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UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF CALIFORNIA

SAN LUIS & DELTA-MENDOTA WATER AUTHORITY and WESTLANDS WATER DISTRICT,

Plaintiffs,

v.

SALLY JEWELL, et al.,

Defendants,

and

HOOPA VALLEY TRIBE; PACIFIC COAST FEDERATION OF FISHERMEN'S ASSOCIATIONS; INSTITUTE FOR FISHERIES RESOURCES; and YUROK TRIBE,

Defendant-Intervenors.

CASE NO. 1:13-cv-1232-LJO-GSA

DECLARATION OF DONALD RECK IN SUPPORT OF FEDERAL DEFENDANTS' OPPOSITION TO PLAINTIFFS' MOTIONS FOR TEMPORARY RESTRAINING ORDER AND PRELIMINARY INJUNCTION

Judge: Honorable Lawrence J. O'Neill
Date: No Hearing Set
Time: No Hearing Set
Courtroom: No Hearing Set

I, , Donald Reck, declare as follows:

1. I am currently employed as an Environmental Resources Specialist with the Bureau of Reclamation, Northern California Area Office in Shasta Lake, California. I was previously employed as a Fish Biologist for NOAA's National Marine Fisheries Service and as a Fish and Wildlife Biologist for the U.S Fish and Wildlife Service for 17 years, most in northern California. In my current position, my responsibilities include implementing the Clear Creek Restoration Program and other salmon and steelhead-related restoration activities in the Sacramento River, obtaining environmental clearances for all Area Office activities, and a water quality monitoring program in the Sacramento River Basin and Trinity River Basin. As a fish biologist with NMFS and the FWS, my duties included implementation of the Endangered Species Act as it relates to listed anadromous fish, marine mammals, and terrestrial and aquatic species. I have had substantial experience analyzing management of regulated river systems, including the Klamath and Trinity Rivers since 1997. I hold a B.S. in biology from San Diego State University and a M.S. in natural resources with a fishery emphasis from Humboldt State University.

2. I make this declaration on the basis of my knowledge and experience as an Environmental Resources Specialist, along with prior experience as a Fish Biologist, and my first-hand knowledge of the Clear Creek Restoration Program and other salmon and steelhead-related restoration activities in the Sacramento River, obtaining environmental clearances for all Area Office activities, and a water quality monitoring program in the Sacramento River Basin and Trinity River Basin.

3. I have reviewed the Court's August 26, 2014 Minute Order (Order) and Plaintiffs' motion for a preliminary injunction and temporary restraining order and the supporting declaration of Dr. Charles Hansen. I submit this declaration to address the Court's questions raised in that Order and to respond to the opinions offered by Dr. Hansen.

I. Ich Life History and Proliferation Under Given Environmental Conditions

4. The Ich outbreak in 2002 is believed to be the principal event that led to the fish die-off. Ich is a fresh-water ciliated protozoan. The life cycle includes the following stages: an attached parasitic stage, a detached reproductive stage, and a free-swimming infective stage. The optimal temperature for Ich development is 21.1-23.9 °C. Within this optimal range, the higher the temperature the faster the parasite replicates.

5. The parasitic phase of Ich can encyst in the skin or gill, and damage to the skin and gill results in osmoregulatory and respiratory distress. Mortality from Ich may be caused by the parasite when the gills are too damaged to function. Breaching the protective barrier of the skin by Ich may also allow opportunistic bacteria or fungi access to underlying tissues resulting in death from secondary infections. Hatchery studies have shown that increased flows and velocities reduced the probability of the infective stage of Ich finding a host, since the parasite was swept away downstream. Outbreaks of Ich occur when conditions are favorable for rapid multiplication of the parasite, and includes a suitable environment and susceptible fish. Ich epizootics occur when fish are stressed, densities are high, and the water temperature is relatively elevated. A variety of factors can induce stress in fish including crowding, high temperature, and spawning activities. Frequently, spawning adults of only one species are affected.

II. Historic Environmental Conditions

6. Historically, there have been relatively low flows in the lower Klamath River in August and September. Specifically, there have been 7 years with flows less than 2,500 cubic feet per second (cfs) since 1978 when fall-run Chinook salmon runs have been forecasted and estimated. Of these years, three years, 1987, 1988, and 2002, featured greater than average run size estimates that coincided with relatively low flows.

7. In 1987 and 1988, the Yurok Tribe Chinook salmon fishery harvested more than 30,000 fish prior to the end of August and fewer fish moved into the lower river on their spawning migration. This resulted in lower densities of fish, less residence time while holding, and less

susceptibility to the spread of disease. Since then, Yurok Tribal fishery management have changed and modernized, and harvest is spread out more evenly over the course of the run.

8. In 2002, low flows and high fish densities and holding residence times contributed to the epizootic disease outbreak of Ich that was the primary cause of the premature death of a minimum of 34,000 adult salmon and steelhead.

III. 2014 Environmental Conditions

9. With the start of calendar year 2014 it was clear that water supplies in the form of reservoir water storage and snow pack could be low. By April, the Pacific Fishery Management Council forecasted a Klamath River fall-run Chinook salmon run size of 92,800 adults. This run size is below average and accordingly fish biologists working in the basin were on alert but not particularly concerned to the extent that run size relates to fish densities and holding area residence times. It subsequently became clear late in July that there would likely be modern-day record low accretions to the Klamath and Trinity Rivers, and forecasts were trending toward accretions lower than 1977, the previous modern-day record low.

10. Flow and temperature conditions in the lower Klamath River have deteriorated to levels lower and warmer than was forecasted prior to July 30, 2014 and are now these conditions are very similar to those documented during the 2002 fish die-off. Flow rates in the tributaries are also extremely low and in some cases, at or near zero. This means that fish must remain in the mainstem and that little thermal relief is available in these areas to lower stress of holding fish. For example, Blue Creek, one of the largest of lower river tributaries presently only offers scant amount of flow and what flow is entering the Klamath River is only providing a narrow band along the rivers margin which is used extensively, despite the shallow nature of these habitats.

11. Discharge in the Klamath River above the Trinity River confluence is similar to that observed in 2002, despite releases from Iron Gate Dam being significantly lower in 2002 than in 2014. This difference can be attributed to the lower contributions from tributaries, which are generally of better water quality and are colder than water in the mainstem Klamath River.

12. In addition, the low volume of tributary accretions has resulted in a smaller overall volume of thermal refugial areas along the mainstem river. These conditions provide limited thermal relief, needed to reduce the stress of holding fish and to minimize conditions conducive to increasing fish-to-fish disease transmission due to crowding.

13. As documented in notes from the August 1, 2014 Klamath Fish Health Assessment Team (KFHAT) conference call notes (**Exhibit 1**), relatively warm water temperatures and low flows in the lower Klamath River have recently been conducive to growth of blue-green algae and higher levels of associated microcystin toxins. The relative higher influence of nutrient-rich water releases from Iron Gate Dam on the Klamath River, due to lower contributions of tributary accretions, has also contributed to this condition. Specifically, a blue-green algae bloom was observed in Weitchpec at the confluence of the Klamath and Trinity Rivers on July 30, 2014.

14. It is not clear exactly what risk is imposed upon returning adult salmon by the bioaccumulation of the microcystin toxins with regard to susceptibility to disease, but other juvenile salmonids and resident fish are more susceptible to accumulation of toxins due to higher residence time and these fish can serve as disease vectors should they succumb.

15. The KFHAT August 1, 2014 call notes also mention that juvenile salmonids have been subject to high levels of Ceratomyxa Shasta infections in 2014, increasing the susceptibility of these fish to Ich infections as well. Large numbers of juvenile salmonids have been observed to reside in the same, limited, cold water refugia being used by returning adult salmonids.

16. Significant numbers of returning adult fish began moving into the lower river earlier than expected and have been observed holding in large, crowded schools for long periods in small thermal refugial areas. This appeared to have been in response to a freshet that occurred in the basin, most notable in the Salmon River, in late July.

17. Following this rain event, water temperatures measured at the Klamath gage site dropped to below 22 degrees C, but thereafter increased to reach daily maximums of over 25 degrees C in early August. Prior to the July 30 Decision it was anticipated that fish would not enter the river

system if it was too hostile. It is well documented that fish remaining in close proximity in holding areas for extended periods can accelerate the spread of Ich through fish-to-fish transmission.

18. Because of the changing environmental conditions and alarming reports of unusual fish behavior, Reclamation convened a technical meeting with State and Federal fishery experts, tribal fishery experts, and consultants to further assess the present conditions in the lower Klamath River and determine if there were conditions or other pertinent factors that were not considered in the July 30, 2014 initial flow augmentation decision. It became clear at that meeting that the convergence of adverse environmental conditions and unusual fish behavior constituted an emergency situation that called for a more proactive increase in flows in the lower Klamath River to prevent an Ich outbreak and resulting large-scale fish die-off.

19. In response to deteriorating environmental conditions in the river, in late summer 2014, the Hoopa Valley Tribe, Yurok Tribe, Humboldt County, and the Pacific Fishery Management Council all provided the Department of the Interior requests for flow augmentation in the lower Klamath River (**Exhibit 2**).

20. Just three weeks ago, on August 1, 2014, the Klamath Fish Health Assessment Team (KFAT) noted that water temperatures in the river were generally between 24 and 26 degrees C and the flow in the lower Klamath River dropped to 2,000 cfs. At the same time, thousands of juvenile Chinook salmon and hundreds of adult steelhead and Chinook salmon were crowded into the Bluff Creek cool water refugia, and possibly more than 1,000 adult steelhead and Chinook salmon were crowded into the Blue Creek cool water refugia. About 25 percent of the juvenile fish at the Pecwan cool water refugia showed signs of illness. Adult salmonids crowded into cool water refugia were observed to be stressed and dark in color.

21. A week later, on August 8, the KFAT issued a press release stating that they were on high alert for signs of fish mortality, as there had already be observed dead adult salmonids in the mainstem Klamath River. And a week after that, Dr. Joshua Strange, Stillwater Sciences,

prepared a memorandum "Update on Flow Forecast for the lower Klamath River and Adult Fish Kill Risk for 2014" that summarizes environmental conditions in the lower Klamath River at that time (**Exhibit 3**).

