous Fish Appendix

Draft: 31 October 1999, Revised 16 November 1999

This document summarizes the NMFS response to reviews of the First Draft of the Anadromous Fish Appendix (or A-Fish Appendix). Substantial and valuable input was provided by ISAB (Independent Science Advisory Board, a distinguished panel of internationally respected scientists appointed by NMFS and the Northwest Power Planning Council to provide such reviews), IDFG (Idaho Department of Fish and Game), and CRITFC (Columbia River Inter-Tribal Fish Commission).

It is important to emphasize that as a result of these wide-ranging external reviews, NMFS has dramatically revised the A-Fish Appendix. In fact, there is at most a 60-70% overlap between the first draft of the A-Fish Appendix and this revised second draft. Moreover, in addition to rewriting original sections, **NMFS undertook completely new analyses and produced one entirely new chapter** (Section 8, which covers the CRI or Cumulative Risk Initiative). For the reader's convenience, preceding each NMFS response are actual word-for word quotes from the external reviews (highlighted in bold italics).

A. ISAB REVIEW

Many of the ISAB criticisms refer to the PATH analyses and NMFS' use of those analyses. Some of these criticisms simply cannot be addressed on a short time scale. This is because PATH involves a suite of models and model outputs over which NMFS has no control (and hence NMFS cannot rerun the models "in-house" to obtain different outputs or to answer slightly different questions). Hence, many of NMFS' responses to ISAB's critique of PATH involved dropping sections of prose from the previous draft.

1.) *"We are not persuaded that the two measures of response of the populations, as scored in the model runs, were informative or appropriate".*

This criticism refers to the rather complicated "survival and recovery criteria" adopted by NMFS and implemented by PATH (these criteria were developed by the Biological Requirements Work Group in the U.S. versus Idaho settlement). ISAB charged that these response measures are difficult to interpret and do not relate easily to fundamental issues such as extinction risk. NMFS agrees with this ISAB criticism and as a result has added an entirely new analysis (CRI) that presents criteria in terms of rates of population growth and reduced extinction risk (see new Sections 8.3-8.6). In addition, PATH has added to its most recent products (1999 Fall chinook salmon draft report) more direct measures of population response, such as predicted annual escapement, and the revised A-Fish includes these population outputs whenever they are available (see Table 5-8).

2.) ***“We are uncomfortable with the element of black box that results from NMFS deriving its conclusions on the basis of a modeling exercise that was conducted by PATH, not by NMFS.....the modeling was extraordinarily convoluted...and NMFS is not in a position to duplicate this analysis independently”.***

NMFS agrees with this criticism, and has immediately undertaken a new modeling effort called the CRI (Cumulative Risk Initiative) to address this issue. The CRI models are much simpler than the collection of PATH models and are held in-house at NMFS. In addition, the NWFSC plans to make CRI analyses AND DATA completely web-based so that co-managers and interested scientists can easily follow the analyses and duplicate them (or attempt additional analyses of the same data). The website has already been established with portions of the analyses and data available at this point in time; by the year 2000 NMFS will be placing all of its CRI data, analyses, and reports on this website. The website is <http://www.nwfsc.noaa.gov/cri/>

3.) ***“We are rather surprised at the optimism reflected by the high relative probability accorded to population recovery...”***

This criticism refers to the fact that in the PATH analyses, recovery of spring/summer chinook salmon is predicted for 98% of the assumption sets if the dams are breached (figure C-1, 48-year recovery criteria in PATH 1998 Final Report), and that in general the fraction of simulated runs achieving success is moderate to high even under current 1995 and 1998 Biological Opinion mitigation levels. NMFS was troubled with this optimism of PATH in the same way that ISAB was. Consequently, in the revised A-Fish Appendix, an entirely new section reports risk of extinction under current conditions (tables 8-6 and 8-7), and identifies how much annual population growth must be improved to reduce this extinction risk (Tables 8-8, 8-9, and 8-10). These analyses paint a much less optimistic picture than those of PATH.

