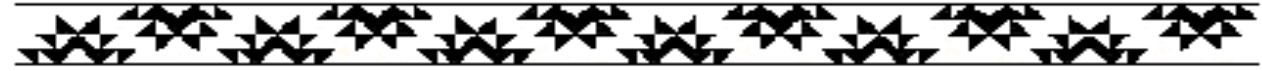


**RESIGHINI RANCHERIA**  
A Federally Recognized Indian Tribe  
**ENVIRONMENTAL PROTECTION AUTHORITY**



Frank S. Dowd, III, Chairman  
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November 28, 2006

Ms. Magalie R. Salas  
Office of the Secretary  
Federal Energy Regulatory Commission  
888 First Street, NE  
Washington, D.C. 20426

Re: Resighini Rancheria Comments on the Draft Environmental Impact Statement,  
(DEIS) Klamath Hydroelectric Project, FERC Licensed Project Number 2082-  
027, Operated by PacifiCorp

Dear Ms. Salas:

Enclosed please find our comments on FERC's Draft Environmental Impact Statement (DEIS), Klamath Hydroelectric Project, FERC Licensed Project Number 2082-027.

When we addressed FERC in our January 18, 2005 letter, we said, "The Business Council of the Resighini Rancheria contends that the PacificCorp Hydroelectric Project is not in balance with the river and represents a disruptive force to the harmony of man and nature in the basin. The Project represents an unnatural event which is having unnatural consequences on the environment and the Tribes." We went on to say, "Whether your Environmental Impact Statement considers us as a people, a living culture and treats our arguments as germane under Section 106 of the Federal Power Act, or as part of the food web and under environmental law, matters only for the sake of argument. We will, however, expect you to remedy the abridgement of our traditional rights as long recognized by the federal government and guide the river's return to good health and allow the restoration of the fish on which we and other Tribes rely. The Council believes that dam removal is the path you must follow to honor that commitment and that such actions must be taken expeditiously to avoid irretrievable and irreversible harm to both Public Trust and Tribal Trust resources."; FERC's Draft Environmental Impact Statement (DEIS) fails to honor that commitment. It is our opinion that the DEIS fails to meet FERC's trust responsibility to the Yurok People of the Resighini Rancheria.

In view of the exhaustive studies conducted by the myriad stake holders and various governmental entities, including affected tribal governments, of which all meaningful studies were submitted to FERC for consideration in developing the DEIS, we find it near



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incomprehensible that the FERC Staff Alternative does not include dam decommissioning, or even fish passage, as viable options to relicensing.

We believe the decommissioning option is essential and that it must include removing all of the dams, including Keno Dam. If PacifiCorp is allowed to remove Keno from the project, who will be required to remedy the water quality impacts resulting from the construction of the Keno Reservoir? Regardless of whether the Keno Dam serves a project purpose, PacifiCorp is responsible for its impacts and must be ordered to clean it up through decommissioning.

On the other hand, we are pleased that FERC extended the APE to the mouth of the river for geomorphology, water quantity, water quality, anadromous fish and socioeconomic values. But we are disappointed in the total lack of studies on the health and socioeconomic impact of the Project on Klamath Basin Indian Tribes. The five California Tribes are working under State grants and agreements studying the health impact and social impact of the Project and its resultant degradation of water quantity, water quality, food resources and commercial opportunities, on Native Americans. We expect our studies to be completed in June, 2007. We believe that any meaningful DEIS will have to wait on the analysis of the results of our studies.

That said, we believe FERC can meet its federal trust responsibility to our people by reconsidering positions taken in the Staff Alternative and by concluding unequivocally that the Klamath Basin, its people, its communities and its natural resources cannot survive another 30 to 50 years of destructive Klamath Hydroelectric Project operation.

Sincerely,

Frank S. Dowd, III, Chairman

Enclosure

cc: Resighini Rancheria Tribal Council  
Tribal Business Manager  
Director, REPA



COMMENTS ON  
FEDERAL ENERGY REGULATORY COMMISSION'S (FERC)  
DRAFT ENVIRONMENTAL IMPACT STUDY  
FOR THE KLAMATH HYDROELECTRIC PROJECT,  
FERC LICENSE # 2082-027, OPERATED BY PACIFICORP

COMMENTS PRESENTED BY  
FRANK S. DOWD, III, CHAIRMAN  
BY AUTHORITY OF THE  
TRIBAL COUNCIL OF THE RESIGHINI RANCHERIA  
KLAMATH, CALIFORNIA

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## COMMENTS ON DRAFT ENVIRONMENTAL IMPACT STATEMENT

Klamath Hydroelectric Project, FERC License 2082-027, Operated by PacifiCorp  
Submitted to FERC by the Resighini Rancheria, a Federally Recognized Indian Tribe

### INTRODUCTION

This document provides comments regarding the Federal Energy Regulatory Commission's (FERC) Draft Environmental Impact Statement (DEIS) for the proposed relicensing of the Klamath Hydroelectric Project (hereafter "KHP"), licensed Project No. P-2082-027.

These comments were prepared with the assistance of our consultant, Kier Associates, Arcata, California.

### A SUMMARY OF THE TRIBE'S COMMENTS

First, we must express our extreme disappointment at FERC's failure to evaluate a project alternative that includes the decommissioning of all of the mainstem KHP dams downstream of Keno Dam and request that FERC include an analysis of decommissioning these four dams in its final EIS (FEIS). We discussed this issue at length with FERC in our December 15, 2004 Government-to-Government meeting, required by FERC's Federal Trust Responsibility to the Tribe. Given the number of Tribes and agencies that have repeatedly, formally requested that FERC evaluate such an alternative, FERC's failure to do so is puzzling and regrettable. We also strongly disapprove of FERC's choice to not include fish passage in its Staff Alternative, despite mandatory conditions to do so filed jointly by National Marine Fisheries Service and the U.S. Fish and Wildlife Service. It appears to us that the issuance of a license that lacks the mandated fish passage would be a clear violation of federal law, is not in our best interest and therefore a clear violation of FERC's trust obligation.. We do not understand, therefore, why FERC staff is not recommending fish passage in the Staff Alternative.

Several of the DEIS recommendations are short-term, inadequate measures that neither recognize nor address the Klamath River's dynamic and interconnected processes. Examples include the proposed use of copper sulfate algacides to manage *Microcystis* blooms, and the notion of dragging chains across the stream bottom to dislodge attached *Cladophora* algae. Such measures are unlikely to produce the needed results and have substantial probability for unexpected negative consequences. Instead, we recommend a more effective, holistic approach to restore ecosystem processes, including habitat reconnection and restoration of natural flows of energy and nutrients. Again, we regret that the decommissioning option that can fully remedy the KHP's impacts on the Klamath River was not evaluated as a viable alternative to the project proposed. We find it unlikely that we will be able to accept any final EIS that does not include dam decommissioning as a viable alternative to relicensing the project.

The accumulating weight of Klamath River science makes clear an unfortunate truth. Due to peculiarities of the Klamath River's geography, particularly its location downstream of a hyper-eutrophic lake ringed by agricultural production, hydroelectric generation utilizing mainstem dams is simply incompatible with a healthy Klamath River. Given these constraints, difficult decisions must be made. The amount of electricity generated by the KHP is relatively small, and given the mandate of fish ladders by the responsible fisheries agencies, it would be expensive to

upgrade and relicense. The electricity could be replaced cost-effectively with clean renewable generation technology such as wind turbines, or generation from natural gas fuel. In contrast, the Klamath River, its fisheries, and its people are irreplaceable. Given the damage that the KHP continuously inflicts upon the Klamath River, we neither comprehend nor could we ever agree with the reasons given in the DEIS for why the public interest is best served by another 30 to 50 years of destructive KHP operation. It certainly does not serve the best interests of the people of the Resighini Rancheria. In view of the harm and injuries caused by the KHP, keeping this antiquated project going does not make socioeconomic or environmental sense. It doesn't even make common sense!

There appears to be a disconnect between the DEIS technical analyses presented regarding the impact of Iron Gate and Copco Reservoirs on water quality and fish disease, and policies promoted in a Staff Alternative that does not include dam removal, or even mandated volitional fish passage. The DEIS, at page 5-15 succinctly states that:

“Removal of the two dams [Iron Gate and Copco] would enhance downstream water quality and reduce cumulative effects that contribute to downstream fish kills caused by disease and poor water quality (low DO, high water temperature, variable pH and ammonia levels, crowding, nutrients and armored substrate favorable for algal populations that form habitat for fish pathogen host)

We commend FERC on the integration of analyses and scientific reports that led to the above summary, and agree with much of the analysis presented in the DEIS regarding the impacts of Iron Gate and Copco Reservoirs to water quality and fish disease. That said, we strongly disagree with FERC's choice not to include dam removal or mandated fish passage in its Staff Alternative, and we wonder in amazement how that came about in view of FERC's recognition that dam removal would “enhance downstream water quality and reduce cumulative effects that contribute to downstream fish kills . . .”.

It is our sincere hope that when FERC staff has had the opportunity to reflect upon the information presented here (there are some significant technical issues that need correction and/or improvement in the EIS) it will, with its improved understanding of the KHP's environmental impacts on the Klamath River, improve its Staff Alternative to include the decommissioning of J.C. Boyle, Copco 1, Copco 2, and Iron Gate dams. Addressed in more detail below in the section “Detailed Comments Regarding Major Issues”, these significant technical issues include:

### **Toxic algae**

***The DEIS does not properly characterize the role of KHP reservoirs in the basin-wide distribution of the toxic algal species *Microcystis aeruginosa* nor the alga's impacts on aquatic and human health in the lower Klamath River***

- ▶ *Microcystis* blooms in Iron Gate and Copco Reservoirs are not triggered by inoculation from upstream sources; they are self-sustaining populations that do not require upstream inoculation.
- ▶ Habitat conditions created directly by the KHP reservoirs cause *Microcystis* to bloom extensively in a river section that is not normally conducive to such blooms.
- ▶ In 2005, high levels of *Microcystis* were detected all the way down to the mouth of the Klamath River during the critical period of salmon migration and high cultural and recreation use of the river.
- ▶ Iron Gate and Copco reservoirs clearly contribute to the high concentrations of toxic algal species observed in the lower Klamath River.

- ▶ Due to the large geographic scope and potential harm of this significant KHP impact, FERC is not correct in requiring PacifiCorp to monitor *Microcystis* only in the reservoirs and immediately below Iron Gate Dam. Monitoring should instead be required downstream to the estuary.
- ▶ Despite the Yurok Tribe's detection of microcystin toxins in adult steelhead livers, the DEIS does not acknowledge the potential harm to aquatic life or human health of these KHP-attributable toxins in the lower Klamath River. Instead the DEIS focuses only on recreation-related human health exposure at Iron Gate and Copco Reservoirs.
- ▶ Due to the threat to human, fish, and wildlife health, FERC should not suggest the use of algaecides to control *Microcystis* blooms.

#### **Effects of peaking/bypass operations on downstream water quality**

##### ***The DEIS fails to provide any analysis of the effects of peaking/bypass operations on the river's nutrient-removal capacity between J.C. Boyle Reservoir and Copco Reservoir***

- ▶ As PacifiCorp (2005) itself has acknowledged, peaking operations decrease the nutrient-removal capacity of the Klamath River by inhibiting growth of attached algae.
- ▶ This impairment of nutrient-removal capacity results in increased nutrient concentrations downstream, with attendant degradation of pH and dissolved oxygen conditions, as well as increased fish disease through increased habitat for the polychaete worm that is host to the fish parasites *Ceratomyxa shasta* and *Parvicapsula minibicornis*.
- ▶ FERC's failure to acknowledge these impacts may explain, in part, why its Staff Alternative fails to require the removal of J.C. Boyle Dam and the peaking it facilitates.

#### **Effects of Iron Gate and Copco reservoirs on nitrogen dynamics**

- ▶ We agree with FERC's conclusions that Iron Gate and Copco Reservoirs can act as both nutrient source and sinks, depending on the time of year, but we would like to provide some additional, important quantitative details
- ▶ A nitrogen budget developed for Klamath River indicates that the free-flowing river reaches below Iron Gate Dam retain nutrients at a moderate and consistent rate, while the combined retention of Iron Gate and Copco reservoirs shifts between positive and negative values (Asarian and Kann, 2006a).
- ▶ Adjusted for length and incoming nitrogen load, nitrogen retention rates in July-September 2002 were 3.3% higher in the Iron Gate-to-Seiad Valley river reach than they were in Iron Gate and Copco Reservoirs (Asarian and Kann 2006a). This indicates that during this critical summer period river reaches are more effective at retaining nitrogen and they would benefit downstream water quality more than do the reservoirs.

#### **Greenhouse gas emissions**

- ▶ In its analysis of greenhouse gas emissions, the DEIS neglects to mention that KHP reservoirs emit the potent greenhouse gas methane, despite strong evidence that methane is produced in the KHP reservoirs.
- ▶ The KHP's methane emissions should be factored into the FERC's calculations of the project's "carbon emissions displacement".
- ▶ Due to the lack of KHP-specific data, precisely estimating methane emissions is difficult at this time, but in the calculations described below we estimate that the global warming potential of KHP's methane emissions are equivalent to 3% to 12% of its carbon emissions displacement.

### **Replacement electrical generation and the need for power**

► The DEIS fails to cite the California Energy Commission's (2004) filing to FERC that requests FERC consider decommissioning the KHP because, "low power - high impact energy facilities can create substantial net environmental benefits if decommissioning proves to be feasible and cost-effective, and if replacement energy is available."

### **Recent advances in Klamath River science**

#### ***The DEIS does not contain information from many important recent scientific investigations***

► The DEIS lacks information from many recent scientific studies. Some were apparently overlooked by FERC during the preparation of the DEIS, while others were not available at the time the DEIS was being prepared.

► The documents are discussed below in appropriate sections, but are also provided as a single list here. Such studies include the calculation of Klamath River nitrogen loads and retention (Asarian and Kann 2006a); the evaluation of PacifiCorp's water quality model (Asarian and Kann 2006b); a review of Klamath River phytoplankton data (Kann and Asarian 2006); an evaluation of the distribution of *Microcystis* in the Klamath Basin (Kann 2006); a report concerning *Microcystis* sampling in Iron Gate and Copco Reservoirs (Kann and Corum 2006) and one on the Yurok Reservation (Fetcho 2006); a characterization of the quantity and toxicity of sediments in KHP reservoirs (California Coastal Conservancy 2006), and a report on the distribution of the fish parasite *C. shasta* and its intermediate host polychaete worm *M. speciosa* in the Klamath River (Stocking (2006).