IV. NEPA Compliance for 2014 Flow Augmentation

22. On August 22, 2014, Reclamation issued its Decision Memorandum to support emergency activities for lower Klamath River flow augmentation in late-summer 2014, pursuant to Department of the Interior guidelines. The memorandum stated that Reclamation intends to follow Council on Environmental Quality (CEQ) NEPA implementation regulations for the emergency situation in the lower Klamath River. Specifically, Reclamation is preparing a focused and concise Environmental Assessment.

23. Plaintiff's request for a temporary restraining order to halt flow augmentation forced Reclamation to delay its Environmental Assessment in order to respond to Plaintiffs' litigation motion. Reclamation is also contacting CEQ to discuss alternative arrangements for completing NEPA documentation for this emergency action.

V. Effects of Reclamation's Emergency Augmentation Flows To Date And Consequences Of An Injunction.

24. The flow augmentation action started on August 23, 2014. Since that time, water temperatures in the lower Klamath River have decreased. There has been a decrease in the number of fish utilizing the Bluff Creek refugia area, although fish observation is challenging due to the blue-green algae bloom. In addition, adult steehead density in the Blue Creek refugia remains high and Chinook salmon are coming into the river and utilizing this refugia in greater numbers. Some fish are showing signs of Columnaris infections, but no Ich infections have been observed to date.

25. All of these environmental conditions will deteriorate if the flow augmentation in the lower Klamath River were prematurely halted. And water temperatures are likely to increase if flow augmentation were halted prematurely, and this would likely further crowd adult salmonids into the limited available cool water refugia and increase stress and susceptibility to disease

VI. Reclamation Responses to Hansen Declaration (Aug. 25, 2014)

26. In his most recent declaration, plaintiffs' consultant Charles Hansen states that Reclamation proposes to release 30,000 [acre-feet; AF] of additional water from the Trinity River in 2014. Hansen Dec. ¶ 8. This is incorrect. Based on the Klamath Basin accretion forecast, and planned reservoir releases, Reclamation plans to release about 25,800 AF of water from Trinity Reservoir to augment flows in the lower Klamath River in late summer 2014.

27. Dr. Hansen also states that Reclamation released 17,000 AF for lower Klamath River flow augmentation in 2013. Hansen Dec. ¶ 15. This is also incorrect. Reclamation released about 17,500 AF from Trinity Reservoir to augment flows in the lower Klamath River in 2013.

28. Dr. Hansen states that Reclamation explained that two factors affected the previous decision not to make "preventative" flow augmentation releases in 2014: a below average fall-run Chinook salmon run size forecast and the need to preserve cold water storage in Trinity Reservoir. Hansen Dec. ¶ 17. While it is true that an above average run size can increase the probability of crowded conditions in fish holding areas, as explained elsewhere in this declaration, increased fish residence time and crowding in holding areas can occur even when the run size estimate is below average. And these conditions are conducive to the spread of disease.

29. The cold water supply in Trinity Reservoir and associated river temperature control have been considered during the flow augmentation decision process. Reclamation believes that temperature control in the Trinity and Sacramento Rivers, and Clear Creek (tributary to the Sacramento River) can be maintained. Reclamation's Central Valley Operations Office indicated that the temperature impacts to Clear Creek are expected to be very minor in October (less that 0.1 degree F increase), and potentially less in the Sacramento River. The Trinity River Division diversion volume to the Sacramento Basin is assumed to remain the same.

30. Dr. Hansen states that increased releases from Trinity Reservoir are not expected to result in a substantial reduction in mainstem water temperatures or expand the area of thermal refugia

for salmon and steelhead. Hansen Dec. ¶ 23. Again, he is incorrect. U.S. Fish and Wildlife Service reports have documented since 2003 that increased flow from Trinity Reservoir in the late summer decreases water temperatures in the lower Klamath River by about 1.0 to 3.0 degrees F. Also, the mainstem Trinity River cools as a result of the increased releases and serves a cool water refugia for use by salmonids.

31. Dr. Hansen states that there is a high degree of uncertainty in predicting the biological benefits from augmenting flows in the lower Klamath River in late summer. Hansen Dec. ¶ 24. While it is not possible to quantify the biological benefits of flow augmentation, as previously discussed, expected water temperature reductions in the lower Klamath River will result in lower physiological stress in salmon and steelhead and an associated decrease in susceptibility to disease.

32. Dr. Hansen states that there is no basis for concluding that flow augmentation in 2014 could mitigate the effect of blue-green algae. Hansen Dec. ¶ 25. This too is wrong. It is reasonable to expect that more microcystin toxins produced by the blue-green algae would be removed from the lower Klamath River due to the greater water velocities resulting from increase flows.

33. Dr. Hansen states that there is only one scientific study that quantified the velocity and water turnover rate necessary to avoid an outbreak of Ich (Bodensteiner *et al.*2000). Hansen Dec. ¶¶ 30, 32, 36. Specifically, he mentions the velocities and turnover rates that were effective in avoiding Ich outbreaks in a hatchery setting. Dr. Hansen then compared these velocities and turnover rates to those estimated in selected areas in the lower Klamath River, and suggested that because the estimated velocities and turnover rates in the river were higher than the threshold identified by Bodensteiner *et al.*, an outbreak of Ich in the lower river was not possible. Dr. Hansen's analysis is flawed and Reclamation disagrees with his conclusion. Among other things, Dr. Hansen failed to mention that only catfish were used in the hatchery studies Bodensteiner *et al.* conducted regarding Ich outbreaks. Catfish are heartier than salmonids and are warm-water

fish that were subjected to ideal conditions in the hatchery (*e.g.*, water temperatures). Salmon and steelhead in the lower Klamath River, however, are cold-water fish and are being subjected to high water temperatures and associated stress and susceptibility to disease. So Bodensteiner *et al.* is irrelevant to Ich outbreaks to salmon and steelhead in the lower Klamath River in 2014. Finally, the fact that flows in the lower Klamath River in 2002 were similar to those in 2014, and that an Ich epizootic outbreak did occur in 2002, empirical evidence shows that Dr. Hansen's conclusions regarding Ich outbreaks in the river are incorrect.

34. Dr. Hanson states that the instream flow schedule for the benefit of fisheries and other aquatic resources on the Trinity River was based, in part, on mimicking a natural seasonal pattern of instream flows and hydrologic patterns on the river, and suggests that altering late-summer flows may adversely impact other aquatic species. Hanson Dec. ¶ 39. The flow schedule developed for the Trinity River Restoration Program did include some features from the natural hydrograph, such as in the spring. However, the summer base flows are generally higher than natural flows to provide appropriate water temperatures for spring-run Chinook salmon and this was a well-considered decision. Also, a flow of 2,500 cfs in the lower Klamath River is not uncommon in August and September and has occurred between 65-70% of the time in August and between 60-65% of the time in September based on hydrologic data from 1911-2012.

35. Dr. Hanson suggests that when river flows are increased substantially during flow augmentation, Trinity River water velocities and water depths will increase, reducing habitat quality and availability for juvenile coho salmon rearing. Hansen Dec. ¶ 43. Notably, Dr. Hansen offers no evidence supporting this speculation. Reclamation did consider the effects to rearing habitat, and Goodman *et al.* evaluated flow-habitat relationships at two channel rehabilitation sites, Lower Indian Creek and Hocker Flat, and found that juvenile coho salmon rearing habitat (suitable depth, velocity and distance to cover) was relatively constant across a range of flows. While this is only a small sample of the river, it was expected that changing the degraded channel shape of the mainstem Trinity River through mechanical channel rehabilitation

and maintaining it through the re-establishment of some geo-fluvial processes would provide the conditions where habitats would be maintained over a range of flows.

36. Dr. Hanson states that the augmented flows may result in an increased risk of redd dewatering and hybridization between spring-run and fall-run Chinook salmon, citing the Trinity River Restoration Program Fall Flow Subgroup. Hansen Dec. ¶¶ 45, 46. In 2012, the TRRP Fall Flow Subgroup identified potential negative ecological and operational consequences to inform decision makers of these concerns, although previous information indicated that some of them were not urgent concerns. But the subgroup nonetheless listed them due to the limited dataset to draw robust conclusions.

37. In contrast to Dr. Hanson's suggestion, no dewatering of spring-run Chinook salmon redds was observed after the completion of the 2012 flow augmentation when the Lewiston Reservoir releases were decreased.

38. While Dr. Hanson suggests that the augmented flows may result in an increased risk of hybridization, he ignores the fact that hybridization of spring-run and fall-run Chinook salmon has occurred since the construction of the TRD, which eliminated the temporal and spatial separation of spring- and fall-run Chinook salmon spawning. Spring-run Chinook salmon used to migrate into the upper Trinity River during the descending limb of the spring hydrograph and hold in the upper Trinity River, the area above Trinity Dam, until spawning in the early fall. Fall-run Chinook salmon would migrate into the Trinity River in the fall but could not migrate into the upper Trinity until thermal conditions were suitable for migration, which was typically after spring-run Chinook salmon had completed most of their spawning. Now, spring-run Chinook salmon are maintained in the mainstem Trinity River by releasing higher summer baseflows, compared to those that naturally occurred before the TRD, to provide suitable water temperatures for these fish to survive over the summer until spawning. This situation has eliminated the spatial separation that occurred between these two races of Chinook salmon and has led to significant hybridization. The National Marine Fisheries Service in their recent status

review of Chinook salmon in the Klamath Basin concluded that sping-run and fall-run Chinook salmon are included in a single Evolutionarily Significant Unit due to a lack of spatial and temporal separation and lack of significant genetic differences.

39. Dr. Hanson cites Stutsman (2005) as the basis for opining that fall flows may adversely impact other aquatic species such as lamprey, and that the information presented in Stutsman shows an apparent increase in lamprey ammocoetes during the 2003 flow augmentation period flow but not during the 2004 flow augmentation period. Hansen Dec. ¶ 47. Reclamation disagrees with Dr. Hanson's conclusions. Stutsman (2005) speculated that the apparent lack of lamprey ammocoetes in the 2004 catch could have been due to trapping operations or that the flow augmentation in 2003 could have had an effect upon lamprey abundance in 2004. Data collected during the Trinity salmonid outmigrant monitoring project from 2001 through 2011 do not support this concern.

40. While the data presented by Stutsman (2005) were expanded to account for non-sampled days, the 2001 through 2011 total catch data had three years of overlapping data (2002-2004), and the longer dataset show that significant numbers of lamprey have been captured at the lower Trinity River trapping site in recent years not featuring flow augmentation. While these data should not be used to judge the status of the Trinity River lamprey population, they do indicate that lamprey ammocoetes are commonly captured in large numbers.

