September 17, 2003

Todd Olson
Project Manager, Klamath Relicensing
PacifiCorp
826 NE Multnomah – Suite 1500
Portland, OR 97232

Re: State of Oregon Hydroelectric Application Review Team Comments on PacifiCorp’s Draft License Application for the Klamath Hydroelectric Project Relicensing (FERC Project 2082)

Dear Mr. Olson:

Attached please find comments prepared by the State of Oregon’s Hydroelectric Application Review Team (HART). HART’s comments were prepared in response to PacifiCorp’s release of the Draft License Application (DLA) for the Klamath Project (Project) on June 24, 2003.

The Klamath HART is comprised of the Oregon Water Resources Department (OWRD), Oregon Department of Fish and Wildlife (ODFW), Oregon Department of Environmental Quality (ODEQ), Oregon Parks and Recreation Department (OPRD), and Oregon Public Utility Commission (OPUC). HART has participated in this traditional relicensing process since PacifiCorp requested its formation on March 15, 2000.

In addition, HART agencies have participated in what PacifiCorp has termed a “traditional plus” relicensing process in an effort to facilitate improved communication among the applicant, resource agencies, Indian tribes, and the public in the pre-filing consultation process. We believe this process, with its variations on the Federal Energy Regulatory Commission (FERC) Alternative Relicensing Process, has produced greater participation by non-applicants while preserving for PacifiCorp a comfortable level of control over the process.

The Klamath HART is tasked under Oregon law with “participating to the fullest extent possible in all proceedings conducted pursuant to the FERC relicensing process for the project.” ORS 543A.400(4)(c). FERC rules provide a ninety-day period to comment on the DLA. 18 C.F.R. 18.8(c)(5). In fulfillment of these requirements, the following HART agencies have prepared comments, which are attached as follows:
Response to Comment S1-1

The lack of data interpretation in the DLA was a result of PacifiCorp agreeing to expand the scope of studies within the limited time frame for publication of the DLA. The FLA is much more comprehensive in addressing Project impacts and identifying PM&Es.

R. Craig Kohanek
Hydroelectric Project Analyst
Oregon Water Resources Department
ATTACHMENT 3

Oregon Water Resources Department

COMMENTS ON PACIFICORP’S DRAFT LICENSE APPLICATION

for

The Klamath Hydroelectric Project
(FERC P-2082)

September, 2003
Response to Comment S1-2

The draft license application (DLA) included a thorough description of the existing Project, its operation, and the Project’s effect on the surrounding environment, to the extent it could be described based upon available study results. PacifiCorp and relicensing participants had agreed prior to development of the DLA that it would not be appropriate for PacifiCorp to draw conclusions in the application about the effects of the existing Project on the surrounding environment, unless those conclusions were based upon study results.

As a result of the Klamath Collaborative’s extensive changes to the number and scope of studies, few studies were completed in time to inform the development of the DLA. Subsequently, PacifiCorp did not have sufficient information to justify proposing changes to the existing Project. Absent information to the contrary, existing facilities and operations were deemed appropriate.

Now that almost all studies have been completed and reviewed, changes to the Project and its operations have been proposed. This proposed Project, proposed Project operations, and the proposed Project’s anticipated enhancement to the surrounding environment are thoroughly described in the final license application.

As per 18 CFR 16.8(c)(2) and (3), an application will not be rejected by FERC as deficient merely because late studies requested by agencies during the second consultation stage are not completed during the second stage.
Response to Comment S1-3

See response to OWRD comment #2, above.

PacifiCorp has made every effort to document all study results available in time for publication of this FLA.

Response to Comment S1-4

PacifiCorp presents information to help meet the above request in the license application Initiation Statement, and in various sections of the license exhibits.

In their DLA, PacifiCorp partially meets the requirement of reporting on the different resources that are "in the vicinity or are impacted by the project" by describing the current project. However, PacifiCorp's DLA fails to comply with 18 CFR 4.51(b)(2) and (3) and ORS 543A.095 (1)(b) and (3) by not identify resources currently affected by the project, by not identifying anticipated continuing impacts, or by failing to provide any protection, mitigation, or enhancement (PME) measures. Additionally, OWRD believes that PacifiCorp's DLA does not comply with 18 CFR 18.8 (c) (4) (B) (ii), which requires the applicant to include a discussion of any PME measures.

Given these deficiencies, the DLA does not provide enough information for OWRD to determine whether the Project's proposed use of water is in compliance with Oregon's standards for hydroelectric water rights, and whether the Project will impair or be detrimental to the public interest. Hydroelectric applicants must disclose the effects of their project on the environment and propose mitigation measures to protect affected natural resources in the next license and water right period.

OWRD is charged with ensuring that the waters of the State of Oregon are used beneficially and without waste. In addition, OWRD coordinates Oregon's process for reauthorizing existing hydroelectric projects, including participation in the federal relicensing process.

This Project operates through a variety of pre-1909 unadjudicated claims for water rights, a non-expiring certified water right, and a time-limited water right. The time-limited water right (HE 160), which is for the development of electricity at PacifiCorp's J.C. Boyle powerhouse, is the only water right requiring reauthorization from the State of Oregon. This right has a priority of 04/17/1951 and is for the use of 2,500 cubic feet per second (cfs) of Klamath River water.

Although OWRD will only determine whether to reauthorize HE 160, the HART will review the entire project in conjunction with the federal process and will be providing state positions regarding the entire project.

OWRD has identified several issues that it would like PacifiCorp to address, as indicated below.

OWRD'S SPECIFIC COMMENTS ON THE DLA

1. The DLA does not provide sufficient information for OWRD to evaluate the Project's proposed water usage under Oregon law.

Under Oregon law, before a water right can be reauthorized, OWRD must find that the continued operation of an existing hydroelectric project does not impair or is not detrimental to the public interest. Oregon Revised Statutes (ORS) 543A.025. In making this finding, a number of factors must be considered by OWRD, including:

ATTACHMENT 3 – OWRD'S 90-DAY COMMENTS ON KLAMATH PROJECT DLA
Response to Comment S1-5

This information is contained in Exhibit B and chapter E3 of Exhibit E.

(a) Conserving the highest use of the water for all purposes, including irrigation, domestic use, municipal water supply, power development, public recreation, protection of commercial and game fishing and wildlife, fire protection, mining, industrial purposes, navigation, scenic attraction or any other beneficial use to which the water may be applied for which it may have a special value to the public;

(b) The maximum economic development of the waters involved;

(c) The control of the waters of this state for all beneficial purposes, including drainage, sanitation and flood control;

(d) The amount of water available for appropriation for beneficial use;

(e) The prevention of wasteful, uneconomic, impracticable or unreasonable use of the waters involved;

(f) All vested and incroached rights to the waters of this state or to the use of the waters of this state, and the means necessary to protect such rights; and

(g) The state water resources policy formulated under ORS 536.295 to 536.350 and 537.505 to 537.534.

OWRD requests that PacifiCorp submit a letter that specifically identifies how each of the above items is addressed in the DLA. Additionally, OWRD requests that PacifiCorp specifically identify where this information is located when they submit the Final License Application (FLA).

The Project DLA will also be reviewed under the standards found in ORS 543A.120. These standards consider several additional factors, including the following:

a) Any applicable basin program, the compatibility of the proposed use with applicable land use plans and information set forth in the application report or final report on studies;

b) An assessment of water availability and the amount of water necessary for the proposed use; and

c) An assessment of whether the proposed use would result in injury to existing water rights.

OWRD acknowledges the large volume of information that PacifiCorp has provided in its DLA and recognizes that some of the issues described above may have been addressed in the DLA, and we may have overlooked that information. If you believe that the information is included in the DLA, please provide us with a reference to the location of the relevant information.
Response to Comment S1-6

This information is contained in Exhibit B and chapter E3 of Exhibit E.

Response to Comment S1-7

Comment noted. PacifiCorp is continuing to work with the Instream Flow subgroup on PHABSIM analysis in this reach. Please see Section 4 of Exhibit E for a detailed discussion on Project impacts to fisheries resources and proposed PM&Es.

Response to Comment S1-8

These comments were considered in developing the License Application. Please see Executive Summary, Socioeconomic FTR and License Application Exhibits B and E for this information.

Response to Comment S1-9

Consistency with applicable land use plans is discussed in section E.8.3.2 of the FLA.
2. PacifiCorp should install real-time telemetry gauges at each point where water enters a project waterway and at the intakes to each powerhouse.

Response to Comment S1-10

Given the means by which the proposed Project will operate, there is no opportunity for wasting water. The water is temporarily diverted to Project turbines and then is returned to the Klamath River.

Response to Comment S1-11

PacifiCorp plans to decommission the East Side and West Side projects, including associated waterways, as described in the FLA.

Response to Comment S1-12

The combined hydraulic capacity is an instantaneous flow rate and does not represent an average flow rate over an extended period of time, which a water right does represent.

Response to Comment S1-13

PacifiCorp has identified instream flows and release mechanisms in Exhibit E.

Response to Comment S1-14

PacifiCorp has submitted a claim for the Spring Water to OWRD.
Response to Comment S1-15

PacifiCorp has not requested a new license length term in the FLA. However, the analysis presented in the FLA is based on a conservative (worst-case) approach of using no less than a 30-year license term to recover investment costs.

4. PacifiCorp’s request for a 50-year Federal Energy Regulatory Commission (FERC) license is inconsistent with the Federal Power Act. The Federal Power Act (Act) specifies that “any new license shall be for a term which the Commission determines to be in the public interest, but not less than 30 years, nor more than 50 years. This provision is consistent with Commission policy which was to establish 30-year terms for those projects which proposed no new construction or capacity, 40-year terms for those projects that proposed a moderate amount of new development, and 50-year terms for those projects that proposed a substantial amount of new development.”

Based on the DLA, it does not appear that PacifiCorp has proposed enough new development to warrant a 50-year license term.

Recommendation
PacifiCorp should clarify how the Project qualifies for a 50-year license term based on the requirements of the Act, or propose a shorter license term.

CONCLUSION
OWRD recognizes PacifiCorp’s efforts to conduct a constructive relicensing process. It is our sincere hope that the issues that we have identified can be resolved before PacifiCorp submits their Final License Application (FLA) by February 29, 2004. If you have any questions or concerns regarding these comments, please contact me at (503) 378-8455, extension 289.

Sincerely,

R. Craig Kohanek
Hydroelectric Project Analyst
Oregon Water Resources Department
September 17, 2003

Todd Olson
Project Manager, Klamath Relicensing
PacifiCorp
825 NE Multnomah – Suite 1500
Portland, OR 97232

Re: State of Oregon Hydroelectric Application Review Team Comments on PacifiCorp’s Draft License Application for the Klamath Hydroelectric Project Relicensing (FERC Project 2082)

Dear Mr. Olson:

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The Klamath HART is comprised of the Oregon Water Resources Department (OWRD), Oregon Department of Fish and Wildlife (ODFW), Oregon Department of Environmental Quality (ODEQ), Oregon Parks and Recreation Department (OPRD), and Oregon Public Utility Commission (OPUC). HART has participated in this traditional relicensing process since PacifiCorp requested its formation on March 15, 2000.

In addition, HART agencies have participated in what PacifiCorp has termed a “traditional plus” relicensing process in an effort to facilitate improved communication among the applicant, resource agencies, Indian tribes, and the public in the pre-filing consultation process. We believe this process, with its variations on the Federal Energy Regulatory Commission (FERC) Alternative Relicensing Process, has produced greater participation by non-applicants while preserving for PacifiCorp a comfortable level of control over the process.

The Klamath HART is tasked under Oregon law with “participating to the fullest extent possible in all proceedings conducted pursuant to the FERC relicensing process for the project.” ORS 441A.400(4)(b). FERC rules provide a ninety-day period to comment on the DLA. 18 C.F.R. 16.6(c)(6). In fulfillment of these requirements, the following HART agencies have prepared comments, which are attached as follows:
Response to Comment S2-1

The lack of data interpretation in the DLA was a result of PacifiCorp agreeing to expand the scope of studies within the limited time frame for publication of the DLA. The FLA is much more comprehensive in addressing Project impacts and identifying PM&Es.

The HART acknowledges that the DLA contains a significant amount of information. Based on our review, however, certain information required under the Code of Federal Regulation (CFR) has been omitted from the DLA. Also, the DLA does not identify or include a discussion of any proposed protection, mitigation, or enhancement (PME) measures. For HART to effectively evaluate water quality, fish and wildlife resources, water resources, recreation opportunities, and other issues affected by project effects, these PME measures are necessary. The attached comments describe specific areas where additional detailed information or clarification is needed.

Again, the HART appreciates the opportunity to provide comments on the DLA and looks forward to continuing to work with PacifiCorp and other stakeholders in a collaborative and productive manner.

If you have any questions or concerns regarding these comments, please do not hesitate to contact me or any other member of the Klamath HART.

Sincerely,

R. Craig Kohanek
Hydroelectric Project Analyst
Oregon Water Resources Department
ATTACHMENT 1

Oregon Department of Environmental Quality

COMMENTS ON PACIFICORP’S DRAFT LICENSE APPLICATION

for

Klamath Hydroelectric Project
(FERC Project No. 2082)

September 2003
Response to Comment S2-2

Substantial information has been added to the analysis of water quality in the FLA (Exhibit E, chapter E3) and Water Resources FTR. A number of water quality studies have been approved and completed, including review of historic water quality data, extensive monitoring of water quality in the Project area during the period 2000-2003, and detailed water quality modeling of the Klamath River from Link dam to Turwar (near the river's mouth). Measures proposed for enhancement of water quality are described in Exhibit E, section E3.8.

FERC's relicensing regulations require that PacifiCorp request certification under Section 401 of the Clean Water Act for the Project no later than 60 days after FERC issues the notice that the relicensing application has been accepted and is ready for environmental analysis. PacifiCorp will request certification from ODEQ and CSWRCB by that date. PacifiCorp will consult with ODEQ and CSWRCB to prepare a detailed analysis and application for 401 certification to ensure that the Project complies with the applicable provisions of CWA, including applicable State water quality standards or objectives. Further consultation with ODEQ and CSWRCB is particularly important given the many sources and factors contributing to water quality conditions in the Project area, including many that are outside of PacifiCorp's control, and because several of the state water quality standards or objectives are qualitative and narrative, and therefore require interpretation and judgement.
Response to Comment S2-3

See response to comment #2.

Given the generally poor water quality conditions that exist in Project-affected waters, ODEQ suspects that PacifiCorp will likely need to propose very significant, if not drastic changes in Project operations and/or facilities to offset Project-related contributions to non-attainment of water quality standards. Considering this, along with the limited time to develop and receive comment on proposed PMEs, and PacifiCorp’s expressed intent to minimize changes in Project operations and facilities, it seems quite plausible that issuance of an affirmative 401 Certification based upon a very soon-to-be-developed 401 Certification application will be quite difficult. ODEQ urges PacifiCorp to move forward quickly with necessary studies and the evaluation and development of PME proposals such that an adequate 401 Certification application can be submitted.

ODEQ appreciates this and previous opportunities to consult with PacifiCorp and other stakeholders regarding the relicensing process. The Department also looks forward to future consultation opportunities to assist PacifiCorp in its efforts to develop adequate 401 certification and final license applications. Please do not hesitate to contact me with questions or comments at the above address, by phone at (541) 398-8146 x 257, or via email at devito.pati@deq.state.or.us.

Sincerely,

Paul A. DeVito
Hydroelectric Specialist
A. General Comments

A.1. Overall Assessment of the Draft License Application

PacifiCorp notified the state Hydroelectric Application Review Team (HART) that it could not file a complete Draft License Application (DLA) with the state one year in advance of filing a Final License Application (FLA) with the Federal Energy Regulatory Commission (FERC). As is allowed under ORS 543A.150, the HART granted a 90-day filing extension to provide PacifiCorp additional time to develop a more complete DLA. Notwithstanding the additional time which ended up stretching to approximately 110 days, PacifiCorp informed the HART that essential information could not be collected and/or analyzed and studies could not be completed in time for inclusion in the DLA.

The DLA lacks detailed information and completed studies necessary to adequately assess Project-related impacts to Klamath River water quality and the state-designated beneficial uses to be made of the river.

Recommendation: In preparing the FLA and Clean Water Act (CWA) § 401 Certification (401 Certification) application, PacifiCorp needs to significantly expand upon the information and level of detail presented in the DLA, incorporating scientifically valid analyses of Project-related impacts and expected efficacy of yet-to-be-developed Protection, Mitigation, and Enhancement Measures (PMEs).

A.2. Overall Assessment of the Consultation Process

The Oregon Department of Environmental Quality (ODEQ) appreciates that PacifiCorp, upon significant prompting on the part of many stakeholders, expanded upon its selected "traditional" FERC relicensing process to provide additional opportunities for consultation and collaboration regarding study plan design. The Department believes, and perhaps PacifiCorp recognizes, that any potential opportunity to successfully relicense this major project in a timely manner, cannot be accomplished via implementation of only the minimum consultation requirements of the traditional process.

Though PacifiCorp has generally implemented a collaborative approach to study plan development, there have been determining issues. Some of the field studies have been implemented prior to receiving or incorporating stakeholder recommendations for study plan improvement. In some instances, interim progress and study results have not been shared with the stakeholders. In other cases, studies have not been finalized or implemented due to PacifiCorp’s reluctance to incorporate recommendations of the majority of stakeholders. For example, PacifiCorp has resisted the recommendations of many stakeholders to provide serious evaluation of a full range of alternatives as is required by the National Environmental Policy Act (NEPA) process.

Recommendation: Initiate studies only after receiving and incorporating stakeholder recommendations for study improvements. Share interim progress and study results with stakeholders as early as possible. PacifiCorp may need to explore a full range of Project alternatives in order to find an alternative that can be certified by ODEQ or to provide FERC with necessary information to adequately conduct an Environmental Impact Statement (EIS) as part of its NEPA process.

Response to Comment S2-4

Please see Section E3 of the FLA for additional detail on water quality and beneficial uses.

Response to Comment S2-5

See response to comment #2, above.

Response to Comment S2-6

Due to timing of relicensing and the need to complete some level of study in key resource areas, PacifiCorp initiated studies prior to Collaborative approval. Efforts were focused to provide study results as soon as possible to the stakeholders at monthly resource meetings. In the case of some study requests, PacifiCorp did not agree with the level of study requested by stakeholders, and declined to include some elements in a study.

