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NATIONAL MARINE FISHERIES SERVICE

Northwest Fisheries Science Center
Coastal Zone & Estuarine Studies Division
2725 Montlake Boulevard East
Seattle, Washington 98112-2097

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MEMORANDUM FOR: F/NW - William Stelle, Jr.
F/SW - Hilda Diaz-Soltero

FROM: F/NWC - Usha Varanasi
F/SWC - Michael Tillman

SUBJECT: Scientific Disagreement Regarding Coho Salmon Status under the ESA

The following is a summary of issues of scientific disagreement related to the three coho salmon ESUs that have been proposed for listing under the Endangered Species Act (ESA). Sources for the information discussed below include public and peer-review comments received on the listing proposal and discussions and work products of the Science Team for Oregon's Coastal Salmon Restoration Initiative (CSRI).

Issues of scientific disagreement for specific ESUs

Oregon Coast ESU

* ODFW and a peer reviewer argued that failure by the National Marine Fisheries Service (NMFS) to consider the same types of data for Oregon and Washington coastal coho salmon biased our risk analysis toward finding relatively high risk for Oregon ESUs. Specifically, they objected to our identification of declines in recruits-per-spawner as a significant risk factor for the Oregon coastal ESU, when that index was not evaluated for the Olympic Peninsula or Puget Sound ESUs. A peer reviewer stated that results of his analyses showed declines in recruits-per-spawner for the Olympic Peninsula ESU similar to those observed in Oregon.

Comment: The peer reviewer's analyses for the Olympic Peninsula were based on more recent data than we considered. We have now obtained the information necessary to update trends in recruits-per-spawner for Oregon and Washington coastal coho salmon and will be performing the necessary analyses over the next month.

Oregon Coast and Southern Oregon/Northern California ESUs

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* The Oregon Department of Fish and Wildlife (ODFW) reviewed the status of Oregon coho salmon from these ESUs under its state ESA and concluded that a listing was not warranted. This disagrees with the conclusion NMFS reached under the federal ESA.

  Comment: The ODFW conclusion relied heavily on assumptions regarding future effects of management actions and improvements in ocean productivity. As explained below, a risk workshop to be held in November 1996 will consider scientific disagreements about how to evaluate the importance of natural environmental fluctuations.

* ODFW and a peer reviewer argued that NMFS overstated the risk to wild Oregon coho salmon from hatchery fish because of misinterpretation or insufficient understanding of the data. ODFW also argued that the scale analysis used to obtain the data used by NMFS is problematical in some populations and can lead to an upward bias in the estimated fraction of hatchery fish spawning naturally. They also argued that we did not adequately consider that a) hatchery fish spawn earlier than wild fish, thus limiting potential interactions, b) naturally spawning hatchery fish have reduced reproductive success compared to wild fish, and c) significant hatchery strays are confined to a small portion of the entire ESU.

  Comment: We have spent considerable time examining each of these points. In general, we don't find that the data (which for the most part were collected by ODFW biologists) support their arguments. Over the last few months, we have compiled detailed summaries of ODFW data on hatchery stock transfers, scale pattern analysis, and run timing and presented them to ODFW for review for completeness and accuracy. We are awaiting their review and comment on this information. According to ODFW, this review has been slowed by heavy demands for the same staff in the CSRI process. We therefore do not expect to have a detailed reply from them until at least November. It is essential to reach agreement on what the data are before drawing conclusions about risk from this important factor.

  The reproductive success of naturally spawning hatchery fish is a key uncertainty in most evaluations. In general, it is difficult to obtain empirical information without fairly complex studies. However, in the late-August draft of the CSRI report, ODFW included a new analysis of abundance data for the Yaquina basin that they used to draw inferences about the reproductive success of naturally spawning hatchery fish coastwide. They concluded that the evidence suggests this success was very low. If true, this would help to alleviate some concerns regarding stray hatchery fish. However, we have not had time to review this new

study in any detail or to determine how generally applicable its results might be. Furthermore, if the poor reproductive success of naturally spawning hatchery has a genetic basis, then whatever matings with wild fish do occur could seriously reduce fitness of natural populations. Careful evaluation of these results and their implications will take at least a month to complete.

* ODFW has sponsored the development of three different population simulation models aimed at addressing risk of extinction for the Oregon Coast ESU. Two of these models were developed by Science Team members as part of the CSRI process; these models have been discussed and refined since May, and preliminary results were made available as part of the draft OCSRI plan in late August. The two models use different approaches and different assumptions, and their results so far are not consistent. We have been told that ODFW is submitting the models and their results for peer review, which is an essential process before they can reliably be used for making listing decisions. It is likely that reviewers will have substantial comments and suggestions for improving the models, so this process can be expected to take at least 2 months.