41. Dr. Hansen suggests that flow augmentation action could have adverse effects on western pond turtles. Hansen Dec. ¶ 48. This ignores the fact that the amount of suitable habitat for western pond turtles was reduced as a result of construction of Lewiston and Trinity Dams and the regulation of flow. The resulting simplification of the river channel below the dams reduced the amount of low water velocity areas that are preferred turtle foraging habitat and accessible basking areas important for thermal regulation. The effects of the regulated flow regime attenuate further downstream of the dam.

42. Water temperatures in the upper Trinity River would be expected to decrease several

degrees C during the planned flow augmentation period, although not as much as in 2002 or 2003 because the magnitude of the planned releases in 2013 are generally less. The planned flows also would likely provide more edge habitat featuring low water velocities and access to more basking areas associated with the Trinity Restoration Program habitat rehabilitation sites that have created more channel complexity. Adult turtles would be able to move about and adjust to the slightly different mix of habitat availability. Thus, contrary to Dr. Hansen's opinion, the net effect to available habitats would likely be neutral: Slightly less advantageous in terms of water temperatures and foraging opportunities, with more edge habitat and basking areas available. The nesting season would be over, and the nests and juvenile turtles would not be affected, as juveniles over winter in the nests which are typically located up to several hundred meters upland from the river and would not be inundated by the magnitude of augmentation flows in 2013.

43. Dr. Hansen further suggests that flow augmentation could have adverse effects on yellow-legged frogs. Hansen Dec. ¶ 48. Here again, he ignores the fact that the amount of suitable habitat for yellow-legged frogs was also adversely affected by the construction and operation of the Trinity River Division. Low velocity edge aquatic habitat was reduced in the upper river, and the thermal regime is cooler in the upper Trinity River as a result.

44. The planned flow augmentation action would not coincide with the breeding season for yellow-legged frogs, and there would no longer be egg masses on the river margins that could be dislodged by higher flows.

45. Adult and juvenile frogs are mobile and can select alternative habitats should the flow augmentation action change local habitat conditions. Juvenile frogs lower in the Trinity River would generally be advanced in development beyond the early life stages that could be more vulnerable to a change in river stage during this time of year. Tadpoles in the upper river may not survive regardless of whether the planned flow augmentation is implemented or not, as the thermal regime of the river below Lewiston dam is so altered.

46. Moreover, surveys conducted in previous years, found no yellow-legged frogs egg masses in the mainstem river upstream of Indian Creek located 15.5 river miles below Lewiston Dam. It may be that the yellow-legged frog population in the upper mainstem Trinity River has persisted as long as it has due to seed populations from the tributaries where the environmental conditions are more favorable (Melissa Snover, U.S. Geological Survey, pers. comm.).

47. Finally, Dr. Hanson implies that implementing the planned flow augmentation could adversely affect listed green sturgeon in the Sacramento River. Hansen Dec. ¶ 5. Dr. Hansen's conclusion is wrong and this would not be the case for at least two reasons. First, the only habitat parameter that would potentially be affected would be water temperature. Water temperatures in the Sacramento River are not likely to be substantially affected in 2013 due to implementation of the planned flow augmentation.

48. Juvenile green sturgeon are currently present downstream in the Sacramento River. At this time of year, the juveniles begin to migrate downstream and can select available temperature regimes within their optimal bioenergetic performance: 15 ° to 19 °C. Releases to the Sacramento River below Keswick Reservoir are primarily managed for much of the year for temperature control for winter-run Chinook salmon. Water temperatures regimes that could affect growth of juvenile green sturgeon with or without implementing the planned flow augmentation would be the same due to management for winter-run Chinook salmon.

This Declaration is made under 28 U.S.C. § 1746. I declare under penalty of perjury that the foregoing is true and correct. Executed on August 26, 2014 in Shasta Lake, California.

Donald Reck

Exhibit 1

Highlights of August 1, 2014 KFHAT call

Organizations in Attendance: CA Department of Fish and Wildlife, North Coast Regional Water Board, US Forest Service, Salmon River Restoration Council, Yurok Tribe, US Fish and Wildlife Service, Liason for Congressman Jared Huffman, Oregon Department of Fish and Wildlife, Klamath Basin Monitoring Program, others were in attendance but agency names not captured.

Lower Klamath

- Recent flows in the mainstem Klamath near Klamath = 2107 CFS and temperatures are at 77 F. Fish coming into the river look healthy/bright, not dark yet. Seeing more steelhead and ~700 adult Chinook harvested since April (last year 900. Has been as low as 200). Fish have signs of columnaris but not ich.
- River temperatures are on the rise, and generally between 24-26C. River flows at Blakes Riffle have dropped to 2000 cfs (Rkm 13).
- Use of thermal refugia by adults and juveniles has increased over past weeks.
- Refugia counts are showing 1000-4000 juvenile Chinook, 1000's of juvenile steelhead, 100's of adult steelhead and Chinook at Bluff Creek refugia and 100's and possibly more than 1000 adult steelhead and Chinook at Blue Creek.
- Juveniles look fairly healthy at refugias with about 5% showing signs of illness. Pecwan refugia is the exception when up to 25% of fish there looking sick.
- Adults seem very stressed, as they are crowded into refugias. They are dark in color and many have sores.
- Sampled about 10 adult Chinook this week (including last Friday at Blue Creek), all were dark and most had columnaris infections of varying severity. No signs of Ich were detected.
- Multiple reports of dead adult Chinook in different sections of the Klamath River from Youngs Bar (rkm 54) to Blue Creek (rkm 26). Two separate reports put the number of deceased fish observed at approximately 10 (these reports are both from yesterday and are from different locations).
- Blue green algae (BGA) bloom hit Weitchpec Wednesday morning. The Klamath River & Copco, Iron Gate are posted due to the presence of BGA scums and a press release went out yesterday. Yurok Tribe Environmental Program will advise as to posting reach of Klamath between weitchpec and Roy Rook.

Middle Klamath

- Bluff Ck, Hopkins, & Ti Creek refugia: more adults using refugia recently.
- Red Cap-refugia: 9000 1+ steelhead. Never seen that many steelhead. 20 springers, 100's of 0+ chinook. Will try to make sure fish can get up tribs to

access. 25-26 C. Never seen BGA come so fast and so heavy. Revising OEHHA standards are at 0.8 ug/L vs. 8 ug/L previously.

Trinity River

- Numbers at Junction City weir are dropping, temperatures are cooling, fish look healthy.
- Crews snorkeled from dam to Junction City and the fish look good- primarily Spring Chinook

Salmon River

- A few reports of dead fish since the spring Chinook dive. Need to confirm if these are fresh fish or not (clear eye, etc.). Lots of fish using refugia. Temperatures are 25-26C in the mainstem, and refugia is 18-20C. Observed 90 Summer Steelhead and 50 Spring Chinook, most all in lower portion of creek

Scott & Shasta Rivers:

- Scott River hit new 72 year low flow of 5 cfs. Still active fish relocation program in Scott. Some Scott coho relocated to Iron Gate Hatchery tanks. Not much water available for fall canyon flows on the Scott River, most water trust efforts have been for over summering habitat.
- Temps improved over last week but climbing up again. Fair amount of smoke in valley so this may moderate temps.
- Shasta River flows at 15 cfs. No reports on major mortality on Shasta. Flow planning group meeting to target Sept 1st. Still active diversion taking place in some places but some shut off since no water available. Some forbearance agreements taking place.

Fish Health/Disease

- July update is out for the juvenile Chinook salmon monitoring which can be found on the Arcata Fish & Wildlife website. Results are through the week of July 13th – *C. shasta* has been detected in 76.5% of juveniles, and *P. minibicornis* has been detected in 87.0%. Sampling is continuing in the lower river, focusing on collecting coded wire tags (CWTs). The Fish Health Center (FHC) looked at a suspected Ich imprint slide from the Yuroks and no Ich was present in that sample. The FHC is ready to response if needed to confirm Ich.
- Pathology sampling near Roy Rook
    - Water temps 70-71 F. middle river 73-74 F. water low, warm and green
    - Fish looked pretty healthy but some bloody anal fins, etc.

Yurok Tribe Monitoring Response Planning

- In light of the fact the US Bureau of reclamation will not be releasing any preventative/ proactive flows from the Trinity River and due to the high # of adults in refugia (most since 2002 fish kill), the Yurok Tribe is scheduling a meeting to discuss response to a fish kill in the lower river and monitoring / data collection protocols (applies to the area of the lower Klamath within the Yurok Reservation).
- In collaboration with US Fish and Wildlife, Arcata office staff, the Yurok Tribe came up with data collection protocol. Please familiarize yourself with the protocol and contact Mike Belchik if you need the protocols or more details **mbelchik@yuroktribe.nsn.us.**
- Please send an updated accounting of your available staff and resources to Mike Belchik before next Friday 8/8.
- Refresher on response protocols is scheduled for Thursday 8/7 9-12.

Trinity Flow Releases

- USFWS and others meeting with US Bureau of Reclamation next week to talk about 2014 criteria/trigger for flushing flow released from the Trinity. Need to take into account no preventative flow releases this year.
- 2 triggers developed in 2013 (which assumed preventative flow releases already occurring):
    - 1. severe Ich infection 5% of sample size of 60 or 2 fish in sample size not less than 30
        - 30 or more parasites on gill arch
    - 2. 50 or more dead fish in 20 km reach
- In 2013 it was recommends flows increased to 3200 cfs.
- Typically takes 24 hours for water to be released from time of request, but may be able to decrease this timeframe. Once water is released, it still takes a few days to reach the lower Klamath River

Fish Kill Contact Number

- CDFW is working on getting the best number for members of the public to call in the event of a fish kill. Once Sara Borok has the numbers it will be put on posters and sent to the group for posting.

Alert Level

- Alert level on the Klamath from the Estuary to the Trinity River raised to orange

- Time to review the KFHAT Response Plan and attend the Yurok refresher training next week.

******PRESS RELEASE******

Klamath Fish Health Assessment Team on High Alert for Signs of Fish Mortality

August 8, 2014; Klamath, CA

To report occurrences of numerous dead or sick fish in the Klamath River or its tributaries please call: **1-800-852-7550**

What is the Klamath Fish Health Assessment Team?