## **DETAILED COMMENTS REGARDING MAJOR ISSUES**

In this section, the following significant issues are addressed in order:

- Toxic Algae
- The effects of peaking/bypass operations on downstream water quality
- The effects of Iron Gate and Copco reservoirs on the river's nitrogen dynamics
- Greenhouse gas emissions
- The need for power
- The Staff Alternative's excessive reliance on plans to resolve essential issues

### **TOXIC ALGAE**

The issue of the toxic algal species *Microcystis aeruginosa* in the Klamath River is dealt with inadequately in the DEIS. While the DEIS presents some useful information regarding *Microcystis*, it does not incorporate information from the most current and comprehensive studies (Kann 2006, Kann and Corum 2006), filed with FERC in March, 2006. The failure to use this information may explain the DEIS' failure to recognize the potential seriousness of the *Microcystis* problem in the Klamath River downstream of Iron Gate Dam all the way to the estuary, and the role of KHP structures and operations in the basinwide distribution and abundance of *Microcystis*. The DEIS does not, therefore, advance adequate solutions to these problems, nor do it propose adequate monitoring of them.

There are several flaws in the DEIS' analysis of *Microcystis*

1. DEIS deficiency: The DEIS fails to recognize the downstream extent of the high concentrations of *Microcystis* concentrations, nor does it recognize the potential consequences of such concentrations on human health and fish health.

Page 3-144 of the DEIS states:

“If a monitoring program is implemented for *Microcystis* and its toxin in project reservoirs, monitoring results that trigger public health agency notification would enable such agencies to make a determination regarding whether there is a health risk to the public who come in contact with Klamath River water downstream of Iron Gate dam. Because algal blooms typically occur in reservoirs, not in free flowing river reaches, we expect the concentration of microcystin downstream of reservoirs where trigger levels may be detected, to be lower and less toxic. Consequently, we find that monitoring for *Microcystis* in free-flowing portions of the Klamath River from Iron Gate dam to the estuary, as Conservation Groups recommend, would be inappropriate to include as a condition of any new license that may be issued for this project.” (page 3-144).

There are at least three reasons why this failure to recognize the significance of downstream microcystin toxins issues on the Klamath River is problematic. Each is described in the following text.

First, although phytoplankton samples from the U.S. Fish and Wildlife Service and the Yurok Tribe in 2005 showed that *Microcystis* cell densities generally followed a decreasing trend as the river flowed from Iron Gate Dam to the estuary, cell counts were still relatively high (Kann 2006, Fetcho 2006). While cells counts in the main water column never exceeded the WHO moderate probability of adverse health effects threshold of 100,000 cells/mL, densities frequently exceeded 10,000 cells/mL with several measurements exceeding 40,000 cells/mL. The 40,000 cell/ml level for *Microcystis* is the level currently adopted by the State of Oregon, Humboldt County Health Department and the Yurok and Karuk Tribes for public health advisories. Note that the 100,000 cell/ml WHO level is a general level for all blue-green species and recent research has shown that 40,000-50,000 cells/ml provides a more protective level for *Microcystis* (e.g., NHMRC 2005). Moreover, *Microcystis* cell concentration exceeded 1.3 million cells/ml in a backwater area near the confluence of Coon Creek nearly 100 miles downstream from Iron Gate Dam in 2005. Microcystin toxin at this station was ~50 µg/L, well over the 8 µg/L level used by the State of Oregon for designating an increased probability of adverse health affects.

Second, the highest *Microcystis* cell counts in 2005 were detected in mid-September, during the critical period of salmon migration and high cultural and recreation use of the river. While monitoring and warning notices would restrain fisherman from fishing during periods when toxic algae advisories were in place, the coincident timing of these advisories would likely result in the loss of all or most of the fishing season. This would be devastating to the tribal subsistence and commercial fisheries, and to the businesses that rely on tourism and the recreational fishing industry. Monitoring obviously fails to prevent migrating salmon from entering the river and does nothing to reduce their exposure to high toxin concentrations. The Yurok Tribe (Fetcho 2006) has detected microcystin in the livers of adult steelhead in the lower Klamath River. Monitoring alone is clearly an inadequate response by FERC to the KHP-driven *Microcystis* problem.

Finally, a review of the available data (Kann 2006, Kann and Corum 2006) shows clearly that through creation of ideal *Microcystis* habitat, that Iron Gate and Copco reservoirs are principal

contributors to the high *Microcystis* cell counts observed below the reservoirs. PacifiCorp, as owner and operator of the KHP, should be required to take responsibility for monitoring the entire area downstream affected by the *Microcystis* problem – *that is, all the way down the river to its mouth.*

Recommendations for FEIS: Using the information provided here, FERC staff should re-write appropriate sections (i.e. 3.3.2.2.2 “Monitoring and Control of Algae that Pose a Risk to Fish, Wildlife, and Public Health” and “Dam Removal to Enhance Water Quality”, 5.2.21 “Dam Removal”, 5.1.2 “Summary of Effects”) to acknowledge the downstream extent of high concentrations of KHP-related *Microcystis* concentrations, and the attendant consequences for human health and fish health.

2. DEIS deficiency: The DEIS fails to recognize that Iron Gate and Copco reservoirs increase the risk of *Microcystis* re-growth downstream

By providing ideal habitat for, and producing algal blooms, Iron Gate and Copco Reservoirs have dramatically increased the amount of *Microcystis* in the lower Klamath River. This increase in inoculum means that *Microcystis* cells have an increased likelihood of dispersing to suitable *Microcystis* habitats, like quiet backwaters, downstream, and that blooms in such habitats can develop much more rapidly because they start from a larger number of cells. In fact, *Microcystis* is capable of re-developing downstream of Iron Gate. It was detected at the extremely high level of 1.3 million cells/mL in a backwater area near the confluence of Coon Creek nearly 100 miles downstream of Iron Gate Dam (Kann 2006).

Recommendations for FEIS: Using the information provided here, FERC staff should re-write appropriate sections (i.e. 3.3.2.2.2 “Monitoring and Control of Algae that Pose a Risk to Fish, Wildlife, and Public Health” and “Dam Removal to Enhance Water Quality”, 5.2.21 “Dam Removal”, 5.1.2 “Summary of Effects”), to explicitly acknowledge that blooms in Iron Gate and Copco Reservoirs increase the risk of, and are principal contributors to *Microcystis* re-growth downstream

3. DEIS deficiency: The DEIS incorrectly assumes that the *Microcystis* blooms in KHP reservoirs are triggered by inoculation from Upper Klamath Lake upstream.

Page 3-144 lines 14-16 of the EIS states:

“The persistence of *Microcystis* in Upper Klamath Lake suggests that there would be continuing availability of algal cells to seed *Microcystis* blooms under favorable conditions in all project reservoirs.” Although *Microcystis* does not produce true spores or akinetes, the vegetative cells and colonies can persist downstream, re-growing when optimal conditions are encountered. We agree that *Microcystis* is present in the Klamath River from Upper Klamath Lake to Iron Gate Dam, and that blooms will, therefore, likely continue to occur seasonally as long as suitable habitat exists. However, we strongly disagree with FERC’s implication that Upper Klamath Lake is the necessary “seed” source for the *Microcystis* blooms in KHP reservoirs such as Iron Gate and Copco. For example, it is well known that *Microcystis* colonies overwinter on the bottom sediment of lakes and reservoirs, and serve as new infective colonies when habitat conditions are conducive (Reynolds et al. 1981) As shown clearly in the multiple datasets reviewed in Kann (2006), *Microcystis* densities during the algal growing season were typically far higher in Iron Gate and Copco Reservoirs than they were at the outlet of Upper Klamath Lake or in the Klamath River directly above Copco Reservoir. Moreover, given over-wintering colonies likely

contained in reservoir sediments, the maintenance of *Microcystis* populations would occur even in the absence of inoculant from Upper Klamath Lake; especially under the pond-like conditions created by the KHP dams.

Recommendations for FEIS: Page 3-144 lines 14-16 should be revised to read “The persistence of *Microcystis* in Upper Klamath Lake, Copco Reservoir, and Iron Gate Reservoir suggests that there would be continuing availability of algal cells to seed *Microcystis* blooms under favorable conditions in all project reservoirs. The calm, warm, nutrient-rich waters of Iron Gate and Copco Reservoirs provide ideal habitat for *Microcystis* blooms (Water Board 2006, Kann 2006, Kann and Corum 2006); thus, we would expect *Microcystis* to continue to thrive in these project reservoirs even with proposed management actions.”

4. DEIS deficiency: The DEIS incorrectly states that 2005 was the first documented *Microcystis* bloom in the Klamath River downstream of Upper Klamath Lake.

The following two quotes are examples of statements from the DEIS regarding the 2005 *Microcystis* blooms:

“Although the toxic algae *Microcystis aeruginosa* has been known to occur regularly in Upper Klamath Lake (Gilroy et al., 2000), where it may degrade the quality of commercially harvested populations of the blue-green algae, *Aphanizomenon flos-aquae*, and as far as 125 miles downstream of the project reservoirs (Kann et al., 2006), this was the first time the extent of the blooms and their toxicity, at locations other than Upper Klamath Lake, had been documented and health advisories issued by public agencies (Water Board) for project waters” (page 3-143)

“*Microcystis aeruginosa* has appeared regularly in Upper Klamath Lake and the extent of the blooms and toxicity documented in 2005 indicates that the algae has dispersed downstream and may have bloomed in project reservoirs prior to last year’s documentation. However, in the absence of a structured monitoring program, any previous occurrence of toxic algal blooms would have been undetected.” (page 3-144)

In fact, a well-documented toxic bloom occurred in Copco Reservoir on September 29th 2004 when 1.9 million cells/ml of *Microcystis* were associated with a microcystin toxin concentration of 482 µg/L (Kann and Corum 2006). In addition, *Microcystis* was frequently detected in KHP reservoirs in a pre-2005 monitoring program conducted by PacifiCorp from 2001 to 2004. While not specifically designed as a *Microcystis* monitoring program, phytoplankton samples were taken approximately 4 to 9 times per year at many sites between Link River and the Shasta River from 2001-2004. The methodology used in this sampling is described in Raymond (2005); an overall summary of results for all species is presented in Kann and Asarian (2006); and Kann (2006) focuses solely on *Microcystis*. FERC’s suggestion that recent *Microcystis* blooms may be a result of algae that were dispersed downstream from UKL is inconsistent with expected algal-habitat dynamics in a riverine system. Blue-green algae have notably been entering the river system from UKL for many years (e.g., Phinney and Peak 1961), and thus recent dispersion is an unlikely cause of KHP reservoir blooms. Rather, these blooms are the direct result of habitat conditions created by the reservoirs and have been occurring for many years. In fact, these same authors (Phinney and Peak 1961) also state that:

"Wherever along its length the river had been impounded, whether behind a dam or in a backwater or slough, the water had produced blooms comparable with that in Upper Klamath Lake. It can be predicted that the construction of additional impoundments on the Klamath River will greatly increase the organic load of this already impossibly burdened stream and will probably bring an end to fish production in this stream."

Iron Gate Reservoir, one of the KHP reservoirs that currently experiences large blooms of toxic *Microcystis*, was constructed subsequent to the Phinney and Peak (1961) prediction.

As noted previously in our comments regarding Recommended Terms and Conditions (filed with FERC in March, 2006), PacifiCorp frequently detected *Microcystis*, yet fails to mention *Microcystis* altogether in its 7000+ page Final License Application to FERC. Nor did PacifiCorp notify the public, inform water quality agencies, nor post public health warnings at its reservoir access points.

Recommendations for FEIS: For the reasons stated above, the text excerpted above from pages 3-143 should be revised as follows:

"The toxic algae *Microcystis aeruginosa* has been known to occur regularly in Upper Klamath Lake (Gilroy et al., 2000), where it may degrade the quality of commercially harvested populations of the blue-green algae, *Aphanizomenon flos-aquae*, and toxicity sampling has confirmed the presence of microcystin toxin in the lake. *Microcystis* was detected in PacifiCorp's 2001-2004 phytoplankton sampling program; however, these detections were not reported to public health agencies. In addition, a toxic bloom was documented in Copco Reservoir in 2004 when 1.9 million cells/ml of *Microcystis* were associated with a microcystin toxin concentration of 482 µg/L (Kann and Corum 2006). The first year in which there was detailed sampling specifically targeting *Microcystis*, including microcystin toxin analysis, in project reservoirs was 2005. Also in 2005, *Microcystis* was detected approximately 190 miles downstream of project reservoirs in the Klamath River estuary (Kann 2006). In response to that 2005 information, health advisories were issued by public agencies for the project reservoirs and the Klamath River downstream (Water Board 2005). A public health advisory was issued again in 2006 (Water Board 2006)."

Additionally, the text excerpted above from pages 3-144 should be revised as follows:

"*Microcystis aeruginosa* has appeared regularly in Upper Klamath Lake, although typically only low concentrations are detected at the lake's outlet (Kann 2006). In its 2001-2004 phytoplankton monitoring program, PacifiCorp regularly observed *Microcystis* blooms in Iron Gate and Copco Reservoirs (Kann 2006; Kann and Asarian 2006), indicating that *Microcystis* was well-established in those reservoirs prior to the detailed documentation of blooms in 2005 and 2006. Because PacifiCorp did not inform public health agencies of its findings, the public was not made aware of the *Microcystis* situation until 2005."

5. DEIS deficiency: The DEIS fails to recognize the Hoopa Valley Tribe's criteria for *Microcystis* and microcystin.

Page 3-143 at line 14 of the DEIS states: “There are no federal or California regulatory guidelines for cyanobacteria and their toxins.” This statement ignores the Hoopa Valley Tribe’s (Hoopa TEPA 2006) adopted criteria for *Microcystis aeruginosa* and microcystin (Table 1). These standards have been approved by the Tribal Council of the Hoopa Valley Tribe, and are pending approval from the U.S. EPA.

