For public discussion
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WHAT THE KLAMATH SETTLEMENTS MEAN FOR KLAMATH SALMON

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Summary

Dam Removal (KHSA): Under the Klamath Hydropower Settlement Agreement (KHSA), in the long-term, dam removal means reintroduction of salmon to more than 600 stream-miles of previously fully occupied upper basin spawning and rearing habitat, much of it still in good condition. This will add at least 10% more habitat for ESA-listed coho salmon, much more than double the available habitat for spring chinook (once most abundant above the dams), as well as considerably expand the current range of fall chinook. The most recent estimate is that this additional 600+ miles of habitat *could support more than 111,000 additional adult salmonids returning to the Klamath each year*. Improved water quality from dam removal, plus better natural recruitment of more spawning and rearing gravel in the lower system, is expected to substantially increase salmon productivity below the dams, including to some degree reducing juvenile mortalities from exposures to toxic algae from the reservoirs and from *Ceratomyxa shasta*.

However, in the short-term dam removal in 2020 would also mean large (but temporary) initial declines of Klamath mainstem salmon abundance because of much higher juvenile salmon mortalities caused in 2020 and 2021 by the release and flushing through of fine sediments previously trapped behind the dams. Various means to minimize those impacts are under consideration, and will factor into the dam removal "Definite Plan." Making Iron Gate Dam the last dam removed will control the timing of these sediment releases to minimize the exposure time for salmon. Nevertheless, this temporary abundance reduction can be expected to curtail ocean salmon harvests that are based on the Klamath *mainstem* juvenile stock abundance for years 2023 – 2025. Fortunately, Trinity River-based salmon runs, depending on a tributary largely unaffected by dam removal, would only face high sediment loads in the very lowest parts of the river where these impacts would be greatly diluted.

According to all the engineering studies to date, this sediment plume is expected to *greatly diminish* after the first year's winter flushing flows. After two or three years, these fine sediments will all likely be flushed out to sea, leaving only clean spawning and rearing gravel behind in much larger quantity than currently exists, thus providing a survival *benefit* thereafter.

Water Reallocation (KBRA): Under the Klamath Basin Restoration Agreement (KBRA), between 130,000 and 230,000 *additional* acre-feet of water would also be provided annually to the Upper Klamath Lake/Klamath River, as compared to the reference index "historic baseline"

years of 1961-2000. Most important, this additional water amount left in-river would be larger during dry years than for wet years. Currently the Klamath Irrigation Project takes out *more* water in dry years (thus exacerbating the impact of every drought on salmon), while under the KBRA "diversion cap," the Project would take *less* water during dry years, thus leaving more in the river to buffer the impact of future droughts (see Figures 1 & 2 attached).

These additional flows would also be *guaranteed* to the lower basin from Year 1 of the KBRA as "interim period" flows secured through an "interim water bank" system under Sec. 19.4.1, until permanent water storage as well as both Project and off-Project demand reductions can offset and permanently replace these interim water bank flows over the next 10 years. These additional flows can also be timed for release to speed up springtime juvenile outmigration so as to minimize later spring and summer exposures to *C. shasta*, which is likely to increase smolt-to-adult survival rates in the lower river significantly. Such higher spring time flows would better emulate the natural pre-dam and pre-irrigation hydrology that Klamath salmon evolved with.

These additional KBRA flows alone (even absent dam removal) are projected to decrease low production fall chinook years in the Klamath *from the current level of 1 in 4, to approximately 1 in 10 years.* Additional habitat access and water quality benefits from dam removal would be additive to these flow-related benefits.

Impacts from the Klamath Basin Restoration Agreement (KBRA):

- The KBRA provides for additional volumes of water to be provided to Upper Klamath Lake (UKL), and thus available to the lower Klamath River, as follows:
    - Reductions of direct Klamath Irrigation Project diversions of between zero and 100,000 acre-feet each year, depending on the hydrological water year (i.e., more provided to the river during dry years, less during wet years – reversing the current practices) under a Project "Diversion Cap" (see Figures 1 and 2) (Sec. 15).
    - Voluntary off-Project, upper basin diversion and water right retirements sufficient to provide a measurable additional 30,000 acre-feet of additional water to Upper Klamath Lake (Sec. 16).
    - ~100,000 acre-feet of additional stored water, to be held in converted wetlands storage at various locations, phased in over time (Sec. 17).