The Klamath Fish Health Assessment Team (KFHAT) is a technical workgroup which formed during the summer of 2003 with the purpose of providing early warning and a coordinated response effort to address, and if possible avoid, a non-hazardous materials related fish kill event in the anadramous portion of the Klamath River basin.

To accomplish this goal, KFHAT has created a network through which current information about river and fish health conditions in the Klamath Basin can be quickly shared among participants, the general public, and resource managers. The severe drought throughout California has resulted in low flows, high water temperatures and high incidence of disease prevalence for salmon and steelhead in the Klamath River. Because of these conditions, the entities that comprise KFHAT are engaged in hands-on daily observations of river and fish conditions throughout the Klamath and Trinity River Basins. KFHAT provides a forum, through regular conference calls and their email distribution list, to exchange real-time information about river and fish health conditions throughout the Klamath and Trinity River basins. Members of KFHAT have also been active in preparing for a fish kill event in case one occurs anywhere in the basin. Scattered reports of fish mortality in the Salmon River, South Fork Trinity, and the mainstem Trinity River have elevated levels of concern among fish managers and scientists.

Why is the Klamath River Important?

The Klamath River is home to the third largest salmon run on the West Coast and is thought to have the highest potential for complete salmon recovery in the United States. In approximately three weeks, the main portion of the fall-run Chinook run will enter the river, dramatically increasing the number of fish in the Klamath River. It is the intention of the KFHAT team to provide water and fish managers with accurate and up-to-date information about the health of these fish, as well as of environmental conditions that could contribute to or cause a fish kill.

<u>What Can YOU Do?</u>

We would greatly appreciate local citizens, organizations, and agencies notifying KFHAT if you believe you may be witnessing a fish kill event. Fish kills typically occur in short periods of time and can result in high numbers of sick and dead fish. Fish kills can occur from a variety of causes, including disease and toxic chemicals. Quick response by trained people is

important. Individuals are cautioned not to attempt to examine fish or put themselves in harm's way during a fish kill event.

To report a fish kill call: **1-800-852-7550**

More information about KFHAT and current river and fish health conditions are available at: http://www.kbmp.net/collaboration/kfhat

Exhibit 2

Hoopa Valley Tribe
PO BOX1348, HOOPA CA 95546 • WWW.HOOPA-NSN.GOV

20 June 2014

Ms. Sally Jewell
Secretary of the Interior
U.S. Department of the Interior
1849 C Street, NW
Washington, D.C. 20240

Re: Hoopa Valley Tribe Request for Supplemental Flows in Lower Klamath River During 2014 Adult Salmon Migration

Dear Secretary Jewell:

The purpose of this letter is to advise you that real-time data reported by USGS Trinity-basin streamflow gages show that we are now experiencing the worst drought on record. Scientists for the Hoopa Valley Tribe have concluded that current gage data reviewed in the context of historic Klamath Trinity hydrology make it very likely that supplemental releases from Reclamation facilities will be necessary in the late summer of 2014.

Supplemental releases would be used to protect Klamath/Trinity fishery resources held in trust by the United States from adverse habitat conditions associated with the fish kill of 2002. The trajectory of data for June 2014 provides evidence that flow levels in the lower Klamath River will likely fall below minimum thresholds developed collaboratively by the Trinity River Restoration Program (TRRP) and the Bureau of Reclamation's Klamath Basin Area Office under the guidance of the TRRP's Fall Flow subgroup for protection of adult fall Chinook migrants.[1]

Specifically, flows no lower than 2,500 cfs as measured at USGS gage "Klamath River near Klamath" are required commencing in August and continuing at least through September 21. This discharge is required to be met regardless of projected run size for fall Chinook salmon. Additional supplementations would be required, should disease outbreaks or unseasonably warm late-September water temperatures come to pass.

In a related matter, we are concerned that excessive diversions of Trinity water through Carr Tunnel may lead to violations of Trinity River water temperature criteria recommended in the Trinity River Flow Evaluation Study Final Report.[2] End of September storage behind Trinity Dam is now projected at 658TAF, a level that threatens meeting these criteria. Lessening diversions

[1] Hayden, T. 2012. Memorandum to the fall flows subgroup. Re: 2010 and 2011 Fall flow release criteria and evaluation process. Available from the Trinity River Restoration Program. http://odp.trrp.net/Data/Documents/Details.aspx?document=1608

[2] United States Fish and Wildlife Service and Hoopa Valley Tribe. 1999. Trinity River Flow Evaluation Final Report. U.S. Fish and Wildlife Service, Arcata Fish and Wildlife Office, Arcata, CA.

DANIELLE VIGIL-MASTEN, CHAIRPERSON • HUPACHAIR@HOOPA-NSN.GOV • PH 530-625-4211 • FX 530-625-4594

now would be key to assuring these criteria are met while providing for supplemental flows during the adult salmon migration this summer-autumn.

We are requesting immediate action by Reclamation to engage with Hoopa Tribal Fisheries Department to prepare for release of supplemental flows this year. For further information please contact Mike Orcutt, Director, Hoopa Tribal Fisheries (530) 625-4267.

Sincerely,

Danielle Vigil-Masten, Chair
Hoopa Valley Tribal Council

Cc: David Murillo, USBOR Mid-Pacific Region

YUROK TRIBE

190 Klamath Boulevard • Post Office Box 1027 • Klamath, CA 95548

July 16, 2014

U.S. Department of the Interior
Sally Jewell, Secretary of the Interior
1849 C Street, NW
Washington, D.C. 20240

RE: Action Requested to Prevent Klamath River Fish Kill

Dear Secretary Jewell:

On behalf of the Yurok Tribe, I write to request that the Bureau of Reclamation proactively release supplemental flows during the 2014 fall Chinook salmon migration to minimize the risk of a fish kill similar to what occurred during 2002. We are facing near record-low flows in the Lower Klamath this summer/fall, well below what scientist of the basin have recommended for minimizing the chance of another adult salmon fish kill. Therefore, we are asking that BOR provide a minimum of 2,500 cubic feet per second (cfs) at the Lower Klamath gauge during the primary period of the fall chinook migration in the Lower Klamath River.

The Yurok Tribe is located on the lower 44 miles of the Klamath River, and is the largest Tribe in California. Fisheries resources of the Klamath Basin are an integral component of the Yurok way of life - for sustenance, ceremonial, religious, and commercial purposes. In light of the importance of the Klamath River fishery resource to Yurok People, the Tribe has been a leader in Klamath Basin science and restoration efforts. We must be vigilant stewards of the river and the fishery it supports, to ensure that future generations of Yurok People may continue our way of life.

In 2002, the Lower Klamath River, within the Yurok Reservation, was the scene of a catastrophic and devastating fish kill. Somewhere between 33,000 to 78,000 adult salmon died in a massive fish kill, prior to reaching their spawning grounds. Although the primary cause of death was disease (Ich and Columnaris), three different reports attributed the kill at least in part, to low flow conditions[1], combined with an above-

[1] Yurok Tribal Fisheries Program 2004, The Klamath River Fish Kill of 2002; Analysis of Contributing Factors; USFWS 2003, Klamath River Fish Die-off September 2002; California Department of Fish and Game 2004, September 2002 Klamath River Fish-Kill: Final Analysis of Contributing Factors and Impacts

Phone: (707) 482-1350 • Fax: (707) 482-1377

average salmon run size. While the fall chinook fish run in 2014 is predicted to be slightly less than average, there is substantial uncertainty associated with this prediction. What we know with certainty is that flows will be extremely low during the 2014 fall Chinook migration; in fact six weeks before the peak migration time, low flows are already substantially less than the 2,500 cfs minimum threshold that scientists of the basin have recommended to minimize the risk of a fish kill, regardless of the run size[2].

As you may be aware, we faced similar low flow conditions during 2012 and in 2013, when the BOR augmented flows to help provide for the successful migration of the Klamath Basin fall chinook. We are appreciative of these proactive flow releases from the Trinity River, which were implemented according to the recommendations of a science advisory team. This supplemental flow provided conditions that allowed for adult salmon to migrate through the lower river and successfully reach their spawning grounds; thereby ameliorating conditions for another fish kill. We are extremely grateful for the foresight and leadership that was displayed in the decision to protect those great runs of fish by releasing more water to the Klamath River via the Trinity River.

The Yurok Tribe is growing increasingly concerned because near-record extremely dry hydrologic conditions will lead to low flow conditions and high water temperatures during this year's upstream migration of fall-run Chinook salmon. In particular, we are concerned that without intervention, low late-summer and fall flows have the potential to lead to conditions similar to those fostering the outbreak of disease that killed the adult salmon in 2002. Indeed, large numbers of adult salmon and steelhead are already trapped at tributary mouths on the Yurok Reservation due to low flows and high water temperatures. These are precisely the conditions that preceded the 2002 fish kill.

Therefore, we ask that the Bureau of Reclamation proactively take action to minimize the potential for another fish kill by augmenting flow releases to alleviate stressful conditions for the 2014 fall Chinook. In particular, we recommend that BOR provide flows near the mouth of the Klamath of 2,500 cfs as recommended by the Trinity fall flows working group in 2012, including the possibility of emergency flows if needed. Attached please find the final recommendations of that group. If the Department requires additional technical analysis, we recommend they work with scientist of the Klamath-Trinity Basin; our staff will consider such collaboration a high priority.

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[2] Hayden, 2012, Fall Flows Subgroup memorandum regarding fall flow release criteria and evaluation process. One of the three criteria recommended by the group was that "Flows projected below 2,500 cfs at RKM 13 during the migration seaon = recommend implement Proactive fall flow release to increase base flows to at least 2,500 cfs during migration season regardless of projected fall chinook salmon run-seizee (Turek et al 2004)".

Strange, 2012. Summary of Scientific Evidence to Guide Special Flow Releases to Reduce the Risk of Adult Fall Chinook Salmon Mass Disease Mortality in the Lower Klamath River. Strange notes that "the one variable that can be overdly influenced by managers is the flow of the river, with a minimum base flow of 2,500 cfs detailed herein as necessary to avoid another fish kill under most circumstances, and ...."

For planning purposes, we would like the Department of Interior to commit to the provision of this water as soon as possible. Because the best available scientific evidence does not ascribe any advantages to water provided from one basin or the other, we believe all options from the Klamath and Trinity Rivers be explored thoroughly.