Table 1. Proposed *Microcystis aeruginosa* and microcystin criteria for the Klamath River on the Hoopa Valley Indian Reservation.

Parameter	Proposed Standard*	Rationale for Proposed
<i>Microcystis aeruginosa</i> cell density	<5,000 cells/mL for drinking water <50,000 cells/mL for recreational water	Combination of WHO and Australian Guidelines-- protective of public health
Microcystin toxin concentration	<1µg/L total microcystins for drinking water <10 µg/L total microcystins for recreational water	Combination of WHO and Australian Guidelines-- protective of public health

\*The presence of cyanobacterial scums poses the highest health risk and are to be avoided at all times.

Recommendations for FEIS: We suggest that the quote above found on page 3-143 at line 14 be replaced with: “The State of California and federal agencies have not yet adopted regulatory guidelines for cyanobacteria and their toxins, but the Hoopa Valley Tribe has adopted criteria for *Microcystis aeruginosa* and microcystin for the Klamath River on the Hoopa Valley Indian Reservation. For recreational waters, the Hoopa criteria are a *Microcystis aeruginosa* cell density of <50,000 cells/mL and <10 µg/L total microcystins”

6. DEIS deficiency: The DEIS considers the use of an algaecide to control *Microcystis* blooms.

Pages 3-148 to 3-149 of the DEIS states that “using an algaecide to control a *Microcystis* bloom could be effective in reducing the amount of microcystin toxin, and associated human health risk, in project reservoirs.” It is incorrect to assume that using an algaecide on *Microcystis* will be a benefit to human health. When an algaecide is used on *Microcystis*, the cells are lysed, releasing the toxin microcystin. Therefore, all toxin is released in one large pulse. This could be detrimental to humans, wildlife, and fish. While it might be reasonable to close down the reservoirs to recreational use for a period of time to treat the reservoirs with an algaecide, it is not reasonable to expect to close the river downstream to human access. Toxic algae blooms occur not only during periods of high recreational use, but also during periods of ceremonial use and subsistence fishing by Tribal members. Furthermore, it is not possible to keep fish and wildlife out of the river or reservoirs.

Page 3-149 of the DEIS goes on to state that “However, depending on the algaecide used, there could be associated adverse water quality effects.” This does not mention the implications on water quality that copper sulfate (a possible algaecide mentioned in the DEIS) could have. Effects could include fish kills from copper toxicity in the reservoirs and river, decreased dissolved oxygen, and bioaccumulation of copper.

Recommendations for FEIS: We suggest that the FEIS acknowledge the impacts of algaecides mentioned above and state that, due to these reasons, algaecides are not reasonable to use to control *Microcystis* blooms.

## **EFFECTS OF PEAKING/BYPASS OPERATIONS ON DOWNSTREAM WATER QUALITY**

### DEIS deficiency:

The DEIS contains no discussion of the effects of peaking/bypass operations on nutrient retention (removal) between J.C. Boyle Reservoir and Copco Reservoir. This is disappointing because we have commented on this subject during each of several rounds of comments: PacifiCorp's Final License Application in April 2004, Scoping Document 1 comments in July 2004, and Recommended Terms and Conditions submittal in March 2006. To date FERC has neither agreed nor disagreed with our position that peaking and bypass operations have a detrimental effect on downstream water quality. We request that FERC respond to this matter in its final EIS.

### **Effect of peaking operations**

As the river fluctuates from 350 cubic feet per second (cfs) to 1500, or even 3000 cfs, and back each day during peaking operations, attached algae is scoured during such high flows, then dries out during low flows. The increased water depth during the peaking flows also reduces the amount of sunlight penetrating through the Klamath River's murky water, further reducing attached algae growth by limiting the amount of light that reaches the river's bed. The net effect of these processes is that attached algae are scarce within the peaking reach (Fig. 1)

In the portions of the Klamath River not subject to hydropower peaking, the channel margins are habitats favored by benthic algae, since shallow water provides ample sunlight and the low water velocities do not scour the substrate (Fig. 2). Biggs (2000) noted that filamentous algae are most often concentrated in the stream margins. The channel margins are most effected by hydropower peaking. Therefore, as PacifiCorp (2005) itself has acknowledged, benthic algae production in reaches that are effected by peaking declines as does the over-all nutrient stripping capability of the river.



Figure 1. The southeastern edge of the Klamath River's channel at Stateline river access during non-peaking hours, approximately 5 miles upstream of Copco Dam. Note the complete lack of attached algae and rooted aquatic plants. Photo by Kier Associates, August 2006.



Figure 2. The southeastern edge of the Klamath River's channel just downstream of the Interstate-5 Bridge at river mile 179, approximately ten miles downstream of Iron Gate Dam. Note abundant attached algae and rooted aquatic plants. Photo by Kier Associates, August 2006.

PacifiCorp has asserted that the high gradient of the stream channel between Keno and Stateline (six miles above Copco Reservoir) limits the ability of attached algae to grow. We agree that while gradient is an important factor in determining the rates of algal assimilation and denitrification within any river reach; the examination of the longitudinal profile of the Klamath River (Fig. 3) nevertheless suggests there are several areas with low- to moderate gradient, totaling 14.3 miles. These include (Note: elevations/miles have been determined from USGS topographic maps):

- The area submerged under J.C. Boyle Reservoir (river mile 228.2 to R.M. 224.6, elevation 3793 to 3720) = 20 ft/mi gradient over 3.6 miles
- From the USGS gage below J.C. Boyle Powerhouse (R.M. 219.7, elevation 3275) to the end of Frain Ranch (R.M. 214.4, 3130 feet) = 27 ft/mi. gradient over 5.3 miles
- From Stateline (R.M. 209, elev. 2740) to Copco Reservoir (R.M. 203.6, elev. 2605) = 25 ft/mi gradient over 5.4 miles

These gradients are approximately twice that of the 12.8 feet per mile that the Klamath River drops from Iron Gate Dam (2180 feet) to Weitchpec (300 feet) in 146.5 miles, but they are likely still low enough that attached algae could thrive. Given the differences in gradient, we would not expect that assimilation rates would necessarily be the same as in the reach below Iron Gate, but would clearly be higher than current conditions that are influenced by peaking operations. In free-flowing river reaches below Iron Gate Dam, mass-balance nitrogen budgets show that in the warm low-flow July-to-September period, an average of about 0.35% of the Klamath River's nitrogen is removed each mile that the river flows downstream of Iron Gate Dam (Asarian and Kann 2006a).

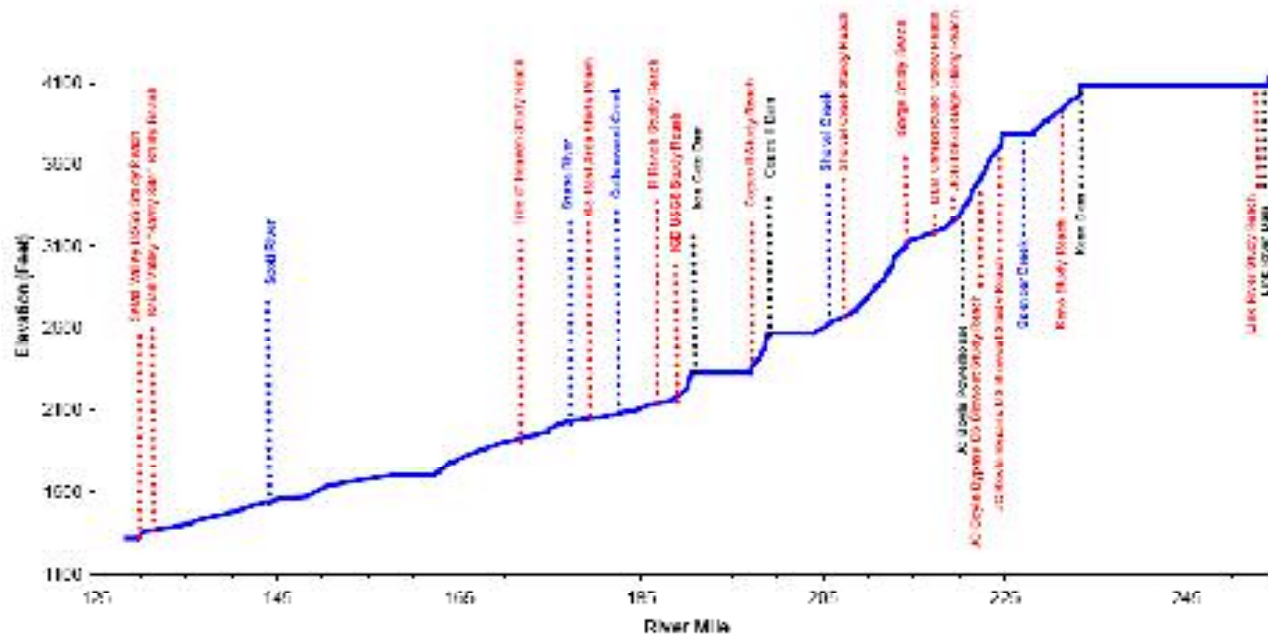


Figure 3. Longitudinal profile of the Klamath River from Link River to Seiad Valley. Note that this figure shows the existing conditions of the water surface, including the reservoirs. Figure from PacifiCorp (2004).

### **The effect of bypass operations**

The steep riverine reaches of the Klamath River (Keno Dam to J.C. Boyle Reservoir; the peaking reach from J.C. Boyle Dam to just below the J.C. Boyle Powerhouse; and the downstream end of Frain Ranch to Stateline) appear to provide a significant benefit to Klamath River water quality. PacifiCorp's 2001-2004 phytoplankton data show substantial decreases in phytoplankton biomass through river reaches like Keno Dam to J.C. Boyle Reservoir and J.C. Boyle Dam to Copco Reservoir (Kann and Asarian 2006). The likely reason for this is that turbulence in these reaches kills phytoplankton, transforms it into organic matter and begins the decomposition process. Once organic matter has decayed into dissolved inorganic nutrients it can be taken up by attached algae, resulting in reduced nutrient concentrations and improving downstream water quality overall.

Current alterations in the bypass reach allow phytoplankton to persist further downstream, delaying improvement in water quality. For example, at J.C. Boyle Dam, most of the Klamath River's water is diverted into a concrete canal that runs parallel to the river for several miles (Figure 4) before re-joining the river at the J.C. Boyle Powerhouse. The canal is low gradient with low water velocity and low turbulence, allowing phytoplankton to pass it through intact. The diverted water does mix violently at the J.C. Boyle Powerhouse, but for only a few moments compared to the multi-hour, 5-mile, constantly-frothing journey that water in the river channel through the bypass reach experiences.



Figure 4. Excerpt from a panoramic photo of the J.C. Boyle Bypass reach and canal. Original photo by Thomas Dunklin (<http://www.thomasbdunklin.com>).



Figure 4. The canal that carries water from J.C. Boyle to the powerhouse. Photo by Katherine Pedery (<http://www.pelicannetwork.net/salmon.boyle.htm>).

In addition to depriving the water of turbulent mixing, the canal provides an extremely poor growing environment for attached algae. The water surface in the canal is exposed to sunlight, but the combination of turbid water and the canal's vertical walls result in very little sunlight reaching its bottom where attached algae could grow. In contrast, although in many other reaches of the Klamath River attached algae may not grow well in the deep light-limited water in mid-channel, it thrives in the shallower water along the channel margins.

Because most of the water is diverted, only a small portion of the remaining streamflow in the river between JC Boyle Dam and the powerhouse is subjected to the turbulent mixing that destroys phytoplankton and begins the decomposition process. Thus, the net effect of the diversion is that the combined water in the river below the J.C. Boyle Powerhouse would have more intact phytoplankton and organic matter, and it will take longer to fully decompose and to be removed from the water column than would be the case if no water were diverted. In addition, the lack of adequate growing conditions in the canal allows for very little or no assimilation of nutrients by attached algae. The net result of these factors would be higher nutrient concentration downstream than would exist absent the diversion.

The 1.4 mile long Copco 2 Bypass reach has similar effects on water quality, albeit for a shorter distance.

#### Recommendations for FEIS:

We recommend that FERC consider the points that we have presented above and revise the EIS to recognize the effects of project peaking/bypass operations on downstream water quality. The affected reaches include the J.C. Boyle Bypass Reach, J.C. Boyle Peaking Reach, and the Copco 2 Bypass Reach. The FEIS sections requiring revision include 3.3.2.2.2 "Dam Removal to Enhance Water Quality", 3.3.3.2.4 "Dam Removal or Decommissioning", 5.2.21 "Dam Removal", 5.2.5 "Instream Flows", and 5.1.2 "Summary of Effects". We also recommend that

the EIS include an alternative that analyzes the affects of the removal of J.C. Boyle Dam, including the effects on downstream water quality described above.

## **EFFECTS OF IRON GATE AND COPCO RESERVOIRS ON NITROGEN DYNAMICS**

### DEIS deficiency:

We agree with the FERC staff's conclusion that Iron Gate and Copco Reservoirs can act as both nutrient source and sinks, depending on the time of year, but we would like to provide some additional information that needs to be incorporated into the EIS.

PacifiCorp has submitted comments to FERC regarding the Kann and Asarian (2005) nutrient budgets for Iron Gate and Copco Reservoirs for the year 2002, stating that nutrient retention in Iron Gate and Copco Reservoirs should not be analyzed in isolation, but rather in tandem to determine the net affect on retention. We agree, although the reasoning for keeping the systems separate was to allow for the evaluation of management measures that could involve either of the reservoirs separately.

That said, when evaluated for the combined retention effect of both reservoirs, there were still two significant periods when net negative retention (that is, nutrient input from the reservoirs themselves) occurred for both TP and TN. For example, for TN in 2002 the two periods were from 5/24 to 6/19 (30 metric tons) and 7/17 to 8/14 (68 metric tons)(Figure 5).