  The third modeling effort is through a contract by ODFW to Dr. Michael Lynch, a world-recognized expert in the fields of evolutionary and conservation biology from the University of Oregon. Dr. Lynch's model differs from the other two in that it will incorporate genetic as well as demographic risks. Preliminary results from his model are expected some time in November. We have scheduled a meeting with Dr. Lynch on October 10 to review technical aspects of his model.

  Although these applications of the model will deal with data for Oregon populations, the results of the models could have significant implications for risk analysis of coho salmon populations coastwide.

  Comment: These models have the potential to provide data that is directly relevant to determining whether an ESA species is "in danger of extinction throughout all or a significant portion of its range" (i.e., endangered) or "likely to become an endangered species within the foreseeable future" (i.e., threatened). A six-month extension would allow adequate time to fully consider the disparity in preliminary model results, thus greatly enhancing the prospects of obtaining the most reliable data on extinction risk for the ESUs proposed for listing.

* ODFW, the Oregon Department of Forestry, and the California Resources Agency disagreed with the listing proposal because they believed, existing, recent, and/or future conservation

measures were not adequately considered. The California Resources Agency also contended that an extension would provide the opportunity to more fully evaluate the benefits of these measures.

Comment: We understand that these issues are being considered by the Northwest and Southwest Regional office.

Northern California and Central California Coast ESU

The key data underlying the risk analysis for the California portion of the Southern Oregon/Northern California ESU and the Central California ESU are: 1) presence-absence data in streams with historical records of coho salmon, and 2) abundance estimates of native and hatchery influenced fish. Both sets of data are limited, particularly the abundance estimates which are based on very crude estimation methods, and this has resulted in some disagreement about the status of coho salmon in California and the risks faced by these populations. For example, the status of coho salmon in the numerous small streams throughout this ESU is largely unknown.

In response to the paucity of real data, NMFS is resurveying streams to gather new presence-absence information, first in the Central California ESU (this work is nearly completed) and next in the California portion of the Southern Oregon/Northern California ESU. The new observations of coho salmon presence/absence obtained by NMFS in the Central California ESU show higher frequency of presence than the Brown and Moyle data used in the 1995 Status Review, including the presence of coho in some streams with no historical record. The State of California Resources Agency recently provided NMFS with new information from commercial timber companies which are consistent with NMFS recent observations. The Resources Agency contends that this new information, and more information which is expected to become available over the next six months, will indicate that coho salmon are more abundant and widely distributed than was previously thought, and that this information should be considered in any final listing decision. NMFS is also developing new methodologies to estimate coastal salmonid abundance on a regional basis.

The state of California has initiated two efforts that address the factors affecting coho salmon: 1) the California Salmon Initiative, and 2) the Southern Coho Restoration Team. Both of these efforts have scientific components that will independently assess the risk level to coho salmon in the Central California ESU. In addition, we have been told that we can expect additional information on California coho salmon from the California Department of Fish and Game by the end of September. Depending on the extent and nature of the new data, it may take

several weeks or more to review and incorporate into the comprehensive analyses.

Because empirical data on coho salmon in this ESU are so sketchy, substantial uncertainties remain about most aspects of the risk analysis.

Habitat information

For all ESUs, there are also substantial uncertainties and, in some cases, scientific disagreement about how best to incorporate habitat information into risk analyses and how to evaluate the effectiveness of conservation measures. Unfortunately, there is little prospect of making substantial progress toward resolving any of these issues within the next few months.

General issues of scientific disagreement

The following three issues have been important considerations for our salmon risk analyses for several years but have never been resolved to everyone's satisfaction. NMFS has organized a workshop on risk analysis[1] that will deal with these and other key issues. Although it is not realistic to expect that the upcoming risk analysis workshop will fully resolve all these issues, NMFS should be in a much better position after the workshop to determine whether the basic risk analysis approach it has been using is appropriate and, if not, how best to modify it.

Lack of explicit listing criteria

Some scientists have complained that NMFS has not articulated explicit, objective criteria that can be used to determine whether listings are warranted. In the absence of such criteria, it is possible for different groups of scientists to come to different conclusions about listing status based on the same data.