Sincerely,

Thomas P. O'Rourke Sr.
Chairman, Yurok Tribe

CC: Lowell Pimley, P.E., Acting Commissioner, Bureau of Reclamation
David Murillo, Mid Pacific Region Director, Bureau of Reclamation
Brian Person, Northern California Area Manager, Bureau of Reclamation

BOARD OF SUPERVISORS

COUNTY OF HUMBOLDT

825 5TH STREET

EUREKA, CALIFORNIA 95501-1153 PHONE (707) 476-2390 FAX (707) 445-7299

July 22, 2014

The Honorable Sally Jewell, Secretary
U.S. Department of the Interior
1849 C Street, NW
Washington, DC 20240

Subject: Request for augmentation flows in lower Klamath River

Dear Secretary Jewell:

I am writing today to express grave concerns of the Humboldt County Board of Supervisors regarding the threat of a fish kill in the lower Klamath River, and to request your prompt attention to mitigate anticipated low flows in lower Klamath River. Flows in lower Klamath River are as of today exceptionally low, significantly lower than in July of 2002 (the fish kill year), and well below the minimum protective flow recommendation of 2,500 cfs. This minimum flow rate, established using best available science, is recommended regardless of projected run size during the peak migration season.

Flows in the lower Klamath are expected to drop substantially lower in the coming weeks. The USGS California-Nevada River Forecast Center prediction for flows in the lower Klamath River for September 1st 2014 is 1,780 cfs with a range of 1,770 to 1,963 cfs; flows will be significantly lower than during the 2002 fish kill, when they approximated 2,000cfs.

Based on these conditions, a fish kill is more likely than not in 2014 in the lower Klamath River. Our estimates of water volumes needed to supplement lower Klamath flows at 2,500 cfs are within the 50,000 acre foot range, corresponding to the annual entitlement of water from the Trinity River Division of the Central Valley Project required to be made available to 'Humboldt County and downstream water users' under section 2 of the Act of August 12, 1955, Public law 84-386, State of California water permit No. 11968 (1959), and the June 19, 1959 contract between Humboldt County and the United States. More than a half century ago, Congress assured us that water needed in our basin would not be diverted to the Central Valley. It is time for the Department to make clear to all Californians that it will honor Congress' mandate.

As you may know, since the 2002 catastrophic fish kill in the lower Klamath River, the County and the Hoopa Valley Tribe have repeatedly requested that the Department of the Interior honor and fulfill the prior rights of the Trinity Basin communities to all water from the Trinity River Division required for fish and wildlife and other uses in the Trinity Basin. As California's drought worsens, the need to be clear on our water rights under the Law of the Trinity River grows more urgent. On February 24, 2011, the Commissioner of Reclamation advised the Hoopa Valley Tribe that the Solicitor had given legal advice to the Secretary about the status of our water rights, but he has refused to disclose that advice. We are entitled to know that the Secretary is faithfully executing the law when it comes to our rights.

We have heard reports that the Bureau of Reclamation may consider making no proactive supplemental flow releases this year unless and until evidence of distress and mortality are observed in migrating adult fall Chinook salmon. If true, that would be an unconscionable and unlawful risk to assign the Trinity Basin communities without our consent. The ability to provide timely relief to diseased and dying salmon by increasing flows after the fact, has not been demonstrated. Despite emergency response flow management actions in 2002, over 33,000 fish died. Transit times for relief flows and bureaucratic delays render post-incident flow augmentation ineffective. We ask you to act now by proactively allocating supplemental flows from Klamath-Trinity water supplies managed by Interior to mitigate this extraordinary threat.

Sincerely,

Rex Bohn

Rex Bohn, Chair
Humboldt County Board of Supervisors

RB:kh

Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101, Portland, OR 97220-1384
Phone 503-820-2280 | Toll free 866-806-7204 | Fax 503-820-2299 | www.pcouncil.org
Dorothy M. Lowman, Chair | Donald O. McIsaac, Executive Director

July 10, 2014

The Honorable Sally Jewell, Secretary
U.S. Department of the Interior
1849 C Street, NW
Washington, D.C. 20240

RE: Action Requested to Prevent Klamath River Fish Kill

Dear Secretary Jewell:

The Pacific Fishery Management Council (Council) is concerned that potential low flows in the Klamath River will substantially affect salmon essential fish habitat (EFH) and potentially create conditions leading to a fish kill in the Klamath River during the fall Chinook migration in late summer of 2014, such as occurred in 2002. The purpose of this letter is to recommend the Department engage in advance planning for stored water releases this fall to prevent such an occurrence.

As you know, the Council is one of eight regional fishery management councils established by the Magnuson-Stevens Fishery Conservation and Management Act of 1976 (MSA), and recommends management actions for Federal fisheries off Washington, Oregon, and California. The MSA includes provisions to identify, conserve, and enhance EFH for species regulated under a Council fisheries management plan. Each Council is authorized under MSA to comment on any Federal or state activity that may affect the habitat, including EFH, of a fishery resource under its authority. Furthermore, for activities the Council believes are likely to substantially affect the habitat of an anadromous fishery resource under its authority, the Council is specifically charged with providing comments and recommendations (MSA §305(b)(3)).

Forecasted Flows

Precipitation and resultant water supply in the Klamath Basin this year are most likely to continue a trajectory toward extreme drought. This is indicated by the fact that precipitation has been substantially lower than average since January 2013 and that flows at several gauging stations throughout the Basin today stand at levels at or below those seen during the severe drought of 1997-98. Precipitation between now and August is

forecasted to be insufficient to mitigate what is expected to be adverse habitat conditions. There are water management decisions to be made between this point and September, and we remain concerned that sufficient water supplies be saved now so that the Bureau will be in a position to prevent conditions that may appear in the lower river similar to those that led to the September 2002 fish kill, when more than 33,000 adult salmon died in the Lower Klamath River.[1]

The hydrologic data for June 2014 provides evidence that flow levels in the lower Klamath River will likely fall below minimum thresholds developed collaboratively by the Trinity River Restoration Program (TRRP) and the Bureau of Reclamation's Klamath Basin Area Office under the guidance of the TRRP's Fall Flow Subgroup for protection of adult fall Chinook migrants.[2] Specifically, flows no lower than 2,500 cfs as measured at the U.S. Geological Survey (USGS) gauge "Klamath River near Klamath" are needed commencing in August and continuing at least through September 21. The Subgroup determined that this minimum floor would be recommended regardless of projected run size for Klamath fall Chinook salmon. Additional supplementation would be necessary, should disease outbreaks or unseasonably warm late-September water temperatures come to pass.

Requested Action

The Council requests that you examine allocations of water scheduled or expected in the current year, and pursue all necessary measures to ensure an adequate amount of supplemental water be available for release from the Trinity and/or Upper Klamath basins during the peak migration and holding timeframe for the fall Chinook salmon return. Such flow augmentation should be designed to maintain the quality of salmon EFH and minimize the likelihood of another fish kill and specifically avoiding the river flow patterns and adverse conditions that resulted in the 2002 fish kill. The Council also recognizes that actions taken this year may impact available water management options in the coming year, and that those impacts should be considered while deriving the optimal flow allocation for the key period in August and September. We recommend the Department of Interior work with Klamath Basin scientists, the TRRP, and co-managers to determine the best manner for shaping flows to minimize the potential for another fish kill.

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[1] Guillen, G.J. 2003. Klamath River Fish Die-off: September 2002: Report on Causative Factors. AFWO 03-03.USFWS. Arcata, California

[2] Hayden, T. 2012. Memorandum to the fall flows subgroup. Re: 2010 and 2011 Fall flow release criteria and evaluation process. Available at http://odp.trrp.net/Data/Documents/Details.aspx?document=1608

In closing, the Council requests planning efforts be initiated now to ensure protection of EFH. Further, this recurring issue leads us to recommend the Department of Interior finalize a permanent and comprehensive plan to address the needs of lower Klamath fish passage.

We would appreciate hearing about the results of your planning, and offer our assistance in any way possible. Thank you for your attention to this important matter.

Sincerely,

D. O. McIsaac, Ph.D.
Executive Director

JDG:csp

Cc: Council Members
Habitat Committee
Salmon Advisory Subpanel
Salmon Technical Team