4.) ***“Perhaps the most disturbing of the shortcomings...is the attempt to isolate decisions about the hydrosystem from decisions about environmental management affecting the rest of the Columbia ecosystem as it impinges on the life cycle of salmon” [i.e., how the other H’s: harvest, habitat, and hatcheries influence the relative value of dam breaching]”***

Again, NMFS agrees with this comment -- the isolation of hydrosystem alterations from actions aimed at the other risk factors is a shortcoming of PATH analyses. Consequently the CRI attempts to evaluate the population-level improvements (measured by increases in annual rates of population growth) by mixtures of management actions (see figures 8-7 and 8-9), of which dam breaching is only one action. This attention to other factors is most evident in discussions of steelhead and fall chinook salmon, where it is pointed out that harvest reductions could achieve the desired increases in rates of annual population growth just as well as could dam breaching (sections 8.5 and 8.6). However, it is also worth defending PATH with respect to the harshness of this ISAB comment – PATH did do some sensitivity analyses that manipulated habitat and harvest. It is just that these

“other H’s” are downplayed in PATH summaries, and tend to get lost amidst the complexity of results that PATH reports.

5.) *“The NMFS appendix does not include specific analyses of [hydropower] program modifications...such as decreased reliance on trucking...”*

This comment is part of a lengthy excerpt from the ISAB review that basically recommends in-depth analyses of possible outcomes to a variety of engineering modifications to the four Snake River dams. NMFS agrees that these detailed analyses are absent. However, there was a reason for the lack of attention to these topics, which was not well articulated in the original draft, but is now expanded on in the revision. Specifically, as is now discussed in section 8.4.3, these details are not examined because the CRI analyses suggest that in-river improvements that are manifested by higher in-river survival simply “cannot matter much” for spring/summer chinook salmon – in other words, even if downstream survival through the four Snake River dams were maximized at 100%, the spring/summer chinook salmon populations would still not have sufficient annual population growth rates to adequately mitigate extinction risk. The key issue is not downstream survival through these dams *per se*, but possible effects on fish fitness that show up later in the life cycle (such as in reduced estuarine survival or reduced fecundity). **Too much attention to the engineering details of downstream passage distracts us from the key biological issues – what happens below Bonneville dam, or during spawning?** Fall chinook salmon represent a different story, since more minor improvements in survival could contribute substantially towards mitigating their risk of extinction.

6.) *“The index stocks are not necessarily representative of the listed stocks or ESU’s.....there are definitely data of other sorts ...that are pertinent”.*

NMFS agrees with this criticism. However, at this point in time, and given the rapid schedule for revision, NMFS has opted to proceed with the very same data upon which the PATH analyses were based. But for the future, NMFS is hoping to broaden the database considered in these evaluations (not just for the Snake River, but for all ESUs). To that end, the CRI website will contain a wide variety of data and data-links. In addition regular technical workshops are being sponsored by CRI staff both to exchange ideas and analyses, and to broaden the awareness of, and exchange of data from multiple sources. The first workshop that aimed to promote a broad exchange of data was held September 28 and 29th, and emphasized data relating salmon productivity to habitat or landscape attributes (see CRI website referred to in response #2 above).

7.) *The NMFS extrapolations of survival estimates [based on PIT tag detections] have the good property of a very clear relationship to data. But the interpretation of these estimates.....merits a few words of caution*".

ISAB goes on to point out the many complexities and uncertainties in these calculations, such as the fact that reach survival data are actually collected over only half the span of the hydrosystem and one third the length of the migration corridor. The points raised by ISAB are generally apt. To address these issues, in the revised draft NMFS has added an entire section (ANNEX B and ANNEX C) that details the sorts of extrapolations and assumptions made. It should also be mentioned that the key question is: *are the current survival estimates "the best estimates we can make", as opposed to "perfect estimates"*.