- A guarantee that the amount of additional water that UKL/the lower river would have gotten after full implementation of the KBRA will be provided immediately (i.e., beginning in year 1 after execution of the KBRA) through an "Interim Water Bank" until the On-Project Irrigation Plan, Upper Basin Off-Project Program, and permanent storage projects have been implemented.[1]

[1] KBRA Sec. 19.4.1 states: "During the interim period, the Parties intend that this program will be administered to increase, to the extent technically feasible, the amount of water in the Klamath River and Upper Klamath Lake toward the amounts which will result from the permanent instream water supply enhancement actions in Sections

- Water flow improvements (pre-dam removal) alone are projected to decrease the average occurrence of poor Klamath fall chinook production years from the current 1 out of every 4, to approximately 1 out of every 10 years, according to SALMOD modeling.[2] Additional post-dam removal population improvements are also anticipated to be significant but will depend upon how long it takes newly opened habitat above the current sites of the dams to become fully occupied after dam removal in 2020.

- An aggressive 50-year restoration program for salmon habitat and water quality improvements throughout the upper, and much of the lower, Klamath Basin, subject to future Congressional funding.

Impacts from the Klamath Hydropower Settlement Agreement (KHSA):

- Subject to NEPA and CEQA analysis of environmental and socioeconomic impacts and creation of an engineering "Definite Plan" for removal, the KHSA provides for a Secretarial Determination on Klamath Hydroelectric Project dam removal ("Facilities Removal" of J.C. Boyles, CopCo 1 & 2 and Iron Gate Dams) by the Secretary of Interior to be made by March 31, 2012.[3]

  Assuming an Affirmative Determination on Facilities Removal by the Secretary of Interior by March 31, 2012:

- Various "Interim Measures" in the KHSA will reduce the interim harm to salmon from poor water quality during the interim period between execution of the KHSA and the Secretarial Determination and dam removal by 2020. PacifiCorp will also be expected to meet its TMDL load allocations as well during this interim period.

- Dam removal is to be achieved by the target date of December 2020 to establish a free-flowing river suitable for volitional salmonid passage to the upper basin. Long-term overall water quality of the river for salmon would also be improved by removal of these dams.

15, 16 and 17." If these implementations are delayed, the "interim period" is likewise simply extended (Sec. 19.4.2).

[2] From the KBRA "White Paper," *Compilation of Information to Inform USFWS Principals on Technical Aspects of the Klamath Basin Restoration Agreement Relating to Fish and Fish Habitat Conditions* (May 2009 Draft), USFWS Arcata Fisheries Technical Report TR 2009-11. A finalize version of this report is to be released Nov. 9, 2009.

[3] KHSA Sec. 3.3.1: Standard for Secretarial Determination: "Based upon the record, environmental compliance and other actions described in Sec. 3.2, and in cooperation with the Secretary of Commerce and other Federal agencies as appropriate, the Secretary [of Interior] shall determine whether, in his judgment ….. Facilities Removal (i) will advance restoration of the salmonid fisheries of the Klamath Basin, and (ii) is in the public interest, which includes but is not limited to consideration of potential impacts on affected local communities and Tribes."

- Access by anadromous salmon to more than 600 stream-miles of once fully occupied habitat above the dams is estimated as capable of supporting more than an additional 111,000 adult salmon and steelhead in the river system (Huntington, 2006).

- An initial sediment plume in Year 1 after dam removal will occur that could be several times fatal levels to juvenile salmonids. This sediment plume, however, is expected to greatly diminish after the first winter season, during which most sediment "fines" will be washed out to sea.[4]

- Probable short-term declines of available Klamath salmon for harvests in Years 3, 4 & 5 after dam removal, followed by increasing long-term average abundances after Year 5 and thereafter.

- After sediment fines wash through the system, the recruitment of significant amounts of new spawning and rearing gravel, now trapped behind dams, is expected to improve spawning and rearing habitat for salmon for at least 50 miles below the former location of Iron Gate Dam.[5]

- Continued full funding by PacifiCorp for the operations of Iron Gate Hatchery for a period of eight (8) years after Facilities Removal at Iron Gate Dam, after which the facility would be taken over by California Dept. of Fish and Game.

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[4] Various ways to mitigate the impacts of this sediment will be considered, including: (1) using Iron Gate Hatchery or Fall Creek Hatchery for interim releases of more mature juvenile fish timed to minimize these impacts on each affected year-class; (2) scheduling final breaching of Iron Gate Dam so as to maximize amounts of flushing of fine sediments, but confined to the shortest possible time during winter months when flows are at their highest and strongest; (3) managing and stabilizing sediments from emergent lands with re-vegetation and constructed flow channeling.