Exhibit 3

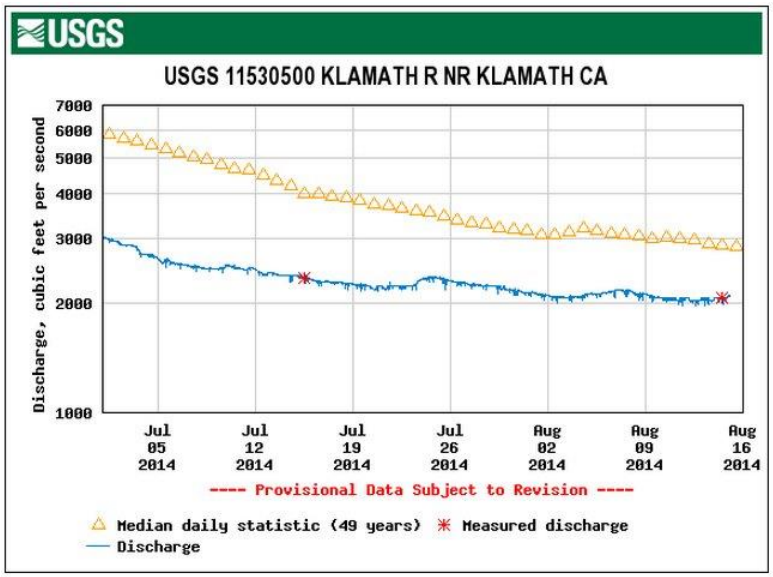
August 15th 2014

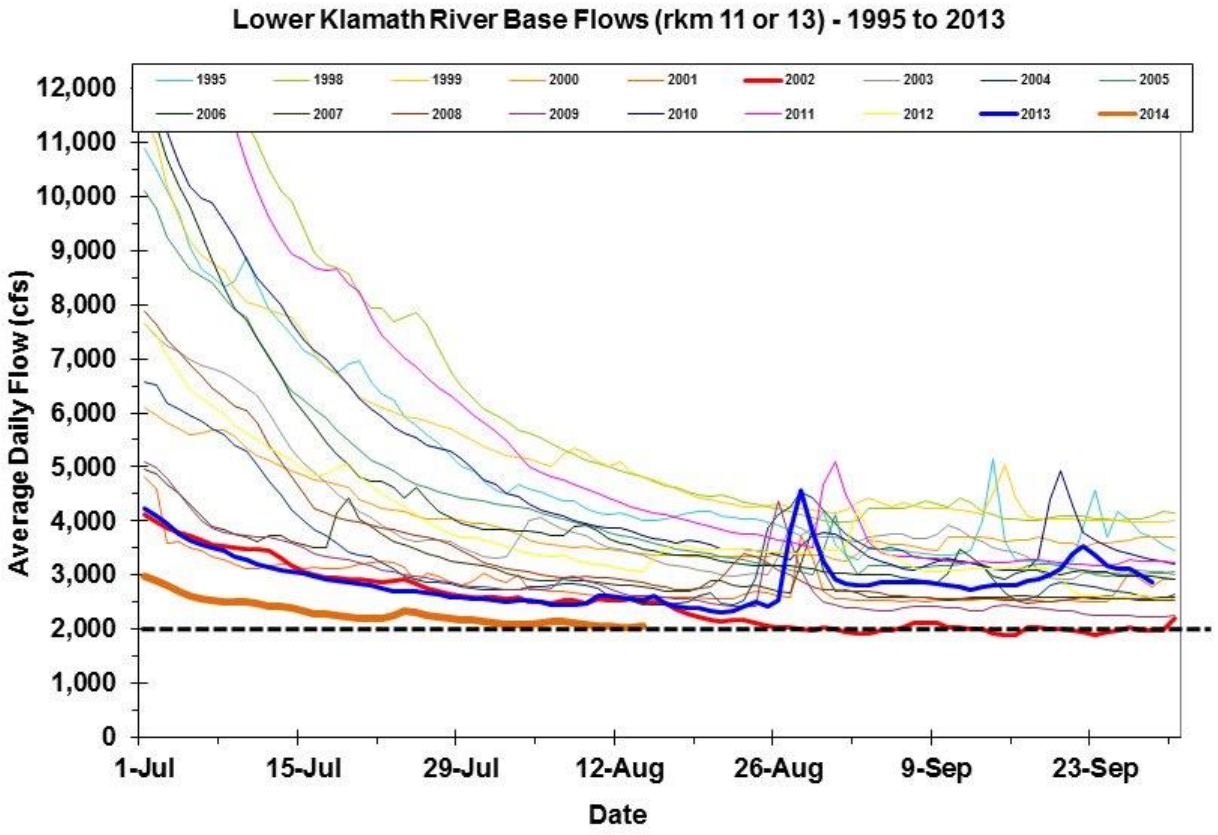
FROM: Dr. Joshua Strange, Stillwater Sciences (jss@stillwatersci.com)

TO: Whom it may concern

RE: Update on flow forecasts for the lower Klamath River and adult salmon fish kill risk for 2014

The following briefly summarizes up-to-date guidance on projected flow levels in the lower Klamath River for the 2014 adult fall Chinook salmon migration season and associated fish kill risk (i.e., the Ich outbreak that occurred in September of 2002). Flows in July and August of 2014 are exceptionally low, significantly lower than in July of 2002 (the fish kill year), and are already well below the minimum protective flow recommendation of 2,500 cfs during the peak fall Chinook salmon migration season. Flows as of 8/14/2014 are only 2,062 cfs and continue to drop (as measured in the lower Klamath River 13 km above the Pacific Ocean). The protective minimum flow rate of 2,500 cfs has been recommended proactively for all forecasted run sizes of less than 170,000 fall run Chinook salmon during four week peak migration season approximately from late August and September (i.e., Strange 2010a; Hayden et al. 2012; TRRP 2012; Joint Memo USFWS NMFS 2013 – these citations and others contain more supporting background information and analysis than is presented in this brief memo). Large and short duration pulse flows (e.g., centered on approximately September 1st when water temperatures typically begin to cool below migration thresholds throughout the basin, Strange 2010b and Strange 2012) have been employed to help flush any Ich parasites safely out to sea that have may have built up over the summer followed by increased baseflows (e.g. 2013). Due to the time delay between detecting and confirming an Ich outbreak, the speed at which Ich can spread from non-detectable levels to a large-scale outbreak, and the lag in travel time of water released from upstream dams to its arrival in the lower Klamath River, proactive flow releases have been strongly recommended to prevent an outbreak before it occurs rather than reactive flow releases once an outbreak is already occurring and an unknown number of fish, likely a large number, will receive a lethal dose of Ich parasites.

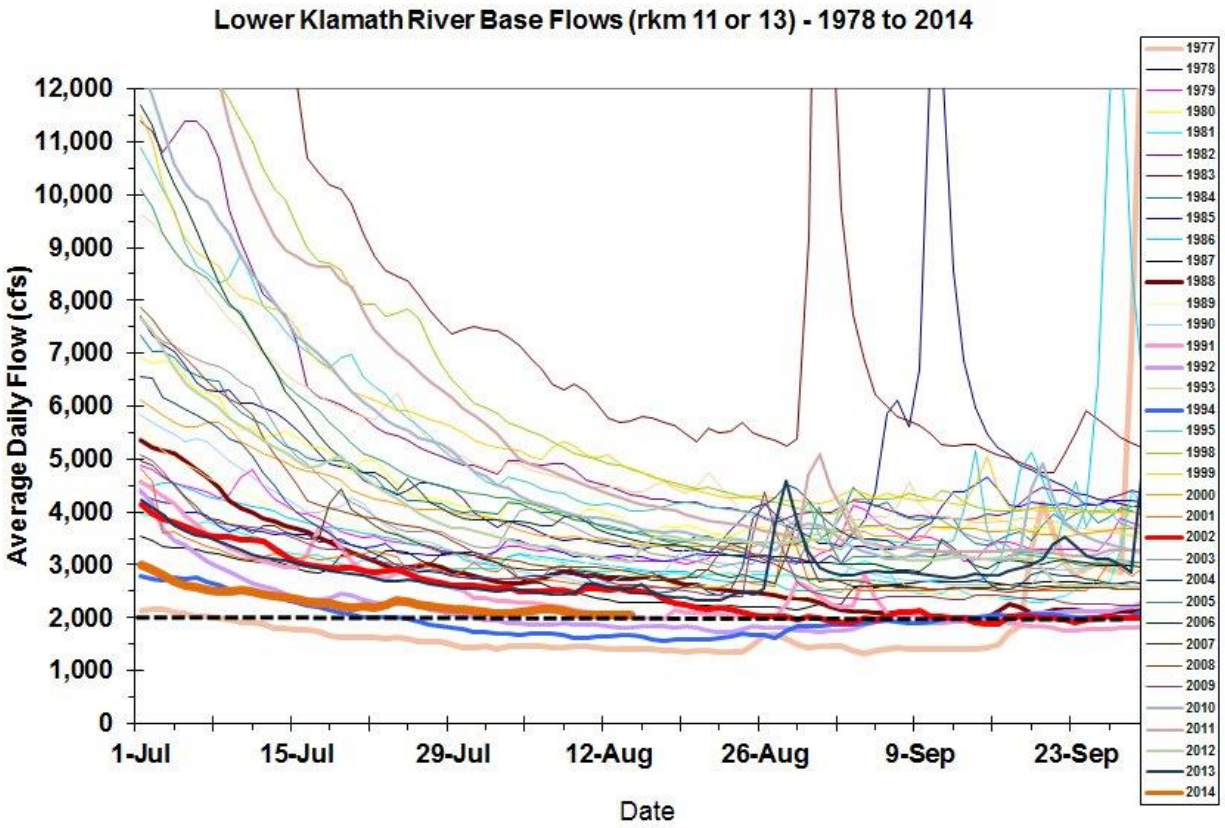




Source: http://waterdata.usgs.gov/ca/nwis/uv/?site_no=11530500&PARAmeter_cd=00065,00060

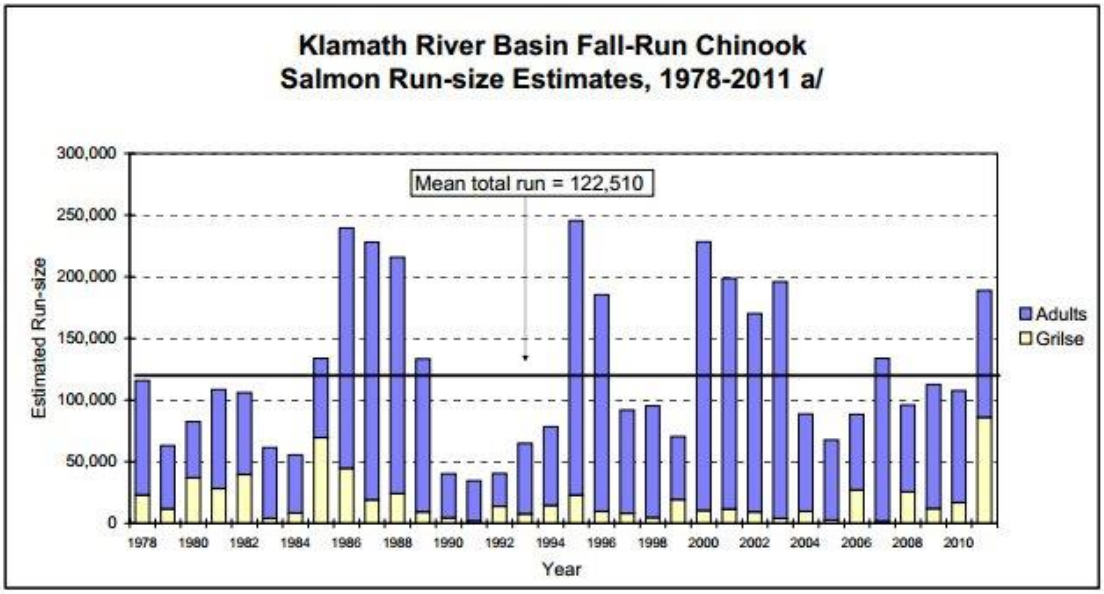
Flows for July 2014 in the lower Klamath River are tied for the second lowest on record with 1994 (period of record from 1963 to 2014 with 1992 also similar). However, releases from Iron Gate Dam on the Klamath River were 300 cfs lower in July of 1994 compared to 2014 (with Lewiston Dam releases on the Trinity River being equivalent), meaning that accretions are ~ 300 cfs lower in July of 2014 compared to the exceptionally dry year of 1994. The extreme drought year of 1977 had the driest July and September on record yet flows did increase on September 20th of that year to over 3,200 cfs from precipitation. In 1994, flows also increased by in September (on the 1st) to approximately 2,000 cfs. Simply put, the drought conditions of 2014 are extreme and appear to be headed towards near record levels for the month of September in the lower Klamath River based on the period of record. Tree ring research indicates that California may be experiencing its driest consecutive 3-year period in the last 500 years (newscenter.berkeley.edu/2014/01/21/states-water-woes/). This is cause for concern and indicates that flows will likely continue to drop more than is typical from July to October (flows from accretions typically continue to slowly decrease until around September 1st). The amount to which flows will drop between now (late July 2014) and the period of concern (primarily the last week of August and the first three weeks of September) is of major importance.