Response to Comment S2-7

The final license application (FLA) provides a thorough description of the existing Project, its operation, and the Project’s effect on the surrounding environment. In addition, the FLA provides a thorough description of the proposed Project, proposed Project operations, and the proposed Project’s anticipated enhancement to the surrounding environment. The proposed Project was developed considering a number of factors, including the issues, questions and concerns raised by participants in the prefiling collaborative consultation process; existing information; and the results of over 38 environmental studies developed by the Klamath Collaborative.
It is not possible for PacifiCorp to accurately predict the alternatives, or all of the information that FERC may need to analyze these alternatives in their Environmental Impact Statement. Should FERC require additional information, they will likely request it from PacifiCorp.

At the request of relicensing participants and in the interest of collaboration, PacifiCorp conducted intensive fish passage and water quality modeling of at least five variations on dam removal, volitional fish passage and run-of-river operations. In addition, PacifiCorp worked with relicensing participants to try and identify all of the implications of implementing numerous facility and operations scenarios through an exercise entitled System Landscape Options Analysis. All of this information is included in the appended technical reports and consultation record. PacifiCorp has addressed alternatives and their associated issues as a means to inform the subsequent NEPA process.

Response to Comment S2-8

Most resource study plans received the approval of Working Groups and the Plenary. In cases where this did not occur, PacifiCorp elected to complete work it felt necessary for the license application. FERC will determine the alternatives for review in the NEPA process.
Response to Comment S2-9

PacifiCorp describes its understanding of applicable regulatory requirements pertinent to ODEQ's authorities in section E3.4 of Exhibit E.

Response to Comment S2-10

Section E3.5 of Exhibit E provides a description of current water quality conditions in the proposed Project area in the context of applicable water quality standards or objectives. Section E3.8 provides descriptions of measures proposed by PacifiCorp to enhance current water quality conditions. A detailed analysis of how the State water quality standards or objectives apply to the Project, and how the Project meets the standards or objectives will be provided in applications for certification under Section 401 of the CWA for the Project.

As described in section E3.4, PacifiCorp will request certification under Section 401 of the CWA for the Project no later than 60 days after FERC issues the notice that the relicensing application has been accepted and is ready for environmental analysis. Please see response to Comment #2, above.

Response to Comment S2-11

See response to comment #10.
Response to Comment S2-12

Comment noted. Please see Section E3 of Exhibit E for a detailed discussion on the Project's impact on water quality and PacifiCorp's proposed PM&Es.

Response to Comment S2-13

See response to comment #10, above. Section E3.8 of Exhibit E provides descriptions of measures proposed by PacifiCorp to enhance current water quality conditions.

Response to Comment S2-14

It is not within PacifiCorp's purview to extend FERC timelines.

Response to Comment S2-15

Please see the Water Resources FTR for the detailed analysis of PacifiCorp's water quality monitoring and modeling efforts.

B. Specific Comments

B.1. Spatial and Temporal Trends of Water Quality Data

In Water Resources DTRs 2.0 and 3.0 and DLA Section E3.0, PacifiCorp identifies spatial and temporal trends of water quality based upon data collected by various entities between 1950 and 2001 in the Klamath River Basin. The collected data spans various flow conditions, basin activities, times of day, seasons, climatic conditions, and sampling methodologies and levels of quality assurance, affecting the accuracy and comparability of the data and making it difficult to interpret and draw reliable conclusions.

Recommendation: While the pattern of differences in water quality among sites along the Klamath River can provide some insight into the dynamics of water quality in the river, PacifiCorp should be cautious in its interpretation and drawing of conclusions regarding...
identified temporal and spatial differences and trends. Where possible, it would be useful to segregate data of high quality into like groups that allow for more rigorous identification of temporal and spatial relationships as well as trends. ODEQ will place more confidence in water quality interpretations and conclusions drawn from contemporary data for which interrelated conditions (location, season, time of day, flow, and etcetera) have been factored into the analysis.

B.2. Compliance Assessment of Compiled Water Quality Data

DLA E.2.4.1 and DTR 3.0 identify methods for database development based upon Study Plan 1.0, Compilation and Assessment of Existing Water Quality Data. Per the approved study plan, plots and statistical analyses were to be developed “to assess trends and compliance with Oregon and California water quality standards, criteria, and objectives.” Study Plan 1.0 further states, “Gaps in the data and information will be identified by exercising expert professional judgment and by comparing the available data and information with the requirements of Oregon and California 401 Certification and the FERC license application.” While some generalized plots and statistical analyses are provided in the DLA and DTR, PacifiCorp neglected to assess compliance with state water quality standards. As a result, the need for additional studies or filling of data gaps is unclear. It is quite possible that ODEQ will need to require additional studies and the filling of data gaps in the future, pending PacifiCorp’s eventual assessment of water quality data in terms of compliance with state water quality standards and filing of a 401 certification application.

Recommendation: Compare and evaluate the compiled water quality data in relation to state water quality standards to determine compliance. Identify and conduct additional studies to fill data gaps if needed to resolve critical uncertainties. Consider the temporal (diurnal and seasonal) and spatial aspects of data points to determine the range of temporal and spatial compliance with each of the state water quality standards.

B.3. Monitoring of Water Temperature and Water Quality Conditions In the Project Area

There is a discrepancy between the actual sampling effort for 2002 identified in Water Resources DTR 3.0 when compared to that of the stakeholder-approved Study Plan 1.2.

Stakeholder-approved Study Plan 1.2, Section 1.2.4.3 calls for:
- Monthly or biweekly collection of grab samples and in situ measurements of 14 water quality parameters at 42 sites
- Automated data collection at hourly intervals of four water quality parameters at 13 sites
- Automated temperature monitoring at hourly intervals at 19 sites including vertical arrays in Keno, J.C. Boyle, Copco No. 1, and Iron Gate reservoirs.
- Multi-day synoptic sampling at 42 sites, including grab samples and additional automated hourly monitoring, to obtain sub-daily information needed for water quality modeling.

Water Resources DTR Section 3.4.4 reports that actual 2002 sampling effort was:
- Monthly or biweekly collection of grab samples for laboratory or in situ measurements of 21 water quality constituents at 31 locations (not all constituents were measured at all places)
- Automated data collection at hourly intervals of four water quality parameters at 5 sites
- Automated temperature monitoring at hourly intervals at 29 sites including vertical arrays in Keno, J.C. Boyle, Copco No. 1, and Iron Gate reservoirs.

Response to Comment S2-16
See response to comment #10.

Response to Comment S2-17
See response to comment #10.

Response to Comment S2-18
Comment noted. The text has been modified to address these comments. PacifiCorp has kept stakeholders informed of studies by posting material on the PacifiCorp relicensing website and presenting results at monthly meetings.
Response to Comment S2-19

PaciCorp agrees and will consult with ODEQ and CSWRCB to prepare a detailed analysis and application for 401 certification to ensure that the Project complies with the applicable provisions of CWA, including applicable State water quality standards or objectives. Further consultation with ODEQ and CSWRCB is particularly important given that several of the State water quality standards or objectives are qualitative and narrative, and therefore require interpretation and judgement.

Response to Comment S2-20

See response to comment #19, above.
Response to Comment S2-21

Section E3.4 includes the 303(d) listing status of Project waters and a summary of TMDL activities.

Response to Comment S2-22

Section E3.4 has been revised to describe water quality-related regulatory requirements that are specifically applicable to the FERC process.

Response to Comment S2-23

Section E3.5 of Exhibit E has been revised to provide an assessment of how current water quality conditions in the proposed Project area compare to relevant water quality standards or objectives.
Response to Comment S2-24

The revised Section E3.5 of Exhibit E includes a discussion of the "total dissolved solids" standard.

Response to Comment S2-25

The revised Section E3.5 of Exhibit E includes a discussion of the "bottom or sludge deposits" standard.

Response to Comment S2-26

The revised Section E3.5 of Exhibit E includes a discussion of the "discoloration, scum, oily sleek" standard.

Response to Comment S2-27

ODEQ's web-based 303(d) database indicates that the Klamath River downstream of Keno dam, including J.C. Boyle Reservoir, to the California border is on the current (2002) 303(d) list only for water temperature (summer).

Response to Comment S2-28

Comment noted. Please see Water Resources FTR, Section 7 for total dissolved gas measurements.
Response to Comment S2-29

A study conducted by CDFG in Project reservoirs and Upper Klamath Lake is reviewing a variety of toxics, not just ammonia. Please see the Water Resource FTR for a summary of the study and its status.

Response to Comment S2-30

See response to comment #10.

Response to Comment S2-31

The DTR has been significantly revised. Please see the Water Resources FTR and Section E3 of Exhibit E for a detailed discussion on the Project's impact on water quality and PacifiCorp's proposed PM&Es.

Response to Comment S2-32

PacifiCorp has agreed to run the SLOM scenarios in addition to the three water quality modeling scenarios presented in the DLA. Please see Section E3 of Exhibit E for a detailed discussion on the Project's impact on water quality and PacifiCorp's proposed PM&Es.

Response to Comment S2-33

Substantial information has been added to the analysis of water quality in the FLA (Exhibit E, chapter E3) and Water Resources FTR, including water quality modeling of the Klamath River from Link dam to Turwar (near the river's mouth). Water quality modeling includes analysis of scenarios for existing conditions, “steady flow operation”, and without-Project (all facilities removed) as described in section 4 of the Water Resources FTR. Additional modeling was conducted to
examine the effect on incremental instream flow releases from J.C. Boyle dam, selective withdrawal from Iron Gate reservoir for downstream temperature management, and hypolimnetic oxygenation in Iron Gate reservoir. This additional modeling is described in section E3.8 of Exhibit E.

Stakeholders requested modeling of other potential Project removal alternatives (e.g., Iron Gate and Copco I and II removed, Iron Gate removed) to complete a System Landscape Options Matrix (SLOM) assessment. The results of model runs of these SLOM scenarios are not discussed in the FLA or FTR, because the SLOM scenarios are not a necessary component of PacifiCorp's evaluation for this license application. These SLOM runs are intended to assist stakeholders to complete an assessment of whether information will be available to FERC to examine potential Project removal alternatives. PacifiCorp plans to complete the SLOM scenarios and present them to stakeholders in early Spring 2004.
Response to Comment S2-34

Comment noted.

Response to Comment S2-35

Please see the Water Resources FTR. PacifiCorp believes that the information necessary to peer review the model inputs, calibration and verification, and the sensitivity analysis is provided. PacifiCorp does not know why the modeler's notebooks are necessary, therefore, that information is not included in the FLA nor is an executable model file.

Response to Comment S2-36

Draft model documentation was made available on PacifiCorp's website earlier in the licensing process. Please see Section E3 of Exhibit E for a detailed discussion on the Project's impact on water quality and PacifiCorp's proposed PM&Es.

B.10. Determination of Sediment Oxygen Demand In Project Reservoirs

Successful modeling of the water quality of the Klamath River will depend largely on the quality of the physical and chemical characterization of the river and reservoir system. Sediments in the vicinity of the Klamath Hydroelectric Project are particularly enriched and have very high oxygen demand. Source water from the highly productive Upper Klamath Lake, coupled with agricultural return flows, point source discharges, and current and historic log storage and handling likely contribute significantly to settling of nutrient-rich organic materials within Lake Ewauna/Keno Reservoir. While settling of organic materials in downstream reservoirs may be less significant than in Lake Ewauna/Keno Reservoir, the demand and nutrient-release dynamics may still significantly influence the water quality in the downstream reservoirs, too.
Additional sediment oxygen demand studies were conducted in 2003. The results of the work conducted by PacifiCorp agree closely to that performed in 2002 and to those by USGS in 2003. The text of the FTR and FLA has been modified to incorporate these results.

Response to Comment S2-38

Please see Water Resources FTR for further information on this particular study.
Response to Comment S2-39

See the Fish Resources FTR for the detailed analysis of the Spring and Fall macroinvertebrate sampling.
Response to Comment S2-40

Please see the Water Resources FTR for the detailed analysis of PacifiCorp’s water quality monitoring and modeling efforts.
Response to Comment S2-41

Comment noted. Please see the Fish Resources FTR and Section E4 of Exhibit E for a full analysis of the ramping studies that PacifiCorp conducted and the proposed PM&Es.

With respect to the second objective, additional water quality parameters should be included. Other water quality parameters of concern with respect to aquatic resources include hydrogen ion activity (pH), unionized ammonia, and turbidity.

Fish and aquatic organisms can be very sensitive to extremes in pH as well as rapid changes in pH. If the pH of the spring water is markedly different than that of J.C. Boyle reservoir water, then the aquatic life within the peaking reach may be impacted by fluctuations in pH.

Very small concentrations of unionized ammonia can cause chronic or acute toxicity to sensitive aquatic species such as trout. High temperatures and pH cause greater partitioning of ammonia to the toxic unionized form. Peaking operations should be examined relative to non-peaking to identify whether or not ammonia toxicity is exacerbated by peaking operations.

Turbidity can significantly influence predation and avoidance in addition to feeding behavior. Turbidity can also influence the abundance and growth rates of periphyton and macrophytes. The periphyton and macrophytes in turn affect dissolved oxygen and pH levels, nutrient uptake, and forage availability. Greater proportions of reservoir water to spring water would most likely result in higher turbidities which would possibly affect the above identified factors during daytime hours. Ramping and rates of ramping, especially upramping, can also result in entrainment of turbidity-causing materials from the river banks.

Recommendation:

Modify the proposed study plan to include the above identified water quality parameters and considerations.

B.14. Ramping Rates

The DLA lacks information that adequately characterizes the range and variation of daily and hourly flow for each Project reach. A brief description of Project ramp rates is provided in DLA E4.2.5.1. The current FERC license allows up and down ramping rates of nine inches per hour within the J.C. Boyle peaking reach. Ramping in the remaining Project reaches is guided by agreements developed since the license was issued in response to numerous fish kills over the years. Excessive down ramping can result in stranding of fish as well as incubation and rearing mortality. Excessive up ramping can entrain terrestrial organisms and cause erosion and increased turbidity. Flow fluctuations can also affect the transport and deposition of fine sediments and gravels.

Recommendation: PacifiCorp should consult with stakeholders to clearly identify Project impacts and develop potential PM&Es for impacts related to ramping and peaking operations.
Response to Comment S2-42

Through FERC relicensing, PacifiCorp has been working with the stakeholders to gather information relevant to identifying Project impacts. The impacts are documented in the FTRs. Based on the data collected, PacifiCorp has proposed measures that protect resident and anadromous fish species, while at the same time balancing other resource concerns.

Response to Comment S2-43

PacifiCorp feels that the fish assessment work conducted in 2000 and 2001 as part of relicensing, combined with other existing fish assessment work done in the Project area (e.g. OSU, Salt Caves, Hardy and Addley), is sufficient to characterize the existing fish community. Please see Section E4 of Exhibit E for a detailed discussion on Project impacts to aquatic resources and proposed PM&Es.
September 19, 2003

Mr. Toby Freeman, Hydro Licensing Director
PacifiCorp
825 N.E. Multnomah, Suite 1500
Portland, Oregon 97232

Ms. Magalie R. Salas
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

Dear Mr. Freeman and Ms. Salas:

Comments on Klamath River Hydroelectric Project "Draft License Application"
Federal Energy Regulatory Commission (FERC) No. 2082

The California Department of Fish and Game respectfully submits the following comments on the June 2003 Draft License Application (DLA) prepared by PacifiCorp (Licensee) for the Klamath hydroelectric project (Project). These comments are based upon a review of the DLA as well as our participation in the relicensing process pursued by the Licensee since December 2000. These comments are submitted to the Licensee and FERC in accordance with provisions of the Fish and Wildlife Coordination Act (16 U.S.C. § 691 et seq.), the Endangered Species Act (16 U.S.C. § 1531 et seq.), the National Environmental Policy Act (42 U.S.C. § 4321 et seq.), and the Federal Power Act (16 U.S.C. § 791 et seq.).

Relicensing Process

In the "Executive Summary," the DLA describes a traditional licensing process (TLP) that has "evolved into a robust collaborative effort . . . to develop study plans and review study results" (page 2-3). The Department is included in the list of active stakeholders and we can verify that the Licensee and stakeholders have indeed met over 100 times since the process began. The primary goal of the meetings was to develop study plans to document Project impacts. The aggressive meeting schedule (approximately one week of meetings every month for the past year and a half) was in response to time frames established under the TLP, the inadequacies of the first stage consultation document, and the need to gather important information as quickly as possible. Under this compressed schedule, a study plan would receive

Conserving California's Wildlife Since 1870
Response to Comment S3-1

Parsing out study plans in an effort to move forward on where there is agreement is a reasonable means to maintain progress. We agree that much effort was given by all stakeholders to reach agreement on study plans. In fact, work continued following the distribution of the DLA in June, 2003. In addition, those referenced study plans ultimately received Plenary approval. PacifiCorp continues to work with stakeholders to resolve issues on studies like Fish Passage modeling and the instream flow analysis. Outstanding disagreements and PacifiCorp's position on these disagreements is documented in Exhibit E, Appendix E1-A. PacifiCorp maintains that the First Stage was completed consistent with FERC regulations.
Response to Comment S3-2

PacifiCorp disagrees and maintains that the Collaborative Process did lead to meaningful progress. However, as noted in the comment, some study plan development did not turn out as stakeholders requested. Such disagreement took too much time away from other aspects of the collaborative process. In such study disagreement, PacifiCorp presented the level of study effort needed for decisions to be made. PacifiCorp disagrees that the level of effort made by the company is insufficient. A great effort has been made to conduct numerous studies and evaluations of the Klamath Hydroelectric Project.
Response to Comment S3-3

PacifiCorp maintains that it has satisfactorily completed the First Stage.

Response to Comment S3-4

The draft license application (DLA) included a thorough description of the existing Project, its operation, and the Project's effect on the surrounding environment, to the extent it could be described based upon available study results. PacifiCorp and relicensing participants had agreed prior to development of the DLA that it would not be appropriate for PacifiCorp to draw conclusions in the application about the effects of the existing Project on the surrounding environment, unless those conclusions were based upon study results.

