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Steven Thompson, Manager
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Joseph Grindstaff, Deputy Secretary
California Resources Agency

Re: Dam Removal, Klamath River

Dear Steve and Joe,

As you know, we were members of the NRC committee which evaluated the fish issues on the Klamath River (NRC 2004). In this letter, we comment further on issues related to effects of dam removal on fish, mainly salmonids, in the mainstem Klamath River. We wish to express our concern that unique and important opportunities to understand –and modify--the impacts of dam removal will be lost if the proposed removal of hydropower dams on the Klamath River is not performed within an appropriate scientific framework.

As you may recall, the NRC committee recommended that dam removal be evaluated as a way of improving conditions in the river. Removing the hydropower dams has the obvious benefit of increasing the amount of habitat available to coho salmon, Chinook salmon, and steelhead both in the dam reach and upstream in tributaries to Upper Klamath Lake (especially the Williamson River). Unrestricted flow in the fall, winter, and spring may also have benefits for adults migrating upstream and juveniles moving downstream. Salmon and steelhead populations in the system are clearly in severe decline and need all the help they can get. For this reason we are, in principle, supportive of current proposals to remove the dams as part of a package of actions related to the on-going FERC relicensing settlement negotiations.

First and foremost, however, we are members of the independent scientific community that supports the transparent use of high quality science to guide critical policy decisions and their implementation. Unfortunately, to date, there is a distinct shortage of scientific analysis of most of the consequences of removal of the Klamath dams. The Klamath is a complex, unique river system with a diverse fish fauna. In addition, the proposed dam removal project is unprecedented in size and scope. The US dam removal community has never attempted anything comparable to this. The combination of project scale and unique river system insures that unanticipated effects—some positive, some negative—will occur during and following dam removal. It seems prudent to make investments in developing the science behind Klamath dam removal that insures effects are as fully understood as possible, and that alternative adaptive strategies are explored. We think that existing studies (primarily in the 'gray' literature) are inadequate to provide reliable predictions about the effects of dam removal. *Most notably, there has not been a systematic, comprehensive assessment of the impact of dam removal on native fish populations of the Klamath, particularly salmonids*. This is surprising because the primary motivation for removal of the dams is improvement of these populations.

Simply put, a science program is needed that is transparent, independent, peer-reviewed where possible, and focused on the major uncertainties associated with how and when to remove the dams. This program should, at minimum, address the following issues that we think would help guide an adaptively managed dam removal program:

1. No entity, including PacifiCorp, federal and state agencies, and stakeholder interest groups, has provided sufficient modeling and analysis to demonstrate the water quality impacts associated with removal of the dams. To date, most of the focus has been on sediment trapped behind the dam. Given that this is a sediment-starved system regulated by a large

lake, sediment from the reservoirs *per se* is unlikely to be a major factor affecting fish and invertebrate populations of the river, at least in the long term. However, given the high nutrient and organic loads discharged by Upper Klamath Lake and the reduced transit times associated with dam removal, it is reasonable to anticipate significant changes in water quality that will impact populations of fish species, especially salmon, steelhead, and sturgeon. These analyses will be critical in guiding dam removal because the water quality effects of dam removal remain the top uncertainty.

2. Based on recent research, Iron Gate Dam appears to create conditions downstream that are conducive to the polychaete worm that is an intermediate host for lethal disease organisms for juvenile salmon. These conditions will presumably change following dam removal. It is not clear at this point if these conditions will improve or simply relocate upstream. If disturbance of the polychaete edge habitat by increasing flows is the main mechanism to be used to control disease (as has been proposed), how will this be accomplished without the dams?

3. The 2004 NRC committee recommended that Iron Gate Hatchery be shut down experimentally for a period of time, to study the effects of hatcheries on salmon and steelhead populations in the Klamath. This has not been done. Yet, the disposition of the hatchery and its role in restoring salmon and steelhead remains unclear. Indeed it is not clear that the hatchery will or can be operated once the dams are down.

4. The upper basin supports a population of redband trout that grow to large sizes in Upper Klamath Lake and spawn and rear in the Williamson River. When steelhead enter the system from downstream, they will impact redband trout and its fishery, given that the two kinds of trout will likely have similar spawning and rearing habitats, can hybridize and are susceptible to the same diseases. In addition, reintroduction of Chinook salmon may change tributary food webs (through addition of nutrients) and increase predation (by juvenile Chinook) on larval suckers, including the listed shortnose and Lost River suckers, as well as on other endemic species.

5. Despite press reports to the contrary, we have seen nothing that would indicate that a dramatic increase in salmon and steelhead populations will occur following removal of the dams. As noted in the NRC 2004 report, tributary conditions in both the upper and lower Klamath Basin are a major limiting factor in recovery of listed species and salmonids in general. For this reason, to be successful any dam removal program must be integrated with efforts to restore those tributaries.

6. Given that there are runs of anadromous fish moving up or holding in the Klamath River virtually all months of the year, it is not clear how dam removal will progress to minimize harm to downstream populations. We think a low-harm strategy is possible (e.g., by sequencing the dam removals) but would like to see it spelled out, at least conceptually, to determine potential harmful effects.

Analysis of these (and other) issues, will involve substantial literature review, modeling, and field research. If such studies are available, we are simply not aware of them. As noted above, a transparent, coordinated science program is needed to address these issues and to guide how, where and when dams are to be removed. After all, if undertaken, this will be the most ambitious dam removal program in history and is likely to set the standard for future dam removal programs. It should be done carefully, adaptively, and with solid scientific backing.

Finally, we reiterate that we are not opposed to dam removal. Indeed, we have endorsed the concept of dam removal many times and support it as a fundamental goal. But we do think a more complete scientific analysis on the effects of dam removal on fish and fisheries is warranted. An independent analysis that considers all the possible effects, good and bad, can only help in making sure that the dam removal process is conducted in such as way as to maximize benefits to the Klamath's beleaguered fishes.

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