[5] The dams have blocked natural gravel recruitment and made the river spawning gravel-poor from Iron Gate Dam downstream for more than 50 miles, according to the FERC FEIS.

Confidential, Subject to Klamath Settlement Confidentiality Agreement

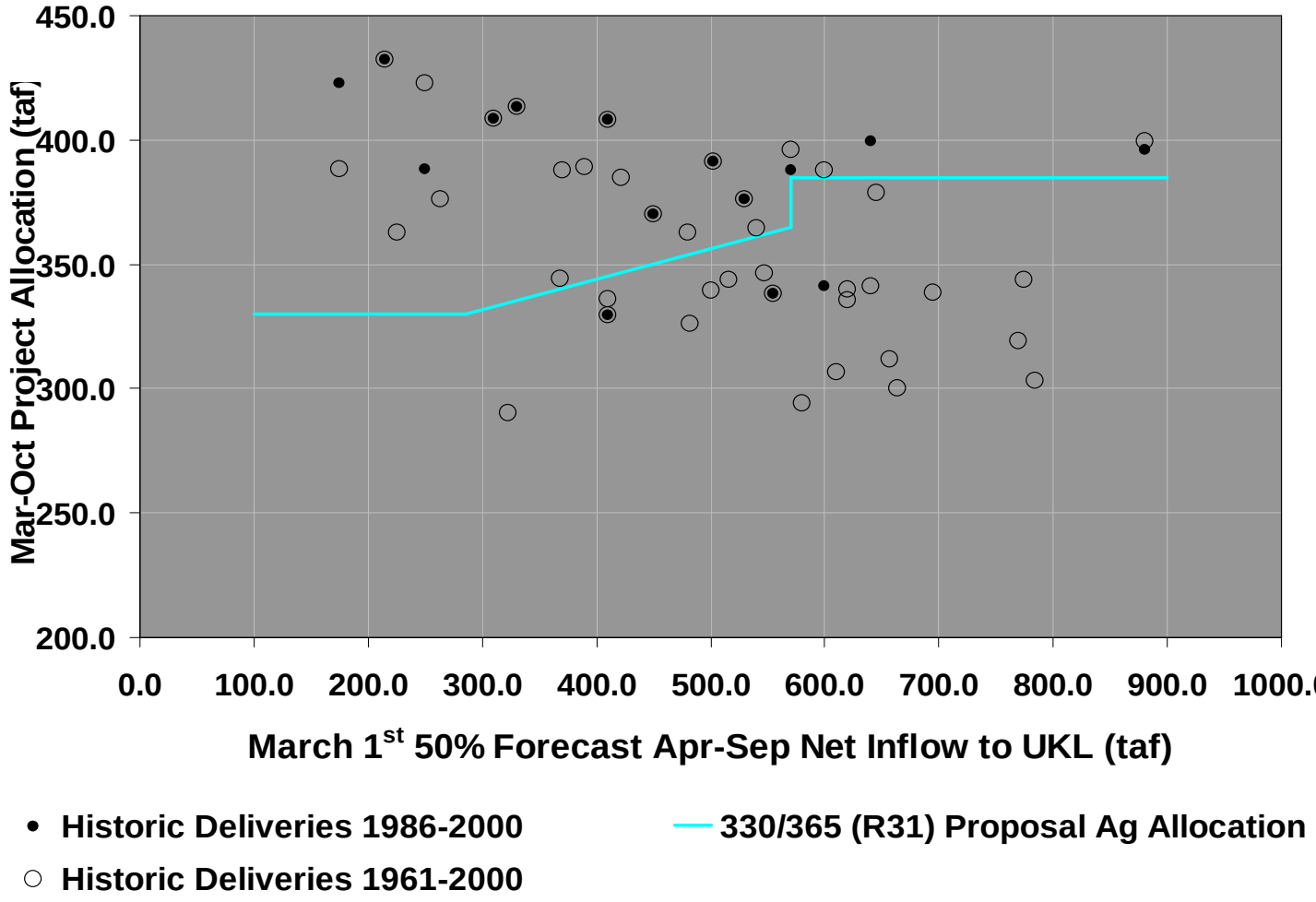

Figure 1: The KBRA "cap" on Project diversion limits (blue line) vs. actual Irrigation Project water used during the historic index reference period of 1961-2000. This period was chosen because it is representative of current irrigation conditions absent any other constraints, i.e., the Project diverting as much water as it requires without any limits imposed under the KBRA "cap" or otherwise. Median water inflows to UKL for this period were about 530,000 acre-feet, representing the mid-point of a "normal water year."