8.) *"So the bottom line is that relative probability is not an adequate basis for decision making under uncertainty"*.

After carefully considering the ISAB discussion of relative probability, NMFS agreed with the ISAB remarks. Consequently, all mention of relative probability has been deleted and replaced with "fraction of simulation runs", which is a more accurate statement. In addition, see answer to #9 below.

9.) *"The inadequacy of the AFA analysis for evaluating the delay option...is even more stark..."*

ISAB goes on to point out that it is essential to actually calculate a probability of extinction if nothing is done and decision-makers pursue the "delay option". In the revised A-Fish Appendix NMFS makes this calculation, and explicitly reports it in a manner that is transparent (see Tables 8-6 and 8-7).

10.) *" We are especially concerned that the PATH analysis operated from a script in which habitat had only a very small part. It is worth remembering that the PATH exercises analyze data time series covering approximately the last 50 years.....the data series cannot be construed as including both before and after (or treatment and control) with respect to habitat "*

In these remarks and elsewhere in their review, the ISAB criticizes the A-Fish Appendix for unjustifiably downplaying habitat. NMFS agrees with this criticism and in response, the new CRI analyses are paying increasing attention to habitat. Unfortunately to do so requires the construction of entirely new databases. A preliminary analysis is attached as ANNEX G, and another analysis directly pertinent to Columbia Basin spring/summer chinook salmon is under external review (Regetz 1999: cited in the revised A-Fish Appendix).

11.) *“the integration of experimental design, monitoring design, and monitoring implementation necessary to solve the problem would require coordination on a scale never before achieved in the Columbia. We think it is fair to ask how this will be done, and who will do it..”*

This excerpt reflects a general theme raised throughout the ISAB review, which is that NMFS needs to pay more heed to monitoring and evaluation. NMFS agrees. First, the CRI website is being established as a forum that might encourage data sharing. Second, NMFS has assigned one of their senior scientists and several others to focus on better designing monitoring and evaluation in the context of the overall salmon research program. In addition, the 4-H Federal Caucus process is developing performance standards that will be invaluable in this context. Third, every effort is being made to find funds to consolidate and organize databases in a way that can facilitate decision-support. Admittedly, these efforts are coming late, and NMFS must bear some responsibility for NOT vigorously having attended to monitoring and evaluation up until now. It is worth pointing out that recent radio telemetry and PIT tag survival studies are providing valuable information, and that NMFS is relentlessly expanding the river-reaches and portions of the salmon life cycle over which measurements are made.

There were several other criticisms made by the ISAB, but the above eleven responses address the bulk of the ISAB commentary.

B. Idaho Department of Fish and Game

12.) *“NMFS uses this narrow assessment to derive justification of delaying long-term recovery decisions...the A-Fish infers that this delay may not substantially increase the risk to survival”.*

It is unfortunate if this impression was created in the initial A-Fish draft. It was not NMFS' intent to recommend any particular action – only to quantify as clearly as possible the consequences of alternative decisions. Certainly delaying actions while learning more is an “action” (or non-action) that warrants analysis and consideration. However, discussing the option does not equal an endorsement of it as the best policy decision. Indeed, the new revised A-FISH appendix goes to great length to quantify extinction risks and to point out that the risk of delay is substantial. A recent NY Times article states, *“For many stocks of the Snake River salmon, the marine fisheries service has found the risk of extinction is considerable, sometimes even in the short term...for instance, studies...indicated that the Marsh Creek salmon had at least a 1 in 10 chance of virtual extinction in the next decade”.* This clearly does not reflect downplaying the cost of delaying.

13.) *“ The A-Fish Appendix....ignores the PATH weight of evidence analyses and upriver vs. downriver stock comparisons....The A-Fish largely ignored the upriver vs.*

downriver stock comparisons, particularly in the context of examining the plausibility of non-hydro related to extra mortality”.