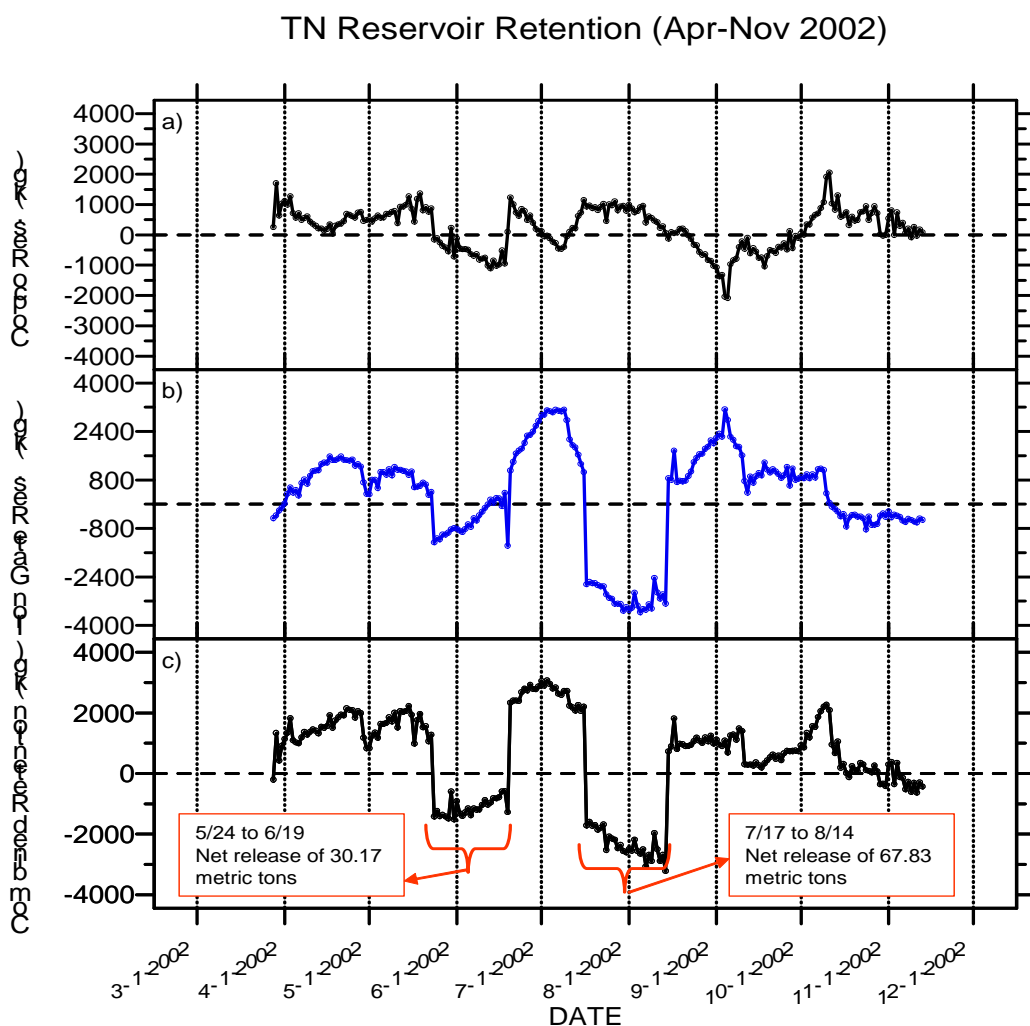


Figure 5. Combined total nitrogen retention in Iron Gate and Copco Reservoirs (based on data from Kann and Asarian 2005).

As noted in Asarian and Kann (2006a), evaluation of the true reservoir effect on nutrient retention requires a further comparison of the combined retention of Iron Gate and Copco reservoirs with that of the retention that would occur through natural processes absent these reservoirs.

Asarian and Kann (2006a) constructed mass-balance nitrogen budgets for free-flowing river reaches downstream of Iron Gate Dam. The results showed that for reaches between Iron Gate Dam and Orleans (140 miles downstream) in the warm low-flow July-to-September period, an average of about 0.35% of the Klamath River's nitrogen is removed each mile the river flows downstream of Iron Gate Dam (Asarian and Kann 2006).

To estimate potential retention in the historic river channel that is currently inundated by Copco and Iron Gate Reservoirs, Asarian and Kann (2006a) applied retention rates calculated for the Klamath River reach from Iron Gate to Seiad Valley (see Kann and Asarian 2006a for details). Retention rates for the Iron Gate to Seiad reach were chosen because it is the reach directly below the reservoirs, is of similar gradient (e.g., see historical topographic maps included in the bathymetric survey report (Eilers and Gubala 2003) and in the December 16, 2005 submissions

to the Federal Energy Regulatory Commission (FERC) by PacifiCorp), and because historic photos of the inundated area, (example below) shows that this reach is markedly different from the steeper gradient gorge reach below JC Boyle.



Copco Reservoir Site looking NW from Lennox Ranch, June 1910. (George Crowe photos)

Figure 6. Historic photo of an area now inundated by Copco Reservoir. The Lennox Ranch referred to in the photo caption was approximately halfway between the present-day upstream- and downstream ends of Copco Reservoir. Photo from Boyle (1976).

The comparison indicated that the free-flowing river reaches below Iron Gate Dam retain nutrients at a moderate consistent rate, while the combined retention of Iron Gate and Copco reservoirs alternates between positive and negative values (Asarian and Kann, 2006a) (Figure 7).

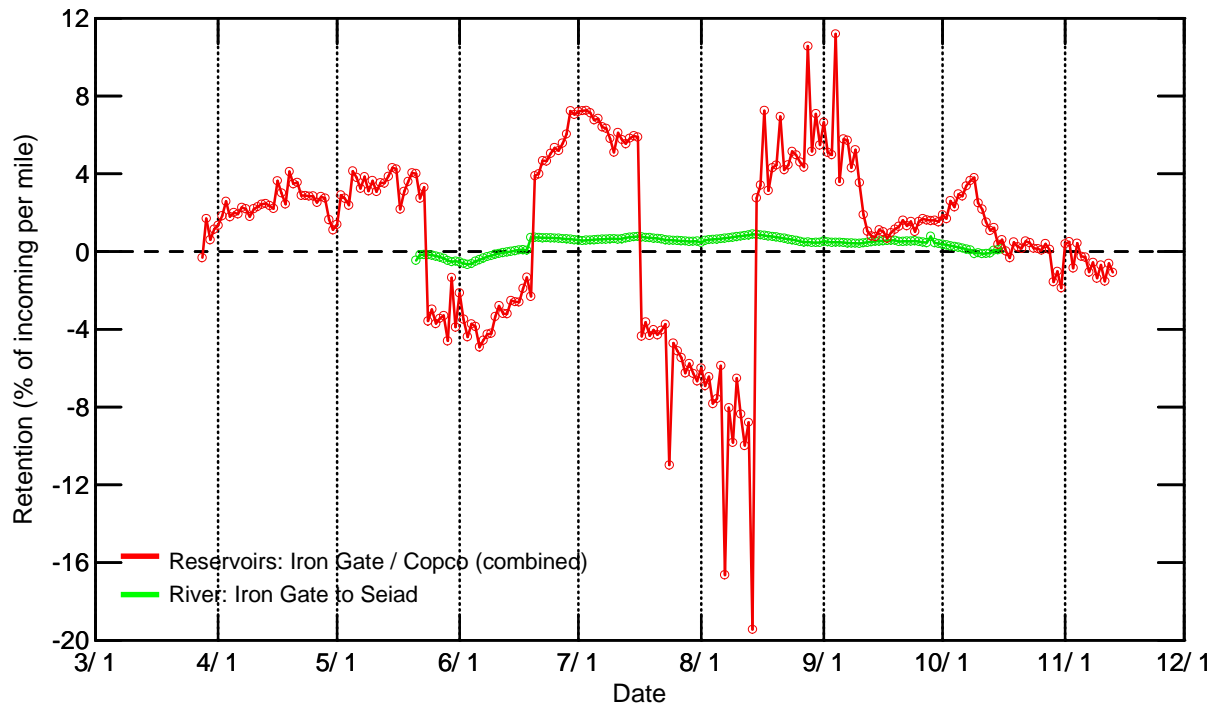


Figure 7. Comparison of combined retention in Iron Gate and Copco Reservoirs (from Kann and Asarian 2005) with retention in the river reach from Iron Gate to Seiad Valley, for the year 2002.

This comparison of the historic streambed -- now inundated -- with current reservoir retention indicates that when retention due to natural river processes is factored into the reservoir retention estimated in Kann and Asarian (2005), that reservoir retention is minimal (4.6% of incoming load) or even negative (-3.3% of incoming load) during the periods evaluated (May 21 – October 16 and July 1 – September 30, respectively). This indicates that during this critical July-September period, river reaches are more effective at retaining nitrogen and would have greater benefit on downstream water quality than the reservoirs. Full details of this comparison are provided in Asarian and Kann (2006a).

#### Recommendations for FEIS:

The information that we have provided in this section is not intended for the amendment of FERC's position, but rather to provide FERC with additional information with which to strengthen the conclusion that it has reached with regard to the impacts of Iron Gate and Copco reservoirs on the nitrogen dynamics of the Klamath River. The appropriate section of the EIS should be revised to include this information. At a minimum, FERC staff should review Asarian and Kann (2006) and cite this work in the FEIS.

## GREENHOUSE GAS EMISSIONS

### Carbon displacement from the KHP

#### DEIS Deficiency:

We support FERC's decision to include an analysis of the KHP's greenhouse gas emissions in the EIS, as global climate change is a significant problem for the world in general, and Klamath River's salmon in particular. That said, we have some substantial disagreements with FERC's calculation concerning carbon displacement.

Section 4.8 of the DEIS estimates the amount of carbon that would be emitted from a natural gas power plant that would presumably provide replacement power were the KHP to be decommissioned. As described below, the "carbon intensity factor" used by FERC for this calculation assumes that the electricity would be replaced by an old inefficient natural gas power plant.

The "carbon intensity factor" of 155 kilograms of carbon per megawatt hour (kg C/MWh) used by FERC to calculate the KHP's carbon displacement apparently assumes that the electricity would be replaced by an old inefficient natural gas power plant -- although no reference is provided for the origin of the number. In reality, a new natural gas power plant would likely have a far higher carbon efficiency. The heat rate (a measure of efficiency) of large-scale new efficient combined cycle natural gas power plants is 0.007 million BTU/MWh (CEC 2005). According to U.S. EPA (2003), the calculation for carbon intensity from natural gas electrical generation is:

$$\text{Carbon intensity} = (\text{Heat rate}) * (31.9 \text{ lbs C/ million BTU}) * (0.995)$$

$$\text{Carbon intensity} = (0.007 \text{ million BTU/KWh}) * (31.9 \text{ lbs C/ million BTU}) * (0.995) * (1 \text{ kg}/2.204 \text{ lbs}) * (1000 \text{ KWh/MWh}) = 101 \text{ kg C/MWh}$$

Thus, FERC's carbon intensity factor is 53% too high (155 vs. 101). A more realistic estimate for KHP carbon displacement is 265,262 metric tons of carbon dioxide (CO<sub>2</sub>) per year, rather than FERC's estimate of 407,085 MT CO<sub>2</sub>/yr.

Table 2 shows a comparison of FERC's estimate for the KHP's carbon displacement with a revised, more realistic estimate based on a more efficient power plant.

Annual Generation <sup>1</sup> (MWh)	Carbon Intensity Source	(kg C/MWh)	Carbon Emissions (MT C/yr)	Carbon Dioxide Emissions (MT CO <sub>2</sub> /yr)
716,800	new combined cycle <sup>1</sup>	101	72,397	265,262
716,800	old inefficient <sup>2</sup>	155	111,104	407,085

<sup>1</sup>Source: CEC (2005) and U.S. EPA (2003).

<sup>2</sup>Source: FERC DEIS, originally from PacifiCorp

<sup>3</sup>Carbon dioxide emissions = (Carbon emissions)\*(3.66412) [ratio of CO<sub>2</sub> molecular weight to C atomic weight].

#### Recommendations for FEIS:

We request that the calculation of KHP carbon displacement in section 4.8 of the EIS be revised to use a more realistic number for carbon intensity, such as 101 kg C/MWh. In addition, the carbon displacement calculation should include an offset for the global warming potential of methane production in the KHP reservoir discussed below. This would best be achieved by adding a methane column to Table 4.7.

We did not review the accuracy of PacifiCorp's calculation of the KHP's annual electricity generation. An independent agency such as FERC or the California Energy Commission should review PacifiCorp's calculations to confirm that they are correct. The results of such an independent audit should be included in the FEIS.

#### **Methane emissions from KHP reservoirs**

##### DEIS Deficiency:

In its analysis of the KHP's effect on greenhouse gas emissions, the DEIS make no mention of the fact that KHP reservoirs emit the potent greenhouse gas methane, despite compelling evidence that methane is produced in KHP reservoirs.

Methane is a substantial contributor to anthropogenic greenhouse gas emissions. On a mass basis, methane's global warming potential is 23 times higher than carbon dioxide (IPCC 2001). Hydroelectric reservoirs are now widely recognized as anthropogenic sources of methane, with some reservoirs producing more greenhouse gas emissions than fossil-fuel generation facilities (Graham-Rowe 2005, Cullenward and Victor 2006).

Lakes and reservoirs emit methane through four processes: 1. ebullition (bubbles), 2. water column storage (gas accumulated in the hypolimnion during stratified periods is released during the fall turnover), 3. diffusive emission, and 4. plant mediated emission (Bastviken et al. 2004, Fig. 8). Emissions vary widely among lakes, and they depend upon lake-specific factors such as lake area, water depth, concentrations of total phosphorus, dissolved organic carbon and methane, and the anoxic lake volume fraction (Bastviken et al. 2004).

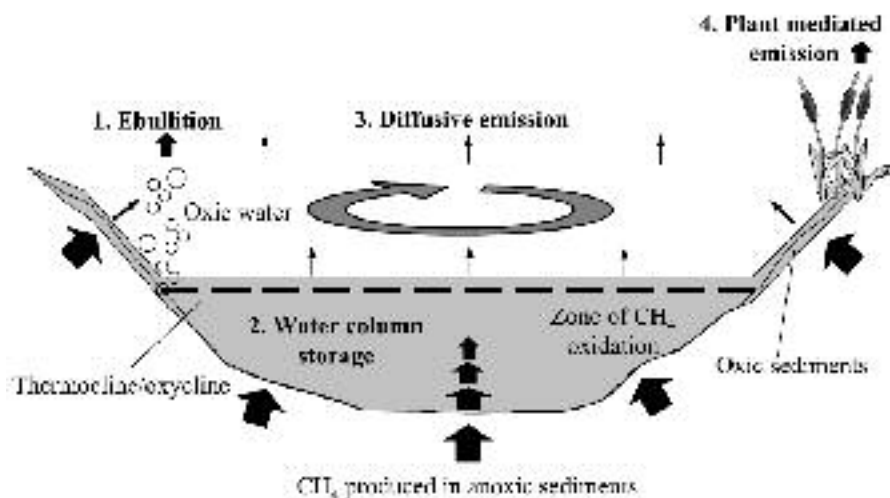


Figure 8. Illustration of emission pathways and methane dynamics in a stratified lake. Figure from Bastviken et al. (2004).