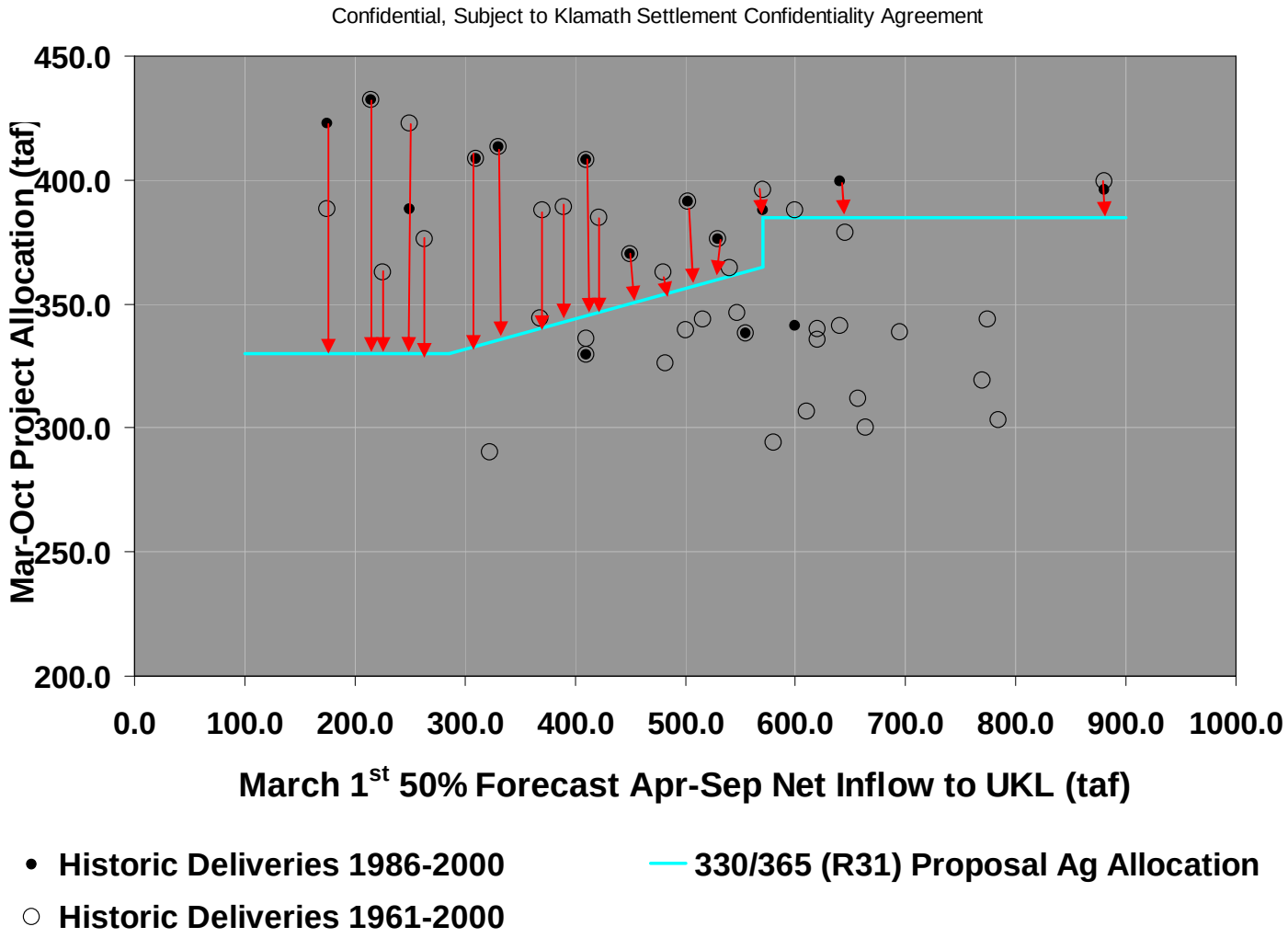

Figure 2: The water *savings* from historic agricultural water deliveries compared to the KBRA delivery cap (blue line). This graph shows that 1) the cap represents a substantial reduction of irrigation diversions, especially in nearly all dry years as opposed to past practices, and 2) agricultural deliveries increased in the sub-period of 1986-2000 (i.e., solid circles are found in upper half of scatter).

Note: Figures 1 and 2 above, though marked as confidential settlement documents in these embedded graphics, are now public documents as of the formal release of the KBRA science "White Paper" on November 9, 2009. The have also appeared previously in non-confidential White Paper drafts and other documents, and can therefore be freely used regarding KBRA issues.