NMFS agrees that the A-Fish Appendix does not focus attention on down-river versus up-river comparisons. The reason for this is twofold. First, the upriver/downriver comparisons do not point as clearly to the hydropower system as the “blame” for poor spring/summer chinook performance as is implied by the IDFG remark. There are too many other features of the ecosystem changing along with the development of the four Snake River dams to lead to a clear-cut verdict, and this leads to a murky statistical problem. This is perhaps best illustrated with a quote from the ISAB review of the A-Fish Appendix:

“The big changes in the Columbia and Snake River system during this period were construction of most of the mainstem dams, massive hatchery production, smolt transportation, and possibly changes in ocean condition. At most a statistical analysis covering this period can attempt to determine correlation between these factors...the statistical analyses was not able to resolve the relative roles of these respective factors...because all the factors, and the population dynamics, exhibited trends that constituted similar signals in the data, relative to a background of considerable noise.”

A second reason is that NMFS rejects the “experimental design” embodied in these particular upriver/downriver comparisons – there is no control. One needs to ask whether upriver/downriver comparisons involving different ESU’s (upriver and downriver) behave differently when there are dams (treatment) as opposed to when there are not dams upriver (control). Without the classic control/treatment design, one cannot conclude the differences are NOT due to the fact the populations are upriver versus downriver, or in two different ESU’s. The upper river and lower river stocks are placed by NMFS in different evolutionarily significant units (ESUs) because they are considered fundamentally different. The stocks are genetically distinct, have different age compositions on adult returns, and rear in ecologically different areas. These differences are not trivial. Under changing conditions, it is not surprising that stocks from different ESUs may exhibit different survival rates (Zabel and Williams, manuscript submitted to CJFAS).

Finally, to further show how these stock-comparisons are not so unambiguous, we need only turn to the upper Columbia stocks. A careful inspection of these data show that the upper Columbia River stocks did not decrease until post 1979 (essentially beginning with the 1975 brood year); whereas the Snake River stocks began to decrease with the returns from the 1971 outmigration. The earlier decline in Snake River stocks is certainly a result of initial hydropower system development. However the lack of decline until later by the upper Columbia River stocks in light of hydropower system development remains unexplained. Juveniles from the upper Columbia River stocks migrated downstream through a hydropower system that was completed in 1968, but their decline didn’t begin until the 1977 downstream migration, 9 year-classes and nearly 2 generations later. This suggests that something other than the hydropower system influenced stock performance

after 1977. Also, the 1970 and 1975 out-migrations from the Snake River exhibited high SARs even though the hydropower system was nearly (or entirely completed).

In short, comparisons of up-river and downriver stocks are not as compelling as the IDFG remark implies. This is not to say that initial dam construction did NOT lead to dramatic declines of the Snake River stocks – the dam construction surely did contribute to such declines. But the pattern is not as simple as IDFG suggests (an opinion that is shared by the ISAB).

14.) ***“Similarly, smolt-to-adult survival (SAR) of Snake River spring/summer chinook transported during 1989-1995 averaged .29% compared to 2.17% for Yakima River...”***

IDFG goes on to discuss a figure (figure 3, attached to the IDFG comments) comparing Yakima and Snake River SAR's as evidence that the hydropower system is the cause. NMFS has not seen the analyses on Yakima River SARs presented in IDFG's Figure 3 in any PATH report and does not know their source. However, it appears from the graph that one could equally well compare the Yakima River SARs to down river stocks and obtain a very different conclusion – that conclusion would be that passage through four dams and reservoirs (McNary through Bonneville Dams for the Yakima stocks) somehow leads to higher (in some cases much higher) SARs than passing through three or fewer dams and reservoirs (passage experience of the lowest Snake River stocks.) NMFS does not believe this conclusion would be warranted, but mentions it to show the peril of making between-stock comparisons – particular examples can be selected as evidence for or against severe hydropower impacts. Also, the SAR estimates for Snake River stocks in 1992-3 are approximately 0.2 to 0.39%, not 0.05% as stated in the IDFG comments.