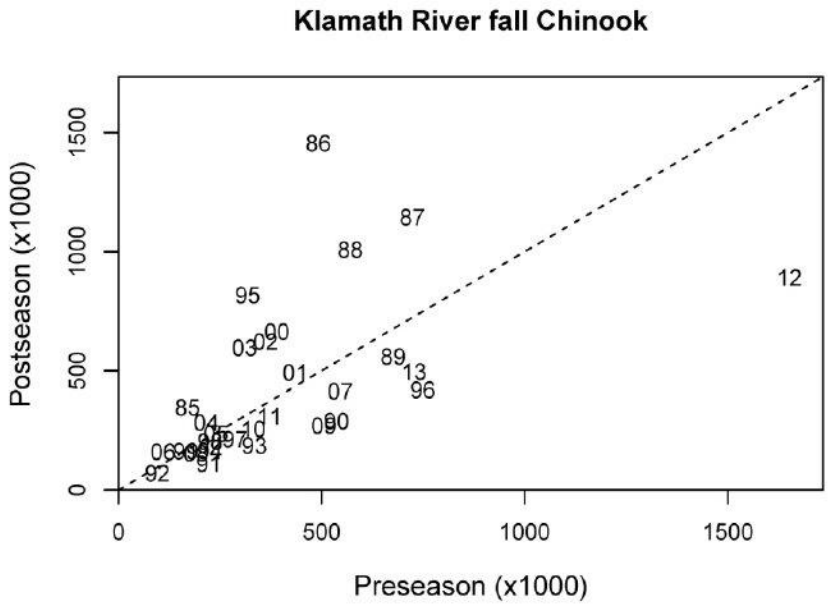
The USGS' CA-NV River Forecast Center advance hydrologic prediction tool provides one means for forecasting flows in the lower Klamath River during the month of September (www.cnrfc.noaa.gov/ahps.php). This tool is designed for forecasting flood events however, and was previously generating less than reliable predictions during low flow conditions. USGS has recently worked to improve the accuracy of predictions during low flow conditions. For example, improved model predictions for flows on 7/17/2014 were only 48 cfs lower than the actual river flows and approximately 173 cfs lower on 8/14/2014. While not perfect, this can be considered useful results. The prediction for flows in the lower Klamath River for 9/1/2014 is 1,822 cfs with a range of 1,817 to 1,930 cfs. Prior to improvements in the river forecast model, I used a multiple linear regression graphing technique to examine the typical slope of decreases (as separated by inflection points) in median and 2002 flows during the dry season, coupled with visual examination for the flow record, which resulted in an estimation that flows will likely reach 1,800 cfs in the lower Klamath River by September 1st 2014 without supplemental protective releases from basin reservoirs (with a potential range of 1,600 to 2,000 cfs). In summary, flows are projected to be the second lowest on record by September of 2014 in the lower Klamath River without protective releases and will likely be substantially lower than the fish kill flows of 2002 (~ 2,000 cfs). Based on projected flow conditions alone, and given the biology of Ich, a fish kill is more likely than not in 2014 among adult fall Chinook salmon migrating in the lower Klamath River if protective flows are not released. However, other uncertainties and unusually severe stressors increase the risk level for an Ich outbreak in 2014.

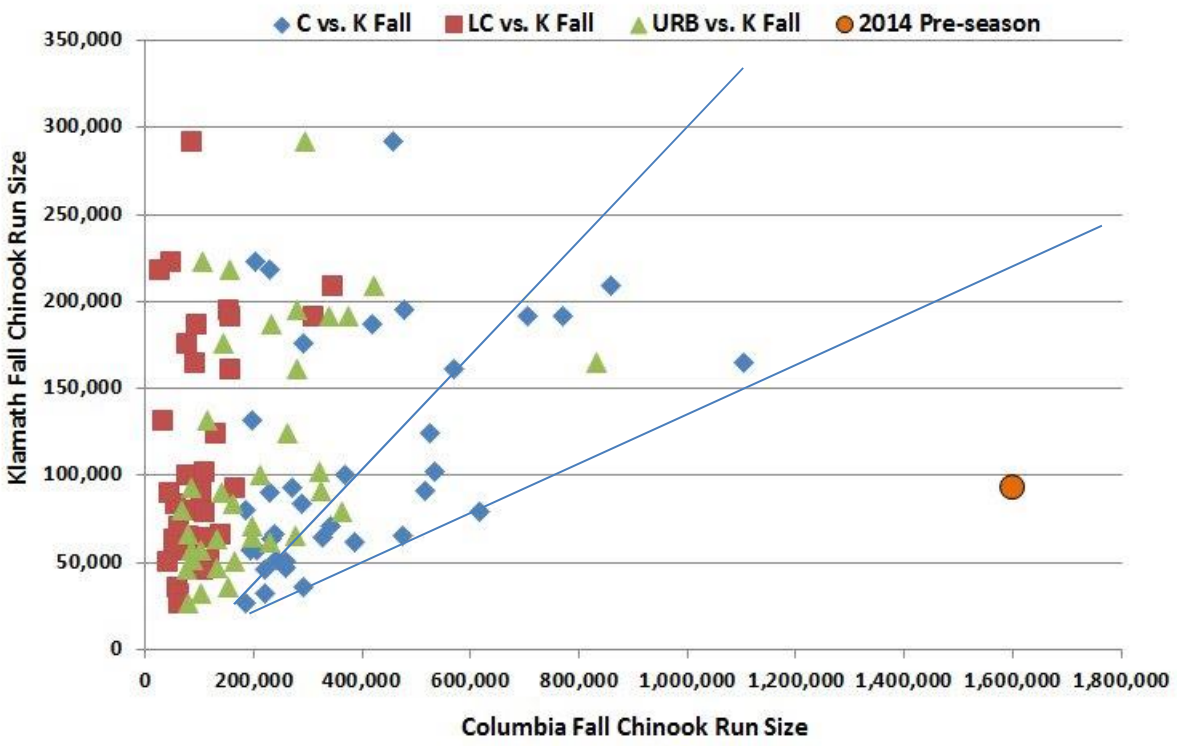


Another consideration for fish kill risk and an important uncertainty is adult fall Chinook salmon run size. The mean run size for the period of record (1978 to 2013) is approximately 125,000 fish, and the 2002 run size was above average at approximately 170,000 fish. The 2014 Pacific Fisheries Management Council (PFMC) pre-season forecast for the Klamath Basin is below average at 92,800 fall run Chinook salmon predicted (with 60,000 fish returning in 1994 and an unknown number in 1977). However, as outlined in previous technical documents, the mechanisms responsible for an Ich outbreak such as occurred in 2002 are not nullified by below average run size; rather flow (i.e. water velocities and turnover rates) is the primary determinant of an Ich outbreak (e.g., Bodensteiner et al. 2000). While there may be a theoretical run size that is small enough to preclude a fish kill no matter how low flows are, multiple lines of evidence regarding fish schooling, fish migration behavior, and Ich's mode of infection via swimming cilia, indicate that a below average run size will not adequately compensate for low flows in terms of fish kill risk. In the face of uncertainty regarding the subject of a threshold run size for an Ich outbreak in the lower Klamath River, a cautionary and protective approach is warranted. It should be emphasized that the occurrence of a fish kill is an event determined by multiple interacting probabilities and is best characterized by the concept of risk, which by definition includes uncertainty.

In addition, pre-season forecasts are subject to error and significant under or over predictions with larger magnitude under prediction occurring slightly more frequently than for Klamath fall Chinook stocks than over predictions (data points above the 1:1 line are under predictions). For 2014, Klamath stocks are predicted to be well below average and yet Columbia River fall Chinook stocks are predicted to have the largest run on record in 2014 (PFMC). While there is considerable variability in the relationship between the run size of Klamath and Columbia fall Chinook stocks especially during years of low Columbia stock abundance, Klamath fall Chinook salmon runs are consistently larger than average during years of high Columbia fall Chinook salmon abundance. In other words, if the below average run size predicted for the Klamath River in 2014 actually occurs, it would be the first time since record keeping in 1978 that a run of less than 150,000 fall Chinook salmon came back to the Klamath River during an unusually large Columbia River run. While there is uncertainty in trying to evaluate the accuracy of pre-season run size forecasts with an unknown level of error, the Columbia to Klamath fall Chinook stock abundance relationship strongly suggests that the pre-season forecast for the Klamath River is more likely to be an under-prediction rather than an over-prediction. Simply put, it's more likely than not that more adult fall run Chinook salmon will return to the Klamath Basin in 2014 than is predicted, and the error in prediction could be significant resulting in a true run size similar to or even larger than 2002.


