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Mr. Demian Ebert
c/o PBS&J
1211 SW 5th Avenue, Suite 790
Portland, OR, 97204

Re: Comments on the KBRA Coho Salmon and Steelhead Expert Panel Report for the Resighini Rancheria

Dear Mr. Ebert,

These comments were formulated on behalf of the Resighini Rancheria, a federally recognized Tribe located at the top of the Klamath River estuary about three miles above its convergence with the Pacific Ocean. Since the Resighini Rancheria members rely on the river for sustenance, as they have since time immemorial, the success or failure of the Klamath Basin Restoration Agreement (KBRA) and Klamath Hydropower Settlement Agreement (KHSA) will have profound and long-lasting impact on them.

Over all we found the Expert Panel report to be well founded and their skepticism of the benefits of the KBRA to coho salmon and steelhead warranted. They pointed out that "presentation of the evidence from all viewpoints on key scientific issues prior to the meeting would have increased the effectiveness of this Panel" (p. 19). We will touch on critical information that the Panel did not receive with regard to water quality, particularly the linkage between the Lost River and Keno Reservoir pollution. The conclusion of the Panel is that there is insufficient evidence to judge whether KBRA will, in conjunction with dam removal, foster recovery of fisheries, water quality, or Klamath River ecosystem function because major aspects of the KBRA remain undefined. The Resighini Rancheria shares these same concerns.

Water Quality Problems Not Solved by KBRA

The Panel recognizes the major problems with water quality, but would have been better informed had they been provided the *Water Quality Control Plan Hoopa Valley Indian Reservation* (Hoopa TEPA 2008), which explains the complex mechanisms of Klamath River water quality impairment. In addition to temperature, dissolved oxygen, ammonium and toxic algae recognized by the Panel, elevated pH caused by nuisance algae blooms can be directly stressful to coho salmon and steelhead (Wilkie and Wood 1995). Elevated pH also combines with warm water temperatures to convert ammonium ions to dissolved ammonia (Goldman and Horn 1983). Not only did the Panel overlook pH as a stressor, it also neglected the topic of synergistic action of multiple water quality

stressors lowering coho salmon and steelhead resistance and increasing their susceptibility to diseases.

The Panel characterized dissolved oxygen (D.O.) problems as follows:

> "Depression of dissolved oxygen in Upper Klamath Lake and the reservoirs is due to elevated oxygen demand caused by high levels of organic matter, mainly due to production by algae (Doyle and Lynch 2005) and to some extent high ammonium concentrations (Sullivan et al. 2010)" (p. 38).

What isn't stated here is that major sources of nutrients causing anoxia in Keno Reservoir are also coming from the lower Lost River, Tule Lake and the bed of Lower Klamath Lake. Winter water from the Lost River is pumped into the Klamath River below Klamath Falls, Oregon (Deas and Vaughn 2007) and has the potential to add to sediment oxygen demand. In summer, drain water from Tule Sump and industrially farmed areas in Lower Klamath Lake is emptied directly into Keno Reservoir through the Straits Drain. Keno Reservoir not only went anoxic from 1996-1998, it continued to do so annually from 2001-2005 (Deas and Vaughn 2007).

The Panel also pointed out the need for a major, strategic reduction in nutrients:

> "Experience from other locations where eutrophication is a major problem suggests that, at a minimum, drastic reductions in loading from the watershed must accompany local amelioration. These reductions must account for the apparently high natural nutrient inputs from the local watersheds, and the unavoidable leakage occurring in watersheds heavily altered for urban and agricultural use. Thus, it would be premature to conclude that any problems caused by these blooms, including low dissolved oxygen, will be substantially reduced by KBRA" (p. 39).

The Lost River Basin was a sink, ending at Tule Lake, and not connected to the Klamath River historically, but today all its wastes are exported to the Keno Reservoir reach. The KBRA gives agricultural interests the right to continue to farm on 22,000 acres of the Tule Lake and Lower Klamath Lake National Wildlife Refuges for 50 years or through 2062. There is no similar arrangement on any other refuge system in the nation and these publicly owned lands need to be restored to lake and marsh systems to meet intended wildlife conservation benefits to reduce pollution, increase natural nutrient assimilation, decrease water demand, and to increase water storage. Without such strategic action, algae blooms will still be a huge problem in the lower Klamath River and water pollution will be an equal or even greater stressor on juvenile salmon and steelhead.