We have considered this criticism but do not see a way at present to establish criteria that would be applicable to all ESUs of all salmonid species. Furthermore, we are not aware of a quantitative way to incorporate all the risk factors we believe

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The workshop will take place November 13-15 in Seattle. It will involve a panel of 12 scientists with expertise in various aspects of extinction risk analysis. The panelists will also make a series of presentations, and they are under contract to provide written summaries of their talks by the time of the workshop. A separate contract has been let with a rapporteur/editor, who will oversee final preparation of the written report of the workshop, with publication expected by the end of January 1997.

are important to consider. Instead, our risk analyses use a qualitative evaluation of various quantitative or semi-quantitative components. The result is that the analyses rely heavily on professional judgement, which is not entirely satisfying but we believe is preferable to adopting strictly quantitative criteria that would necessarily fail to incorporate important considerations.

This disagreement thus involves the basic framework for the entire risk analysis process. After the risk analysis workshop, we should have a better idea whether a more quantitative approach is feasible.

Diversity within ESUs

Some scientists have argued that once ESUs are defined, they should be considered essentially homogeneous units, and the only ESA issue is whether the entire unit is at risk of extinction or endangerment. These scientists have criticized NMFS' concerns for conserving diversity within ESUs, pointing out that salmon ESUs already are only "distinct population segments" of biological species, so diversity of the species is insured if all ESUs are maintained.

Although we agree that the process of identifying successively finer units for conservation can be taken too far, it is not the case that most (or even very many) salmon ESUs are homogeneous. If we wanted ESUs to meet this criterion, there would be a very large number (at least hundreds) for each salmon species. Most salmon ESUs we have identified incorporate substantial geographic areas, a variety of life history types (e.g., summer and winter steelhead), and, presumably, considerable genetic diversity. Furthermore, according to the ESA, a "distinct population segment" is a "species" that is eligible for the same level of protection as biological species and subspecies. This means that an ESU can be listed if it is threatened or endangered "throughout all or a significant portion of its range."

The key scientific disagreement thus focusses on the most appropriate biological interpretation of the phrase "significant portion of its range" with respect to ESUs. In spite of the legal definition, populations or groups of populations (such as most ESUs) are qualitatively different than biological species. Does a "significant portion of the range" of an ESU have a different biological meaning than it does for a taxonomic species? If so, what factors should be considered in evaluating the importance of diversity within ESUs? Again, this topic will be considered at the November risk analysis workshop.

This issue is applicable to most ESUs of most species, but is particularly so for the transboundary coho salmon ESU, which is dominated by populations in the Rogue and Klamath Rivers.

Natural environmental variability

Even pristine salmon populations are prone to large fluctuations in abundance. Furthermore, there is growing evidence for decadal-scale cycles in ocean productivity regimes that can strongly affect abundance of populations over a large geographic area. Some scientists believe that NMFS has not adequately accounted for these natural sources of variability in its salmonid risk analyses, particularly for coho salmon and steelhead. Some argue that even if no further conservation measures are taken, many populations that are presently considered at risk will rebound naturally when ocean productivity improves. For example, ODFW has concluded that declines in ocean productivity have been the most important factor in the decline of coastal Oregon coho salmon. The State of California's Resources Agency has contended that the relative importance of this and other factors responsible for the decline of coho salmon are unknown.

We have recognized these sources of variability in our risk analyses, but it must be kept in mind that the ESA allows listing of species that are at risk because of natural as well as human factors. Unfortunately, the baseline for identifying "cycles" in environmental factors is very short in evolutionary time scales, and there is no guarantee that current "hard times" will turn around any time soon. The key is to ensure that ESA "species" are healthy enough to survive the hard times with the added pressure of human-induced mortality, as they presumably have in the past when only natural factors were involved.

This source of scientific disagreement substantially affects risk analysis for all three coho salmon ESUs proposed for listing.

Summary

We have been working diligently since the listing proposal (July 1995) to resolve scientific issues related to the coho salmon ESUs that were proposed for listing or identified for candidate species status. Since May of this year, this has involved intense efforts working with the Science Team for Oregon's CSRI process. Much progress has been made, but we are only just now at a point where we can review and summarize all the new information for consideration by the Biological Review Team. Furthermore, scientific disagreements about some key types of data (especially data related to extinction risk analyses and the effects of hatchery fish) will not be resolved for an additional 1-3 months. Finally, it would be very unfortunate if NMFS were forced to make a final listing determination before the results of the risk analysis workshop could be carefully reviewed and incorporated.