While we are not aware of any measurements of methane concentrations in KHP reservoirs, water quality data from project reservoirs show conditions that foster methane production, including widespread summer anoxia in KHP reservoirs, particularly in Keno, Iron Gate, and Copco. Hydroacoustic sampling has identified bubbles in the deep portions of Iron Gate and Copco Reservoirs on several occasions (Eilers and Eilers 2004). In addition, a massive bubbling event was observed in Copco Reservoir on October 31, 2003 (Eilers and Eilers 2004). Corum (pers. comm.) observed a similar but less dramatic bubbling event in Copco Reservoir on October 18, 2005. As described above, bubbling (ebullition) is only one of four pathways by which lakes can emit methane.

The DEIS acknowledges the likely production of methane in KHP reservoirs at page 3-149: “Methane production, which is strongly suspected as occurring under certain similar anoxic conditions, at least in Iron Gate reservoir (Eilers and Eilers, 2004), can also produce taste and odor problems”

Due to a lack of KHP-specific data, estimating its methane emissions precisely is not possible at this time; however, methane emissions have been measured in reservoirs around the world and classified based on lake characteristics, so it is possible to generate reasonable estimates. Bastviken et al. (2004) presents a review of studies of methane emissions from lakes and reservoirs in North America and Eurasia, and describes the lake characteristics that affect the quantity of methane produced in a lake. Using data from 73 lakes, Bastviken et al. (2004) developed regression equations to predict lake emissions based on lake characteristics.

Most lakes and reservoirs where methane emissions have been studied have water quality superior to that of the KHP reservoirs and hence are likely to emit even less methane than the KHP reservoirs. For instance, Soumis et al. (2004) measured methane emissions from hydroelectric reservoirs in the western United States, but all of them had much better water quality than the KHP reservoirs (i.e. no anoxic hypolimnion), so data from those reservoirs are not directly applicable despite their geographic proximity. Only 2 of the 73 lakes studied in Bastviken et al. (2004) have total phosphorus concentrations similar to the KHP reservoirs. These include Priest Pot, a 2.5 acre small pond in the United Kingdom, and Lake Mendota at Madison, Wisconsin. Lake Mendota is 9,740 acres, with a maximum depth of 83 feet, making it

approximately 10 times larger than Iron Gate and Copco Reservoirs, and somewhat shallower. Similar to KHP reservoirs, both Priest Pot and Mendota are subject to substantial seasonal algae blooms.

Using a variety of literature-based methane flux rates, and then applying the total area of project reservoirs, we have calculated the annual global warming potential of methane emissions from KHP reservoirs (Table 3). Given the lake/reservoir characteristics, it is likely that methane flux rates for KHP reservoirs are somewhere between those of Lake Mendota and Priest Pot. Hence, the annual global warming potential of methane emissions from KHP reservoirs is approximately equivalent to 3 to 12% of the KHP's carbon displacement (Table 3). While this is not a huge percentage, it is not insignificant. Site-specific studies of KHP reservoirs could be used to refine the estimate.

Table 3. Comparison estimated global warming potential (GWP) of methane (CH<sub>4</sub>) emissions from KHP reservoirs and global warming emissions from a natural gas power plant that would replace KHP electrical generation.

KHP Reservoir Area <sup>1</sup>	CH <sub>4</sub> Flux	CH <sub>4</sub> Mass Flow Rate <sup>4</sup>	CH <sub>4</sub> Mass Flow Rate <sup>5</sup>	Global Warming Potential per Year <sup>6</sup>	KHP Carbon Dioxide Displacement <sup>7</sup>	GWP of Methane Emissions as % of Displacement <sup>8</sup>	
(m <sup>2</sup> )	Source	(mg CH <sub>4</sub> / m <sup>2</sup> d)	(MT CH <sub>4</sub> / d)	(MT CH <sub>4</sub> / yr)	(MT CO <sub>2</sub> equivalent /yr)	(MT CO <sub>2</sub> /yr)	(%)
19,582,738	Lake Shasta <sup>2</sup>	11	0.215	79	1,808	265,262	0.68%
19,582,738	Lake Mendota <sup>3</sup>	50	0.979	357	8,220	265,262	3.10%
19,582,738		100	1.958	715	16,440	265,262	6.20%
19,582,738	Priest Pot <sup>3</sup>	193	3.779	1380	31,729	265,262	11.96%
19,582,738	flooded rainforest reservoir <sup>2</sup>	500	9.791	3574	82,199	265,262	30.99%

<sup>1</sup>Area [m<sup>2</sup>] = Keno + J.C. Boyle + Copco + Iron Gate = 2475 + 420 + 1000 + 944 = 4839 acres, unit conversion to m<sup>2</sup> = 19582738

<sup>2</sup>Source: Soumis et al. (2004)

<sup>3</sup>Source: Bastviken et al. (2004)

<sup>4</sup>CH<sub>4</sub> mass flow rate [MT CH<sub>4</sub>/d] = (CH<sub>4</sub> flux)\*(Area)

<sup>5</sup>CH<sub>4</sub> mass flow rate [MT CH<sub>4</sub>/yr] = (CH<sub>4</sub> mass flow rate)\*(365 d/yr)

<sup>6</sup>Global Warming Potential per year [MT CO<sub>2</sub> equivalents/yr] = (CH<sub>4</sub> mass flow rate)\*(23) because CH<sub>4</sub> is 23 times more potent than CO<sub>2</sub> a mass basis [IPCC 2001]

<sup>7</sup>KHP Carbon Displacement = Amount of carbon that would be released annually from a natural gas power plant that would replace KHP generation. (101 kg C/MWh)\*(KHP generation

716,800 MWh/yr)\*(3.664124552 kg CO<sup>2</sup>/kg C)/(unit conversion 1000 kg/MT)) [Source: FERC DEIS and Table 3]

<sup>8</sup>GWP of Methane Emissions as % of Displacement = (Global Warming Potential per year)/  
(KHP Carbon Displacement)

#### Recommendations for FEIS:

We request that FERC consider the points we have provided above, and revise section 4.8 of the EIS to include recognition that KHP reservoirs can produce substantial quantities of methane, a potent greenhouse gas. Similar to the exercise shown above, section 4.8 of the EIS should also include estimates for the amount of methane produced in KHP reservoirs, and compare that with the FERC estimate of KHP carbon displacement (the annual amount of carbon that would be generated were the KHP replaced by a natural gas-fueled power plant). In other words, a more reasonable analysis of the relative benefit/detriment of the KHP on global warming should include both the more realistic carbon displacement effect shown above, and the further offset due to reservoir methane production.

### **THE NEED FOR POWER**

#### DEIS Deficiency:

Section 1.3 (Need for Power) of the EIS fails to properly recognize the role of the KHP in the context of electrical supply in the region. The simple facts are these: 1) the KHP is an extremely small contributor to the electrical supply, 2) whether or not the KHP stays in production has little to no bearing on the overall electrical supply, 3) due to its effects on anadromous fish, the KHP has a much higher environmental impact than other FERC licensed hydroelectric projects in California. We request that FERC acknowledge these facts in its final EIS.

The DEIS fails to cite the California Energy Commission's (2004) filing to FERC that requests that FERC consider decommissioning the KHP because:

- "low power - high impact energy facilities can create substantial net environmental benefits if decommissioning proves to be feasible and cost-effective, and if replacement energy is available."
- "The Klamath project is a small energy facility ... Loss of some or all of this energy would not significantly affect PacifiCorp's ability to provide electricity to its 1.6 million customers."
- "Replacement energy is available locally and regionally."
- "Klamath River is one of the most important salmon rivers in California, and salmon restoration is an important state policy objective."
- "Energy generation is one of several contributing factors to the decline of Klamath River fisheries."

#### Recommendations for FEIS:

We request that in its final EIS, FERC respond to these comments and thoroughly explain the reasons why it ignores or rejects the position of the CEC. It is our understanding that the CEC will be submitting comments on the DEIS. We hope, therefore, and expect that FERC will take the CEC comments into account, and revised the "Need for Power" section 1.3 accordingly. FERC should also add a project alternative that includes the decommissioning of the lower four project dams.

## THE STAFF ALTERNATIVE'S EXCESSIVE RELIANCE ON PLANS TO RESOLVE ESSENTIAL ISSUES

### DEIS Deficiency:

The Staff Alternative in the DEIS proposes several planned measures, including a “cooperative fish disease risk monitoring and management plan” and “comprehensive water quality management plan.” While we support the concept of planning and interagency/ Tribal coordination in general, we have serious reservations regarding FERC’s heavy reliance on plans to resolve significant issues already at hand. The plans proposed in the EIS are actually a step removed from plans; they are plans to make plans. Such plans are little but a form of deferred decision-making.

We recognize that there are times when a plan might be an appropriate action to propose, such as regarding a newly discovered issue where little research had been done and good solutions were not yet evident. This is decidedly not the case with the plans in this EIS. The Klamath River has been intensively studied over the past decade. If we are not yet prepared to make decisions now, when will we ever be? The relicensing process is the precise time to make necessary, important decisions for several reasons: 1) much attention is currently being focused on the KHP and the Klamath River, 2) there is much information on which to base decisions, 3) agencies have powerful management tools and authorities during the relicensing proceeding that they will lack later (for instance Hoopa, California and Oregon’s CWA Section 401 certifications).

There is a very real prospect that the “cooperative fish disease risk monitoring and management plan” and the “comprehensive water quality management plan” proposed in the EIS will fail to achieve necessary improvements to water quality and fish health. First, there is no evidence provided that actions in the proposed plans can effectively mitigate many of KHP impacts to water quality. For example, although the ability to control algal blooms through surface circulation is listed as a measure to include in the plan; not only is the efficacy not addressed, but clearly the mere presence of a plan does not serve to mitigate. Second, the applicant may not cooperate adequately during plan development and implementation. PacifiCorp has often been reluctant to share data that it has collected, and the company has not followed through on commitments made during collaborative-process meetings to perform studies. The EIS does not describe how it will compel cooperation. Third, the proposed plans lack any specific goals or concrete objectives (e.g. that dissolved oxygen levels below Iron Gate Dam will meet California’s clean water requirements, or that *Microcystis* levels will be reduced below levels that are harmful to human and aquatic life), any milestones (e.g. how many years will be allowed to demonstrate measurable progress, how long until full achievement is required), nor any consequences for failure to meet objectives (e.g. partial or full removal of the KHP if plan objectives are not met). Fourth, many of the actions contemplated in the plans, such as the use of copper sulfate algacides to manage *Microcystis* blooms and dragging chains across the stream bottom to dislodge attached *Cladophora* algae, are simplistic “magic-bullet” measures unlikely to produce the necessary results and which have a high probability of producing unintended negative consequences.

The core purpose of the EIS is to capture, assess, and disclose information, for public review concerning the likely environmental impacts of the proposed project – in this case the proposed relicensing and continued operation on the KHP on the Klamath River – and to identify those measures necessary to mitigate such impacts. However, the plans proposed by the DEIS do not exist, because their contemplated actions remain unidentified, because their effectiveness is

entirely unknown, they do not adequately address nor promise mitigation to the well-known environmental impacts that result from KHP operations.

#### Recommendations for FEIS:

Rather than rely on insubstantial and uncertain plans comprised of actions yet unknown, we recommend a more effective and holistic approach that aims to restore ecosystem processes, including habitat re-connectivity and restoration of natural flows of energy and nutrients. As described fairly well in the EIS, dam removal would solve many of the problems that the plans aim to solve, but in a much more effective and comprehensive fashion. Given this, we request that FERC abandon its use of plans-for-plans and, instead, recommend the necessary dam removals.

### **SECONDARY ISSUES**

In this section, we provide comments on issues of lesser concern. After “General notes regarding DEIS figures and tables of water quality data”, our comments are listed below with page numbers and section numbers that refer to the relevant portion of the EIS.

#### General notes regarding DEIS figures and tables of water quality data

In the case of many figures of water quality data in the DEIS, there is no notation provided regarding the number of samples collected at each site, the times of year in which samples were collected, nor the differences in the timing of sample collection between sites. In most sampling programs, more data are collected at some sites than others. It is important to have knowledge of such differences when interpreting data, particularly when the trends are subtle. Many sites have only a few data points so they should probably be excluded from the charts and tables. Since water quality parameters change between seasons and years, creating charts and tables that mix infrequently and frequently-sampled sites can suggest trends that are in fact simply artifacts of sample collection timing.

Many figures and tables are cited as “(Source: PacifiCorp, 2004a, as modified by staff)” [the Final License Application] but it is unclear whether a particular figure or table was originally created by PacifiCorp or whether FERC staff created the figure or table from data provided by PacifiCorp. If FERC staff actually created a figure or table from PacifiCorp data, then we suggest its identity be changed to read “(Source data: PacifiCorp, 2004a, as modified by staff)”

In addition, most of the figures and tables do not include sites downstream of the immediate KHP area. As such, they do not provide proper context for understanding the basin-wide spatial trends in temperature, dissolved oxygen, pH, nutrients, and algae.

Given these deficiencies, many of the figures and tables displaying water quality data in the DEIS are of limited value. Fixing these deficiencies may not be worth the time required, given the other elements of the EIS that need improvement. On the other hand, if these figures and tables are intended to inform policy decisions, then they must be fixed.

The bottom line is this: FERC staff have reached conclusions about the impact of KHP operations on Klamath River water quality that agree generally (with some important exceptions, as noted herein) with those of the river’s science community. Those conclusions should have driven staff to the clearest alternative for remedying the adverse impacts of the KHP on the river, which is dam removal. It matters little, therefore, how correctly staff may have used the available

data to produce charts and graphs characterizing the KHP's adverse impacts on the Klamath River, given that the staff conclusions are already mostly correct, and that staff fails to recommend genuine actions to remedy project-driven problems.

