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Mark Walker
Director of Public Affairs
Northwest Power and Conservation Council
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Portland, Oregon 97204-1348

Dear Mr. Walker:

We have reviewed the Northwest Power and Conservation Council's (Council) Artificial Production Review and Evaluation (APRE) Draft Basin-Level Report and Appendices, the APRE province and subbasin-level reports, APRE summaries, the APRE HGMPs (Hatchery and Genetic Management Plans), and the results of the APRE Questionnaire and offer the following comments.

In general, because the Draft Basin-Level Report does not relate the data collected in this process to ongoing fishery management agency hatchery review and reform processes, it does not present an accurate and complete review of hatchery reform efforts in the Columbia River basin. Some of our specific concerns were brought to the attention of several of the Council members and staff during the Subbasin Planning Regional Coordination Group meeting on November 6, 2003. The opportunity to discuss our concerns with Council members and the staff working on the APRE and in another meeting with your staff and the contractors were very helpful in our review. Our concerns with the draft APRE can be broken down into the following major areas:

- 1) The APRE generated HGMPs for Fish and Wildlife Service (Service) hatchery programs contain errors and data gaps that are difficult to interpret and may be misinterpreted if the reader does not have access to the HGMPs that were submitted by the Service to NOAA Fisheries as part of the consultation process under the Endangered Species Act.
- 2) The results of the questionnaire are subject to misinterpretation because the "yes or no" and multiple choice formats used in the questionnaire have not captured the complexities of the different hatchery programs.
- 3) Data from the questionnaire are used to draw conclusions about hatchery programs in the Columbia River basin without first determining, in collaboration with the Service and the other co-managers, whether the information was valid for those uses. This need was identified by the Service in meetings early in the APRE effort.
- 4) The Council released the draft Basin-Level Report with general conclusions about the status of hatchery programs in the Columbia River basin without providing the Service and the co-managers the opportunity to review and comment on the report in

the context of other ongoing hatchery reform and related fishery management efforts in the basin.

The Service supports the work through the APRE to promote the thoughtful consideration of the future purpose and role of hatcheries in the Columbia River basin and to identify hatchery practices that contribute to both the benefits and risks of hatcheries. The APRE also should provide information that will aid the Council's Fish and Wildlife Program and state, tribal, and federal agency reform efforts. The APRE is only one of several processes in the basin in which the Service is engaged to address the future role of hatcheries, including HGMPs and ESA consultations, NOAA Fisheries recovery planning, *US v. Oregon*, and subbasin planning. Together, these efforts represent a significant body of information that should be integrated into the final APRE analysis. As we move forward in evaluating artificial production programs, implementing artificial production reforms, and reporting on our progress to Congress and to other parties, it is our desire to promote a collaborative process to support decisions about programs and facilities in the basin.

We have enclosed a more detailed set of comments for each of our concerns listed above and have included specific recommendations to the Council on how to help resolve them. In recent discussions, our staffs have agreed to work together to revise the Draft Basin-Level Report and to work on updating and editing the APRE. Additionally, we have included page-by-page comments on the draft Basin-Level Report.

We appreciate the opportunity to provide comments and look forward to working together on our common goal of improving artificial production programs in the Columbia River basin.

Sincerely,

Regional Director

Enclosures

cc:

NOAA Fisheries (Bob Lohn, Rob Walton)
Washington Department of Fish and Wildlife
Oregon Department of Fish and Wildlife
Idaho Department of Fish and Game
Columbia River Inter-Tribal Fish Commission
Columbia Basin Fish and Wildlife Authority (Rod Sando)

Columbia Basin Coordinator

Columbia Basin USFWS Fisheries Field Offices

USFWS Regional Office Line Supervisors

FOlney:jpa December 9, 2003

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US Fish and Wildlife Service General Comments on the Artificial Production Review and Evaluation and Draft Basin-Level Report

The APRE generated HGMPs for Fish and Wildlife Service (Service) hatchery programs contain errors and data gaps, are difficult to interpret and may be misinterpreted if the reader does not have access to the HGMPs that were submitted by the Service to NOAA Fisheries as part of the consultation process under the Endangered Species Act.