Asarian et al. (2010) found that dam removal will actually result in a substantial increase in total nitrogen (TN) at the current location of Iron Gate Dam and a modest increase in total phosphorous (TP) because they will no longer settle out in reservoirs. This recent finding makes an even stronger case for reducing nutrients in the Upper Klamath Basin at their source.

Conversion of marsh land around Upper Klamath Lake has provided ample phosphorous for plant growth and caused nitrogen to become more limiting. The nitrogen fixing blue-green algae *Aphanizomenon flos aquae* colonized Upper Klamath Lake after WW II (NRC 2004) and can transform nitrogen gas from the air into a form usable by plants. Agricultural water supply through the A Canal continually inoculates the Lost River and Tule Lake with this nitrogen fixing species. Research indicates that mild acids from decaying material within marshes causes *A. flos-aquae* cells to break down (ASR/WRC 2005, WRC 2009). Therefore, marsh restoration is needed to stop nitrogen fixation that is a major source of pollution throughout the Upper Klamath Basin.

> "The description provided to the Panel (Barry et al. 2010) says the restoration is 'Likely to be combination of treatment wetlands, engineered water treatment facilities, physical removal of particulate organics, treatments to precipitate nutrients (alum, clay, etc.). Cost certain to be large, precise estimates will follow appropriate studies'" (p. 38).

The technical approach embraced by the KBRA will not likely be sufficient and the cost of treatment and/or pumping associated with such actions is likely to be prohibitive. The greatest likelihood of success would be to restore the natural water storage and water filter capacity of the Upper Klamath Basin, or some portion thereof, as it existed prior to disturbance. As marshes within the lower Lost River and Keno Reservoir riparian zone and Tule and Lower Klamath lakes were restored, they would reduce sources of pollutants and water demand and instead act as nutrient assimilation and cold water storage systems. They would also be fed by gravity and natural flow patterns that do not require constant expenditure of energy or on-going subsidy.

Laetz et al. (2009) recently found that coho salmon juveniles were very susceptible to combinations of pesticides at low levels due to synergistic effects and the Resighini Rancheria is concerned that this issue is not even addressed in the KBRA or the Expert Panel coho and steelhead report.

Ecosystem Function Not Restored by KBRA

The Panel comments on ecosystem function focus on food production and competition with native trout, but fail to look at landscape scale questions with regard to re-establishing the equilibrium of flow and nutrient inputs with which coho salmon and steelhead co-evolved. For example, the Lost River where much of the Klamath Project is located was never joined to the Klamath River historically and the large export of nutrients into the Keno Reservoir is far beyond the capacity of the system to assimilate. The Panel repeatedly refers to the Klamath River as "naturally" nutrient rich, but the ecosystem was still extremely productive because of the natural buffer and filter capacity of the marshes and lake systems. Hundreds of thousands of acres of marsh and lakes in the Upper Klamath Basin have been converted to agriculture; the question is how much needs to be restored to marsh to re-establish this balance.

The Panel points out in discussion of flow that patterns were much different before Lower Klamath Lake was disconnected and the inception of the Klamath Project and their Figure 3 is adapted for use here (Figure 1). The clear departure of flow patterns from historic levels with which salmon and steelhead co-evolved is in itself another manifestation of failure to restore ecosystem function. This artificially low flow regime fosters increased temperature, increased nutrient concentrations and conditions that help increase pathogens in the river. The KHSA and KBRA will move the river further from its historic range, not closer to it; therefore, these agreements will not heal the river. If Lower Klamath Lake were refilled, it would increase water storage and move the lower Klamath River flow towards its historic norm, eliminate a large nutrient source and restore assimilative capacity it so badly needed to offset contributions from the Lost River.