As a result of the Klamath Collaborative's extensive changes to the number and scope of studies, few studies were completed in time to inform the development of the DLA. Subsequently, PacifiCorp did not have sufficient information to justify proposing changes to the existing Project. Absent information to the contrary, existing facilities and operations were deemed appropriate.

Now that almost all studies have been completed and reviewed, changes to the Project and its operations have been proposed. This proposed Project, proposed Project operations, and the proposed Project's anticipated enhancement to the surrounding environment are thoroughly described in the final license application.

As per 18 CFR 16.8(c)(2) and (3), an application will not be rejected by FERC as deficient merely because late studies requested by agencies during the second consultation stage are not completed during the second stage.
Response to Comment S3-5

See response to comment #4, above.

Response to Comment S3-6

PacifiCorp has conservatively applied a 30-year licensing term in its assessment of power production costs and reasonable returns on investment.
Response to Comment S3-7

The Initial Statement has been revised to reflect these additional statutory and regulatory requirements.

Response to Comment S3-8

Significant revisions have been made to section E3 of Exhibit E, including improved graphs, discussions on the Project's effect on water quality and PacifiCorp's proposed PM&E measures.

Response to Comment S3-9

See response to comment #8.
Response to Comment S3-10

During monthly stakeholder meetings, PacifiCorp agreed to model the scenario "without Project 2" which tries to "even out" USBR flows. PacifiCorp also agreed to model the "SLOM" runs which does look at different Project configurations. Modeling results are with Project, without Project, and Run-of-River Project are presented in the Water Resources FTR, Section 4.

Response to Comment S3-11

Section E3 of Exhibit E has been updated to include up to date study results and an assessment of Project impacts.
Response to Comment S3-12

Please see Section 3E of Exhibit E for an updated and detailed discussion on the Project's effect on water quality.

Response to Comment S3-13

While Copco dam has an effect on anadromous fish, the report by Hardy and Addley (2001) reported that the decline of spring-run Chinook occurred prior to the completion of Copco dam and cited overexploitation, and activities such as placer, gravel, and suction mining as factors contributing to the decline.
Response to Comment S3-14

Adjustments to peaking operations have been considered. Please see Exhibit E for a detailed discussion on the Project's effect on water quality and PacifiCorp's proposed PM&E measures.

Response to Comment S3-15

Please see Exhibit E for an analysis of Project effects on fisheries resources and water quality, and the proposed PM&E measures. PacifiCorp is currently not proposing fish passage at Copco No. 1.

Response to Comment S3-16

PacifiCorp's proposed PM&E measures are commensurate with its assessment of its effects on water quality. Please see Exhibit E.

Response to Comment S3-17

Comment noted. The value of cold-water refugia for fish is being discussed as part of on-going modeling efforts.

Response to Comment S3-18

Substantial information has been added to the analysis of hydrology in the FLA (Exhibit E, chapter E3) and section 5 of Water Resources FTR to describe flow effects by Project development and/or reach. PacifiCorp concludes that an additional analysis using the Indicators of Hydrologic Alteration (IHA) method is not needed to support this FLA. The analysis of hydrology in the FTR includes information on
monthly discharge conditions, duration of flows, peak (flood) flows, low flows, and rate and frequency of flow changes, all categories similar to those assessed using the IHA method. In addition, the IHA is mostly intended as a tool to compare existing conditions to pre-Project (or unimpaired) "baseline" flow conditions. Treating pre-Project (or unimpaired) flow conditions as "baseline" conditions in a FERC license application is not appropriate since FERC considers "baseline" to be the existing Project-related environment.
Response to Comment S3-19

See response to comment #18, above.

Response to Comment S3-20

Except for the character of the sediment beneath Project reservoirs, these comments are addressed in Chapter 6 of the Water Resources FTR. Delays in data collection were created by a dry summer, not by limited staff resources. Geomorphologists started working with the Fish Passage Work Group in November 2003 to refine the characterization of river bed conditions beneath project reservoirs.

Response to Comment S3-21

PacifiCorp maintains that the fish assessment work conducted in 2000 and 2001 as part of relicensing combined with other existing fish assessment work done in the Project area (e.g. OSU, Salt Caves, Hardy and Addley) is sufficient to characterize the existing fish community. Please see Section 4E of Exhibit E for a detailed discussion on Project effects to aquatic resources and proposed PM&E measures.

Response to Comment S3-22

The Fish Passage Work Group is continuing to work on these issues as they populate the EDT and KlamRas models.
Response to Comment S3-23

See response to comment #21, above.

Response to Comment S3-24

Please see Section E4 of Exhibit E for a discussion on PacifiCorp's proposed instream flows that are presented as PM&E measures.
Response to Comment S3-25

PacifiCorp is continuing to work with the Instream Flow subgroup on PHABSIM analysis above Iron Gate Dam. Please see the Fish Resources FTR for a detailed report on the instream flow study and Section E4 of Exhibit E for PacifiCorp's proposed instream flows at each development.

Response to Comment S3-26

The use of total reservoir storage recommended by the CDFG in this comment would result in deep or complete reservoir drawdown that is not necessary to meet downstream instream flow needs. The current and proposed instream flow schedule below Iron Gate dam is based on the Klamath Project 2003 Operations Plan. This plan was developed by USBR in consultation with the U.S. Fish and Wildlife Service and NOAA-Fisheries based on detailed instream flow studies in the Klamath River below Iron Gate dam. This current and proposed instream flow schedule is protective of ESA-listed species, and can be met without the need to access reservoir storage beyond the existing level of active storage.

PacifiCorp is considering a water quality enhancement measure involving low-level release for downstream water temperature management (see Exhibit E, section E3.8). However, the volume of cool water storage for such release is already limited, such that downstream temperature benefits from a low-level release would be modest (about 2°C or less) and short-term (days or weeks in duration). The deep or complete reservoir drawdown recommended by the CDFG in this comment would, if anything, reduce and more quickly evacuate the volume of reservoir cool water storage.
Response to Comment S3-27

The Battle Creek analysis evaluated the potential impediment to salmonid passage caused by river hydraulics at various
flows. PacifiCorp knows of no such flow barriers downstream of Iron Gate dam. In addition, the fact that salmon and
steelhead already migrate to Iron Gate dam indicates that downstream hydraulics do not currently impede migration.

Flows below Iron Gate dam are directed by USBR’s Klamath Project 2003 Operations Plan, not by PacifiCorp. The current
and proposed instream flow schedule in the Klamath Project 2003 Operations Plan was developed by USBR in consultation
with the U.S. Fish and Wildlife Service and NOAA-Fisheries based on detailed instream flow studies in the Klamath River
below Iron Gate dam.

Response to Comment S3-28

PacifiCorp is continuing to work with the Instream Flow subgroup on PHABSIM analysis above Iron Gate dam. Please
see the Fish Resources FTR for a detailed report on the instream flow study.

Response to Comment S3-29

The Fish Resources DTR has been significantly revised, including more detailed discussions on the ramping study.
The FLA contains an integrated assessment of Project effects on fisheries resources, as well as addressing proposed PM&E
measures.
Response to Comment S3-30

Please see the Fish Resources FTR and Exhibit E for a full analysis of the ramping studies that PacifiCorp conducted and the proposed mitigation.
Estimates of system effectiveness have been presented at meetings of both the Aquatics and Fish Passage Work Groups. Currently, these effectiveness assumptions are being reviewed, and used in on-going KlamRas and EDT Modeling efforts. Section E4 of Exhibit E describes PacifiCorp’s proposed fish passage improvement’s and outlines plans for further review on fish reintroduction above Iron Gate dam. Cost is an evaluation factor pertinent to all entities, be they public or private, and is a reasonable consideration in a FERC licensing process when balancing public interests.
Response to Comment S3-32

The consultant numbers included the cost of construction only, and did not include design, administrative and legal fees, etc.

Response to Comment S3-33

Comment noted.

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As a general comment, the estimates of the capital costs to construct new fish screens and fish ladders presented in the Fish Resources DTR appear excessive, in many cases, the estimates appear to be inflated when compared to the estimates developed by the Licensee's consultant, CH2M Hill, and presented to the collaborative team in February 2003. While the DLA makes it difficult to verify the estimates by providing only minimal supporting documentation, CH2M Hill has previously supplied cost summary tables that provide some, albeit limited, information on the basis of the cost estimates. Notwithstanding the limited documentation, Department hydraulic engineers representing the Department have developed estimates of the capital costs to construct fish screens and fish ladders at Iron Gate, Copco 1, and Copco 2 using available references. The following table compares Department cost estimates with those presented by both the Licensee and CH2M Hill. Unfortunately, the Licensee has not provided the necessary information to verify cost estimates for fish locks, fish lifts, trap and haul facilities, or tailrace barriers.

| Comparison of Klamath River Fish Passage Facility Cost Estimates (2003 dollars) |
|-------------------------------|----------------|----------------|
|                               | DLA Estimate  | CH2M/Hill Estimate |
| I. Iron Gate Dam              |               |                 |
| Fish Ladder (140 ft)          | $21.0M        | $16.0M          |
| Fish Screen                   | $15.1M        | $7.6M           |
| II. Copco 1                   |               |                 |
| Fish Ladder (125 ft)          | $18.9M        | $19M            |
| Fish Screen                   | $23.4M        | $18.8M          |
| III. Copco 2                  |               |                 |
| Fish Ladder (22 ft)           | $3.3M         | $2.2M           |
| Fish Ladder (147 ft)          | $22.1M        | $18M            |
| Fish Screen                   | $21.4M        | $18.8M          |

* Estimate does not include costs associated with modifications to existing ladders or sorting facilities.

When developing the cost estimates for fish ladders, the Department relied upon the criteria presented by Charles H. Clay (1995). In this reference, the author suggests basing the cost of fish ladders on the volume of the structure. Clay suggests an approximate cost of between $20 per cubic foot and $40 per cubic foot (1987 dollars). Using typical fishway dimensions suggested by Bel (1991), Department engineers estimated the fishway volume for a given fishway height. The volume was then multiplied by the cost range presented by Clay to estimate the fishway costs in 1987 dollars. The average change in the Consumer Price Index between 1987 and 2003 is 3.1% and this value was used to convert the 1987 cost estimates to 2003 dollars.
Response to Comment S3-34

Both the $16.0M and $21.0M Iron Gate fish ladder costs are correct. The $16.0M cost is a construction capital cost. The $21.0M cost is a project capital cost. The project capital cost includes the construction capital cost plus allowances for engineering and design, owner's legal and administrative costs and services during construction. These additional items add approximately 25% to the base construction capital cost.

Response to Comment S3-35

The range of technologies explored as part of the fish passage analysis was developed in consultation with the stakeholders. Facilities examined included high speed screening systems as well as conventional screening systems that meet agency criteria. In regards to adult passage, the engineering group examined both ladders and trap-and-haul systems at all project facilities.
Response to Comment S3-36

In the FLA, PacifiCorp has proposed measures to reduce Project-related impacts to resident fish populations. These measures include a combination of new and improved fish passage facilities and habitat actions designed to protect and enhance resident fish populations.

Response to Comment S3-37

PacifiCorp is not currently proposing to install high-speed screens at Project facilities. These systems were examined at the direction of the stakeholders who were interested in reviewing all possible technologies.

Response to Comment S3-38

PacifiCorp engineers and biologists are of the opinion that a well-designed gulper system is capable of significantly reducing entrainment at Project facilities. Data collected on the Baker River gulper in Washington State show that their simple system collects up to 70 percent of the juvenile coho, and sockeye arriving at the Upper Baker River Project.

Response to Comment S3-39

PacifiCorp agrees that where they make biological sense, the construction of volitional fish passage systems are the preferred method for passing both upstream and downstream migrants. However, in a situation like the Klamath River where, (1) water temperatures are not conducive for providing good upstream or downstream fish migration conditions, and...
(2) juveniles and adults must pass through multiple dams and reservoirs, it is our opinion that both adult and juvenile survival would be higher under a trap-and-haul system.

Response to Comment S3-40

See response to comment #37, above.

Response to Comment S3-41

See response to comment #37, above.

Response to Comment S3-42

See response to comment #37, above. We also note that volitional passage systems expose fish to many of the same stressors listed for the trap-and-haul system. For example, adult fish arriving at Iron Gate dam from June through October would have to pass through multiple reservoirs and fish ladders with water temperatures (>21 C) near the upper range of their tolerance levels. Exposure to high water temperatures also decreases egg survival and may increase mortality due to disease (e.g. Ceratomyxosis).

Response to Comment S3-43

Comment noted. This issue has been addressed in the FLA.

Response to Comment S3-44

Comment noted. The draft table was distributed to the Engineering Subgroup for their direct input. The final table contains the comments from all agency representatives on the subgroup who responded. Table will be updated with the new information provided by CDFG.
Response to Comment S3-45

Comment noted. See the response to comment #44, above.

Response to Comment S3-46

Comment noted. See the response to Comment #44, above.

Response to Comment S3-47

Comment noted. See response to comment #44, above.

Response to Comment S3-48

Comment noted. See the response to comment #44, above.

Response to Comment S3-49

Comment noted. See the response to comment #44, above.

Response to Comment S3-50

Comment noted. See the response to comment #44, above.
Response to Comment S3-51

PacifiCorp and other stakeholders agree that the decision is a policy question that only the agencies can address, we believe that models provide a valuable tool for identifying key uncertainties, and the probable risks and benefits associated with reintroducing anadromous fish to the Upper Klamath basin. Thus, we believe that the models will help inform the decision-making process regarding this issue.
PacifiCorp, in collaboration with the stakeholders, is currently modeling the 300 miles of stream habitat assumed available for anadromous salmonids in the Upper Klamath River basin. As the Department is aware, some of this habitat may be highly productive salmon habitat, other portions may not support salmon production at all. Three separate reviews conducted by the fisheries agencies in this basin have each concluded that anadromous fish should not be reintroduced into the Upper Klamath for a myriad of reasons. Despite this, PacifiCorp is working with its partners to re-examine the issue one more time to see if reintroduction is feasible.

Response to Comment S3-53

PacifiCorp is currently working with stakeholders to model five different fish passage alternatives, including dam removal. The results of these analyses will be available for review in mid-2004.

Response to Comment S3-54

The final license application (FLA) provides a thorough description of the existing Project, its operation, and the Project’s effect on the surrounding environment. In addition, the FLA provides a thorough description of the proposed Project, proposed Project operations, and the proposed Project’s anticipated enhancement to the surrounding environment. The proposed Project was developed considering a number of factors, including the issues, questions and concerns raised by participants in the prefiling collaborative consultation process; existing information; and the results of over 38 environmental studies developed by the Klamath Collaborative.
It is not possible for PacifiCorp to accurately predict the alternatives, or all of the information that FERC may need to analyze these alternatives in their Environmental Impact Statement. Should FERC require additional information, they will likely request it from PacifiCorp.

At the request of relicensing participants and in the interest of collaboration, PacifiCorp conducted intensive fish passage and water quality modeling of at least five variations on dam removal, volitional fish passage and run-of-river operations. In addition, PacifiCorp worked with relicensing participants to try and identify all of the implications of implementing numerous facility and operations scenarios through an exercise entitled System Landscape Options Analysis. All of this information is included in the appended technical reports and consultation record. PacifiCorp has addressed alternatives and their associated issues as a means to inform the subsequent NEPA process.

Response to Comment S3-55

The fish passage modeling (using EDT and PasRAS) being conducted by PacifiCorp includes an assessment of alternatives (including those listed) as developed in consultation with the Aquatics Work Group.
Response to Comment S3-56
Comment noted. FERC in their NEPA process will address the issue of cumulative impacts.

Response to Comment S3-57
The EDT model used for analyzing anadromous fish production is utilizing water quality data as input.

Response to Comment S3-58
Comment noted.

Response to Comment S3-59
Please see Section E4 of Exhibit E, which describes fish passage considerations.

Response to Comment S3-60
Please see Section E4 of Exhibit E, which addresses proposed PM&E measures at the Iron Gate hatchery. Consideration of production goals can also be examined against results of fish production through the EDT fish passage modeling.

Response to Comment S3-61
See both Section E4 of Exhibit E and the Fish Resources FTR for a detailed discussion on the Iron Gate hatchery.
Response to Comment S3-62

Comments noted. Corrections will be made in the FLA with updated information obtained from hatchery personnel.

Response to Comment S3-63

Comment noted. Corrections will be made in the FLA with updated information obtained from hatchery personnel.

Response to Comment S3-64

PacifiCorp has committed to the recommended marking program to assist CDFG fisheries management (see Exhibit E of the FLA).
PacifiCorp
Klamath Hydroelectric Project
FERC No. 2082

Response to Comment S3-65

PacifiCorp acknowledges the important contribution that the Iron Gate hatchery makes to the downstream fisheries. PacifiCorp proposes to continue funding the hatchery operations at the 80% level, however; additional measures at the hatchery will be 100% funded by PacifiCorp. See Section E4 of Exhibit E of the FLA.

Response to Comment S3-66

Please see Section E4.3 of Exhibit E for a discussion on fish passage considerations and proposed PM&E measures. PacifiCorp is continuing to work with the Fish Passage Work Group on anadromous fish reintroduction issues.
Response to Comment S3-67

PacifiCorp proposed juvenile survival studies in 2002 and 2003 that would have provided some of this information. However, because stakeholders were uncomfortable with study protocols and possible interpretation of study results these studies were not undertaken. However, PacifiCorp and the stakeholders have agreed to perform a study to determine fish behavior in Copco 1 and Iron Gate reservoirs in 2004.

Response to Comment S3-68

Comment noted. Please see the Fish Resources FTR for reporting of the trout movement study.

Response to Comment S3-69

Field studies have been conducted at J.C. Boyle. Please see the Fish Resources FTR and Section E.3 of the FLA for the results of these ladder function studies. PacifiCorp is not proposing a new fish ladder at J.C. Boyle dam for those reasons enumerated in the FLA.

Response to Comment S3-70

PacifiCorp has proposed to exclude Keno dam from the proposed FERC boundary. The company's responsibilities at Keno will be considered outside the FERC process.
Response to Comment S3-71

The results of the genetic study are in the Fish Resources FTR. PacifiCorp believes that the identification of appropriate stocks for reintroduction should be done collaboratively within the Fish Passage Work Group.