One of the purposes of developing the APRE generated HGMPs was to assist in developing the HGMPs for the ESA consultations. Early in the HGMP process, we indicated to the Council's staff that the Service intended to focus on directly developing the HGMPs rather than using the APRE process for that purpose. Draft HGMPs that we developed and submitted to NOAA Fisheries under the ESA consultation, which they indicated were complete, were provided to the Council staff and the Council's contractor with the understanding that the information would be transferred to the APRE database by the contractor. In our review of the database-generated APRE HGMPs, we found that information from our HGMPs was missing, there were data gaps and errors, and the format of the APRE HGMPs makes them difficult to understand.

An example of the problems with the APRE-generated HGMP is illustrated by examining the Spring Creek National Fish Hatchery (NFH) HGMP. The APRE generated HGMP does not clearly articulate the important mitigation purpose and justification of the Spring Creek NFH tule fall Chinook program. The genetic importance of this stock, which is maintained through the hatchery program, is described in the Service produced HGMP as well as the ecological risks posed by the hatchery program. This information was not included in the APRE-generated document. Another area clearly articulated in the Service-produced HGMP is in Section 1.10 "List of program performance indicators." Following the NOAA Fisheries HGMP format, the Service identified performance indicators as benefits and risks and articulated how we monitor each of these indicators. Again, this information was not included in the APRE-generated HGMP. In an attempt to standardize the process for multiple hatcheries, information was lost because individual hatchery programs have unique circumstances that are not reflected in the APRE format. There were also some fundamental errors. For example, the APRE HGMP history section (6.2.1) incorrectly identified this 100-year old program as starting in 1990. These are just a few of the examples where the database-generated HGMPs were difficult to read, contained errors, and could be misleading to the public. We will work with the contractor to address additional corrections rather than attempt to include all of them in our comments here.

The Council's website indicates that the APRE HGMPs should be viewed as "working drafts which differ from those officially submitted for ESA permits." However, the Council's APRE website does not provide a link to the Service's and the co-managers' HGMPs that were submitted to NOAA Fisheries under the ESA consultation. A link on the Council's website would provide access to a significant body of information developed by the Service and the co-managers that is complete and should be shared with the public.

Recommendation: The Council should provide a link on its APRE website to the Service and co-manager produced HGMPs that were submitted to NOAA Fisheries under the ESA consultation. Having two different HGMPs is confusing. It should be made clear that the Service has not formally endorsed the APRE-generated HGMPs, which have errors and missing information and are considered working drafts.

The results of the APRE questionnaire contain errors and data gaps. In addition, the results of the questionnaire are subject to misinterpretation because the “yes or no” and multiple choice format used in the questionnaire have not captured the complexities of the different hatchery programs.

A questionnaire was used to collect information on hatchery goals and operations from hatchery managers and operators and the responses were entered into an APRE database. The APRE Questionnaire consists primarily of categorical variables (yes/no; a, b, c multiple choice), and sometimes answers addressed a range of values (e.g., <3, >3). Narrative responses were often limited to questions like “name of program.” Obviously this approach has limits when describing complex programs, and can easily lead to confusion.

For example, at Spring Creek NFH statements that describe the rearing water source were checked if they applied or left blank if they did not apply. Two of the statements that were not checked because they did not apply to the hatchery were: “The hatchery operates to allow all migrating species of all ages to bypass or pass through hatchery related structures” and “Adequate flows are maintained to provide unimpeded passage of adults and juveniles in the bypass reach created by water withdrawals.” In the comments section we explained that the hatchery water source is spring water that never was accessible to anadromous fish. In fact, the spring erupts from the hillside above the hatchery. Despite the explanation we provided, these were listed in the APRE database as “hatchery practices that might place program goals at risk.” Obviously, lack of access for adult and juvenile fish to the spring on the hillside above the hatchery is not placing any program goals at risk. This is just one example of many we found where the questions and the responses (checked boxes or yes/no answers) do not accurately describe the situation and can lead to confusion in the computer-generated outputs, even in this case where an explanation was provided.

The questionnaire also has limitations in its application because it is based on the assumption that a single set of hatchery practices applies equally to all of the different facilities and management situations. For example, we disagree with the assumptions in the questionnaire that volitional release of juveniles is an objective that is applicable to all facilities in the Columbia River basin, that predator avoidance training is a proven method for increasing smolt to adult survival, or that using natural water temperature profiles for adult holding is advisable at all facilities. While the comments provided by the co-managers can capture some of these differences, it is not clear how providing more detailed comments will affect the summary information generated from the database. This type of questionnaire does lend itself to easy summarization, a plus for

the contractor, but we are struggling with whether there is “value added” in using the results of the questionnaire to identify needed improvements at hatcheries.