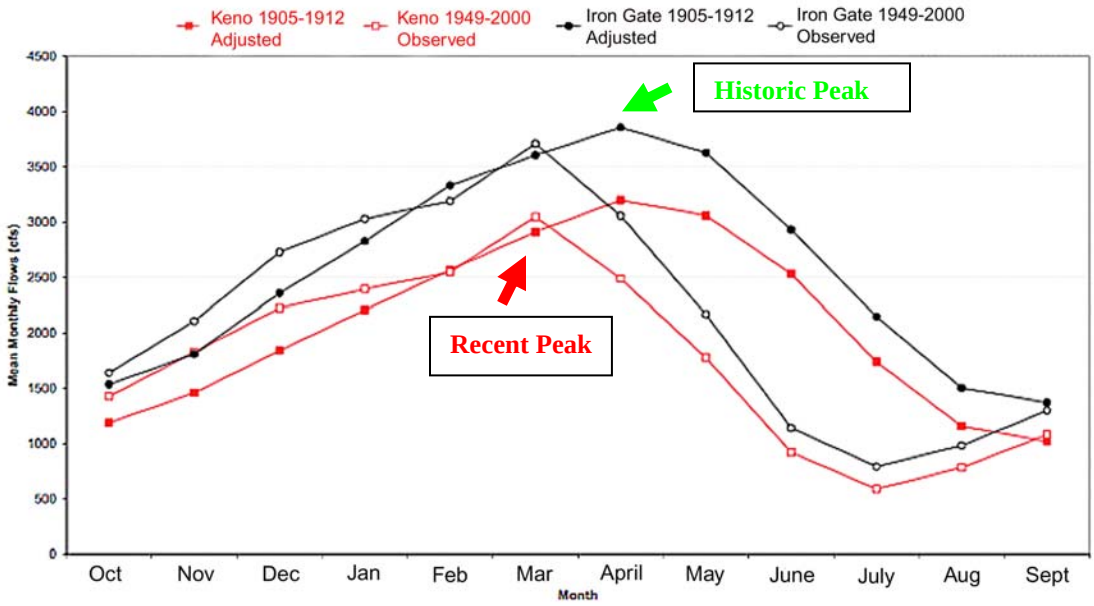

Figure 1. Chart of historic seasonal flows versus those after the construction of the Klamath Project and the disconnection of Lower Klamath Lake with annotations on peaks added. Taken from the coho and steelhead Expert Panel draft report where it occurs as Figure 3.

The Indian People of the Klamath River Basin have harmony based cultures that believe themselves and all the other living things to be a seamless part of the river. For the river to function properly and continue as a living system, all native aquatic organisms should be able to flourish. While the Lost River and short-nose suckers of the Upper Klamath Basin were covered by a previous KBRA/KHSA report and process, we believe the coho and steelhead expert Panel should have recognized them as an indicator species. The NRC (2004) recommended that Lower Klamath Lake be filled to establish an additional population center for suckers. In addition, the NRC (2004) also notes that the lower Lost River and Tule Lake were once the most important areas for Native American fishing because of the abundance of suckers. These areas also need to be restored to a suitable condition for suckers under the Endangered Species Act and the Clean Water Act and yet

under the KBRA the Lost River is to remain compromised until at least 2062. As a consequence, the pollution exported from this area will continue to push the Klamath River over the tipping point from nutrient enriched to nutrient polluted and the ecosystem will exhibit continuing non-normative function.

The Panel invokes the Klamath River TMDL (NCRWQCB 2010) as having the potential for helping abate water pollution in conjunction with the KBRA. The Klamath TMDL is conjoined to the Lost River TMDL, which also includes Lower Klamath Lake. The Lost River and short-nose suckers are beneficial uses under the CWA and, therefore, need to be restored in these locations. However, continued farming on the Lease Lands in the Tule Lake and Lower Klamath Lake National Wildlife Refuges will not allow either sucker or water quality recovery by 2062, thus, the KBRA actually blocks successful TMDL implementation. If suckers were thriving in these locations, Keno Reservoir would no longer exhibit anoxia and the balance of a properly functioning Klamath River ecosystem would be restored.

The Panel recognizes that failure by the KBRA to abate water pollution in Keno Reservoir and Upper Klamath Lake and instead relying on trapping and hauling for fish passage constitutes an "open-ended retreat from ecosystem restoration goals."

There are also problems with maintaining ecosystem function in Klamath River tributaries, such as the Shasta and Scott Rivers. The Panel correctly raised questions about the success of restoration there:

> "Restoration efforts, independent of KBRA, are currently improving habitat in tributaries downstream of Iron Gate Dam, but the extent of changes and their effect on populations or even use of the habitat are undocumented in the reports supplied to the Panel. Some of these efforts apparently began years ago; yet, increases in some species such as coho that depend on tributary habitat are not apparent" (p. 54).