Response to Comment S3-72

PacifiCorp has addressed fish impacts from entrainment through Project facilities in the FLA. Proposed PM&E measures are designed to reduce project impacts on ESA listed suckers, native and non-native resident fish species where these actions are supported by the data collected as part of the relicensing proceedings. The literature review of turbine and spillway mortality, as well as fish survival through reservoirs, is deemed sufficient to allow the Department to determine possible impacts on key management species. PacifiCorp has been unwilling to collect site-specific data on fish entrainment at Project facilities without the Department and other agencies setting performance criteria from which to evaluate study results. To date, the resource agencies have expressed the opinion that facilities must be screened if even one resident fish is entrained and lost. Additionally, the resource agencies have stated that facilities will need to be screened if and when anadromous fish are reintroduced into the Project area or upstream of Keno dam. Given the opinion expressed by the agencies regarding this issue, it seems that entrainment studies would have no impact on agency recommendations as to the need for screening.

Response to Comment S3-73

See response to comment #72, above.
Response to Comment S3-74

See response to comment #72, above.
Response to Comment S3-75

Comment noted. Please see Section E4.3 of Exhibit E of the FLA for an explanation of PacifiCorp’s proposed ongoing studies on fish reintroduction.

Response to Comment S3-76

To clarify, PacifiCorp has stated that it is impossible to test multiple test conditions in a single migration year. This is especially true in the first year of a study where data does not exist to predict how long it will take juveniles to migrate through each reservoir, or the number that will even survive passage. This type of data is needed to determine how long a single test condition must be maintained and the sample size required to draw statistically valid comparisons of alternative outcomes. Additionally, project spillway and turbine openings are surface oriented, i.e. within about 36-ft of the reservoir surface. Thus, reservoirs cannot be drawn below this point and still pass water, thus limiting the range of reservoir levels that can be examined. Finally, inflows to the Project are controlled by Mother Nature and the Bureau of Reclamation. As PacifiCorp has little control of the flow entering the project area, it is difficult to adjust flows on the monthly time-step basis that would be needed for testing multiple conditions during a single migration period.

PacifiCorp agrees that study protocols proposed are biased by the size of the test specimens used. However, it should be noted that the size of fish being tested would be representative of a typical Klamath River fall Chinook or coho smolt. The limitations of the antennas have been considered in study design. Researchers conducting the survival tests will be testing antenna reception in the reservoirs, at turbine and spillway intakes, and in the tailwater of each project.
Antennas will be designed and located in a manner that results in a known detection efficiency that will be used in calculating detection rates at each project.

Response to Comment S3-77

The stakeholders and PacifiCorp have recognized that the first year of the study is in reality a pilot evaluation of study protocols.
Response to Comment S3-78

Pre-Project mapping of all areas currently inundated by Project reservoirs has been conducted and incorporated into the FTR. Results of the pre-Project mapping and habitat assessment, including the quantification and typing of all inundated lands, is provided in the Terrestrial Resources (TR) FTR, Section 3.7. Coupled with the results of vegetation cover type mapping for non-inundated lands provided in the FTR, Section 2.7, the FTR now provides current and historical quantification and typing of all lands located within the Licensee's property boundaries.

Response to Comment S3-79

All wildlife studies conducted as part of relicensing for FERC Project #2082 were initiated in consultation with CDFG, USFWS, ODFW and other state and federal resource agencies and biological experts, to identify and address potential Project impacts to terrestrial species. Species inventories were conducted as an initial step to determine species and populations likely to be affected by continued Project operations. The Terrestrial Resources FTR provides a detailed account of potential Project impacts based upon relicensing studies and past research for each biological resource group (FTR Sections 2.8, 3.8, 4.8, 5.8, 6.8, 7.8, 8.8, 9.8 and 10.8). The FLA provides a summary of ongoing Project impacts to terrestrial wildlife species and includes specific PM&E measures.
Response to Comment S3-80

PacifiCorp has conducted mapping of vegetation communities that existed prior to construction of Keno, J.C. Boyle, Copco, and Iron Gate dams. This information is described in Section 3.7 of the Terrestrial FTR. There is no guarantee that this habitat would develop if reservoirs were removed.
Response to Comment S3-81

Additional details on the existing condition, especially as it relates to the current value of the salmon commercial fishery, have been added to the FLA.

Response to Comment S3-82

The proposed high level analysis (i.e., Phase 2 study) of the landscape options was re-directed by the Plenary. Therefore, the Phase 2 study proposed by PacifiCorp, which had not been approved by the Socioeconomic Work Group members, will not be included in the Final Technical Report or the Final License Application.

Response to Comment S3-83

The analysis of the full range in alternatives is expected to occur under the NEPA process. The desire by stakeholders for PacifiCorp to begin this process sooner (i.e., during the license application process) has been noted by PacifiCorp in the Socioeconomic Issue Paper.

Response to Comment S3-84

Continuing stakeholder work group meetings and information exchange was intended to augment the DLA and to "set the stage" for a collaborative process.
Response to Comment S3-85

See response to CDFG comment #54.

Response to Comment S3-86

See response to CDFG comment #54.

Response to Comment S3-87

PacifiCorp concludes that the studies and analysis presented in the FLA and associated FTRs will be sufficient to support a complete and detailed application for Section 401 certification. FERC’s relicensing regulations require that PacifiCorp request certification under Section 401 for the Project no later than 30 days after FERC issues the notice that the relicensing application has been accepted and is ready for environmental analysis. PacifiCorp will request certification from ODEQ and CSWRCB by that date.

Response to Comment S3-88

The Department’s assertions of Project impacts have been noted.
Information missing in this section of the DLA is now included in the License Application.

Response to Comment S3-90

PacifiCorp expects that of all the alternatives examined, dam removal will provide the largest benefits to anadromous fish species. However, PacifiCorp maintains that other alternatives will provide significant benefits to anadromous fish species, while at the same time protecting and balancing other public resources such as recreational rafting, power generation, cultural resources, and water quality.
Response to Comment S3-91

Comment noted. [Forrest to expand.]

Response to Comment S3-92

The hatchery sub-working group met several times to provide input on PacifiCorp's hatchery analysis. Future options for the hatchery have been reviewed by PacifiCorp. Please see Exhibit E Section 4 for related hatchery PM&Es.

Response to Comment S3-93

[Forrest to address.]

Response to Comment S3-94

PacifiCorp proposes decommissioning its East Side and West Side developments and eliminating the Keno development from the proposed FERC boundary. A high-level alternative analysis is being conducted. Such an analysis affords a reasonable review of fish passage and water quality benefits and constraints. PacifiCorp has addressed its position with stakeholders numerous times as to why it has not “elected” to fully evaluate decommissioning.
Response to Comment S3-95

Measures proposed by PacifiCorp for enhancement of water quality are described in section E3.8 of Exhibit E. These measures do not include removals of Iron Gate and Copco 1 dams.

Response to Comment S3-96

Comment noted. These are the types of comparison that would be made during the FERC NEPA analysis.
Response to Comment S3-97

The proposed Phase 3 study includes an assessment of Project-induced impacts on Property values.

Response to Comment S3-98

The purpose of Keno reservoir and its benefits are described in Exhibit B.

Response to Comment S3-99

Comment noted. Project decommissioning was generally not investigated during the recreation relicensing studies and is not a required analysis since it is not being proposed by the licensee. However, as noted by CDFG, Project decommissioning would likely result in a loss of reservoir-based recreation opportunities which would potentially be replaced by river-based recreation opportunities. Such comments would be addressed during the FERC NEPA analysis.

Response to Comment S3-100

PacifiCorp acknowledges that decommissioning is an alternative for FERC to evaluate as it chooses in the course of the license proceedings; however, the April 2003 guidance does not direct the applicant to provide this evaluation.

At the request of relicensing participants and in the interest of collaboration, PacifiCorp conducted intensive fish passage and water quality modeling of at least five variations on dam removal, volitional fish passage and run-of-river operations. In addition, PacifiCorp worked with relicensing participants to try and identify all of the implications of implementing numerous facility and operations scenarios through an exercise entitled System Landscape Options Analysis. This information
is intended to inform FERC’s evaluation.

Response to Comment S3-101

The licensee has addressed "Project" impacts and has proposed PM&Es for those impacts related to the Project. PacifiCorp maintains it has satisfied its First Stage obligations. See response to CDFG comment #3.
Response to Comment S3-102

See response to CDFG comment #3.

Response to Comment S3-103

PacifiCorp maintains that the information included in the License Application will be sufficient for timely issuance of a new license.

Response to Comment S3-104

PacifiCorp maintains that the License Application provides sufficient information to review Project impacts and identify new license measures that adequately consider power and non-power values.
References


Mr. Toby Freeman  
Ms. Magalie R. Salas  
September 19, 2003  
Page Thirty-Six


Oregon Department of Fish and Wildlife. 1997. Mini-management plans: management of the mainstem Williamson River, Klamath River (below Keno dam) trout management program including Spenser Creek.


Mr. Toby Freeman  
Ms. Magalie R. Salas  
September 19, 2003  
Page Thirty-Seven


Mr. Toby Freeman
Ms. Magalie R. Salas
September 19, 2003
Page Forty

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Response to Comment S4-1

The Consultation section in the Executive Summary of the license application now reflects that SWRCB was not a party to the collaborative process.
Response to Comment S4-2

PacifiCorp plans to continue to work with the SWRCB beyond the relicensing process to provide information needed for a 401 certificate for the Klamath Hydroelectric Project.

First Stage Consultation Package Comments – March 23, 2001
Second Stage Consultation: Study Plans – August 15, 2001
Relicensing Process and Study Plans – December 21, 2001
Second Revision of Draft Study Plan – February 28, 2002
Study Plans – December 23, 2002

We have requested both in writing and verbally during meetings a number of studies to be completed by PacifiCorp. The studies requested by SWRCB staff will help PacifiCorp develop information to support a 401 certification application for the Project. An incomplete First Stage Consultation Document, the slow progress on development of study plans, and the lack of study results and proposed PM&E measures in the draft application, have made it difficult to determine the full extent of studies that are necessary for this project. Therefore, the SWRCB is maintaining it’s right to require additional studies at a later time.

Clean Water Act Section 401 Certification
Section 401 of the federal Clean Water Act (33 USC §1341) (CWA) requires any applicant for a federal license or permit, which may result in any discharge to navigable waters, to obtain certification from the State that the discharge will comply with the applicable water quality parameters in the Act. In this case the federal agency issuing the license is the Federal Energy Regulatory Commission (FERC). States are authorized to condition any section 401 certificate to assure compliance with state law related to water quality. The sections of the CWA for which a state must certify compliance before issuing a section 401 certification include sections 301 and 302 (effluent limitations), section 303 (water quality standards and implementation plans), section 306 (national standards of performance for new sources), and section 307 (pretreatment effluent standards).

Under section 303 of the CWA and under section 13240 of the California Water Code, the NCRWQCB has adopted and must review from time to time water quality standards. The NCRWQCB adopted the standards as part of a Water Quality Control Plan that designates the beneficial uses of waters to be protected along with the water quality objectives necessary to protect those uses. The Basin Plan for the North Coast Region lists municipal and domestic supply, industrial service and process supply, ground water recharge, freshwater replenishment, hydropower generation, water contact recreation, non-contact water recreation, commercial and sport fishing, warm and cold fresh water habitat, wildlife habitat, migration, spawning, reproduction and/or early development, aquaculture, and rare, threatened and endangered species as beneficial uses of the Klamath River. The beneficial uses of the water at Copco and Iron Gate Reservoirs are listed as freshwater replenishment, hydropower generation, water contact recreation, non-contact water recreation, commercial and sport fishing, warm and cold fresh water habitat, wildlife habitat, migration, spawning, reproduction and/or early development, aquaculture, and rare, threatened and endangered species.

The Basin Plan also contains water quality objectives that set or describe the water quality limits necessary to achieve and protect the beneficial uses. PacifiCorp must evaluate the quality of the
Section E3.5 of Exhibit E provides a description of current water quality conditions in the proposed Project area in the context of applicable water quality standards or objectives. Section E3.8 provides descriptions of measures proposed by PacifiCorp to enhance current water quality conditions. A detailed analysis of how the State water quality standards or objectives apply to the Project, and how the Project meets the standards or objectives will be provided in applications for certification under Section 401 of the CWA for the Project.

As described in section E3.4, PacifiCorp will request certification under Section 401 of the CWA for the Project no later than 60 days after FERC issues the notice that the relicensing application has been accepted and is ready for environmental analysis. PacifiCorp will consult with ODEQ and CSWRCB to prepare a detailed analysis and application for 401 certification to ensure that the Project complies with the applicable provisions of CWA, including applicable State water quality standards or objectives. Further consultation with ODEQ and CSWRCB is particularly important given the many sources and factors contributing to water quality conditions in the Project area, including many that are outside of PacifiCorp's control, and because several of the state water quality standards or objectives are qualitative and narrative, and therefore require interpretation and judgement.

Response to Comment S4-4

PacifiCorp will coordinate with CSWRCB as appropriate on CEQA requirements and documentation.
Response to Comment S4-5

Appendix E1-A of the FLA, "PacifiCorp Consultation Record for Relicensing the Klamath Hydroelectric Project," provides a summary status of each study plan included in the application. The summary identifies outstanding disputes.
PacifiCorp agrees that the juvenile survival study is important and will implement this study in 2004.

Response to Comment S4-7

See response to CDFG comment #72.

Response to Comment S4-8

Comment noted. Please see Sections 3 and 4 of Exhibit E for detailed discussions on Project impacts to aquatic resources and proposed PM&Es.

Response to Comment S4-9

CSWRCB staff indicated that PacifiCorp would be required to develop a water temperature objective (for Klamath River salmon and steelhead) for use in the Klamath River. On that basis, PacifiCorp agreed to prepare a study plan, or technical approach, to develop such a water temperature objective. In the process of investigating and preparing a technical approach, PacifiCorp has determined that other stakeholders in the basin have already begun coordination and research on potential basin-specific water temperature criteria. In addition, PacifiCorp has determined that extensive reviews and recommendations on water temperature criteria for salmonids are already available from CSWRCB, ODEQ, and EPA Region 10 that likely is applicable to Klamath River salmon and steelhead. PacifiCorp will consult further with CSWRCB and the North Coast Regional Water Quality Control Board (who is responsible for the existing temperature objective in the Klamath Basin) on this matter. The outcome of this
further consultation will be used in preparing the application for certification under Section 401 of the CWA for the Project.

Response to Comment S4-10

The draft license application (DLA) included a thorough description of the existing Project, its operation, and the Project's effect on the surrounding environment, to the extent it could be described based upon available study results. PacifiCorp and relicensing participants had agreed prior to development of the DLA that it would not be appropriate for PacifiCorp to draw conclusions in the application about the effects of the existing Project on the surrounding environment, unless those conclusions were based upon study results.

As a result of the Klamath Collaborative's extensive changes to the number and scope of studies, few studies were completed in time to inform the development of the DLA. Subsequently, PacifiCorp did not have sufficient information to justify proposing changes to the existing Project. Absent information to the contrary, existing facilities and operations were deemed appropriate.

Now that almost all studies have been completed and reviewed, changes to the Project and its operations have been proposed. This proposed Project, proposed Project operations, and the proposed Project's anticipated enhancement to the surrounding environment are thoroughly described in the final license application.

As per 18 CFR 16.8(c)(2) and (3), an application will not be rejected by FERC as deficient merely because late studies requested by agencies during the second consultation stage are not completed during the second stage.

Response to Comment S4-11

Since not every stakeholder is interested in every volume of the License Application and Technical Appendices (FTRs), some redundancy was necessary to aid a broader audience. The provision of "all" raw data would conflict with the intention to be as concise as practical.
PacifiCorp proposes to decommission the East Side and West Side facilities. PacifiCorp will consult with the agencies to determine information and approvals necessary to decommission these facilities. No decommissioning of other Project facilities is proposed or anticipated. As such, PacifiCorp concludes that a study plan providing details of studies and reports necessary to decommission these other facilities is not required.

To address salmon passage, PacifiCorp is conducting detailed and comprehensive analysis of anadromous fish reintroduction and Project fish passage options using EDT and PasRAS models. The models assume various Project scenarios, including dam removal, as described in the Fish Resources FTR and chapter E4 of Exhibit E. EDT and PasRAS modeling is being done in consultation and coordination with the Aquatics Work Group.

Response to Comment S4-13

PacifiCorp plans to decommission the East Side and West Side projects as described in the FLA. No other decommissioning of Project facilities is proposed.

Response to Comment S4-14

See the Fish Resources FTR for an evaluation of the Iron Gate Hatchery.

Response to Comment S4-15

See response to SWRCB comment #3.
Response to Comment S4-16

Figures and charts in the FLA have been reproduced in a manner that affords better data interpretation.
Response to Comment S4-17

The California Water Code and Water Rights sections in the license application - Initial Statement have been revised per further investigation into this comment.

Response to Comment S4-18

The correct section has been noted in the FLA.

Response to Comment S4-19

Comment noted.

Response to Comment S4-20

Keno dam/reservoir are no longer part of the Project for which a license is being requested.

Specific Comments

Volume 1

Draft Initial Statement, Page 3 - #8, Water Code section 101 is not the correct citation; you should reference Water Code sections 106.7 and 1300.5 which address the appropriation of water for hydropower. In #9, instead of section 3160, you should reference Water Code section 13160 which authorizes the SWRCB to issue certification under section 401. The citation to section 3855 should be edited to read, California Code of Regulations, title 23, section 3855.

This section lists the requirements for water quality certification. The correct reference for laws applicable to the safety of dams, including construction, repair, inspection, and maintenance of dams is Water Code section 6000 et. seq., not section 6102. You should also add Clean Water Act Section 401 to the list, as well as other applicable federal laws and regulations.

Draft Initial Statement, Page 5 - Many of the water rights listed are either cited or incorrectly or are altogether incorrect. A quick review of our records revealed the following application numbers or permitted or licensed appropriative rights (preceded by A) and claims of water rights in statements of diversion and use (preceded by S):

- Iron Gate Reservoir:
  - A017527 – Pacific Power, direct diversion of 3300 cfs
  - S012968 – Pacific Power, direct diversion of 48 cfs

- Copco:
  - S015375 – PacifiCorp, direct diversion of 3200 cfs
  - S015374 – PacifiCorp, direct diversion of 3200 cfs

- Fall Creek:
  - S015373 – PacifiCorp, direct diversion of 50 cfs
  - S015372 – PacifiCorp, direct diversion of 50 cfs
  - S012966 – Pacific Power and Light, direct diversion of 10 cfs

Please review these water rights and let us know if PacifiCorp has or claims to have additional water rights.