The Service accepts some of the blame for errors since we did not complete our review of all of the material in the APRE database and provide corrections before the Draft Basin-Level Report was released.

Recommendation: The Council indicates on its website that the data are under review, subject to updates, and that the managers are editing the information. Since the information has errors, is incomplete, and is being edited, the Council should be cautious in using the results of the questionnaire and other APRE-generated data unless the Service and the co-managers agree that it is complete. There is much useful information in the APRE database and we will continue to work with the Council staff and contractor to update and edit the information to ensure that it is correct and complete.

The Council used the draft APRE reports and data to draw conclusions about hatchery programs in the Columbia River basin without first determining, in collaboration with the Service and the other co-managers, whether the information was valid for those uses.

The Council summarized data and drew conclusions from the APRE data in the Draft Basin-Level Report, despite the fact that the information has errors and is incomplete, and the Council’s own website indicates the data are under review and subject to updates, the managers are editing the information, and work products should be viewed as working drafts. For example, on page iii of the report the Council indicates under *Hatchery Practices*:

“Many segregated hatchery programs contribute significantly to wild spawning populations, despite the intention to separate hatchery and wild fish. The amount of mixing was unknown in a third of segregated programs. In addition, 41 percent used non-local broodstock and 63 percent transferred or released fish from outside the system. In contrast, 91 percent of integrated programs used broodstock derived from within the subbasin and 81 percent avoided transfer or release of fish from outside the subbasin.

A critical question before releasing summary information like this is whether the database is a valid tool to use in this manner. Certainly there is no question that many segregated programs use non-local broodstock and that fish are transferred. The implication is that this is all negative and there is no explanation presented by the Council why this is occurring. We have a major problem with the Council summarizing and using the information from the questionnaire in this manner. The Service and co-managers were not asked to assess whether this was a valid use of the information.

As an example of how this information can easily be misinterpreted, the Little White Salmon/Willard National Fish Hatchery Complex raises coho salmon. The hatchery uses a non-

local broodstock because coho salmon are not native to the Little White Salmon River. In addition, a natural falls and steep canyon just above the hatchery located at the mouth of the river where it enters the Columbia River blocks access to anadromous fish. Coho salmon raised at the Willard NFH are collected at a weir at Little White Salmon NFH. Half of the production from Willard NFH is released on-station and the other half is transferred to other subbasins to support programs to restore coho salmon where they were extirpated. In this case, the box asking if the program avoids stock transfers was checked “no” and the question of whether broodstock were collected at another facility was checked “yes.” They were then listed in the database as “hatchery practices that might place program goals at risk” despite the fact that they support program goals. Other segregated hatchery programs managed by the Service and co-managers also have logical explanations of why they use non-local broodstock and transfer fish. In this case, the Council’s summary of the “yes/no” information for the basin as a whole was an oversimplification of a more complex situation, and the conclusions drawn were not based on a realistic and valid assessment.

The basin-level summary information presented under *Monitoring and Evaluation* is another example of a potentially misleading use of the raw and incomplete APRE data. The section under *Monitoring and Evaluation* states that “escapement figures were collected for 20.7 percent of programs.” The implication is that most hatcheries don’t keep escapement information. This is based on an APRE database that is incomplete, under review, and that the managers are editing. Hence, the statement is not based on valid information. The Council’s StreamNet database has all of the escapement information for hatcheries in the basin spanning many years. The Council did not provide this basin-level summary information to the Service and the co-managers to review and to reconcile with other information, like StreamNet, and with individual agency records to determine whether it was a valid use of the information in the database. This approach could hinder rather than facilitate progress we are making in revamping our hatchery systems to meet the changing needs of society and the resource.

Recommendation: The Council should work collaboratively with the Service and the co-managers to ensure that summary information and conclusions drawn from the APRE data are accurate and clearly describe the status of hatchery programs.

The Council released the draft Basin-Level Report with general conclusions about the status of hatchery programs in the Columbia River basin without providing the Service and the co-managers the opportunity to review and comment on the report.