15.) ***“NMFS’ decision to minimize technical collaboration and review of the A-Fish ...and lack of technical review prior to release”.***

NMFS is not sure whether these remarks are accusing NMFS of not seeking and listening to input and review? Or are these remarks accusing NMFS of not making sure there was consensus before releasing the Draft A-Fish Appendix. With respect to the first charge, NMFS is certainly NOT excluding input or feedback, and to the contrary is keen about soliciting reviews of its analyses. For example, prior to the initial draft NMFS sought and incorporated criticisms from USFWS, BPA, Bureau of Indian Affairs, EPA, US Army Corps of Engineers, and Bureau of Reclamation. The maximum possible input was sought commensurate with producing the document on schedule. After having received “federal input” a first draft was produced. Now a second draft has been completed, in which the peer review by ISAB, and comments from IDFG, CRITFC and assorted scientists have been used to improve the final document. Substantial revisions have been made, and all major comments have been carefully considered and responded to.

However, if the accusation is that NMFS has not developed a consensus before releasing the draft A- Fish Appendix, then that observation is true. The reasons are three-fold and simple. First, pursuing consensus science takes a lot of time, and to do so would have delayed the production of the A-Fish Appendix by six to twelve months. Second, ultimately NMFS is responsible for the salmonid assessment, and in accepting that responsibility, must adopt a leadership role. Third, science progresses by identifying the most likely hypotheses and models.

16.) ***“State, tribal and USFWS technical staff reviewed the D analysis...they found that there is a wide range of possible D-values, with the NMFS estimate falling at the extreme upper end of this distribution”.***

A lengthy document details these concerns by the IDFG (Bouwes et al., 4th October 1999, see [Http//WWW.R1.FWS.GOV](http://WWW.R1.FWS.GOV)). In return, a lengthy document details NMFS' response to this critique of the “D-analysis”. The NMFS response and explanation appears in ANNEX B and ANNEX C of the revised A-Fish Appendix. This is a complicated technical debate. There are three components to the debate.

a) NMFS calculates its “D-value” in one particular way, based on a set of assumptions and extrapolations explained in ANNEXES B and C; Bouwes et al. favor a different way of calculating D. Resolving the two different calculation methods will not be easy. Both methods have technical merit. There is an on-going technical dialogue.

b.) Bouwes et al. also present 480 different ways of calculating D, in addition to their “preferred method” and comment on the position of NMFS’s D-value relative to this frequency distribution of possible D-Values. NMFS finds this method of analysis less valuable than debating two alternative approaches. If one wants to focus on D-values, it will be most fruitful to attempt to select between the two alternative preferred methods, as opposed to remarking upon 480 different ways of possibly calculating D-values.

c.) NMFS is moving to an analytical framework (CRI) that downplays the D-value formulation of the problem. There are several reasons for reformulating the problem in a way that does not focus on D-values. First, estimates of D-values are possible for only two of twelve ESU’s in the entire Columbia Basin, and for only 2 of 25 federally listed ESU’s on the west coast. If scientific debates and discussions elevate the D-values to such a high position, it distracts us from more general issues and analyses. In addition, the real question is, ***“if the four Snake River dams are removed, what is the likely improvement in survival expected as a result?”*** D-values represent one specialized way of getting at an answer to the question, but NOT the only way. CRI would ask the question in italics above, and say, ***“ONE line of evidence comes from D-value calculations, based on detailed retrospective/prospective simulation models...etc.”*** Moreover, interpreting D-values, even if one agrees on the data and exactly how to calculate them is not clear.

17.) ***“The A-Fish is also unrealistic in its implications about which populations and species could be assisted through habitat improvement”***

NMFS disagrees. On-going analyses are suggesting that habitat improvements could make a major contribution to recovery, even for Snake River fish, which have extensive high-quality habitat. This remark by IDFG runs directly counter to the ISAB conclusion about habitat, which criticized the A-Fish for not paying enough attention to habitat (see #10 above). Moreover, improvements in first-year survival are not limited to habitat improvement – hatchery actions to minimize impacts on wild stocks may also yield increased survival during this critical first year of life.