Klamath River Basin Fall-Run Chinook
Salmon Run-size Estimates, 1978-2011 a/
Mean total run = 122,510
Estimated Run-size
300,000
250,000
200,000
150,000
100,000
50,000
0
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Year
Adults
Grilse


Klamath River fall Chinook
Postseason (x1000)
0
500
1000
1500
Preseason (x1000)
0
500
1000
1500
86
87
88
12
95
03
02
00
01
89
13
96
07
85
04
11
10
09
00
93
92



Columbia River fall chinook forecasts, returns

Year	Forecast	Actual return	Percentage of forecast
2007	347,500	219,600	63%
2008	376,700	449,000	119%
2009	532,900	429,000	80%
2010	664,800	657,100	99%
2011	776,300	620,600	81%
2012	654,900	525,200	80%
2013	686,900	1,266,400	184%
2014	1,602,900	----------	-------

SOURCE: Columbia River Technical Advisory Committee

Several other stress factors are notably contributing to increased fish kill risk in 2014. First, spring and summer run Chinook salmon in the Klamath Basin are experiencing higher than normal levels of stress and pre-spawn mortality due to the unusually low flows and high water temperatures, which will likely result in elevated background levels of fish diseases, including columnaris and potentially Ich. For example, approximately 22 salmon carcasses were counted in the lower Klamath River over a 55 mile reach on 8/14/2014, likely due to columnaris. This situation could increase the subsequent disease risk to later entering fall run fish, such as may have occurred in 2002 (a year that was also unusually stressful to spring and summer run Chinook salmon in the Klamath Basin). The difficult migration and warm temperature also results in increased numbers of adult salmon holding at cold water thermal refuges for extended periods, such as has been observed at the mouth of Blue Creek (river mile 16) in July and August of 2014 (Yurok Tribe), which provides an opportune situation for Ich to begin spreading and elevating above background levels. Another stressor that was unusually high in 2014 is the myxosporidian parasites that cause some level of mortality to juvenile salmonids in the Klamath River every year, with 2014 having one of the worst levels of incidence (> 80%) and associated mortality over approximately the last decade since monitoring began. These disease causing parasites quickly infect adult salmon, primarily via the gills, as they enter the Klamath River to begin their migration. While not typically lethal to adult salmon, these parasites attack the intestinal track, liver, and kidneys of salmon, all of which are important organs for immune response. Thus the exceptionally high level of infectious myxosporidian parasites as indicated by juvenile fish health monitoring results in 2014, indicate that this could be a significant and serious additional stressor to migrating adult salmon this fall (True 2014). A final, potentially serious additional stressor that is problematic in 2014 is the high amount of the toxic blue-green algae microcystis (KFHAT 2014, YTEP 2014) that is being released into the river from the Klamath hydroelectric reservoirs. This blue-green alga produces a super-potent toxin that is especially harmful to the liver, which is why the river is currently closed to swimming. The exact impact of this toxin exposure on migrating salmon is unknown, but again, the liver is a very important organ for immune function that is part of the complex physiological process to fight off parasites such as Ich at low to moderate doses. Dual infections with the two myxosporidian pathogens along with exposure to microcystin toxins could act synergistically to make salmon much more vulnerable to Ich parasites.

In conclusion, the risk of a fish kill (Ich epizootic outbreak) occurring in the lower Klamath River in 2014 as occurred in 2002 without proactive protective flow releases is more likely than not with unreasonably high risk due to near-record low flows (forecast of only ~ 1,800 cfs by September 1st). While the predicted below average run size might reduce the fish kill risk to some extent, this risk reduction is not considered sufficient or reliable, and the pre-season run size forecast for Klamath Basin fall Chinook salmon stocks are more likely to be an under prediction this year than an over prediction based on the record abundance of Columbia River fall Chinook salmon stocks. In addition, other stressors are unusually severe this year, all which would be predicted to increase the risk of an Ich outbreak. Proactive protective flow releases are needed in 2014 to reduce the risk of a fish kill to fall run Chinook salmon in the lower Klamath River to reasonable levels and emergency flow criteria that rely on detecting fish killed by Ich at the beginning of an outbreak is not considered adequate or reliable for preventing mass salmon mortality.

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Exhibit 4

August 22, 2014 Memorandum Documenting Endangered Species Act Compliance for Late Summer Flow Augmentation in the Lower Klamath River

United States Department of the Interior

BUREAU OF RECLAMATION
Northern California Area Office
16349 Shasta Dam Boulevard
Shasta Lake, California 96019-8400

IN REPLY REFER TO:

AUG 22 2014

NC-300
ADM-1.10

MEMORANDUM

To: Central Files

From: Don Reck
Chief, Environmental and Natural Resources Division

Subject: Endangered Species Act Section 7 Compliance for the Lower Klamath River Late Summer Flow Augmentation from Lewiston Reservoir in 2014

The Bureau of Reclamation is proposing to augment flows in the lower Klamath River during late summer 2014 due to rapidly changing conditions on the river that affect fish health to improve environmental conditions for the returning run of fall Chinook salmon. Flows near the mouth of the Klamath River without augmentation are forecast to be similar to those that occurred in August and September 2002, when at least 34,000 adult salmonids died. Of these, an estimated 344 were coho salmon listed as threatened under the Endangered Species Act (ESA). The cause of death was a disease outbreak, and several investigations of this event concluded that low flows contributed to the cause of premature death.

The proposed action for 2014 would consist of releasing about 25,700 acre-feet of water stored in Trinity Reservoir, through Lewiston Dam, into the Trinity River. At the confluence of the Trinity and Klamath Rivers, this water would merge with Klamath River water and flow to the Pacific Ocean. The augmentation flow release would be designed to result in flows in the lower Klamath River of 2,500 cubic feet per second (cfs) between August 23 and approximately September 14, 2014.

The proposed action would affect water temperatures in the Trinity and Klamath Rivers, and potentially in Clear Creek below Whiskeytown Reservoir and the upper Sacramento River. In turn, listed fish in the Klamath Basin and the Central Valley may be affected. Modeling results suggest that, during implementation of the flow augmentation action, Lewiston Reservoir water temperatures would be about 1.0 to 1.5°F cooler than under a no action scenario because of less residence time in Lewiston Reservoir. As a result, the Trinity River and lower Klamath River would see a reduction in water temperatures. Following the augmentation releases when Trinity River flows would return to 450 cfs, water temperatures would return to those expected if no flow augmentation action were taken. While these temperature changes are expected to occur, temperature targets in the Trinity River are expected to be met.

Modeling results also suggest that during the augmentation releases at Lewiston Dam water temperatures of releases from Whiskeytown Dam into Clear Creek would be reduced by about the same amount. Cooler release temperatures would be sustained through the flow augmentation period; by about mid-October, Whiskeytown Dam release temperatures may potentially increase up to 0.1°F. A similar response is indicated for the Spring Creek Powerplant release, where inflow into Keswick Reservoir is expected to be reduced by 1.0-1.5°F during the augmentation releases, with a subsequent potential increase beginning in mid-October by about 0.1°F. Because of the relatively minor contribution of Spring Creek inflow compared to Shasta Reservoir release, the temperature impact in the upper Sacramento River is expected to be less than 0.1°F.

Depending on future meteorological and hydrologic conditions and Central Valley Project (CVP) operational objectives, some amount of water used for flow augmentation may not be available for other purposes (*e.g.*, water temperature control) in future years. Accordingly, it is appropriate to consider the effects to listed fish species and designated critical habitats in the context of ESA section 7(a)(2) consultation.

Reclamation has considered the effects of the proposed action on ESA-listed species that are under the jurisdiction of the National Marine Fisheries Service (NMFS). Specifically, species considered include Southern Oregon/Northern California Coasts (SONCC) coho salmon in the Klamath River Basin, and Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, California Central Valley steelhead, and Southern Distinct Population Segment (DPS) of North American green sturgeon.

Proposed operation of the Trinity River Division of the CVP was described in the 2008 Biological Assessment (BA) for the long-term operation of the CVP and State Water Project (SWP) submitted to NMFS. The NMFS issued a June 4, 2009, Biological Opinion (Opinion) addressing CVP/SWP operations as they affect listed anadromous fish and their designated critical habitats in the Central Valley. The Opinion concluded that the proposed operation of the CVP/SWP would jeopardize listed species and destroy or adversely modify designated critical habitat, and offered a Reasonable and Prudent Alternative (RPA) that, if implemented, would not jeopardize the species or destroy or adversely modify designated critical habitats according to their analyses. Reclamation was also informed of NMFS's intent to issue a separate biological opinion addressing SONCC coho salmon informed by the 2008 BA. To date, Reclamation has not received that biological opinion, and consultation continues.

The 2009 CVP/SWP operations Opinion was subject to a number of legal challenges in the United States District Court for the Eastern District of California (Court), and Reclamation was challenged for its provisional acceptance and implementation of the RPA. On September 20, 2011, in the Consolidated Salmonid Cases, the Court remanded the Opinion to NMFS. Reclamation plans to submit a consultation package that includes a supplemental/updated BA describing proposed operation of the CVP/SWP to NMFS, to facilitate the remand of the Opinion, consistent with section 7(a)(2) of the ESA. The current schedule of the Court-ordered remand of the Opinion calls for NMFS to issue a draft CVP/SWP operations Opinion to

Reclamation by October 1, 2016, and a final CVP/SWP operations Opinion by February 1, 2018. Per the most recent court ruling, an additional one-year extension is possible to February 2019.

The 2014 late-summer flow augmentation release will continue the status quo as to listed species in that Reclamation still retains discretion to provide flow and temperature conditions that are consistent with currently anticipated conditions with respect to the listed fish. Reclamation has determined that implementing the proposed flow augmentation action in 2014 prior to receiving the above mentioned new Opinion on CVP/SWP operations will not violate section 7(d) of the ESA, *i.e.*, the action would not constitute an irreversible or irretrievable commitment of resources which would have the effect of foreclosing the formulation or implementation of any RPA measures which would not violate section 7(a)(2) of the ESA.

The volume of Trinity Reservoir water used for augmentation and not available in the future for other purposes (*e.g.*, river temperature control) will only be a "deficit" in Trinity Reservoir until the reservoir fills, or significant Safety-of-Dam releases occur. It is likely that one or both of these things will happen before issuance of the new CVP/SWP Opinion. Thus, by extension, the flow augmentation action in 2014 is not expected to preclude development of any RPA measures during the ongoing consultation.

Reclamation also believes that the flow augmentation action in 2014 is consistent with the 2009 CVP/SWP operations Opinion RPA Action I.2.2.C. If the end of September storage in Shasta Reservoir is below 1.9 million acre-feet (MAF), this action states, among other requirements, "Starting in early October…curtail discretionary water deliveries to the extent that these do not coincide with temperature management for the species." This action is focused on discretionary water releases into the Sacramento River, however the intent is to preserve water in Shasta Reservoir to protect the cold water pool. Due to the drought, inflows into Shasta have been extremely low, and several actions have been taken to manage Shasta storage and temperatures in the Sacramento River. In the summer of 2014, Trinity Reservoir exports to the Sacramento River Basin have been managed to conserve the cold water pool in Shasta Reservoir in anticipation that the end of September storage in Shasta will be less than 1.9 MAF. This action will not foreclose Reclamation's ability to achieve an end of September storage of 1.9 MAF. Additionally, the proposed action will end in mid- September and is therefore consistent with RPA Action I.2.2.C.