It is unfortunate that the first opportunity we had to review the contents of the Council’s draft Basin-Level Report was through your press release and *The Oregonian*. This is inconsistent with assurances we received from Council staff that we would have an opportunity to review APRE work products before they were released to the public. The Council’s approach in the Columbia River basin is in stark contrast to the Western Washington Hatchery Improvement Project, where the Hatchery Scientific Review Group (HSRG) has never released any reports or recommendations to the public without first giving the co-managers the opportunity to correct any errors or misinterpretations by the HSRG. As we mentioned above, we have a problem with the Council’s use of an incomplete database to summarize information and draw conclusions in

the Draft Basin-Level Report. Not providing the Service and the co-managers an opportunity to correct errors and misinterpretations further compounds the problem.

Recommendation: The Council should modify its APRE process to be more collaborative, like the Western Washington Hatchery Improvement Project. The Council should not release any reports or recommendations based on the APRE to the public without first giving the Service and the co-managers the opportunity to review the material and help correct any errors or misinterpretations.

US Fish and Wildlife Service Detailed Comments on the Artificial Production Review and Evaluation and Draft Basin-Level Report

Pages iii and iv: Under *Distribution of Hatchery Releases* the fish releases reported are planned releases rather than actual releases. Actual releases more accurately reflect the current levels of production and should be used in this report. As indicated in our general comments, the information used to draw conclusions in the *Monitoring and Evaluation* summary is incomplete and incorrect.

Page 5: In the second paragraph it states, “APRE will produce partial draft HGMPs that will be revised through the federal process.” It should be clarified that the Service chose not to use the APRE process to develop its HGMPs. The reader should be referred to the official HGMPs.

Page 6, I.D Scope of the APRE: The first paragraph states, “A fundamental premise of the APRE was to use information freely provided by the fishery managers.” The information set presented in APRE is not complete. The schedule developed by NPCC was not conducive for the fishery managers to “freely” provide information. Workshops were held and dates established without coordinating with the managers affected. Because of schedule conflicts and other priorities, the Service did not fully participate. For example, some workshops were marginally attended. To circumvent this problem, Service-produced HGMPs were provided to the private contractors to NPCC, but not all information was transferred by the contractor to the APRE databases, or was misinterpreted. Also noteworthy is the competing schedule for each agency completing an HGMP for ESA consultation and the APRE data-gathering exercise. A more interactive approach would have been for the contractors to return the information to each agency, highlighting the sections with incomplete information. The Service assumed the HGMPs, which the Service produced and provided to the contractor, would provide all the answers for the APRE-generated HGMP. The Service provided the HGMPs to NOAA Fisheries and the documents were considered complete. The APRE HGMPs have numerous data gaps, were difficult to read, contained errors, and could be misinterpreted by the public. The Council’s website should provide a link to the Service-produced HGMPs.

Page 7: The first full paragraph states that “The information base is far from complete due to lack of basic information about many programs.” We agree and question why the report was used to draw conclusions from an incomplete information base about hatchery programs in the basin.

Page 7: “The evaluation addressed only generally the appropriateness of the purposes of hatchery programs in the present economic, social and scientific context.” In our view, many of the conclusions in this report are based on what the authors “believe” is the current economic, social and scientific context. They have not provided the analysis to adequately define how they reached the conclusions on what the present economic, social and, to a lesser degree, scientific thinking is on these subjects and ignore the conflicts inherent among each of these areas of thinking when society is forced to make choices. The latest scientific thinking on the issues of using hatcheries to conserve/supplement wild stocks is virtually ignored in the suggestion that

downriver production should be moved upstream to create more integrated hatchery programs. The question of the long-term risks of supplementation must be answered when considering moving more hatchery production upstream into areas already occupied by wild populations and presently supplemented populations.

On the societal context, the willingness of the public to accept some aspects of hatchery reform conflict with the science and the societal view as espoused by this report. A good example of this is the public outcry over clubbing excess hatchery fish rather than outplanting them into the natural environment. The science generally supports a cautious approach to putting excess hatchery fish into the streams.

Page 8: The first full paragraph states, “This Basin-level report contains a synthesis of the APRE conclusions.” Since the APRE data base reports are incomplete or in error, the basin level report is flawed. The report should have discussed problems with the incomplete nature of the data and indicated that any conclusions drawn are subject to error.

Page 12: “Since the 1970s, the role of hatcheries has shifted to the conservation of natural populations.” This is only partially true. The role of hatcheries in providing mitigation for lost habitat and lost production and to provide fish for fisheries, both commercial and recreational, has continued to make up for these losses. Some of these programs, like the Leavenworth NFH Complex, continue that important role today and are located above Bonneville Dam. More recently, many of the newer programs are increasingly focused on conservation, but even the older programs have made considerable alterations/reforms to their programs to minimize potential impacts to wild stocks and operate more efficiently.