### 3.0 ENVIRONMENTAL CONSEQUENCES

#### 3.3 PROPOSED ACTION AND ACTION ALTERNATIVES

##### 3.3.2 Water Resources

###### 3.3.2.1 Affected Environment

###### *Page 3-103*

Table 3-26 shows dissolved oxygen (D.O.) data and is a prime example of the issues noted above in "General notes regarding DEIS figures and tables of water quality data." Although it is not noted in the DEIS, we assume that this table appears to include only grab sample data, not automated, continuous recording multi-parameter probes. At sites such as the Klamath River above the Shasta River, where dissolved oxygen dynamics are driven primarily by attached algae and macrophytes, the calculation of average monthly D.O. is of little value. Algae photosynthesize and produce oxygen during daylight hours, then consume oxygen at night through respiration, producing large daily swings in D.O. At such sites the mean monthly D.O. will tell more about what time of day the samples were collected than of any spatial or monthly trends. In the depths of reservoirs, where D.O. levels do not undergo diurnal fluctuations and D.O. dynamics are driven primarily by biological oxygen demand and sediment oxygen demand, then monthly means are useful.

An additional issue is that the data in the figure is cited as being from PacifiCorp's Final License Application (FLA). The FLA was submitted in February 2004, yet this table includes data from 2004, presumably from the months after the FLA was submitted to FERC, indicating that the citation may be incorrect.

Some of the numbers in the table are highly suspect, likely an artifact of the (unknown) low number of samples. For example, it is highly unlikely that the actual summer monthly mean D.O. for Copco reservoir outflow and Iron Gate reservoir outflow are really as high as shown in the table.

While the automated probe data for temperature, pH, and D.O. are not available for as many years and as many sites as are the grab sample data, there is a substantial amount of data that encompasses most of the major monitoring sites in KHP area for at least one season. Most of the available data have been assembled and are available as electronic appendix C in Asarian and Kann (2006a), filed at FERC as accession number 20060811-5089. The EIS should make use of these data.

###### *P3-109 to 3-113*

Figures 3-31 through 3-34 and the text that explains them are problematic for many reasons. First, they suffer from the same problems as many of the DEIS figures (see comments above regarding General notes regarding DEIS figures and tables of water quality data). Second, site names in the figures are illegibly blurry, apparently due to conversion between various computer

programs. Third, box plots with median, interquartile ranges, and outliers would be more useful than the minimum, mean, and maximum plots presented in the DEIS.

Fourth, if the data in the charts come from the 2000-2003 spreadsheet posted on PacifiCorp's website, then the 2000 data are flawed. Apparently, PacifiCorp accidentally deleted a cell in the spreadsheet so that the some columns became offset from the others. The result is that much of the 2000 data have dates, depths, and sites that are offset one row from the original correct data. For instance, data listed as collected at a site in August was actually collected in September. Even worse, data for the beginning and end of the sampling season was shifted from one site to another.

Fifth, apparently these charts contain only PacifiCorp's 2000-2003 data while substantial additional datasets (e.g. from USGS, USFWS, Karuk Tribe, and Yurok Tribe) are available and have been compiled into a single database that also includes PacifiCorp's 2000-2004 data (though as described above PacifiCorp's 2000 data should not be used). This larger dataset is available as electronic appendices C and E in Asarian and Kann (2006), filed at FERC as accession number 20060811-5089.

#### *P3-113 and P3-114*

Table 3-30 suffers from many of the same problems as Figures 3-31 to 3-34. As described above, this includes 1) the lack of any information regarding organic nitrogen (typically the most abundant form of nitrogen in the Klamath River) or total nitrogen, 2) no mention of the number of samples, 3) likely inclusion of erroneous PacifiCorp 2000 data, 4) failure to use all available data, 5) no data downstream of the Shasta River.

The statement that "Seasonal changes in water quality constituents below Iron Gate dam are not large (Table 3-30)" does not appear to be supported by the available data. After making that statement, the DEIS then goes on to describe that there differences in seasonal concentration, contradicting the original statement. An increase in nitrate values from approximately 0.2 mg/L in the May-August period to approximately 0.4 in the September-November period is characterized in the DEIS as a "slight" increase, a substantial understatement considering that it is a doubling of concentration. The DEIS should note that the 1.99 mg/L average ammonia concentration above the Shasta River is driven largely by a single, seemingly impossibly high measurement in 2004 (3.84 mg/L). Additionally, the DEIS should identify whether or not table 3-30 includes PacifiCorp's filtered and unfiltered samples for 2004, or just the unfiltered samples. Asarian and Kann (2006) analyzed seasonal and interannual variations in total nitrogen (TN) concentration in the Klamath River. Appendix A of that document includes detailed charts of total nitrogen concentrations for sites with available data for 1998-2002. The charts show that in most years there are seasonal differences in TN concentrations below Iron Gate Dam, with values typically higher in August-November than May-July.

#### *Page 3-113*

The information provided in Table 3-29 is useful but it could be improved substantially by including information regarding the number of samples collected. Additionally, information regarding nitrate, organic nitrogen, and total nitrogen should be added.

#### *Page 3-115*

Lines 5 and 6 of this page in the DEIS state "In Copco and Iron Gate reservoirs, BOD is lower and sediment effects become a more important influence on the quality of the overlying water."

We are not aware of any evidence to support this assertion. The statement should have a literature citation or mention of some specific data to support it, or it should be removed altogether.

*Page 3-117*

Figure 3-36 shows 1996-1997 data for chlorophyll below Iron Gate Dam. Similar to many DEIS figures, it does not list the number of samples and the months in which the samples were collected. Without such information, it is impossible to interpret any trends. Given the large variations in monthly chlorophyll levels shown in Figure 3-35, the spatial trends that appear in Figure 3-36 could be meaningless if the sites were not sampled during the same time of year.

*Page 3-117*

While the DEIS presents some useful information regarding *Microcystis*, it does not incorporate the information from the most current and comprehensive studies (Kann 2006, Kann and Corum 2006), filed at FERC in March 2006. This section should be re-written using information from those documents. For more information about how the DEIS' discussions and analyses of *Microcystis* should be improved, see our comments regarding "Toxic algae" in the "Detailed Comments Regarding Major Issues" section above.

Minor note: The document cited as "Kahn et al. in 2005" on lines 10 and 18 is not in the references, and should be "Kann".

*Page 3-118*

To emphasize the point that 2005 was not an abnormal year for *Microcystis*, the following text should be added to Line 5: "SWRCB (2006) issued a similar health advisory again in 2006, noting that *Microcystis* concentrations in the reservoirs were higher in 2006 than 2005."

The following text should be added to Line 22: "Additional details regarding Klamath River periphyton data are contained in Appendix G of the Hoopa Valley Tribe's water quality standards (Hoopa TEPA 2006)."

The paragraph regarding PacifiCorp's phytoplankton data in lines 6 through 12 requires some revisions. For instance, mean algal abundance is not the best metric to use to describe overall phytoplankton trends. Because colony sizes can vary by orders of magnitude, calculating the total number of colonies of all species in a sample provides excessive weight to small algal species such as *Rhodomonas minuta* and under-weights important species with large colonies such as *Aphanizomenon flos-aquae*. We recommend deleting that paragraph and adding the following text instead:

PacifiCorp performed phytoplankton sampling from 2001 to 2004 at 22 sites in the vicinity of the Klamath Hydroelectric Project, including the Klamath River, its tributaries, and Upper Klamath Lake. Sampling methodology is described in Raymond (2005), an overall summary of results for all species are presented in Kann and Asarian (2006), and Kann (2006) focuses solely on *Microcystis*. According to Kann and Asarian (2006), the overall longitudinal trend for phytoplankton biovolume and important nitrogen-fixing and bloom forming species all confirm the same declining trend from Upper Klamath Lake to above Copco Reservoir, with a subsequent increase in the Copco/Iron Gate Reservoir complex.

PacifiCorp's data also shows low incidence and magnitude of *Microcystis* leaving UKL and in the Klamath River above Copco Reservoir, and high incidence and magnitude in Copco and Iron Gate Reservoirs (Kann 2006). Kann (2006) notes that this pattern is consistent with literature (Huisman et al. 2004 and Reynolds 1986) showing that *Microcystis* and other buoyant cyanobacteria do not dominate in conditions of turbulent mixing such as that known to occur in the Klamath River above Copco and Iron Gate Reservoirs.

Kann (2006) also analyzed *Microcystis aeruginosa* (MSAE) data from Upper Klamath Lake collected by the Klamath Tribes, Karuk Tribe data from Iron Gate and Copco Reservoirs, and Yurok/USFWS data from the lower Klamath River, summarizing: "Taken together these data provide compelling evidence that Copco and Iron Gate Reservoirs are providing ideal habitat for MSAE; increasing concentrations dramatically from those upstream, and exporting MSAE to the downstream environment."

### 3.3.2.2 Environmental Effects

#### 3.3.2.2.2 Water Quality

Page 3-136 to 3-137

This page of the DEIS states: "PacifiCorp analyzed the hypothetical release of hypolimnetic water from both Copco and Iron Gate reservoirs using the CE-QUAL-W2 modeling system which has since been incorporated by the EPA into their technical analysis of the forthcoming Klamath River TMDL, giving the model a high level of credibility." We agree that the model has a high level of credibility for flow and temperature, but we disagree strongly that it is credible for analysis of dissolved oxygen, nutrients, attached algae, and phytoplankton. For example, Asarian and Kann (2006b) calculated total nitrogen and total phosphorus from model outputs for the Existing Condition (EC) scenario, and compared them to field data. The results showed that the model consistently under-predicted total nitrogen levels at Iron Gate Dam several-fold, indicating that the model greatly over-predicts nutrient retention in KHP reservoirs. Due to this difference between model outputs and field data, comparisons between the Without Project (WOP) and EC scenario results for nutrient-dependent parameters such as dissolved oxygen should be regarded with skepticism.

As such, we request that "for predicting flow and temperature" (i.e., "...giving the model a high level of credibility for predicting flow and temperature.") be added to the end of sentence quoted above.

Page 3-138

For reasons stated above in our comments on page 3-137, we request that the following text be added to the end of line 8:

"It should be noted here that a comparison of measured data and Existing Condition model predictions showed that the model consistently under-predicted total nitrogen levels at Iron Gate Dam by several-fold and under-predicted phosphorus to a somewhat lesser degree (Asarian and Kann 2006b), indicating that the model greatly over-predicts nitrogen retention in KHP reservoirs. Given these results, comparisons between the

Without Project (WOP) and EC scenario results for nutrient-dependent parameters such as dissolved oxygen should be examined skeptically, as modeled nitrogen WOP concentrations may be erroneously high relative to the EC concentrations.”

Monitoring and Control of Algae that Pose a Risk to Fish, Wildlife, and Public Health

Page 3-143.

Please see comments regarding “Toxic Algae” in the “Detailed Comments Regarding Major Issues” section above. This section of the EIS needs to be revised to respond to those comments.

Pages 3-143 to 3-145

This section contains good discussions of the relationships between the parasite *C. shasta* and *Cladophora* algae. We agree with FERC staff’s view of this issue. We suggest the following minor revision. The citations for “Stocking (2006, as cited by Resighini Rancheria, 2006)” refers to a presentation given at Humboldt State University in February 2006. All of the information included in the DEIS from that presentation are included in Stocking’s now complete master’s thesis, so the citations should be changed to that document (Stocking 2006, see References section below for full citation).

Project-wide Water Quality Management

Page 3-147

The DEIS states on Lines 21 to 25:

“PacifiCorp suggests that Copco and Iron Gate reservoirs trap and remove nutrients from the Klamath River. Table 3-29 shows the concentrations of total phosphorous, orthophosphate phosphorus, and ammonia in the hypolimnion of Copco reservoir increase in the summer, which could be used to support such conclusions; however, the concentration data alone are not enough to irrefutably support PacifiCorp’s position.”

We disagree with FERC’s choice of the phrase “are not enough to irrefutably support PacifiCorp’s position” in this sentence, as it is far too charitable to PacifiCorp’s position. More appropriate would be “offer some support for PacifiCorp’s position.” In fact, Table 3-29 offers only weak support for PacifiCorp’s position, for several reasons. First, there is no presentation of data upstream of Copco. This is important because nutrient concentrations generally increase throughout the whole Klamath during summer, likely due to increased concentrations from upstream sources such as UKL. Second, the lumping of several years together can be useful but also misleading due to changes in the number/timing of samples between years, and changes in concentration between years. For instance, concentrations from Link Dam to Copco were generally lower in 2001 and 2002, and higher in 2003 and 2004 (see Asarian and Kann 2006a for details). Without notations regarding the number/ timing of samples, it is difficult to know if the apparent patterns are real. Third, the volume of the hypolimnion in Copco is relatively small. Table 3-29 does provide evidence that nutrient concentrations in Copco’s hypolimnion are elevated compared to other parts of Iron Gate and Copco Reservoirs but does not indicate anything about the mass of nutrients accumulating, the effect on the river, the source of those increased nutrient concentrations nor their ultimate fate. Based on the review of PacifiCorp’s model by Asarian and Kann (2006), it is clear that the modeling outputs that PacifiCorp relies on to assert that the reservoirs trap and remove nutrients do not agree with observed data. These data show that the model consistently under-predicts nutrient concentrations in the river directly

below the reservoirs. Further analyses described in detail above (Asarian and Kann 2006a, Kann and Asarian 2005) also show that when compared to the nutrient retention that would have occurred under historic non-inundated conditions, not only is the sink effect of the reservoirs minimal, but the reservoirs actually generate nutrients during certain periods.

*Pages 3-148*

We concur with FERC staff's view that KHP reservoirs can act as both sources and sinks, depending on the time of year. Please see our comments regarding "Effect of Iron Gate and Copco Reservoirs on Nitrogen Dynamics" in the "Detailed Comments Regarding Major Issues" section above. This section of the EIS needs to be revised to respond to those comments.