18.) ***“IDFG disagrees with NMFS decision and rationale to exclude the Scientific Review Panel (SRP) weights, and to disregard the weight of evidence (WOE) results for spring/summer chinook.”***

NMFS stands by its decision to neglect SRP weights for the original reasons given in the A-Fish Appendix. NMFS does agree with IDFG that it needs to be careful about “selectively” citing one WOE report (Williams et al 1998) and not others. This is a fair criticism. In principle, NMFS feels that publication of analyses and results in scientific journals is a goal for how to identify which work is most deserving of citation. Unfortunately, there is a time lag between analysis and publication, and secondly there will still be conflicts between accounts that are published in journals. However, greater focus on published papers can help reduce the overwhelming volume of “reports” that is consulted.

C. Columbia River Inter-Tribal Fish Commission (CRITFC)

19.) The A-Fish concludes, ***“there is a chance that continued transportation would lead to recovery”***.

NMFS never intended, even in the first draft, for this to appear to be a conclusion. Certainly the revision leaves no opportunity for such a conclusion to be reached since the new CRI extinction analyses reveal substantial probabilities of extinction for all salmonids if the current situation continues as it is.

20.) ***“NMFS suggests that substantial gains could be made by improving survival in areas unrelated to hydropower (i.e., the other Hs: harvest, habitat and hatcheries)”***.

The CRITFC comments go on to state that substantial opportunities for recovery through these other Hs are unlikely. NMFS disagrees. It is worth noting that the ISAB also

disagrees with this comment by CRITFC and instead argues for more attention to habitat and other Hs (see #4 and #10 above).

21.) ***“The D statistic and its computation are the subject of the attached document (Bouwes et al, 1999).”*** (See # 16 above)

22.) ***“NMFS...largely ignores several key pieces of evidence in support of breaching. First there were rapid declines in all Snake River stocks, but not downstream stocks, that accompanied the construction of the dams. Second there are also survival estimates prior to the construction of the last three dams indicating that survival through the Snake River reach was approximately 96%. “***

The downriver versus upriver comparisons are not as convincing as implied in this CRITFC remark, as is discussed in #13 above. Also, it is not clear where this 96% figure came from? PATH has used as its estimate for the Snake River reach downstream survival 89%, which is the average reported by Raymond's studies prior to the construction of the dams. But there is a more fundamental issue at play. The significance of having 96% survival through that downstream stretch is overstated. In particular, as is discussed in section 8.4.3 of the revised A-Fish Appendix, even if survival through the Snake River reach were increased to 100%, the annual rate of population growth would remain insufficient to recover the stocks.

23.) ***“In addition, NMFS ignored an entire section of a recent PATH report devoted to sockeye. PATH concluded that sockeye are unlikely to recover through actions involving screens because of the high rates of descaling they receive”.***

NMFS disputes this criticism. Data do indicate that guided sockeye salmon have higher descaling rates than chinook salmon. But there is no empirical evidence indicating that these higher descaling rates in sockeye salmon translate into higher mortality rates and PATH never claimed such evidence existed. Instead, the PATH report stated ***“If high rates of descaling...are a primary source of mortality...”(page 213 of Marmorek et al 1998)*** then transportation is not a viable option.