Page 13: “Hatcheries have been slow to respond to changes in societal values and to scientific insights.” This is a broad general conclusion that is not supported by information included in the report. The report does not review and evaluate the adaptive management efforts that have been implemented in the hatchery system over the past two decades.

Page 14, Table II-1, Grand Coulee Dam Mitigation: The Mitchell Act of 1938 was also an establishing mechanism for this program.

Page 15: “This practice is on-going since 1980; however, such stock transfers are now considered a questionable practice on biological grounds and they remain an imperfect solution to an important social and legal issue.” This statement is a broad sweeping statement not supported by fact. Only a few programs continue to move stocks upstream and for only relatively short distances upstream, compared to earlier efforts that occurred before the science revealed that certain transfers were likely to fail or cause negative impacts to local stocks. Coho salmon are the obvious exception. Coho salmon restoration programs involve long distance stock transfers, but the lower river stocks are the only stocks remaining to use to restore upriver runs.

Page 17, Economic Context of Hatcheries: This section of the report implies that hatcheries were established solely to provide for harvest and that fishery mitigation programs have been rendered passé by changes in market economics. It is commendable to consider that economic

issue, but the authors have overlooked other important factors such as the legal obligations of mitigation activities, the community impacts of commercial and sport fishing activities, and the cost effectiveness of such programs.

Page 19, Recreational Value: This assessment probably significantly underestimates recreational fishery values because it uses 2000 and earlier data and does not include the most recent years of greatly increased runs and the much greater recreational interest and value for these fish, particularly in upriver areas. Idaho Department of Fish and Game has developed economic information on the benefits of salmon fishing in Idaho for the more recent years that should be referred to here.

Page 24, Treaty harvest: Much of the treaty harvest is focused on fall chinook, including lower river stocks. Moving more of this production upstream or reducing production may result in a net loss of tribal fishing opportunity, at least in the short term, if these fish are exposed to losses at more dams.

Page 34, “Hatchery fish and the environment:” In addition to salmon carcasses playing an important nutrient source in freshwater, a large number of species are known to utilize juvenile and adult salmon as a nutrient and food base in the marine environment. Reductions of wild populations of salmon could reduce overall ecosystem productivity. Because of this, hatchery production has the potential for playing an important role in population dynamics of predator-prey relationships and community ecology in the marine environment.

Page 32-36: Many of the statements in this section on intra- and inter-species effects, hatchery fish and the environment, and genetic effects of hatchery programs are supported by only one or two references. A more comprehensive review of the literature should be provided in this section.

Page 43: “The individual program reports in the database contain a summary of facility information including operator, funding sources, and overall performance, as well as recommendations for each hatchery based on the HSRG and IHOT guidelines.” The Service will work with the Council and contractors to closely review and correct errors in the APRE database to make this summary information more useful to agencies and the public.

Page 46: “This is the result of a few very large, older facilities, such as Bonneville and Spring Creek hatcheries, which, like many programs in the lower river, release large numbers of fall Chinook and coho to supply lower river and ocean fisheries.” One purpose of Spring Creek NFH is to mitigate for the loss of harvest in ocean and inriver fisheries but, it should also be stated that this is also a conservation hatchery that has preserved an original Columbia River stock near their site of origin for over 100 years.

Page 50, “Distribution of hatchery releases:” It should be further noted that it was unknown at the time if salmon and steelhead could naturally sustain themselves upstream of the lower river dams, hence mitigation was located primarily in the lower river.

Page 53: “The act also funds the Leavenworth National Fish Hatchery Complex (Leavenworth, Entiat and Winthrop hatcheries) in the Columbia Cascade Province.” The Mitchell Act stations receive their funding through NOAA Fisheries. The Leavenworth NFH Complex facilities are funded by Reclamation and BPA.

Page 55, “Monitoring and Evaluation:” Because the data were not fully transferred from the Service-generated HGMPs, the data presented are conservative estimates. The database needs to be updated.

Page 60: “The APRE found that few hatchery programs adhere to all key guidelines identified by the HSRG, suggesting ample room for improvement in the performance of hatchery programs.” While we agree that there is room for improvement in the performance of hatchery programs, the standard used here of “adhere to all key guidelines” is not appropriate when some of the guidelines are based on hypotheses still undergoing testing and some may not be applicable in all situations.