Draft Executive Summary, Page 3 - The reference to the study status in section E2.7.2.1 of Exhibit E is incorrect. The correct section should be referenced.

Draft Executive Summary, Page 4 - To our knowledge delta smelt do not occur in the Klamath River (Moyle, 2002). You may have intended to include enhalchon (Thaleichthys pacificus).

Draft Exhibit B, Page 6 - PacifiCorp should provide additional information about the operational flexibility of Keno Dam/Reservoir. The draft application states that the reservoir elevation is held steady through the coordinated efforts of PacifiCorp and the U.S. Bureau of Reclamation (USBR). Reservoir levels are held steady by adjusting flows through East and West Side Powerhouses with coordination of flows in the Lost River and Straits Drain. Why does the water surface elevation need to be held constant? When and/or where does flexibility exist in the
The text has been modified to address this comment.

Response to Comment S4-22

Comment noted. Please see Exhibit E for a detailed discussion on the Project's impact on water quality and PacifiCorp's proposed mitigation measures.

Response to Comment S4-23

The text has been revised to say "no control."

Response to Comment S4-24

Water quality impacts have primarily been assessed by comparing present conditions under the recent Biological Opinion to proposed Project conditions into the future. PacifiCorp reasonably assumed that required instream flows would not revert to pre-1997 conditions. Exhibit B of the FLA describes Project operations and resulting power production. In addition, a white paper was presented to the stakeholders that described current Project operations and the constraints or limitations of PacifiCorp's ability to generate power under USBR instream flow and reservoir stage requirements.

Response to Comment S4-25

The data in question must be obtained from the USBR. Under the terms of the data release agreement, PacifiCorp is not able to distribute unpublished USBR data.
Response to Comment S4-26

The Water Resources FTR includes summaries of all the water quality data collected during PacifiCorp's relicensing studies. PacifiCorp believes it is unnecessarily cumbersome to include the raw data. Copies of the data sheets can be specifically requested.

Response to Comment S4-27

The Water Resources FTR includes summaries of all the water quality data collected during PacifiCorp's relicensing studies. PacifiCorp believes it is unnecessarily cumbersome to include the raw data. Copies of the data sheets can be specifically requested.

Response to Comment S4-28

Comment noted. Please see the Water Resources FTR for a detailed discussion on Project reservoirs.

Response to Comment S4-29

Comment noted. Please see the Water Resources FTR for a detailed discussion on Project reservoirs.
Response to Comment S4-30

Discharge from the fish hatchery below Iron Gate dam is permitted by the State of California. PacifiCorp assumes that this discharge is meeting the state water quality standards. PacifiCorp believes that the sampling sites are adequate to describe the Project's influence on water quality.

Response to Comment S4-31

Comment noted. Please see Sections 8 and 12 in the Water Resources FTR for a detailed discussion on the Fall and Spring macroinvertebrate sampling.

Response to Comment S4-32

See response to SWRCB comment #3, above. PacifiCorp's fish resources studies (see Fish Resources FTR) includes a review of anadromous fisheries in the Klamath River, and describes the use of EDT and PasRAS models to assess potential anadromous fish (including coho) reintroduction. EDT includes water quality as one of the environmental attributes considered in assessing historic, current, and potential conditions for anadromous fish.

Response to Comment S4-33

Comment noted. Please see Section 3 of Exhibit E for a detailed discussion on the Project's impact on water quality and PacifiCorp's proposed mitigation measures.
Response to Comment S4-34

CSWRCB staff indicated that PacifiCorp would be required to develop a water temperature objective (for Klamath River salmon and steelhead) for use in the Klamath River. On that basis, PacifiCorp agreed to prepare a study plan, or technical approach, to develop such a water temperature objective. In the process of investigating and preparing a technical approach, PacifiCorp has determined that other stakeholders in the basin have already begun coordination and research on potential basin-specific water temperature criteria. In addition, PacifiCorp has determined that extensive reviews and recommendations on water temperature criteria for salmonids are already available from CSWRCB, ODEQ, and EPA Region 10 that likely is applicable to Klamath River salmon and steelhead. PacifiCorp will consult further with CSWRCB and the North Coast Regional Water Quality Control Board (who is responsible for the existing temperature objective in the Klamath Basin) on this matter. The outcome of this further consultation will be used in preparing the application for certification under Section 401 of the CWA for the Project.
Response to Comment S4-35

Please see Section 7 of the Water Resources FTR for the total dissolved gas (TDG) measurements. TDG sampling was conducted over a range of Project operations, including spill, and none of the values exceeded either Oregon or California’s TDG criteria.

Response to Comment S4-36

Comment noted.

Response to Comment S4-37

Comment noted.

Response to Comment S4-38

Comment noted. Please see Section 3 of Exhibit E for a detailed discussion on the Project’s impact on water quality and PacifiCorp’s proposed PM&Es.

Response to Comment S4-39

Comment noted. Please see Sections 8 and 12 in the Water Resources FTR for a detailed discussion on the Fall and Spring macroinvertebrate sampling.

Response to Comment S4-40

PacifiCorp does not believe that water quality is adversely affecting recreation beneficial uses. See the Recreation FTR for an analysis of recreational use in the Project area.
Response to Comment S4-41

See response to comment #38.

Response to Comment S4-42

Temperature impacts from Straits Drain are discussed. The creation of the reservoirs, and the destruction of historic marsh complexes are beyond the scope of this relicensing.

Response to Comment S4-43

Comment noted. Please see Section 3 of Exhibit E for a detailed discussion on the Project's impact on water quality and PacifiCorp's proposed PM&Es.

Response to Comment S4-44

See response to comment #43.
Response to Comment S4-45

Studies on the foothill yellow-legged frog have been conducted in 2003 in accordance with the final study plan. Results of foothill-yellow legged frog studies are presented in the Terrestrial Resources FTR Section 4.0.

Response to Comment S4-46

The Recreation Resources FTR describes the impact of various flow regimes on boating and fishing opportunities. The balancing of power and non-power values and licensee proposed flows below the J.C. Boyle powerhouse are addressed in the FLA.

Response to Comment S4-47

Comment noted.

Response to Comment S4-48

See Section 9 of the Water Resources FTR for a detailed report on sediment oxygen demand in selected Project reservoirs.

Response to Comment S4-49

Water quality modeling results and Project impacts on water quality are included in the FLA.
Response to Comment S4-50

The macroinvertebrate study has been completed and the methodologies are documented in the Water Resources FTR.
Response to Comment S4-51

Comment noted. See the Fish Resources FTR for the detailed analysis of the Spring and Fall macroinvertebrate sampling.

The NCRWQCB staff reviewed the Water Resources Draft Technical Report. Their comments are enclosed, and they will supplement the comments provided above. As you know, SWRCB staff and NCRWQCB staff have been working together coordinating the 401 certification and Total Maximum Daily Load (TMDL) issues relevant to this project. NCRWQCB staff are involved with this project because the information generated by the relicensing process may be useful in developing TMDLs for the Klamath River. The Klamath River is on the state List of Impaired Waterbodies (Clean Water Act section 303(d) list). The Project impacts water quality in the river, and is therefore relevant to the TMDL analysis. The SWRCB may not be able to issue a 401 certification for this Project until the Project’s contribution to the 303(d) listing are fully understood, and loads are allocated.

Conclusion
We look forward to working with PacifiCorp, agencies, Tribes, and NGO’s on the relicensing of this Project. If you have any questions, or want to discuss the details of these comments, please contact me by phone at (916) 341-5341 or e-mail at rkantz@waterrights.swrcb.ca.gov.

Sincerely,

Russ J. Kanz
Environmental Specialist
Division of Water Rights

Enclosure
References:

Belchik, Mike. 2002. Yurok Tribal Fisheries
City of Klamath Falls. November 1986. Application for new license Salt Caves
hydroelectric project

cc: See enclosed Mailing List.
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<thead>
<tr>
<th>Klamath Hydroelectric Project Mailing List</th>
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ATTACHMENT

2

Oregon Department of Fish and Wildlife

COMMENTS ON PACIFICORP’S DRAFT LICENSE APPLICATION

for

Klamath Hydroelectric Project

(FERC 2082)

September 2003

Oregon Department of Fish and Wildlife
Prineville, Oregon
Response to Comment S5-1(B)

PacifiCorp appreciates the efforts of ODFW throughout this licensing process. You will find that the FLA and technical appendices (FTRs) provide a significant degree of data updates and study clarifications. In addition, the FLA describes the proposed Project impacts and proposed PM&E measures. PacifiCorp is continuing to collaborate with the Aquatics Work Group on fish passage, instream flow, and water quality issues and is also hopeful that outstanding issues can be resolved collaboratively. In cases where PacifiCorp maintains that the scope of study both executed and planned is sufficient for FERC purposes, contrary to the opinions of others, these disagreements have been documented in Appendix E1-A of the FLA.
information for potential dam decommissioning and removal. We are hopeful that these issues can be resolved through continued discussions with PacifiCorp, the federal and state resource agencies, Native American Tribes, and interest groups.

During relicensing consultation, PacifiCorp modified the formal traditional process by adding an informal collaborative process with other partners in the region such as tribal and federal agencies and non-governmental organizations (NGO's), and state agencies to formalize and approve studies to identify and assess the impacts of the Project. Despite this effort, ODFW notes that the DLA lacks information to address potential resource impacts. In many cases, field studies and data analyses are not completed. This has resulted in a DLA that lacks detailed descriptions of existing conditions, affected resources, Project impacts, and proposed PM&E measures. In some cases, PacifiCorp either chose not to conduct certain studies recommended by ODFW, or chose not to use standard study methodologies recommended by ODFW. For example, the unapproved Fisheries assessment study (Study Plan 1.9), that should provide a baseline of information for existing fish populations, is technically flawed and cannot meet the stated objectives of understanding the baseline conditions of fish populations and Project impacts. Results of an approved and technically qualified study would have been used to assess Project effects and then identify appropriate PM&E's. Similarly, the Fish Passage Study Plan (Study Plan 1.10) also has not been approved via the collaborative process and does not meet the stated objectives of describing current conditions, completing adequate studies and developing PM&E's.

As described by FERC regulations, the purpose of the FLA is to fully disclose effects of the Project on the environment, provide sufficient information for FERC to meet its obligations under the National Environmental Policy Act (NEPA) and the Endangered Species Act (ESA) as well as tribal trust responsibilities, and propose PM&E's that will mitigate for the impacts of the Project. The FEA needs to address study deficiencies and identify a process to conduct studies needed to determine appropriate PM&E types and scale. The FEA should present conclusions of comprehensive studies that have been requested by ODFW and other participants, including description of the scope, methods, results, and analysis of such studies. Additionally, the FEA needs to describe current conditions, Project impacts and PM&E's. In the absence of such information, ODFW will need to submit conservactive 10j recommendations that are conservative in order to ensure resource goals and objectives and state statutory requirements are met.

The Project's FERC boundary traverses approximately 53 miles of the Klamath River in Oregon, and includes the Link River diversion, and Keno and JC Boyle dams and reservoirs. The FERC boundary also extends downstream along the Klamath River approximately 20 miles in California, and includes the Copco 1 and 2, and Iron Gate dams and reservoirs. While ODFW's comments are focused on Project impacts in Oregon, our interests are also affected by Project operations in California. Oregon coastal fishers have utilized anadromous fish originating from the Klamath Basin for over a century. The health of Klamath stocks affects allocation of fish resources for Oregon, Washington, California and Alaska users, as well as numerous tribal nations with fishing treaties with the United States government. The Klamath populations also factor into harvest allocation agreements between the United States and Canada, regulated by the Pacific Salmon Treaty. Water quality from Oregon affects water quality in California and lack of passage at California dams prevents anadromous fish access to historic habitat in Oregon. Therefore, while ODFW's comments primarily address the adequacy of the DLA in evaluating current conditions, Project impacts, and PM&E's in Oregon, we also provide recommendations that encompass the entire Project boundary and area of Project effects.
We look forward to working with PacifiCorp throughout the remainder of the relicensing process and beyond for the benefit of fish, wildlife, and habitat resources. ODFW appreciates the opportunity to provide comment on the DLA and wishes to continue our cooperative working relationship with PacifiCorp. If you have any questions or need additional information, please call me at 541-447-5111, ext. 27, or send email to pplyhyd@state.or.us.

Sincerely,

Amy M. Stuart
Hydro Power Program Biologist
High Desert Region

c: Klamath HART (Kebler, Madill, DeVito, Haeckel, McNamara)
Klamath CAPS (Madill, Edick, Llewellyn, Byler)
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M. Rede, G. Smith and A. Manji, CDF&G
R. Vandevert, USFS
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M. Delichik, H. McConnell, and C. Chamberlain, Yurok Tribe
S. Suter, B. Mushado, S. Sandalier, M. Turnisky, BLM
K. Pierce, KRITFC
D. Leland, NCMQCB
R. Kanz, Cal SWRCB
S. Redfart, American Rivers
C. Bonham, TU
E. Catlett, Friends of the River
H. Barr, World Wildlife Fund
G. Huntington
L. Darnmoor, R. Hamilton, Klamath Tribes
M. Salat, FERC, Washington DC plus 8 copies
J. Madix, FERC, Washington DC
## Comments of the Oregon Department of Fish and Wildlife
on PacifiCorp's Draft License Application—June, 2003
Klamath Hydroelectric Project (FERC No. 2082)

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Response to Comment S5-1

Due to a variety of reasons, many studies were not completed in time for submitting the DLA. The final license application includes missing information or identifies the remaining work and schedule to complete outstanding studies.

Response to Comment S5-2

The lack of data interpretation in the DLA was a result of PacifiCorp agreeing to expand the scope of studies within the limited time frame for publication of the DLA. The FLA is much more comprehensive in addressing Project impacts and identifying PM&E measures.

The FLA documents the analyses on those subjects listed in your comment. The PM&E measures presented for fish passage will be further refined upon acceptance by FERC and regulating agencies.

Response to Comment S5-3

PacifiCorp deemed some studies requested by ODFW as unnecessary for Project relicensing.
Response to Comment S5-4

Due to the timing of relicensing and the need to complete some level of study in key resource areas, PacifiCorp initiated studies prior to the Collaborative’s approval. Efforts were focused to provide study results as soon as possible to the stakeholders at monthly resource meetings.

Response to Comment S5-5

The final license application (FLA) provides a thorough description of the existing Project, its operation, and the Project’s effect on the surrounding environment. In addition, the FLA provides a thorough description of the proposed Project, proposed Project operations, and the proposed Project’s anticipated enhancement to the surrounding environment. The proposed Project was developed considering a number of factors, including the issues, questions and concerns raised by participants in the prefiling collaborative consultation process; existing information; and the results of over 38 environmental studies developed by the Klamath Collaborative.

It is not possible for PacifiCorp to accurately predict the alternatives, or all of the information that FERC may need to analyze these alternatives in their Environmental Impact Statement. Should FERC require additional information, they will likely request it from PacifiCorp.

At the request of relicensing participants and in the interest of collaboration, PacifiCorp conducted intensive fish passage and water quality modeling of at least five variations on dam removal, volitional fish passage and run-of-river operations. In addition, PacifiCorp worked with relicensing participants to try and identify all of the implications of implementing...
numerous facility and operations scenarios through an exercise entitled System Landscape Options Analysis. All of this information is included in the appended technical reports and consultation record. PacifiCorp has addressed alternatives and their associated issues as a means to inform the subsequent NEPA process.

**Response to Comment S5-6**

PacifiCorp does not interpret the handbook language as requiring an alternatives analysis of "no project operation."

**Response to Comment S5-7**

See response to ODFW comment #5.
ODFW STATUTES, POLICIES, AND RULES

ODFW's goals and objectives for the fish and wildlife populations affected by the Project are found in the following Oregon Revised Statutes (ORS) and Oregon Administrative Rules (OAR). In addition, ODFW has authority pursuant to Section 10(j) of the Federal Power Act (FPA) and the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.) to provide recommended terms and conditions to FERC to protect, mitigate and enhance fish and wildlife and their habitat affected by operation and management of the Project.

- **Wildlife Policy (ORS 469.012)**
  Establishes wildlife management policy to prevent serious depletion of any indigenous species and maintain all species of fish and wildlife at optimum levels.

- **Oregon Plan for Salmon and Watersheds (ORS 541.405)**
  Restore native fish populations, and the aquatic systems that support them, to productive and sustainable levels that will provide environmental, cultural, and economic benefits.

- **Policy to Restore Native Stocks (ORS 469.435)**
  Establishes goal of the State of Oregon to restore native stocks of salmon and trout to their historic levels of abundance.

- **ODFW's Fish Passage Law (ORS 569.580 - 569.615)**
  Establishes an state policy that upstream and downstream passage is required at all artificial obstructions in those Oregon waters in which migratory native fish are currently or have historically been present. For existing hydroelectric Projects, releasing by the Federal Energy Regulatory Commission (FERC) is the "trigger" that initiates consideration of fish passage.

- **General Fish Management Goals (OAR 635-007-0510)**
  Fish shall be managed to take full advantage of the productive capacity of natural habitats, and ODFW shall address losses in fish productivity due to habitat degradation through habitat restoration.

- **Natural Production Policy (OAR 635-007-0521 thru -0524)**
  Protect and promote natural production of indigenous fishes.

- **Native Fish Conservation Policy (OAR 635-007-0525 thru -0528)**
  Conserve and recover native fish in Oregon to avoid serious depletion of native fish, provide ecological and societal benefits, and opportunities for fisheries and other societal uses.

- **Wild Fish Management Policy (OAR 635-007-0529 thru -0529)**
  Protect genetic resources of wild fish.

- **Wild Fish Gene Resource Conservation Policy (OAR 635-007-0530 thru -0538)**
  Manage wild fish to maintain their adaptiveness and genetic diversity.

- **Trout Management (OAR 635-007-010 thru -0120)**
  Maintain the genetic diversity and integrity of wild trout stocks; and protect, restore, and enhance trout habitat.