24.) ***“All available evidence indicates that there were substantial increases in mortality...associated with dam construction. There is no evidence indicating breaching would not reduce the current high levels of mortality”.***

NMFS is in total agreement with this quote. But this agreement does not mean the management options are aptly analyzed. The policy dilemma is much more complicated than simply deciding that dams hurt salmon populations and removing dams would help salmon populations. Specifically, one can agree with the CRITFC quote and still not be sure whether dam breaching **by itself** would recover salmonids stocks. Secondly, one can agree with this statement, and still not be sure **whether other management actions might collectively recover salmonid stocks.** In other words, the above quote does not address whether dam breaching is NECESSARY OR SUFFICIENT. Secondly, it is very

important to remember that in no way would breaching the four Snake River dams create a free-running natural river system – there would remain four major dams on the Columbia River between the Snake River spawning grounds and the ocean.

General Concluding Remarks Concerning Responses to Critical Reviews

Several comments raise the objection that NMFS has not adequately considered input from scientists outside NMFS. The extensive revision of the A-Fish Appendix in response to outside reviews indicates that this is not true. Furthermore, these changes were made in an extremely timely fashion, with a great sense of urgency, and yet with careful attention to each reviewer's criticisms. Specifically, the major external reviews were dated: August 30th for IDFG and CRITFC remarks, October 4th for the Bouwes *et al.* criticism of D-calculations, and October 12th for the official ISAB review. The A-Fish revision was completed by NMFS on October 26th in an attempt to serve the needs of the region. Clearly, there is room for further improvement, and in fact several additional analyses (such as those of habitat and hatcheries) are underway.

In the interest of being "inclusive", as NMFS moves to address some of the criticisms (inadequate estimation of "costs of delaying", more complete analyses of habitat and hatcheries, and so forth), it has established a monthly workshop series that alternates between technical and policy emphases. The technical workshops have invited scientists from a wide variety of agencies and groups, and the policy workshops are open to all. Information about these workshops can be found on the website mentioned in #2 above.

Finally, no one argues that the construction of the hydropower system did not contribute to severe declines in Snake River salmonid populations. However, many other factors (such as harvest and habitat degradation) also produced large declines in salmonids. Further, adverse ocean conditions can play a significant limiting factor. Management decisions and actions must be forward-looking and must emphasize rebuilding stocks, as opposed to assigning blame for past declines. The key questions before us now are:

What actions or suites of actions are necessary for recovery?

What actions are sufficient for recovery?

If these questions are kept at the forefront of all discussions, and if finger-pointing about "blame" is avoided, the scientific debate will be much clearer. Of course the policy debate, which is beyond the scope of the A-Fish Appendix, will remain difficult.

RESPONSE TO ISAB REVIEW OF NEW CRI ADDITION TO THE ANADROMOUS FISH APPENDIX

As mentioned in #2 above, the ISAB criticized the PATH component of the A-Fish Appendix because of its convoluted, complicated, and "black box" approach. In order to provide broader, as well as simpler and more transparent scientific analysis, NMFS has recently undertaken a new analytical approach, labeled the CRI (Cumulative Risk Initiative). NMFS subsequently asked the ISAB to review this new effort, even though the CRI is just getting underway. NMFS felt a review was necessary both to offer early corrections to the CRI, and to help make the CRI more effective as a tool for assessing alternatives regarding the Snake River hydropower system. The general review was favorable, but pointed out several shortcomings. Below, NMFS responds to these

criticisms. In addition, NMFS has rewritten the CRI portion of the A-Fish Appendix, and placed improved text and worksheets on its website so that interested parties can better duplicate analyses for themselves. The title of this document is: “***CRI assessment for suites of management actions aimed at Snake River salmonids – moving towards a general analytical framework for all risk factors***”. The ISAB reviews of the ANADROMOUS FISH APPENDIX can be found on the NWPPC website.

25.) “***The CRI does not present an explicit synthesis of its own analysis and conclusions with those of the AFA or PATH***”.

This shortcoming was certainly present in the material provided to the ISAB, but subsequently a synthesis has been produced for both the revised A-Fish Appendix (new chapter 9), and in the new CRI paper on the web (“*CRI assessment for suites of management actions aimed at Snake River salmonids – moving towards a general analytical framework for all risk factors*”). Due to time constraints, the synthesis is still not as satisfying as NMFS would like; but progress is being made.