Kier Associates (1999) chronicled some success with riparian restoration in the Shasta and Scott River basins, but also noted that depleted flows were confounding restoration success. Van Kirk and Naman (2008) showed that increased groundwater pumping was depleting surface flows in the Scott River basin to well below historic norms. There is an attendant decrease in water quality and suitability for salmonids (QVIC 2008a). NRC (2004) pointed out that spring flows that historically provide ideal conditions for salmonids in the Shasta River had been cut off and diverted for agriculture and domestic water supply. They recommended restoring flows to decrease transit time and thereby alleviate temperature problems in the Shasta River. The Shasta River TMDL (NCRWQCB 2006) calls for an increase in flows to restore water quality, but no action has been taken or is currently planned. The California Department of Fish and Game (ESA 2009a, 2009b) incidental take permits (ITP) issued for the Scott River and Shasta River will not address flow problems (QVIC 2008a, 2008b). Therefore, additional expenditures of KBRA funds in these basins will not restore ecosystem function.

The Panel discusses the small cold water islands at the mouths of Klamath River tributaries and in their lower reaches and suggests modeling exercises related to their carrying capacity. The refugia are the last viable patches of habitat, and surely they must be protected, but the juvenile coho that utilize them should actually be able to rear in the Shasta River and Scott River all year long, if their flows were restored. This would help achieve the two to four-fold increase in freshwater survival the Panel said was needed for coho salmon to flourish into the future and provide a source of colonists for habitat opened up by dam removal.

Water Quality Monitoring

The Panel was disappointed that the KBRA did not have a defined water quality plan and offered the following (emphasis from their report):

> "Monitoring programs should be planned, coordinated, and implemented ***now*** for effective and timely detection of the consequences for the salmon of the grand experiment comprising the dam removal and KBRA program. A monitoring program should be designed and established ***as soon as practicable*** to provide useful and timely guidance for KBRA and the design of dam removal" (p. 18).

If the KBRA were really coordinated with the TMDL, and its objective was to abate water pollution, then the water quality standards within the TMDL, the *North Coast Basin Plan* (NCRWQCB 2007) and the *Water Quality Control Plan Hoopa Valley Indian Reservation* (Hoopa TEPA 2008) should have been adopted as program targets. Trend monitoring of these parameters at strategic locations along the river before and after dam removal would provide information on which to base adaptive management. Target dates for compliance need to be relevant to Pacific salmon recovery (10 years).

Effects of Hatchery Operation Versus Habitat Loss on Coho Salmon Productivity

The Panel ascribes low stock productivity in the Shasta River to introgression of non-native traits into the population, when in fact the low survival is as a result of a habitat collapse. While the Panel used information from Bill Chesney of the CDFG on low survival of coho salmon in the Shasta River, they may not have been in receipt of the report *Shasta River Juvenile Coho Habitat and Migration Study* (Chesney et al. 2009). This report indicates that some of the last springs in lower Parks Creek are being dried up directly resulting in loss of coho juveniles. Long term Shasta Rack counts document wild coho salmon trends (QVIR 2006) and the Scott River has consistent, widespread wild coho salmon spawning (Maurer 2002, 2006). The extreme flow depletion in these basins has driven coho to the brink of extinction in these basins, not stray hatchery fish.

Conclusion

The Panel clearly describes the changes in precipitation and ocean conditions attendant with the Pacific decadal oscillation cycle (PDO) and documents on-going climate change effects in the Klamath Basin such as increased snow elevations, decreased spring flows,

and highly variable precipitation. The switch of the PDO to dry on-land and poor ocean productivity in 1975 was followed by the 1976-77 drought and the record inter-annual drought from 1986-1992 also came during this cycle. This means that there will likely be an equal or more severe series of droughts after the predicted PDO switch sometime between 2015-2020 (Collison et al. 2003).

There are empirical data not put before the Panel that show that coho and steelhead habitat is drying up and that acute nutrient pollution is causing a cascading downward ecological spiral in the Klamath River that now includes toxic algae. The KBRA should have followed a "best-science" approach to ecosystem restoration as described by Bisson et al. (2009):

> "Management of the freshwater habitat of Pacific salmon should focus on natural processes and variability rather than attempt to maintain or engineer a desired set of conditions through time."

The KBRA attempts to use technical fixes and energy intensive engineering approaches to restoration while failing to deal with the fundamental problems of flow and nutrient pollution.

The Panel states that "The processes, controlling factors, and hazards likely to have the greatest influence on project outcomes should be identified ***now***" (emphasis in report). The KBRA needs to be modified to deal with the reality that dam removal increases nutrients and to abate pollution and restore natural water storage and purification systems upstream or poor Klamath River fish health and low juvenile survival will continue.

The Tribal Council of the Resighini Rancheria respectfully requests that you consider and evaluate these comments.

Sincerely,

Patrick Higgins

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