Attachment 2  Page 10  ODFW Comments on Klamath DLA

September 18, 2003
Fish and Wildlife Habitat Mitigation Policy (OAR 635-415-0000; thm 0025)
Require or recommend mitigation for losses of fish and wildlife habitat.

Oregon’s Elk Management Plan
Protect and enhance elk populations in Oregon to provide optimum recreational benefits to the public and to be compatible with habitat capability and primary land uses.

Oregon’s Black Bear Management Plan
Maintain healthy populations of black bear consistent with public desires and state law.

Oregon’s Cougar Management Plan
Maintain healthy populations of cougar consistent with public desires and state law.

Wildlife Diversity Plan (OARs 635-100-0001 thru -0030)
Maintain Oregon’s wildlife diversity by protecting and enhancing populations and habitats of native wildlife at self-sustaining levels throughout natural geographic ranges.

Klamath Basin Fish Management Plan (OARs 635-500-3600 thru -3850)
Protect and promote natural production of indigenous species and protect and restore these habitats through coordination and cooperation with other agencies, entities and landowners.

RE-LICENSING ISSUES

PacifiCorp issued its First Stage Consultation Document (FSCD) in December 2000. ODFW reviewed the document and provided written comments to PacifiCorp (ODFW 2001). We identified important relicensing issues and recommended methodologies to collect information for assessing Project impacts. ODFW believes these issues should be addressed in the FIA to support PM&E’s for relicensing. Project relicensing issues identified in ODFW’s review of the FSCD included the following:

- Upstream Fish Passage
- Downstream Fish Passage/Fish Entrapment in Power Canals
- Project Operations and Hydrology, and Sediment and Geomorphology in the Klamath Basin
- Seasonal Minimum Flows in All Reaches
- Fixing Reaches for By-pass and Peaking Flow Reaches
- Water Quality Monitoring and Macroinvertebrate Surveys
- Habitat Surveys for Potential Anadromous Fish Production in the Upper Basin
- Native Trout and Wild Fish Surveys; Stock Assessments for Anadromous Fish
- Terrestrial and Botanical Resources; Noxious Weeds
- Cumulative Impacts

In our comments below, ODFW reviews these issues along with our assessment of the information provided in the DLA and recommendations for how PacifiCorp might address our concerns in the FIA.
Response to Comment S5-8

Study results do not fully support all of these conclusions. The commenter is referred to Section 4.3 of Exhibit E for the assessment on fish passage.

Response to Comment S5-9

PacifiCorp tagged resident redband trout in 2003 as a means to monitor fish movement and usage of fish passage facilities at J.C. Boyle. The results of this study showed that fish were able to pass through the ladder and exit into the J.C. Boyle reservoir.

Response to Comment S5-10

PacifiCorp staff will conduct evaluation studies for all new fish passage facilities constructed at the Project. The costs of these evaluations are included in the FLA.

Response to Comment S5-11

Number of fish using the J.C. Boyle ladder has according to previous studies, decreased. The cause of this decrease continues to be a point of disagreement. Please see the Fish Resources FTR for PacifiCorp's point of view.

Response to Comment S5-12

Comment noted. PacifiCorp did not see it as necessary to complete such modeling for determination of proposed PM&E measures.
PacifiCorp has acknowledged that the construction of Copco and Iron Gate dams eliminated all anadromous fish production upstream of the Project.

Response to Comment S5-14

Comment noted. The Fish Passage Group is continuing to refine the KlamRas and EDT models to address the anadromous fish reintroduction issues.

Response to Comment S5-15

Please see Chapter E 4 of Exhibit E for a detailed discussion on Project impacts to aquatic resources and proposed PM&E measures. PacifiCorp is continuing to work with the Fish Passage Working Group on anadromous fish reintroduction issues.

PacifiCorp is not proposing volitional fish passage at all facilities at this time since current study results do not support such an action given conditions within the basin beyond PacifiCorp's control.
facilities or other alternatives that ensure connectivity of fish populations are needed to mitigate for the impacts of the Project. These impacts continue to prevent restoration of native fish populations. Effective mitigation for these impacts will further ODFW’s resource management objectives for native resident and anadromous fish.

The FLA needs to include information on a range of fish passage alternatives, including dam decommissioning and removal, to enable FERC to conduct alternatives analysis required by the NEPA. In the FERC Hydroelectric Project Licensing Handbook (April 2001), FERC indicates that Exhibit E of the FLA should contain enough and sufficient evidence to evaluate impacts and their significance. For example, removal of the lower 3 California hydroelectric dams would immediately provide 35 miles of anadromous fish habitat with no obstructions to fish passage and cool water refuges from Fall, Spring and Jenny creeks. The remaining 3 Oregon dams could be retrofitted to provide more effective passage to over 260 miles of historic habitat.

With respect to PacificCorp’s proposal to use a decision structure analysis for making decisions on PM&E’s, ODFW requests that this method be carefully reviewed. This method needs to include enough information to consider a full range of alternatives. For example, a test of the decision structure could be used to analyze how new instream flows in the JC Boyle bypass reach would affect other alternatives such as fish passage. ODFW requests opportunity to review and approve methods and data used in this analysis.

ODFW proposes the following specific recommendations for each Project facility. In addition, once new facilities are installed, PacificCorp will need to conduct post-construction hydraulic and biological evaluation of the fish facilities, and modify facilities based on results and agency approval, to ensure proper performance.

Keno Dam (Exhibit E 4.2.4.2.2 and DTR 5.3.4)

Additional hydraulic and biological review of current fish passage facilities is needed. Species of concern for passage include native trout, suckers, lamprey and anadromous fish. Preliminary reviews to date have shown the following barrier conditions may occur: low attraction rates at the fishway entrance; fishway gradient steeper than suckers/fish are known to negotiate; step height greater than 0.5 ft (ODFW criteria for trout); and lack of refuges in several weirs near the fishway exit, forming a probable barrier for lamprey, which don’t jump.

The current ladder configuration has a much steeper slope (IV: 10.51) than the criteria for passage of suckers. Automated weir 25 through 28 lack adequate refuge passage and fish using the ladder have to jump over these last four weirs to pass into the reservoir. While trapping studies indicated that trout use the ladder, the existing structure does not meet ODFW criteria for passage of trout. Additional hydraulic and biological evaluation is needed to address effectiveness of the ladder for all species including native trout, suckers, lamprey and anadromous fish.

ODFW Recommendations –

ODFW’s objective for upstream fish passage at Keno Dam is to provide effective passage for native trout, suckers, lamprey and anadromous fish. To meet this objective, ODFW recommends that PacificCorp construct and operate a new ladder at Keno Dam, utilizing a design similar to that developed by US Bureau of Reclamation (USBR) for Link River Dam. The FLA needs to describe proposed fish passage measures, including conceptual designs for a new fish ladder, the scientific basis for the design, and a process for review and approval of designs and post-construction evaluations by ODFW and federal fisheries agencies.

Attachment 2
September 16, 2003

Response to Comment S5-16

Based on the data collected during relicensing, PacifiCorp believes that the current fish ladder at Keno dam meets the objectives ODFW outlines in the comment.
Response to Comment S5-17

The results of the 2003 redband radio-tag study indicate that fish are able to successfully find the J.C. Boyle ladder entrance and ascend the ladder structure. None of the tagged fish showed any kind of migration delay, and in fact, moved quickly though the structure. As no problems were observed, PacifiCorp does not believe that additional studies are needed to address this issue.
Biological Studies and Results:

- A radio telemetry study is currently underway with 3 groups of 14 trout in each group tagged at locations below J.C. Boyle Dam. ODFW has previously informed PacifiCorp that the study designs were not sufficient to evaluate the adequacy of the facility in regard to passing fish. Because of constraints in the study (e.g., sample size of fish, duration and timing of study), conclusions from these studies will not clearly establish the degree to which adult fish passage is compromised by the lack of adequate fish passage facilities at J.C. Boyle Dam.

- Trapping in the fish ladder done in 1999 documented an estimated upstream passage of 5,529 redband trout (Hanel and Gochfeld 1984). Internal correspondence by Hanel (1999) reported that 93% of the total catch of rainbow trout migrating over J.C. Boyle occurred in the fall of the year. The estimate did not include January to mid-May when several more thousand fish may have moved through.

- Estimates in 1960 and 1961 were 3,882 and 2,295 fish, respectively.

- Trapping efforts by Biac consultants in 1981 showed a small run of trout in the spring and the 1984 study showed a very small spring migration and a larger one in the fall.

- Biac consultants tagged 453 redband trout over 200 mm in the fall of 1998 downstream of the powerhouse (City of Klamath Falls 1989). ODFW monitored fish passage at the ladder from late 1998 through 1999. None of the tagged fish were observed in the fish ladder, and of those sampled in the ladder, 64% were less than 200 mm long.

- Research done from 1988-91 showed that by 1991 passage of redband trout over the dam had dropped to as low as 2% of the 1959 estimate (Hemminger et al. 1992). Numbers of fish were 507, 288, 412, and 76 in 1988, 1989, 1990, and 1991, respectively.

- Floatation flow through the fish ladder was frequently reported in the monthly ODFW research reports. Fish passage is compromised by constantly changing flows in the ladder, causing fish to avoid or wash out of the flowway. The September 1989 flow fluctuation caused all fish to wash out of the trap twice. ODFW’s monthly report in June 1999 documented 300 fluctuations of flow, including one extreme event, when the ladder flow dropped to 9 cfs on one day.

- ODFW research staff also noted numbers of fish captured in the J.C. Boyle Ladder trap increased sharply in days following periods of spill from the dam.

- The attraction water diffusion pool may not be properly secured, allowing fish to enter and become trapped in this chamber. The April 1988 monthly report noted that electroshocking samples regularly caught trout from 220-316 mm in size.

In addition, temperature changes may affect fish passage at J.C. Boyle fish ladder, where fish are given a choice between warm water from the reservoir and blended spring and river water. Studies by Bureau of Commercial Fisheries indicated that adult salmonids avoid temperature changes and prefer to remain in river temperature water, prefer cooler water when given a choice, and took longer to pass through the test facility in water heated or cooled compared to river water (Weaver et al. 1972).

Because passage efficiency at this ladder may be adversely affected not only by inadequate design, but by water quality, temperature or other factors affected by the Project; modifying the ladder without significant design changes may not improve fish passage. In 1998 and 1999, ODFW had several meetings with PacifiCorp Environmental Services to discuss conducting a native trout study, first focused on native trout ecology from Upper Klamath Lake to Copco Reservoir, and secondly focused on passage at Link, Keno and J.C. Boyle dams. ODFW and PacifiCorp staff members spent a considerable amount of time to identify methodology, costs, equipment and labor needs, and study tasks. Unfortunately, both studies were dropped when Scottish Power purchased PacifiCorp. These studies are still necessary to collect information on specific fish passage problems at J.C. Boyle Dam.
In the DLA, PacifiCorp places heavy reliance on the cost for facility comparison and these cost estimates are high. PacifiCorp has not proposed any measures for fish passage at this site (DLA, Section 5.2.3.5 relies heavily on cost rather than feasibility, reliability and effectiveness. For example, one of the “Cons” for a “fish ladder to freebay” (Table 5.3-10) is the “high cost”. ODFW believes the PacifiCorp consultants significantly overestimated the ladder cost estimate. In the last year, we have reviewed ladder designs at other Projects, and believe that $9 million for a ladder at JC Boyle is high. ODFW recently reviewed cost estimates for a ladder to pass trout, salmon, and lamprey over a 77 ft high dam. The assumptions used for the estimate were also independently reviewed, and the final estimate was $1.8 to $3.1 million. At another dam that is 100 ft high, costs of a new ladder with multiple entrances are estimated at $5 million. We recognize that costs may be higher at Boyle due to its remote location, however, we question why this should double the cost.

Without any design details for a tailrace barrier, PacifiCorp evaluates the tailrace barrier entirely based on cost ($7.02 million). ODFW’s recent review of tailrace barriers for diversions of 1,500 to 1,550 (approximately half of J.C. Boyle) resulted in estimates of $0.9 to $1.2 million. ODFW cannot analyze the cost estimate any further because a design is not included in the DLA; however, PacifiCorp’s cost estimate appears to be extraordinarily high.

**ODFW Recommendations**

ODFW believes sufficient information presently exists to support the need for a new fish ladder at JC Boyle Dam. Additional study is needed, however, to identify ladder entrance location and other design elements in order to ensure that a new ladder will effectively pass resident fish, including suckers, as well as anadromous salmonids and lamprey if reintroduction is determined feasible. Studies should include the following:

- Radio tag sufficient numbers of trout to determine:
  - Migration patterns within the J.C. Boyle bypass reach,
  - The risk of migration delays due to poor attraction conditions at the spillway, near the ladder entrance, or elsewhere in the bypass reach,
  - Effect of water temperature and other water quality parameters on migration,
  - Length of time for a fish to pass through the ladder,
  - Whether fish hold for long periods in the ladder, or partially ascend the ladder.

Concurrent with monitoring fish movement, PacifiCorp should document Project operation for spill conditions and hydraulic conditions in the fish ladder, including stage/discharge relations upstream and downstream of the dam and fishway, and the location of eddies, standing waves, excessive turbulence, primary current patterns and temperature effects of various flow sources.

The FIA should include proposed measures to provide fish passage, the scientific rationale for the design, and functional design plans with sufficient detail so the agencies can review and provide comment.

**Fish ladder design will need to be based on the following objectives:**

- Maximize protection and safe and timely passage of all migratory fish species including native trout, suckers, lamprey and anadromous fish through effective design and, if necessary, modification of Project operation.
Response to Comment S5-18

PacifiCorp has included a description of all proposed fish passage facilities in the FLA. We have not submitted an analysis of a full range of possible fish passage alternatives in the FLA as this is not required as part of the standard FERC process. However, we are providing the resources needed for the HMG to evaluate, through modeling, eight different fish passage alternatives. The results of this analysis are expected in mid-2004.

Response to Comment S5-19

A description of proposed fish passage facilities is provided in Section 4.3, Exhibit E of the FLA. In addition, we have attempted to provide a better description of current conditions and Project impacts to fisheries resources in the FLA. The Fish Resources FTR provides a description of the methodology used to evaluate existing and recommended fish passage measures. See response to Comment #18, above.
The EDT model results for a test run of Spencer Creek, along with full analysis of the upper basin are not complete. Like any model, results of the EDT model need to be placed in the context of the limitations of EDT products. For example, PacifiCorp needs to identify all the input parameters and clearly state model assumptions. PacifiCorp also needs to cite source information. The model needs to be properly validated and calibrated to an existing nearby subsection of the Klamath River with model results that reflect known populations in other subbasins. The preliminary results of Spencer Creek “test” run need to be shared with the Fish Passage Work Group. PacifiCorp also needs to conduct a sensitivity analysis of model results to identify those parameters that have the greatest effect on model results, and determine how these sensitivities correspond to what is known about the real world.

PacifiCorp did not conduct studies requested by ODFW and other agencies to evaluate surface currents using drogues or current meters at Klamath reservoirs, and to predict their effects on downstream movement of resident and potential anadromous fish. These studies are critically important to evaluate attraction flows, and design and locate bypass facilities proximate to shorelines where many species typically migrate.

Project impacts - The DLA does not adequately describe Project impacts. In comments on the FSCD as well as in subsequent requests to the Fish Passage Work Group, ODFW has requested PacifiCorp to conduct a literature review of existing Project-related downstream fish passage information. This preliminary information is still not available in the DLA. PacifiCorp has been unwilling to conduct entrainment or turbine mortality studies at any of the Project facilities. The Fish Passage Study (110) is generally incomplete and no agreement was reached with stakeholders on study scope and methodologies.

Prior to initiating relicensing, PacifiCorp did conduct an entrainment study at the Eastside and Westside diversions from 1997 to 1999 (Gutermuths et al. 2000). Based on entwinement indices calculated from number of fish collected, percent of canal flow sampled and sampling efficiency, an estimated 792,000 fish passed through the Eastside powerhouse from July 1997 to October 1999. Similarly, an estimated 528,000 fish passed through the Westside powerhouse. The study concluded that large numbers of fish were entrained, generally proportional to the volume of the flow diverted. The study indicated that large amounts of juvenile and adult salmon were captured moving downstream, through the spring, and especially during late summer and early fall. Overall, Westside catch rates were very high often following re-openings of the canal after a period of closure. Within the late summer period of high suckers entrainment, sucker and steelhead entrainment increased with canal flows. Some reduced trout were also entrained during the study although they were a small percentage of the catch. ODFW staff has noted the Oregon Natural Resources Council (ONRC) recent notice of intent to sue PacifiCorp due to the lack of screening at Eastside and Westside canal diversions.

The EDT and KlamRAS models have not been completed and are still in the verification phases. These models are intended to compare relative fish survival and productivity rates as a function of various passage scenarios such as vertical passage, dam removal, etc. The models should not be used to test “feasibility” of anadromous reintroduction. The Fish Passage Work Group specifically requested deletion of this word as it is misleading. The models produce index values to analyze when, how much, and how fish passage is implemented and relative fish production under various passage alternatives.

PacifiCorp states in the DLA that it has no plans to conduct entrainment studies and that its approach instead will be to conduct a “literature review and apply results from other studies and apply to fish assessment study.” (Exhibit 11-4-10). However, the fish assessment study has many technical problems, which include sample size, representativeness, frequency and seasonality of sampling that application of the fish assessment to entrainment may produce questionable results. Ms. Toby Freeman, PacifiCorp, has also stated in meetings that PacifiCorp will not conduct any entrainment studies because costs for studies

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Response to Comment S5-20

PacifiCorp will work collaboratively with ODFW to develop methods to evaluate any new, proposed, fish passage facility to be constructed in Oregon waters. See responses to your earlier comments.

PacifiCorp will work collaboratively with ODFW to develop methods to evaluate any new, proposed, fish passage facility to be constructed in Oregon waters. See responses to your earlier comments.

are too expensive. However, California Department of Fish and Game (CDFG) has pursued cost estimates for the use of hydroacoustics to estimate entrained by a reputable consultant, Biosonics. Although this approach precludes species identification for each fish entrained, it does provide initial estimates of the numbers of all species that are entrained and can also provide relative percentages of fish entrained versus those in the reservoir or passing through another route. The estimates were $100,000 for 6 months at any one facility, thus indicating that entrainment could be determined at reasonable relinquishing costs.