26.) “***The ISAB considers this espousal of clarity and openness laudable, and hopes that NMFS will follow through on these good intentions...the present CRI document lives up to these intentions only partially....***”

The above criticism is elaborated on in a discussion of several aspects of the spreadsheets and mathematical methods that were poorly described or not even described at all. NMFS has taken these criticisms to heart, and has revised all of the spreadsheets, including much greater detail. NMFS hopes that the fact the ISAB could duplicate our “extinction calculations” to the third or fourth significant digit, indicates we are moving in the right direction (see page 9 of the ISAB review of the CRI). It would be very hard to duplicate calculations embedded in or key to the PATH process modeling – which is one of the reasons the CRI is currently being emphasized. There are probably still aspects of CRI calculations that are unclear, and the NWFSC welcomes further input on potential sources of confusion. In particular, if anyone has constructive suggestions about how to make the methods even more transparent, NMFS welcomes comments directed via e-mail SIMULTANEOUSLY to the following CRI scientists:

Michelle.McClure@noaa.gov
Beth.Sanderson@noaa.gov
Peter.Kareiva@noaa.gov

(We ask that you direct comments simultaneously to all three of the above scientists, because their travel schedules are so busy, that there is a better chance of getting rapid action by contacting all three researchers.)

27.) “***The present version of the [extinction] model has some structural limitations that merit future attention.***”

The ISAB correctly notes that the extinction analysis reported in the A-Fish Appendix is only a “first-cut”. NMFS agrees. NMFS is producing alternative extinction models that will also be web-based that allow all of the more realistic complications mentioned by the ISAB. Several of the mathematicians involved in this effort predict that these additional complications are unlikely to change the estimated risks substantially with one exception: if models include an ocean regime shift toward improved conditions for the threatened salmonids, then clearly the extinction risks could be altered. However, the consequences of including such long-term ocean cycles is not as easy to anticipate as casual thinking might suggest. For example, while it is true that if conditions get better for the next 5-15 years the short-term extinction risks would be decreased, over a 100-year period, populations would still need to “ride out” or persist through several troughs in ocean conditions.

28.) ***“But this theoretical comparison does not take into account of feasibility of reducing the remaining mortality in the various life history stages”***

The above quote reflects a more general dissatisfaction with what CRI calls “feasibility studies” – for example, how feasible is it to get a 10% increase in first-year survival by habitat restoration? NMFS is also not satisfied with its feasibility studies. They are limited by an absence of data, or by the accessibility and synthesis of data that may exist but have not been assembled in a useable database. These feasibility studies and the creation of effective databases are at the top of NMFS current science priorities. A sample of the approach being taken is provided as Annex G in the revised A-Fish Appendix.

29.) ***“The ISAB does not find the scope of the CRI analysis...to be entirely satisfactory”***

The above criticism was also applied to the original A-Fish Appendix and its PATH analyses. The point being made by the ISAB is that there needs to be more thorough examination of suites of management actions involving harvest, hatcheries, and habitat. NMFS agrees, and hopes to develop these analyses over the next three months. Partly this has not been possible because of limited time and the absence of adequate feasibility studies. In addition, there are so many possible management actions that assessment of options is made more practical if a small set of options is presented (as opposed to a virtually unlimited array of combinations). The recent development of the 4-H paper describing management alternatives will help focus the CRI analyses, and make this a more tractable task.

30.) ***“Comparing the table of average growth rate values from the extinction model ...and the average growth rate from the demographic projection matrices...we see that substantial discrepancies are the rule”***

These discrepancies arose because the wrong table of matrices had been inserted into the CRI chapter that the ISAB reviewed. The correct table, which is now presented in the

CRI analyses of Snake River hydropower system management options of November 15th indicates that there are no longer substantial discrepancies between the two different estimates of average annual growth rates Table 3 of the CRI document mentioned above corrects these discrepancies).