Page 61: “One of the most alarming results of the APRE is the frequency of the “Do not know” response to key questions regarding performance and the impact of hatcheries on surrounding stocks. Managers often are not able to answer the most basic questions regarding the success or potential harm caused by hatchery programs.” Before this conclusion was presented to the public, the Council should have verified with policy representatives of the Service and the other co-managers whether this was due to lack of information included in the database or whether it did represent current knowledge. For our facilities and programs it is the former.

Page 61: “A ‘culture’ that discourages outside scrutiny cannot be allowed to continue; all hatchery programs must be thoroughly examined.” We find this statement to be very objectionable and not supported by the facts. Hatchery programs managed by the Service and the other co-managers have been through very close scrutiny and almost continuous review during the last decade, particularly under ESA since salmon and steelhead stocks were listed in the basin. The Service has not discouraged outside scrutiny. This statement should be struck.

Page 62: “Hatcheries promised to make up for the loss of fish abundance that resulted from construction and operation of the Columbia River hydroelectric system and other development activities. Clearly, this result has not been achieved. Despite massive hatchery programs, current adult returns to the Columbia River Basin fall far below historical estimates.” The APRE report did not provide or evaluate any data to draw this “conclusion.” This statement is based on previous evaluations and opinions (e.g., ISG 1996: *Return to the River*; Brannon et al 1999) that were conducted prior to the very recent turnaround in marine ocean conditions and major increases in smolt-to-adult survivals. Moreover, the Council web site talks about “record returns” in the last 2-3 years since runs were first monitored at Bonneville Dam (1938?).

Page 62-63: “In the 1960s and 1970s, thriving commercial fisheries existed in the lower Columbia River and in the oceans off Oregon, Washington, British Columbia, and southeast Alaska. These fisheries were supported to a large degree by Columbia River hatchery programs. The fact that wild runs declined in large part due to over-harvest, in addition to the loss of habitat, was not viewed as a crisis but rather as a demonstration of the inefficiency of nature

compared to that of hatcheries.” Again, this is not a “conclusion” that can be drawn from this report. It is background or historical information and should be presented as such in an earlier section of the report.

Page 63: “In fact, it can be concluded from the results presented in this report that the Columbia River hatchery program for the most part continues to be operated under the social paradigm of the mid 20th century.” We strongly disagree with this statement. The report did not include a review and assessment of the many reforms and changes in hatchery programs that have occurred in recent years. The APRE database used to draw this conclusion is flawed and incomplete.

Page 63: “Therefore, hatcheries appear to be part of the solution to maintaining viable fish runs in the Columbia River system. For example, hatcheries still offer the only way to mitigate for fish habitat lost to construction of a dam without fish passage facilities. In addition, hatcheries may offer the only means of providing sufficiently productive stocks to allow the continuation of tribal fisheries above Bonneville Dam.” We don’t disagree with this statement, but it is not a “conclusion” that can be drawn from this particular review process. For example, the report did not perform any simulations to estimate fish abundance or sustainability of natural populations in the absence of hatcheries upstream of Bonneville Dam. It is an opinion based on other information and not the information presented specifically for this APRE report.

Page 64: “Reform requires that hatcheries operate in a business-like manner. ... After application of business principles, hatcheries that are successful should be retained, while those that are not should be eliminated.” The term “business-like manner” can be interpreted to imply “profit margins,” “net economic benefit,” etc. For example, if it costs \$3.00 to produce one ocean caught fall Chinook, but it can only be sold for \$1.00 per pound, does that mean the hatchery program should be “eliminated?” We don’t think this is what the report intended to say, but that is how the public will interpret this “conclusion.” On the contrary, hatcheries should be operated in a scientifically defensible and accountable manner in terms of documenting benefits and evaluating risks. Many of these “benefits” have no dollar value. For example, our National Parks and National Wildlife Refuges are not intended to be operated in “business-like manner” but rather to maximize the social and recreational benefits to the public within their respective conservation mandates. The National Parks would have to charge substantially higher admission fees if they were to be operated in a “business-like manner.” Hatcheries should be viewed, and managed, with the same perspective. One cannot put a dollar value on the future economic value of a resource. The term “business-like manner” only perpetuates the fallacy that salmon and steelhead are commodities, and not a living component of the natural, but human-influenced, ecosystems in which they occur. We believe that a more accurate measure of success is one that measures overall effectiveness in a much broader context.