PhM&E's - PacifiCorp proposes PM&E's for downstream fish passage in the FLA. While the FLA describes an array of fish passage components from a conceptual engineering perspective with relative costs, there is no commitment by PacifiCorp to initiate downstream fish passage protection at any of its facilities. No information is provided to the stakeholders or FERC to assess the full range of alternatives, including dam decommissioning and removal.

ODFW has authority under state law to protect downstream migrating fish at water diversions. ORS 498.311 and 589.615 These statutes require installation, operation, and maintenance of a fish screen on any diversion of water in Oregon by the Project divertor in this case, PacifiCorp. In our comments to the FSCD, ODFW provided to PacifiCorp hydraulic design criteria for fish screens at hydroelectric Projects with specific guidance and criteria on implementing screening facilities that best protect fish species in Oregon. These are additional criteria to reflect the unique needs for sucker juveniles. New facilities will need to be constructed at all PacifiCorp's diversions in the Klamath Hydroelectric Project to meet the needs of lamprey and suckers in the basin as well as salmonids.

ODFW recommends that PacifiCorp propose in the FLA to install and operate new fish screens and bypass facilities at all of its California and Oregon Klamath Project diversions to provide effective downstream fish passage for all native resident and anadromous fish species. PacifiCorp needs to consult with ODFW, the federal fish agencies, CDFG and other interested stakeholders to clearly identify Project impacts and potential PM&E's for downstream fish passage at all Project facilities.

The FLA needs to include information for FERC on the full range of alternatives to mitigate for ongoing impacts of non-existent and ineffective fish passage at each facility, including dam removal of one or more of the facilities. Each facility should be evaluated for its relative impact on fish passage, the PM&E's necessary to provide effective downstream fish passage, and the biological benefits of decommissioning and removal.

Effective mitigation for these impacts will further ODFW's resource management objectives for native resident and anadromous fish.

Implementation of new facilities will require biological and hydraulic evaluations of screens to test their effectiveness by bypassing juveniles. Techniques include the use of nets and traps for trapping fish and radio tags for tracking fish movement. Hydraulic studies must include evaluation of approach and sweep velocities, screen material, size openings and permeability, flow "hot spots", slots or leakage, seasonal operation at various flows, type of screens, cleaning methods and frequency, etc.

ODFW proposes the following specific recommendations for each Project facility along with site-specific post-construction hydraulic and biological evaluation of the fish facilities, and modification if necessary based on results and agency approval, to ensure proper performance.

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ODFW Comments on Klamath FLA

September 16, 2003
Response to Comment S5-21

PacifiCorp has chosen to decommission its East Side and West Side developments. Decommissioning plans are outlined in the FLA.

Response to Comment S5-22

PacifiCorp has chosen to remove the Keno dam from the hydroelectric Project boundary. Please see Exhibits A and B for explanation. The company's responsibilities for Keno are under review.

Response to Comment S5-23

As part of its proposed PM&E measures for fish resources, PacifiCorp plans to install a gulper system to address juvenile downstream passage issues. See Section E4.7 of Exhibit E for proposed PM&E measures to address fish passage improvement at the J.C. Boyle development.
power canal and fish impingement on the screens causes injury and mortality. The surface collector is not an acceptable fish passage facility.

Existing Design Problems:
- The design parameters used for the construction of the existing downstream juvenile screens and bypass facilities are outdated and there is no practical or cost-effective means to modify the facilities to meet current standards to allow for more efficient fish passage. Improving downstream fish passage with installation of screening facilities is an identified objective of the ODFW's Klamath River Subbasin Fish Management Plan (ODFW 1997) and is a goal of other agencies involved in the FERC relicensing.
- Presently, each of the four entrances at the intake structure is equipped with Rex vertical travelling screens to prevent entanglement of fish in the power canal (CH2M HILL 2003). The existing screens are 11° wide and 29° high at a flow head of 3.75 ft. This screen height resides 6 inches at the bottom of the screen is ineffective due to the normal seal arrangement. The gross approach area for each of the four screens is 32.4 square feet for a total gross area of 1,318 square feet. The resulting approach velocity with an intake flow of 2.8 feet per second (fps), which is almost six times ODFW's current standard of 0.4 fps. The existing screen bypass system does not meet modern design standards. The flow rate for the existing bypass is estimated at 20 cfs.
- High pressure spray systems are intended to keep the screens free of debris buildup. Fish screen highings were modified in 1988 to allow year-round operations. Prior to that time, screens were removed during the winter period to avoid ice build-up. Metal screens were replaced in 1992 with 1/16-inch mesh, but debris occasionally damages the screens requiring time-consuming repair with no backup screens in place during repair.

Biological Studies and Results:
- Fish Consultants placed a fyke net in the fish ladder and fished once a week for a 24-hour period from April to mid-June and August through mid-October (City of Klamath Falls 1986). They estimated a downstream movement of 128, 246 juveniles.
- Researchers monitored downstream movement below IC Boyle Dam and the bypass outflow in the river to measure possible recruitment from Spencer Creek but low capture numbers prevented adequate estimates of downstream migrating juveniles (Hemmingsen et al. 1992). While trap efficiency was unknown, researchers felt that low numbers of fish captured likely reflected juvenile recruitment and is therefore likely inadequate to assess the population in the river between IC Boyle Dam and the study site. However, based on informal assessment of angler catches, the trout populations appear to be maintaining a fishery with extremely conservative regulations of one trout per day, filet and head only (ODFW 1997).
- ODFW described in its monthly reports fish salvages in the IC Boyle power canal of 133, 12 and 68 trout in July 1988, 1990 and 1991, respectively, when the Project was shut down for annual maintenance. Fish ranged in size from 50-360 mm. This was reported as "slimming as only a small percentage of the total volume of water in the canal was sampled, and that fish screens had been operating at IC Boyle since the last shutdown. The finding of fish in the canal seems to indicate the effectiveness of the Boyle Dam fish screening devices are limited at best". The July 1989 salvage report was missing. In addition, there were thousands of nongame fish that were not sampled or enumerated, undoubtedly including listed suckers (Rod Freese, ODFW biologist personal communication).
- The May 1988 monthly report also reported sampling the attraction flow diffuser chamber at Boyle Dam with a backpack electroshocker, and 7 redband trout ranged in size from 142-337 mm.
- The ODFW downstream trap captured a total of 37,481 juvenile redband trout in Spencer Creek from October-November 1990, March through September 1991, October and November 1991 and March.
Response to Comment S5-24

Comment noted. PacifiCorp has proposed new measures in Section E4.7 of Exhibit E that are designed to address these concerns.

Response to Comment S5-25

Comment noted. However, surface collectors, including gulpers, are being utilized throughout the Columbia River with great success. In regards to gulpers, data collected on the Baker River (Washington State) show that their simple facility collects up to 70 percent of migrating anadromous juveniles. Improvements to this facility over time have increased adult returns to the Baker River dramatically over the last 20 years. This system is so successful that WDFW, NOAA and USFWS have all recommended that the gulper continue as the preferred juvenile fish passage system in the new license for the Baker River project.

Response to Comment S5-26

Please see Section E4.7 of Exhibit E for an updated discussion of proposed fish passage improvements at J.C. Boyle development. PacifiCorp recognizes that continued coordination with the resource agencies will be required to design, construct, and monitor these facilities proposed in the License Application. Please see response to Comment #17 regarding new studies.
Response to Comment S5-27

The FLA does not propose any fish passage improvements at California developments with the exception of Fall Creek where a fish ladder and screen are proposed. Anadromous fish reintroduction is currently being reviewed by the Aquatics Work Group. PacifiCorp has outlined a plan of study in the FLA (Section E4.3).
Response to Comment S5-28

PacifiCorp is continuing to work with the Instream Flow subgroup on PHABSIM analysis above Iron Gate dam. Please see the Fish Resources FTR and Section 4E of Exhibit E for a full analysis of the ramping and instream flow studies that PacifiCorp conducted and its proposed PM&E measures.

Response to Comment S5-29(B)

PacifiCorp presents an instream flow analysis for Proposed Project reaches. Based on this analysis PacifiCorp has proposed minimum flows for a future license. These proposed flows account for power and non-power resources.

Response to Comment S5-29

Substantial information has been added to the analysis of hydrology in the FLA (Exhibit E, chapter E3) and section 5 of Water Resources FTR to describe flow conditions and effects by Project development and/or reach.

Response to Comment S5-30

The Exhibit E Consultation Report has been amended to address ODFW's comments.
Response to Comment S5-30(D)

The Keno reservoir is managed for certain water elevations to allow water diversion to USBR's Irrigation Project and other local irrigators. Because the reservoir elevation fluctuates only a minimal amount, the downstream reach responds to larger inflow changes and therefore fluctuates accordingly. Peaking at J.C. Boyle is based on available inflow and not time of year.

Response to Comment S5-30(C)

Natural flows were identified as "without hydroelectric Project." Limitations of the analysis were in place to recognize non-hydroproject impacts.

Response to Comment S5-30(B)

Exhibit B is intended to describe Project operations and power production. USBR flow regulations affect Project operations. The actual impacts of USBR's UKL operations vary greatly by water year type. The Project's effects on instream flow are appropriately described in Exhibit E, not Exhibit B.
Response to Comment S5-31

Substantial information has been added to the analysis of hydrology in the FLA (Exhibit E, chapter E3) and section 5 of Water Resources FTR to describe flow effects by Project development and/or reach. Flow-related measures are described in sections E3.8 and E4.8 of Exhibit E. It should be noted that the analysis of instream flow is still on-going with stakeholders as described in the FLA, and revisions to instream flow measures as proposed in the FLA may be revised upon completion of this analysis.

PacifiCorp concludes that an additional analysis using the IHA method is not needed to support this FLA. The analysis of hydrology in the FTR includes information on monthly discharge conditions, duration of flows, peak (flood) flows, low flows, and rate and frequency of flow changes - categories similar to those assessed using the IHA method. In addition, ODFW has never specifically described how the requested IHA analysis would be used. PacifiCorp has learned that IHA is mostly intended as a tool to compare existing conditions to pre-Project (or unimpaired) "baseline" flow conditions. Treating pre-Project (or unimpaired) flow conditions as "baseline" conditions in a FERC license application is not appropriate since FERC considers "baseline" to be the existing Project-related environment.
Response to Comment S5-32

Additional geomorphological studies were conducted in the interim between the publication of the DLA and FLA. Please see the Water Resources FTR and Section E3 of Exhibit E for data updates, an analysis of Project effect, and proposed PM&E measures.
accumulation of sediment. Preliminary results indicate that the channel bed has coarsened with removal of small particles due to entrapment and peaking effects of the Project.

Most studies are ongoing and have not completed analysis of Project facilities and operations on sediment transport and river geomorphology. With the presence of Project dams, the channel is out of synchronization of sediment and seasonal flows. The native species in the Klamath River evolved under the seasonal variability of an unregulated river, with a freely moving bedload.

Two objectives of the study are to assess how Project facilities and operations affect fluvial geomorphic processes and identification of PM&E’s to meet resource management goals for Project effects on sediment transport and river geomorphology (Water Resources DTR p. 6-1). The study includes a reservoir sedimentation analysis, classification of reservoir sediments, geomorphic delineation of reaches, review of previous studies, and review of historical aerial photos. In representative study reaches field observations and measurements were made of channel profiles, bed material, floodplains and terrace features, riparian vegetation, and large woody debris, and pebble counts. Other aspects of the study were channel classification, bedload and suspended sediment sampling, measurements of sediment pathways, tributary delta surveys, and bathymetric surveys, a tracer gravel study, and estimation of bedload mobility and a sediment budget. Some preliminary results are presented in some aspect of the study on current conditions. Many of the studies are ongoing and expected to be completed in 2003. There is some discussion of potential Project impacts based on literature reviews that indicate that the Project could cause transport of the substrate and alter the shape of the hydrograph, resulting in changes in the extent of riparian vegetation establishment (Water Resources DTR p. 6-24).

There are also preliminary results for discharge estimates to mobilize bedload and the FLA proposes to include “unimpaired” thresholds of mobility at each transect in the final report (Water Resources DTR p. 6-71). Similarly, the bedload transport rate analysis has preliminary rates for 5 transects (p. 6-72) and proposes to present a discussion on potential Project impacts on bedload transport rates and significant morphologic consequences for different Project reaches.

Preliminary analysis of historical photos revealed “local changes to channel features in the JC Boyle bypass and full flow (peaking) reaches, the Capo 2 bypass reach, and in reaches downstream of Iron Gate dam” (Water Resources DTR p. 6-50). However, the study also indicates that with the resolution used in the analysis, that more detailed mapping of patterns of changed may be required to test specific effects of Project operations such as the peaking that occurs in the reach. Thus, the objective of identifying Project impacts has not been met due to the resolution used in the analysis.

Project impacts - The Project impacts discussion in the DLA is very general with a brief discussion of sediment trapping and sediment movement in bypass reaches. Below Project dams, with lack of sediment from flushing flows, the bedload composition becomes “armor” with material too coarse to be moved by the river, until in some cases, bedrock is exposed (Collier et al. 1996). Impacts that have been documented for other hydro Projects that likely occur at the Klamath Hydroelectric Project include sediment entrainment behind dams and peaking operations that entrain bedload and alter riparian vegetation recruitment. As a result, these impacts continue to prevent federal and state agencies and numerous tribes from meeting their resource objectives of protection and restoration of native resident and anadromous fish by altering habitat quantity, quality, and productivity.

PM&E’s - PacifiCorp proposes no PM&E’s in the DLA.

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September 15, 2003

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An extensive geomorphology study has been completed and is fully described in section 6 of the Water Resource FTR and summarized in chapter E3 of Exhibit E. Measures resulting from the geomorphology study (related to gravel augmentation) are described in section E4.8 of Exhibit E. Substantial information has been added to the analysis of hydrology in the FLA (Exhibit E, chapter E3) and section 5 of Water Resources FTR to describe flow effects by Project development and/or reach.

Response to Comment S5-34

PacifiCorp is not planning on conducting an instream flow modeling study in the Keno Reach. During monthly stakeholder meetings, the Aquatic Work Group agreed that the number of transects used in both the BLM study (this study used the same transects that were used in the Salt Cave FERC application) in the J.C. Boyle peaking reach and the BIA study in the Link River bypass reach were inadequate to represent the habitat in these reaches. In addition to expanding the number of transects in these reaches, PacifiCorp continues to work with an Instream Flow subgroup on PHABSIM analysis for the J.C. Boyle bypass reach. PacifiCorp is proposing to not include the Link River and Keno developments in the new license. Please see the Fish Resources FTR and Section 4E of Exhibit E for a detailed analysis on the instream flow study and proposed PM&E measures.
September 26, 2000, barely an estimated 25-30 cfs was flowing downstream from the dam, primarily dam leakage and flow via the fish ladder. PacifiCorp is conducting a PHABSIM study to determine necessary flows for the bypass reach, however, data and results of the study have not been made available.

- **Link River below the bypass**: Minimum flows below the Easside powerhouse are 450 cfs as per PacifiCorp’s draft operations and maintenance plan and to address concerns of homeowners in the reach. Flows below this require fish salvage efforts by a Project biologist and PacifiCorp staff.

- **Keno Reach**: The minimum flow requirement below Keno Dam, per FERC article 18 and ODFW agreement is 200 cfs. PacifiCorp states that flows below Keno Dam, in the Keno Reach are dependent entirely on what is delivered to the Keno Reservoir by the BOR and other irrigation operations and that PacifiCorp has no discretion or control over flows in the Keno Reach. However, PacifiCorp can and does alter flows in the Keno Reach for hydroelectric Project purposes, including maintenance actions. For example, in June 2003 flows in the Keno Reach were reduced by PacifiCorp in order to limit the amount of flow to the J.C. Boyle Reservoir during a Project outage for maintenance at the J.C. Boyle Powerhouse. Due to both rapid declines in flow, the sustained low flow of 250 cfs and hot weather, a fish kill occurred in the Keno Reach. ODFW concludes that PacifiCorp, not the BOR, altered flows in the Keno Reach, for hydroelectric Project purposes, which resulted in adverse impacts to fish and aquatic resources. This example demonstrates that a minimum flow regime needs to be established as part of the new license.

- **J.C. Boyle Bypass Reach**: There is an established minimum flow of 100 cfs released at the J.C. Boyle Dam. An additional 200 to 250 cfs enters the bypass reach beginning approximately one half mile downstream, increasing the total flow to around 300 – 350 cfs by the time the flow reaches the J.C. Boyle Powerhouse.

- **J.C. Boyle Peaking Reach**: Below the powerhouse, downstream 22 miles to Copco 1 Reservoir, there is no minimum flow. When the J.C. Boyle turbines are shut down, the flow is approximately 300 to 350 cfs composed solely of flows from the J.C. Boyle bypass reach. When the turbines operate, flow in the Peaking Reach fluctuates up to about 500 cfs or 700 cfs depending on whether one or two turbines are running. At times these fluctuations occur daily as PacifiCorp follows electrical load demands. At other times, when river flows are sufficient, turbines run at a more constant level. The result is the Peaking Reach is subject to widely varying, adverse flow fluctuations. While the river has evolved a race of reed and trout that live in the warm, nutrient rich waters of the Klamath River, the production capacity is limited by disruptive peaking flows which essentially restrict habitat to the low flow stream levels and cause daily dramatic changes in water temperatures.

Reframing should result in establishing minimum flows in Project affected reaches that will provide greater potential to meet fish management goals and objectives through restoration of stream habitat. Seasonal minimum flows that reflect a closer approximation to the natural historic flow regime will improve habitat for native salmonids and endangered suckers.

**Project impacts** — The DLA does not describe impacts within each Project reach due to Project flow manipulations and operations. Descriptions of existing flow changes due to operation are extremely limited, precluding a reasonable description of how those flow changes might potentially impact fish, aquatic, riparian and other resources.

Instream flow studies being conducted by PacifiCorp have not been completed and significant outstanding data collection and analysis issues remain in the instream flow study plan that has not been approved by the Aquatic Working Group. To date, PacifiCorp has not provided any data or results, beyond habitat surveys from the instream flow studies to the Aquatic Working Group, precluding any opportunity to describe or evaluate potential impacts. Results of the ongoing instream flow studies may,
if conducted according to analyses requested by the Aquatics Work Group, provide adequate information with which to describe and evaluate continuing Project impacts.