*Pages 3-149*

This sentence on lines 2 and 3 "However, depending on the algaecide used, there could be associated adverse water quality effects" should be replaced with "However, applying algaecide is known to cause release of cell-bound microcystin toxin into the water column, and depending on the algaecide used, there could be other associated adverse toxicity effects."

*Dam Removal to Enhance Water Quality*

*Page 3-150*

On lines 20 to 23, the DEIS states "If water quality objectives are not met for reasons that aren't related to project operations (e.g., the quality of water entering the development is similar to the quality of water leaving the development), it would be inappropriate to consider decommissioning the development." We strongly disagree with this statement as worded. We agree that PacifiCorp should not be held responsible for problems not related to the KHP; however, analysis of whether "the quality of water entering the development is similar to the quality of water leaving the development" is an incomplete way to assess the effects of the project on water quality. As we have stated repeatedly, the true measure of the KHP's affect on water quality is the comparison of current (with-project) conditions at Iron Gate Dam with the conditions that would exist at Iron Gate Dam absent the KHP. Though related, these are separate questions with different answers.

Although many parameters (with the notable exception of *Microcystis*) exiting the KHP at Iron Gate decrease from values entering the KHP at Keno, this does not mean that the KHP has a beneficial, or no affect on water quality. First, many parameters (e.g., nitrogen, phosphorus, chlorophyll, algal biomass, and blue-green algal biomass) may decline between Keno and above Copco Reservoir, but then can increase substantially through the Copco/Iron Gate complex (e.g., Asarian and Kann 2006a,b and Kann and Asarian 2006). Thus, the overall effect of a major portion of the KHP is an increase in various water quality parameters. Second, the KHP receives substantial amounts of clean water from the springs in the J.C. Boyle bypass reach and tributaries such as Spencer, Shovel, Fall, and Jenny creeks. These inputs substantially dilute the nutrient-rich mainstem Klamath River. As we noted in the Recommended Terms and Conditions that we filed with FERC in March 2006, these tributaries and springs clearly pre-date the KHP and cannot legitimately be claimed as part of any KHP "benefit" to water quality. Third, natural river processes (currently confounded by the KHP) remove nutrients from the water column as the river flows downstream. These processes include denitrification by micro-organisms in the hyporheic zone and assimilation by algae attached to the bed of the river, and are discussed above in our comments regarding "Effect of Iron Gate and Copco Reservoirs on Nitrogen Dynamics" in the "Detailed Comments Regarding Major Issues" section above.

In the Recommended Terms and Conditions that we filed with FERC in March 2006, to quantify the effect of dilution, we examined U.S. Geological Survey stream gage data over a 10-year period from 1995-2004 during the time of year having low flows and poor water quality – July 1 to September 31. The J.C. Boyle gage is located downstream of the J.C. Boyle Powerhouse return at river mile 219.7, the Iron Gate gage is located downstream of Iron Gate Dam at river mile 189.5, and the Keno Gage is located downstream of Keno Dam at river mile 233.3. We examined a three-month period, rather than a shorter period such as August, in order to minimize “errors” due to differences in reservoir management (e.g. if the amount of water stored in a reservoir were to increase or decrease substantially over a short period of time).

Mean streamflow averages 674 cfs at Keno, 939 cfs at J.C. Boyle (141% of Keno), and 1036 cfs at Iron Gate (156% of Keno). This translates into accretions of 265 cfs between Keno and the J.C. Boyle gage, primarily due to springs in the J.C. Boyle Bypass Reach, with much smaller contributions from Spencer Creek and other tributaries. Accretions between J.C. Boyle and the Iron Gate gage average 97 cfs include Shovel, Jenny, Fall, Camp, and Bogus Creeks (note that while Bogus Creek is below Iron Gate Dam, it is upstream of the USGS gage).

Nutrient concentrations in the springs are so low relative to the mainstem Klamath River that the dilution effect is similar, though not identical, to the addition of pure water. To provide some quantitative detail to this discussion, we calculated expected total nitrogen (TN) concentration at Iron Gate Dam based on this dilution (Table 10). Average TN concentration at Keno for available data in the June-October period of 1996-2003 was 1.83 mg/L (Asarian and Kann 2006a), 12.8 times higher than the 0.15 TN concentration cited by PacifiCorp for the springs. Based on dilution from these accretions, TN concentration at Iron Gate Dam should be expected to be only 67.8% (a 32.2% decrease) of what it is at Keno (Table 10).

Table 10. Effect of the tributary/spring accretion on total nitrogen (TN) concentrations from Keno to Iron Gate. Flows are means from July 1 - September 31 for the 10-year period 1995-2004. TN Concentrations are means of June-October 1996, 1997, 1998, 2002, and 2003 (Asarian and Kann 2006a).

Source	Flow		TN Conc.	Load		Combined TN Conc.	
	(cfs)	(% of IG)	(mg/L)	(kg/day)	(% of combined)	(mg/L)	(% of Keno)
River at Keno	674	65.1%	1.93	3183	96.0%		
Accr. Keno to IG	362	34.9%	0.15	133	4.0%		
Combined	1036	100.0%		3316	100.0%	<b>1.31</b>	<b>67.8%</b>

Page 3-150

Regarding PacifiCorp’s water quality model, the DEIS states on lines 30 to 34:

“Unfortunately, because many of the other parameters in the model (e.g., pH, nutrients, and algae) are driven by much more complex biochemical processes than temperature, modeling results for these parameters are contingent on the quality of the entire dataset and subject to variable interpretation. We base much of our analysis of the potential effects of dam removal on our review of existing water quality data from the riverine reaches and general principles that typically influence water quality.”

We agree with FERC's approach of relying on field data and general principles, rather than model outputs, for parameters other than temperature, especially given the failure of the model to accurately predict nitrogen transport as described by Asarian and Kann (2006b). In addition to the issues of lack of an adequate amount of data for some parameters, it is important to note that model structure can also be an issue. For instance, PacifiCorp's model does not include nitrogen fixation in reservoirs (or denitrification in river reaches). Thus, if nitrogen fixation is an important factor in Klamath River water quality dynamics, and given the large annual blooms of *Aphanizomenon flos-aquae* in KHP reservoirs (Kann and Asarian 2006) it would certainly appear to be important, then no amount of additional model input data will result in an accurate characterization of nutrient dynamics. We recommend, therefore, that after "variable interpretation." the following sentence be added: "In addition, issues with model structure such as the lack of simulation of nitrogen fixation by algae in project reservoirs hinder model performance for nutrient-dependent parameters such as dissolved oxygen, pH, and algae."

*Page 3-151, line 17*

Regarding "Biggs (2000, as cited by Resighini Rancheria, 2006)", this document was e-filed at FERC (accession number 20060328-5082) as part of a series of reference documents, so FERC staff can examine the original document if they wish.

*Page 3-151 lines 2 to 13*

In its discussions regarding the impacts of the removal of J.C. Boyle Dam on water quality, FERC does not mention two important factors discussed above in the section Detailed Comments Regarding Major Issues, namely the affects of bypass and peaking operations on downstream water quality. This section should be revised to include those issues, as they are attributable to J.C. Boyle Dam, and would cease with dam removal.

Another important issue that needs to be added to this section is the occurrence of *Microcystis* blooms in J.C. Boyle reservoir. PacifiCorp's phytoplankton data show that on October 17, 2004, *Microcystis* comprised 60% of the phytoplankton biovolume of the sample (see Figure 17 in Kann and Asarian 2006). *Microcystis* was not detected in samples collected at PacifiCorp sites upstream including Above J.C. Boyle Reservoir, Below Keno Dam, and Link River on any day in 2004 including October 17, although it was detected several times by the Klamath Tribes at Pelican Marina (note: J.C. Boyle Reservoir was not sampled in 2004). In contrast, *Microcystis* was detected on October 10 at 58% of the sample's biovolume downstream at Above J.C. Boyle Powerhouse, and throughout the season in and below Copco and Iron Gate Reservoirs. This information regarding *Microcystis* should be added the EIS. Hence, we suggest the following sentence be added to the discussion of the water quality effects of removing J.C. Boyle Dam:

"In October, 2004, PacifiCorp detected *Microcystis aeruginosa* at its site below J.C. Boyle Dam during a year when it was not detected at sites upstream between Link River and above J.C. Boyle Reservoir, indicating that J.C. Boyle Reservoir was the likely source of the *Microcystis*. Hence, removal of J.C. Boyle Dam could reduce the amount of *Microcystis* above Copco Reservoir."

### 3.3.2.4 Unavoidable Adverse Effects

*Page 3-157 Line 18*

We agree that the KHP results in unmitigable impacts to water temperature in the Klamath River. The first sentence should be strengthened to recognize the project's adverse impacts on fall chinook spawning and incubation.

*Page 3-157 Line 24*

Language should be added regarding the toxic alga *Microcystis aeruginosa*.

### 3.3.3.1.4 Diseases Affecting Salmon and Steelhead

*Page 3-212 Lines 6 to 15*

This section should mention the findings of Stocking (2006) regarding the distribution of the intermediate polychaete fish parasite host. These key findings are described in the DEIS page 3-145. Also, see comments regarding page 3-145 above.

### 3.3.3.2.3 Disease Management

*Page 3-285 to 3-286*

We generally agree with the DEIS' discussion of how the KHP contributes to fish disease, although it is somewhat incomplete (see comments below).

We only partially agree with FERC's statement that "Efforts to restore passage of anadromous fish to areas upstream of the project may provide little or no benefit if disease problems in the Klamath River downstream of the project are not effectively addressed." (Page 3-285, lines 19-21). We agree that disease is a serious problem in Klamath River; however, providing fish passage should assist in reducing fish disease. Fish ladders would reduce crowding during spawning by expanding the availability of spawning habitat. Dam removal would provide multiple benefits, simultaneously providing fish passage to the Upper Basin, improving water quality, and reducing pathogen loads.

*Page 3-285*

The DEIS list of how the KHP "has likely contributed to conditions that foster disease losses in the lower Klamath River" should have a fourth factor added to it: "4) algae from blooms in project reservoirs are flushed downstream where they settle and provide habitat for the polychaete alternate host for *C. shasta* and *P. minibicornis*." We then recommend that the following paragraph be added as further explanation:

"PacifiCorp's 2001-2004 phytoplankton sampling program has documented the existence of large blooms of algae in project reservoirs. A longitudinal analysis of the data shows that phytoplankton biovolume is highest in Upper Klamath Lake, then follows a generally declining trend to the reach above Copco Reservoir, and then increases substantially in the Copco/Iron Gate Reservoir complex (Kann and Asarian 2006). The limited number of available samples from the river below suggests that phytoplankton levels decrease as the water flows downstream from Iron Gate Dam to sites above the Shasta River and Interstate 5. This decrease indicates that much of the phytoplankton are dying and decaying into organic matter. Stocking (2006) found that fine benthic organic matter was

the primary habitat for the *M. speciosa* polychaete, so if the organic matter settles to the riverbed before it fully decays, it could provide polychaete habitat. Increased habitat for *M. speciosa* could increase its population size, increasing *C. shasta* and *P. minibicornis* infection in *M. speciosa*, releasing more parasite spores into the water, and resulting in increasing rates of disease in juvenile salmonids. Through these mechanisms, the growth of phytoplankton in reservoirs and subsequent discharge into the Klamath River below can contribute to disease outbreaks in juvenile salmonids.”

For illustrative purposes, we include a photograph taken below Iron Gate Dam on a day when phytoplankton were streaming out of Iron Gate reservoir at high densities (Figure 9).



Figure 9. The edge of the Klamath River below Iron Gate Dam in late August 2006 with small particles of free-floating algae flushed out of Iron Gate Reservoir at very high densities. Photo by Kier Associates.

*Page 3-286*

Lines 15-16 of this page state “...DO levels predicted by PacifiCorp’s water quality model indicate that stressful conditions for juvenile fall Chinook generally occur starting in late May...” As a general rule, whenever field data are available they should be used in place of model outputs. In most years since 2000, extensive water quality data have been collected using multi-parameter automated probes at Iron Gate Dam and other sites downstream. We recommend that FERC staff examine this rich dataset to see if it provides the same answer as PacifiCorp’s water quality model. See our comments above regarding Page 3-103 for instruction on how to locate these data.

*Page 3-287*

Some of the items to be explored in the disease management plan have the potential for serious adverse affects. For instance, dragging a chain over the riverbed to dislodge attached algae would likely release nutrients downstream. If this were done during the algal growing season, it would likely stimulate the growth of attached algae downstream. Similarly, chemical control has a high potential for adverse unexpected reactions. We recommend that efforts not be directed at symptoms, but they should, instead, be directed at efforts to reduce the river's nutrient burden, including the removal of dams. Regarding FERC's proposal to develop disease resistant stocks, the priority should, instead, be toward maintaining existing natural genetic diversity.

While we appreciate the attention devoted to *Cladophora* in the DEIS in general, and in the disease management plan, FERC staff should be careful not to overlook the point that Stocking (2006) found more polychaete populations living in fine benthic organic matter (69) than in *Cladophora* (32). From a practical standpoint the distinction may not matter much, since effective solutions for reducing each habitat would likely be similar (scouring flows and reducing nutrient concentrations), except that symptom-treating efforts like dragging chains across the river's bed or chemical control would do nothing to reduce fine benthic organic matter.

Also, please refer, again, to our comments regarding "The Staff Alternative's Excessive Reliance on Plans to Resolve Essential Issues" in the "Detailed Comments Regarding Major Issues" section above.

#### 3.3.3.2.4 Dam Removal or Decommissioning

##### Effects of Mainstem Dam Removal on Fish Disease

*Page 3-289 Lines 27-31*

Discussions on this page overlook the important point that J.C. Boyle Dam affects downstream water quality not just with its relatively small reservoir, but by enabling peaking and bypass operations. As is discussed in detail in various places in the DEIS, water quality affects fish disease. Please refer to our comments regarding "Effects of Peaking/Bypass Operation on Downstream Water Quality" in the "Detailed Comments Regarding Major Issues" section above. This section should be revised to include those issues, as they are enabled by J.C. Boyle Dam, and would cease with dam removal.

*Page 3-289 Lines 43-44*

Temperature is a primary driving factor in the metabolism of attached algae (Biggs 2000). Hence, the thermal lag also extends the growing season for attached algae (and perhaps macrophytes) downstream of Iron Gate Dam, extending the period of poor water quality (excessive pH and D.O.) into the fall. This section of the EIS should be revised to include that. We suggest "Because temperature is a primary influence in growth of attached algae (Biggs 2000), the thermal lag extends the growing season for attached algae, resulting in degraded pH and dissolved oxygen conditions in the late summer and early fall."

## Adverse Effects of Dam Removal on Aquatic Resources

P3-292

Discussions regarding the amount and toxicity of sediments in KHP reservoirs in this section of the EIS should be updated with the information from California's State Coastal Conservancy (2006) study which was released shortly after the DEIS was completed. The results indicate that the toxicity of the sediments in the lower four dams is very low, that only a relatively small portion of the total stored sediment would erode in the event of dam decommissioning, and that the sediment will not cause downstream flooding.

### 3.3.5.2 Environmental Effects

#### 3.3.5.2.2 Coho Salmon

#### Effects on Critical Habitat

### 4.0 Developmental Analysis

Table 4-3 contains FERC's estimates of costs and benefits for the five alternatives analyzed in the DEIS. Because the mandatory conditions for fish passage must legally be included in any new KHP license issued by FERC, our comments here focus on the Staff Alternative with Mandatory Conditions.

FERC estimates that if the KHP were to be decommissioned, it would be replaced by a natural gas power plant, producing electricity at \$41.50/MWh. The cost of KHP generation for the Staff Alternative with Mandatory Conditions is \$99.24/MWh, or 2.39 times higher than replacement power (presumably natural gas).

While FERC does not have the authority to mandate what type of power would replace the KHP if it were decommissioned, the EIS should contain some discussion of the costs of various types of electrical generation. For instance, the EIS should note that the annual cost of the Staff Alternative with Mandatory Conditions is actually substantially more expensive than wind power. The approximate installed cost of large-scale wind farms is \$1000/kW, with costs ranging from \$30-60/MWh (CEC 2006). Within the vicinity of the KHP, there are locations in close proximity to transmission lines that have wind conditions suitable for commercial-scale wind farm development, including the southern portion of the Shasta River basin north of the town of Weed (Northwestern U.S. Wind Mapping Project 2006).

Given the extremely high cost, it would be a disservice to PacifiCorp's customers to add volitional fish passage at KHP facilities. Decommissioning the KHP and replacing it with truly clean energy would be much cheaper, and would have the added benefits of reversing the KHP's tragically adverse impacts upon Klamath River water quality and fisheries, and eliminating the KHP methane emissions.

### 4.7 KENO DEVELOPMENT ANALYSIS

*Pages 4-10 to 4-19*

Although we have not conducted an in-depth analysis regarding whether Keno Dam serves "project purposes", we recognize the severity of water quality problems in Keno Reservoir and

the need for them to be remedied. PacifiCorp constructed Keno Dam, and therefore bears responsibility for its impacts. This would be best accomplished by keeping Keno in the KHP license application, so that its impacts can be analyzed and their mitigation correctly provided in the context of project regulation. We therefore request that FERC reject PacifiCorp's proposal to remove Keno Dam from any new license.

It is our opinion that PacifiCorp's request to remove Keno from its application for a license is equivalent to asking to decommission with the development left intact. As such, FERC has the authority to place conditions on Keno Dam even if it is to be removed from the KHP. Hence, we request that should FERC accept PacifiCorp's proposal to remove Keno from the KHP, that it order PacifiCorp to cooperate and to fund efforts to improve water quality in Keno Reservoir through nutrient load reductions.

#### 4.8 GREENHOUSE GAS EMISSIONS

*Page 4-20*

Please refer to our comments above regarding "Greenhouse Gas Emissions" in the "Detailed Comments Regarding Major Issues"

##### 5.1.2 Summary of Effects

*Pages 5-11 to 5-18*

Table 5.1 requires some revisions. There is no analysis of how the various alternatives affect greenhouse gas emissions, including both carbon dioxide (from replacement power) and methane (from KHP reservoirs).

*Page 5-13*

The water quality section of Table 5.1 should be revised to include language regarding about how the various alternatives affect taste and odor compounds, pH, and ammonia. In addition, regarding the effects of the "Staff Alternative" on *Microcystis*, the DEIS states "*Microcystis* monitoring would enable public notification of potential health risks from contact recreation at project reservoirs", yet does not mention that the "Retirement of Copco No. 1 and Iron Gate Developments" scenario would nearly eliminate the *Microcystis* problem lower Klamath River. This is an oversight that requires correction.

#### 5.2 DISCUSSION OF KEY ISSUES

##### 5.2.4 Water Quality Management

*Pages 5-25 to 5-26*

The DEIS proposes woefully inadequate measures to deal with water quality. First, a "comprehensive water quality management plan." Second, the installation of turbine venting at Iron Gate Dam to increase dissolved oxygen levels in the outlet of Iron Gate Dam.

For our position on the proposed "comprehensive water quality management plan", please refer to our comments above regarding "The Staff Alternative's Excessive Reliance on Plans to Resolve Essential Issues" in the "Detailed Comments Regarding Major Issues" section. Reducing upstream nutrient loads by improving land and water use practices is a complex, long-term process that will require the efforts of multiple public agencies and thousands of individual

landowners. *If effectively designed and implemented*, a water quality management plan that does not include KHP decommissioning would result in some benefit, but it overlooks a critical factor of singular importance.

One of the DEIS' justifications for the cost of a development of a water quality management plan is that the KHP causes "modification of the temperature regime downstream of Iron Gate dam in a manner that adversely influences salmon." This statement is indeed true; however, as acknowledged by both PacifiCorp and the DEIS, there is no way to adequately mitigate for KHP impacts to temperature other than dam removal. Additional study and the development of a water quality management plan cannot change that fact, and we should not pretend otherwise.

With the exceptions noted above, the DEIS does a commendable job of characterizing KHP impacts to water quality and fish disease. Hence, it is extremely disappointing that the only explicitly required measure the DEIS proposes to mitigate for the multitude of adverse impacts is a turbine venting system. Unfortunately, given the wide-ranging water quality impacts of the KHP, this measure will do little to improve overall water quality.

We have not done an in-depth evaluation of whether turbine venting would be sufficient to enable water released from Iron Gate Dam to meet California's water quality standards for dissolved oxygen. However, at best, this measure would only improve dissolved oxygen levels in the immediate vicinity of the dam. Most of the dissolved oxygen problems in the Klamath River are caused by excessive growths of attached algae and rooted aquatic macrophytes that cover large portions of the river, hence oxygenation at a single point will be largely ineffective. Turbine venting would do nothing to mitigate for the KHP's many impacts to water quality and fish disease. As described in the EIS, a partial list includes fostering massive blooms of nitrogen fixing (*Aphanizomenon flos-aquae*) and toxigenic (*Microcystis aeruginosa*) blue-green algae that are flushed into the river below, the alteration of nutrient dynamics by interrupting natural river processes that remove nutrient from the water column as the river flows downstream, and causing a thermal lag with detrimental effects to salmonids.

The only way to eliminate the KHP's impacts to water quality is to decommission the four lower dams in the project. Piecemeal actions such as turbine venting, hypolimnetic aeration, and algaecide application are as yet untested, are not likely to be fully effective, and have a high potential for adverse affects.

### 5.2.5 Instream Flows

#### J.C. Boyle Bypassed Reach

##### *Pages 5-26*

Discussions in this section should be revised to acknowledge the important point that bypass operations have a detrimental effect on downstream water quality. For details, please refer to our comments regarding "Effects of Peaking/Bypass Operation on Downstream Water Quality" in the "Detailed Comments Regarding Major Issues" section above.

*J.C. Boyle Peaking Reach**Pages 5-28*

Discussions in this section should be revised to acknowledge the important point that peaking operations have a detrimental effect on downstream water quality. For details, please refer to our comments regarding “Effects of Peaking/Bypass Operation on Downstream Water Quality” in the “Detailed Comments Regarding Major Issues” section above.

*Copco No. 1 and Copco No. 2 Developments**Pages 5-28*

Discussions in this section should be revised to acknowledge the important point that bypass operations in the Copco 2 Bypass Reach have a detrimental effect on downstream water quality. For details, please refer to our comments regarding “Effects of Peaking/Bypass Operation on Downstream Water Quality” in the “Detailed Comments Regarding Major Issues” section above.

*5.2.6 Anadromous Fish Restoration**Pages 5-35 to 5-38*

This section of the EIS requires major revisions. The DEIS overestimates the benefits of trap and haul, and underestimates the benefits of volitional fish passage (ladders). We choose not to provide details here, but instead refer FERC staff to the ALJ’s Decision and record, which makes clear that volitional fish passage is superior to trap and haul, and that the DEIS’s concerns regarding water quality and predation on downstream migrants in KHP reservoir are overstated.

In addition, this section of the EIS needs to be revised to include consideration of how to provide fish passage for all historic and currently suitable habitat above Iron Gate Dam for native anadromous fish species, including: fall-run Chinook, spring run Chinook, steelhead, coho, and lamprey.

*5.2.7 Fish Disease Management**Pages 5-38 to 5-39*

Discussions in this section of the DEIS regarding how the Iron Gate and Copco reservoirs affect water quality and fish disease are generally correct, but are lacking regarding a some important issues, and hence requires revision. Information should be added (based on the comments provided herein) regarding how KHP bypass and peaking operations also affect water quality. Additionally, the EIS should note that *Microcystis* is not just a public health threat but it is also a threat to fish health, another is a long list of the KHP detrimental cumulative affects to water quality, including temperature, nutrients, ammonia, pH, and dissolved oxygen.

After describing the effects of Iron Gate and Copco Reservoirs on fish disease, the DEIS states that:

“However, because of the substantial costs of dam removal, and due to the urgency of the disease situation in the lower Klamath River, we also evaluate measures that would involve developing and implementing approaches for reducing the incidence of fish diseases downstream of Iron Gate dam through a disease monitoring and management plan. The plan would focus on developing

measures that could be implemented in the near term and potentially reduce disease losses in a much shorter time frame and at a much lower cost than dam removal.”

We disagree with the DEIS conclusion that despite the KHP’s severe fish disease-driven impacts that dam removal is too expensive, and that a fish disease management plan could adequately address the problem at a lower cost. First, as discussed above in “Excessive Reliance on Plans to Resolved Major Issues” in the “Detailed Comments Regarding Major Issues” section, we are extremely skeptical that a plan to make a plan will result in a substantial reduction in fish disease in the Klamath River. Second, because federal law requires that FERC must include USFWS/NMFS mandatory conditions for volitional fish passage in any KHP license granted, there will be substantial investment in providing volitional fish passage. The question is whether that fish passage will consist of fish ladders, or dam removal. As noted in the recent ALJ Decision and record, fish ladders would provide definite benefits to anadromous fish in the Klamath River by providing access to historic habitats. By reducing crowding in the spawning grounds below Iron Gate Dam, ladders may well cause some reduction in fish disease. However, as described fairly well in the DEIS, dam removal would provide a wide range of additional benefits, including access to more historic habitat, improved water quality and reduced levels of fish disease.

As Table 4-3 makes clear, the Staff Alternative with Mandatory Conditions is less expensive than the Retirement of Copco No. 1 and Iron Gate Developments. Given that federal law requires FERC to include the USFWS/NMFS mandatory conditions for volitional fish passage, FERC must include volitional fish passage in any license granted. In the DEIS, FERC analyzed only two alternatives that include volitional fish passage, and the Retirement of Copco No. 1 and Iron Gate Developments was the less expensive of the two alternatives. Dam removal will provide multiple, better benefits, and it is cheaper. Thus, we see no reason why FERC should choose fish ladders, and a hypothetical plan to reduce disease, as these actions will be more expensive and less effective than dam removal.

It should also be noted that the economic analyses in Table 4-3 are not a true cost-benefit analysis, but is actually an analysis of the private costs/benefits to PacifiCorp. If public benefits such as the value of restored anadromous fisheries and endangered species protection were included in the analysis, dam removal would be even cheaper.

Intensive studies of fish disease in the Klamath Basin are already underway and significant discoveries have been made in recent years. We do not need PacifiCorp to fund a fish disease management plan; we need FERC to order PacifiCorp to remove its dams and reservoirs. This would result in permanent long-term improvements to Klamath River water quality and a reduction in fish disease.

### 5.2.21 Dam Removal

*Pages 5-56 to 5-58*

The DEIS underestimates the impact of J.C. Boyle and Copco No. 2 Dams on water quality. For example, “Because of their greater effect on downstream water quality, and because of the quality and quantity of habitat that they inundate, we conclude that the removal of Iron Gate and Copco No. 1 dams would provide a much greater benefit than removing the Copco No. 2 and

J.C. Boyle dams.” While we agree that Iron Gate and Copco No. 1 Dams have *greater* effects on water quality, we disagree that this should be used as a justification for leaving J.C. Boyle and Copco No. 2 Dams in place. As described above in our discussions regarding “Effects of Peaking/Bypass Operation on Downstream Water Quality” in the “Detailed Comments Regarding Major Issues” section, these dams enable bypass and peaking operations that result in impaired water quality downstream. Section 5.2.21 should be revised to take into account these impacts.

Additionally, discussions regarding the amount and toxicity of sediments in KHP reservoirs in this section of the EIS should be updated with information from California’s State Coastal Conservancy (2006) study that was released shortly after the DEIS was completed. The results indicate that toxicity of the sediments in the lower four dams is very low, and that only a relatively small portion of the total stored sediment would erode in the event of decommissioning, and that the sediment will not cause downstream flooding.

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BEFORE THE  
UNITED STATES OF AMERICA  
FEDERAL ENERGY REGULATORY COMMISSION

PacifiCorp )  
 ) Project No. 2082-027  
Klamath Hydroelectric Project )  
 )  
\_\_\_\_\_ )

**CERTIFICATE OF SERVICE**

I hereby certify that I have this day served, by first class mail and e-mail, the Resighini Rancheria's Comments on the Draft Environmental Impact Statement, (DEIS) Klamath Hydroelectric Project, FERC Licensed Project Number 2082-027, Operated by Pacificorp, and this Certificate of Service upon each person designated on the official service list compiled by the Secretary in the above-captioned proceeding.

Dated at Klamath, California this 29<sup>th</sup> day of November 2006.

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