PM&E’s – In the DLA, PacifiCorp does not propose any form of PM&E’s for instream flows for any Project reach. In lieu of information and analysis provided by PacifiCorp, ODFW has used existing available information as the basis for preliminary flow release recommendations.

**ODFW Recommendations** –
PacifiCorp needs to consult with ODFW and federal fish and wildlife and land management agencies, tribes, and other interested stakeholders to clarify state Project impacts and potential PM&E’s for impacts to instream flows. The FLA needs to fully disclose effects of the Project on the environment, contain adequate information for FERC to meet its NEPA, ESA and tribal trust obligations, and propose PM&E’s that will fully mitigate for the impacts of the Project.

- **Link River:** The Bureau of Indian Affairs (BIA) conducted a PHABSIM study in the Link River as part of studies conducted in support of their claim under the Klamath Basin Agreement. Twelve PHABSIM transects were sampled and modeled to represent redband trout habitat. Results indicate that 700 cfs is needed to provide adequate habitat in the reach. Based on this information, ODFW recommends a minimum bypass reach flow of 700 cfs. This flow recommendation is not inconsistent with the flows adopted for the 2002 Biological Opinion for ESA-listed suckers. The Biological Opinion required at least 250 cfs from June to October when needed and were best estimates of flows that could be provided during summer months during critical water quality episodes associated with high water temperatures and low dissolved oxygen. These flow recommendations were set as a minimum flow specifically for ESA-listed suckers and not based on recognized scientific methodology. The Biological Opinion flows also were not established for other sensitive species in the river such as salmonids, including redband trout, which was the species used in the BIA PHABSIM analysis study.

- **Keno Reach:** ODFW is not aware of any instream flow studies in the Keno Reach. The existing minimum flow agreement calls for 200 cfs, which has resulted in fish kills during hot summer conditions. ODFW and other stakeholders have consistently requested incremental instream flow studies in order to determine the necessary flow regime for the reach. PacifiCorp has proposed application of "standard setting" hydrologic based methods based on its assertion that the Project does not manipulate flows within the reach. However, current and historic operations, as recent as June, 2003 when flows were reduced to 250 cfs, resulting in fish and aquatic invertebrate kills, clearly demonstrate that PacifiCorp can and does regulate flows in the Keno Reach for hydropower operation purposes. ODFW regards the proposed standard setting hydrologic based methods as inappropriate for evaluating incremental tradeoffs between Project operations and fish and aquatic resource impacts. Results from an incremental based instream flow study are needed in order to identify appropriate minimum flow regimes for the Keno Reach.

- **J.C. Boyle Bypass Reach:** Results of studies being conducted by PacifiCorp have not been made available. In lieu of these results, ODFW draws upon results of the PHABSIM analysis conducted by the Bureau of Land Management (BLM) for the "lower reach" of the J.C. Boyle Pumping Reach (BLM 2002). The BLM examined flow regimes necessary in the Pumping Reach based on existing PHABSIM data, from the lower gradient area around the Frain Ranch, termed the "Upper Reach" and within the higher gradient reach within the Caldera/Hills Corner reach, termed the "Lower Reach." Gradient, substrate and other channel...
characteristics within the J.C. Boyle Bypass Reach are most similar to this “Lower Reach”. The PHABSIM analysis for the Lower Reach probably serves as a reasonable surrogate for the J.C. Boyle Bypass Reach. The BLM analysis shows that flows from 600 to 900 cfs optimize juvenile and adult habitats, respectively, when velocity shelters were not considered. When velocity shelters are incorporated, flows from 900 to 1000 cfs optimize these habitats. ODFW recommends a minimum bypass reach flow of 900 cfs to protect juvenile and adult fish habitat.

- **J.C. Boyle Peaking Reach**: Results of studies being conducted by PacifiCorp have not been made available. The BLM conducted a PHABSIM analysis of transect data previous collected within the Peaking Reach for the proposed Salt Caves Project (BLM 2002). The BLM analysis incorporated key life history strategies, such as the use of stream margin vegetation and shallow water habitats by fry and velocity shelters by adults and juvenile life stages. Fry habitat was absent at about 300 cfs and increased steadily and rapidly to a maximum at 1700 cfs. The BLM analysis further showed that when flows fluctuate between 363 cfs and 1530 cfs, an effective fry habitat is available. Adult and juvenile habitats were lowest at 300 cfs and increased rapidly to peaks at about 1500 cfs for juveniles and 1800 cfs for adults, after which habitat leveled off. An analysis incorporating velocity shelters, an important bioenergetically efficient strategy, the shape and peaks of the juvenile and adult habitat relationships were essentially the same, except for showing approximately one-third less habitat overall. The BLM analysis also considered flows for benthic macroinvertebrates and examined flow regimes through the use of habitat time series analysis. The BLM’s conclusion, considering a balancing of life stage requirements, was that a flow of 1700 cfs would best protect all life stages. ODFW supports the BLM’s conclusions and recommends a minimum flow for the J.C. Boyle Peaking Reach of 1700 cfs.

- **Cpeco 2 Bypass Reach**: ODFW is not aware of any instream flow study information on which to base a flow recommendation for the Cpeco 2 Bypass Reach. The existing flow is around 20 cfs, from leakage and a minor fish bypass pipe. PacifiCorp has proposed to conduct a PHABSIM study in the reach and has performed habitat surveys for selection of study sites and transects. Habitat surveys have been conducted at two flow levels, 20 cfs and 200 cfs. All participants in the Instream Flow Work Group agreed a flow level of 20 cfs was too low as to be inadequate and inappropriate for even characterizing habitats. Work group participants concurred that a flow of 200 cfs was much better for fish habitat, as water filled the basic channel and provided edge habitat. However, even at a flow of 200 cfs, it is clear there will be substantial changes in habitat characteristics at higher flows and a vast increase in edge and complex habitats associated with vegetation. Gradient and other channel characteristics of the Cpeco 2 Bypass Reach are similar to the J.C. Boyle Bypass Reach and the “Caledra” reach of the J.C. Boyle Peaking Reach. Available information on these reaches suggests flows on the order of 900 cfs are necessary to provide adequate habitat for juvenile and adult redding trout. Link River Bypass reach is highly encroached with woody and other vegetation, similar to the Cpeco 2 Bypass Reach, and while probably not as steep or hydraulically complex as the Cpeco 2 Bypass Reach, may shed some light on necessary flows for the Cpeco 2 reach. Based on PHABSIM studies conducted in the Link River, the BLM concluded a flow of 700 cfs was necessary for the Link River. In lieu of results from yet to be conducted studies, ODFW recommends a minimum flow in the Cpeco 2 Bypass Reach of 700 to 900 cfs.
Response to Comment S5-35

Please see Section E4 of Exhibit E for a more thorough analysis of Project impacts on fisheries resources related to ramping operations, and the proposed PM&E measures. It should be noted that the East Side, West Side, and Keno developments are not being proposed for inclusion with the new Project as defined in the FLA. PM&E measures include ramping modifications.
c. JC Boyle Peaking Reach: The existing ramp rate, incorporated in the FERC license, is an up and down ramp rate of 9 inches per hour.

Production capacity of redband trout has been limited by disruptive peaking flows, which essentially restrict habitat to the low flow stream levels and cause daily dramatic changes in water temperature. Extreme flow fluctuations in daily and seasonal flow patterns created below hydroelectric power operations lead to drying of spawning beds, and both low flow and high flow induced spawning interference, incubation mortality, and rearing mortality of resident fish (Marcus et al. 1990). Downstream dewatering and desiccation of spawning habitat was documented in the JC Boyle peaking reach (City of Klamath Falls 1990). PacifiCorp has not studied the extent and cumulative impacts of standing in the JC Boyle peaking, but the occurrence of larval standing was documented in a previous study (City of Klamath Falls 1997). Daily temperature fluctuations of up to 12°F occur in the JC Boyle Full Flow reach during the middle of the summer (City of Klamath Falls 1996) as a result of daily peaking events. Effects of these large thermal temperature fluctuations on the existing fish populations have not been studied in the JC Boyle peaking reach.

The large flow fluctuations associated with the JC Boyle Powerhouse can cause high mortality to small fish such as young trout through stranding (City of Klamath Falls 1990). Common habitat types in the JC Boyle peaking reach are shallow rapids, riffles, and runs. Channels with an abundance of shallow habitat are more likely to have larger areas exposed during down ramping where fish could become separated from the main river flow due to declines in river stage (1999). Relicensing should result in establishing new ramp rates in all affected Project reaches that will provide greater potential to meet fish management goals and objectives through restoration of stream habitat.

The DLA does not describe current conditions (other than existing agreements), Project impacts, or propose FM&E's for these ongoing impacts. The DLA is lacking necessary information because of lack of site-specific studies in Project-impacted reaches and the two limited studies being conducted are still being reviewed and/or in progress. Study Plan 1.7 Evaluation of Ramping only summarizes literature and has one brief field study of stranding observations in the JC Boyle peaking reach. Study Plan 1.1.6 Ramping Flow Fluctuations was only recently resurrected as a study plan in July 2003 after repeated requests by stakeholders and is an integration of other studies. Therefore, site-specific impacts of flow fluctuation on aquatic habitats of the Klamath River cannot be clearly characterized until studies have been completed.

The Draft Executive Summary (4-5) states study results that have not been shared with ODFW and other stakeholders. It also draws unsubstantiated conclusions regarding Project impacts. It states that down ramp rates in the Link River, Keno, and JC Boyle bypass and peaking reaches occur only 3%, 2%, and 20% of the time, respectively. Then, it concludes that the ramp rate in the Link River does not pose stranding problems and fish salvages adequately mitigate ramp impacts. Similarly, the conclusion in the Keno Reach is that while ramp rates are high, they are infrequent and at the discretion of the USBR, despite information described above that Keno Dam is a hydroelectric facility that causes severe oscillations in the Keno Reach that could be better managed with less severe ramp rates by PacifiCorp. PacifiCorp concludes in the JC Boyle peaking and peaking reaches that based on the limited riverine sampling assessment, trout populations are good in both reaches (4-5).

PacifiCorp needs to better characterize down ramp data by focusing on the percent of the time the river reaches are ramped during critical egg incubation, and fry and juvenile rearing occur, which is generally from May to August. For example, the ramp data for JC Boyle peaking reach shows that for flows less than 3000 cfs, down ramping is a small effect a low percentage of the time. PacifiCorp's use of exceedence curves misrepresents existing conditions. The duration curve for JC Boyle in Exhibit B, Figure B7.5-4 shows that flows exceeding 3000 cfs occur less than approximately 15% of the time. Including data from...
other times of year when streamflows are naturally high masks the adverse effects of ramping during lower flow periods. Bowen et al. (1997) reported that “habitat bottlenecks” (such as due to low flow conditions) can cause short-term acute or long-term chronic effects on fish populations. Habitat bottlenecks affect the population dynamics of one or more life stages of a species and can be acute during early life history.

There is a limited and selected literature review of down ramping and peaking effects on aquatic life and misleading conclusions are made regarding species, size of fry and ramp rates. The Fish Resources DTR (4-4) erroneously concludes that winter ramp rates of 6 inches per hour appear not to cause stranding based on this limited literature review.

The Fish Resources DTR (4-4) cited the Smith River as a point of reference for an unregulated stream. Discussions at the Aquatic Work Group concluded that use of the Smith and nearby Klamath tributaries is inappropriate to use for comparisons since the hydrology, climate conditions, geology, and geology are significantly different. The Smith River and lower river tributaries are in a coastal rainforest area with gentle geology and pernicious soils that results in different stream flow characteristics. This point was made at more than one of the work group meetings.

With the lack of site-specific studies and the lack of separating and analyzing the different impacts of peaking versus down ramping, ODFW will use the information acquired from ODFW research and Salt Caves studies to recommend ramp rates or range of river Project operations.

Down ramping occurs daily below JC Boyle powerhouse when average daily flow is less than 3,000 cfs, usually from summer to fall. The present ramp rate agreement is 9 inches per hour compared to most hydroelectric facilities in the Pacific Northwest that ramp at a maximum of 2-3 inches per hour.

Information on flow fluctuations was not provided in the FERC for stakeholders. Ramp fluctuations at JC Boyle from during various time periods were viewed at the USGS gage website for gage #11519700 and demonstrated very wide fluctuations in the past few summers. For example, flow fluctuations from July 1 to September 30, 1998 showed wide fluctuations that typically ranged from 800 to 1,400 cfs. In one case, flow dropped from 1,408 cfs to less than 500 cfs in less than a day, almost a 3-fold reduction in flow. Similarly in 1999, flows from July through September typically ranged on almost a daily basis from 800 to 1,400 cfs. Again, there was a case where river flow dropped dramatically from over 1,700 cfs to less than 400 cfs in 2 days time, again almost a 3-fold reduction in flow.

Rapid flow fluctuations are also documented to contribute to erosion of gravels and fine sediments, particularly to gravel-starved reaches below dams that block sediment movement (Collins et al. 1996). The proposed study should include documented or expected problems from current ramping practices, including public safety issues, and a description of frequency, magnitude, and duration of ramping events.

ODFW supports PacifiCorp’s proposal to assess current ramping procedures and determine the adverse impacts that result. This information is necessary for ODFW to evaluate the need for ramping and to determine what the rates should be to protect and enhance fish and wildlife and their habitat. ODFW will provide additional comments on future study plans.

The DLA has not evaluated ramping relationships to important water quality parameters using a time sequence analysis. For example in the fall flow reach below the JC Boyle powerhouse, temperature varies dramatically during the course of a day in the summer when the river is ramped from high to low flows. As a result of peaking, flow in the “Salt Caves reach” varies almost daily June through October from 400 cfs (18 hours) to approximately 1500 cfs (6 hours) daily. The temperature differential which results from this alteration of flow is approximately 0°F daily (from 14°F to 20°F on a typical summer day) (Fred 1991).
Project impacts – The DLA fails to describe impacts within each Project reach due to Project flow manipulations and operations. Descriptions of existing flow changes due to operation are extremely limited, precluding a reasonable description of how those flow changes might potentially impact fish, aquatic, riparian and other resources. Lack of site-specific studies other than a brief stream survey in the summer of 2003 will preclude clear assessment of Project impacts. Observations by ODFW district staff and ODFW research staff as well as previous research indicated that most trout present in the Oregon segment of the peaking reach were identified as 2+ to 4+ age fish. The general absence of age 0+ and 1+ fish was also noted (City of Klamath Falls 1999).

Numerous fish kills have been documented over the past 20 years by ODFW district biologists and letters from concerned anglers. The most recent fish kill was documented by ODFW district biologists in the Keno Reach during the June 2005 outing at J.C. Boyle when the Keno Reach flow was drawn down to 250 cfs. The rate of flow reduction in the Keno Reach, presumably conducted at the current “self-imposed, non-regulatory ramp rate of 500 cfs or 9 inches per hour,” appears to have been partially responsible for the loss of non-mobile or slow moving aquatic insects and fish resources, and demonstrates the inadequacy of the current ramp rate. It is further evidence of the need for scientific studies to determine appropriate downstream rates.

Instream flow studies that may assess impacts of the varial zone from peaking have not been completed and significant outstanding data collection and analysis issues remain in the instream flow study plan that has not been approved by the Aquatics Working Group. To date, PacifiCorp has not provided any data or results, beyond habitat surveys, from the instream flow studies to the Aquatics Working Group, precluding any opportunity to describe or evaluate potential impacts. Result of the ongoing instream flow studies may, if conducted according to analyses requested by the Aquatics Work Group, provide some information on extent of the varial zone during drawdown.

The standing field observations appear to be anecdotal observations of biologists inspecting sites in the J.C. Boyle peaking reach for 3 trips during the summer of 2002. PacifiCorp does not provide any information on frequency, timing, and duration of observations. No results are presented. However, the absence of stranded fish does not verify that standing is a problem. Frequent flow fluctuations appear to have fry and juvenile recruitment since 0+ and 1+ age fish have generally been noted absence and flows of less than 300 cfs (which happens daily) provide virtually no fry habitat.

(3) PM&E’s – In the DLA, PacifiCorp does not propose PM&E’s for instream flows and ramp rates for any Project reach. In lieu of information and analysis provided by PacifiCorp, ODFW proposes that existing information and ramp standards for the Pacific Northwest at other Projects be applied as the basis for preliminary flow release recommendations. In the absence of agreement of these conservative ramp recommendations, ODFW recommends that the Project be operated as a run of the river hydroelectric Project.

ODFW Recommendations – PacifiCorp needs to consult with ODFW and federal fish and wildlife and land management agencies, tribes, and other interested stakeholders to clearly state Project impacts and propose potential PM&E’s for impacts to instream flows via peaking and ramping. The FEA must fully disclose effects of the Project on the environment, contain adequate information for FEA to meet its NEPA, ESA and tribal trust obligations, and propose PM&E’s that will fully mitigate for the impacts of the Project.
Response to Comment S5-36

As the Project is operating under the current ramp rates directed by the Biological Opinion for Link River dam, field biologists walk the Link River bypass reach after ramping to return any ESA-listed sucker or salmonid that may have been isolated due to the ramping back to the river. This data is submitted annually to USFWS. Therefore, this ramp rate has been tested. PacifiCorp is proposing to decommission the East Side and West Side facilities under the new license.

Response to Comment S5-37

Water fluctuations in the Keno bypass reach are primarily due to the USBR operations and maintaining Keno reservoir elevation constant. A more conservative ramp rate below Keno dam would probably require fluctuating the reservoir elevation. The consequence of the reservoir fluctuations on irrigators, residents that surround the reservoir, and ODFW's wildlife refuge is not fully known. PacifiCorp is proposing to not include the Keno dam within the FERC boundary under the new license.

Response to Comment S5-38

Comment noted. Please see the Fish Resources FTR and Section E4 of Exhibit E for a full analysis of the ramping studies that PacifiCorp has conducted and for the proposed PM&E measures.

Response to Comment S5-39

The BLM's PHABSIM analysis used the transect data that were available for the Salt Caves FERC application. During monthly stakeholder meetings, the Aquatics Work Group agreed that the number of transects used in that study was inadequate to represent the peaking reach. In addition to
expanding the number of transects in the peaking reach, PacifiCorp continues to work with an Instream Flow subgroup to refine the habitat suitability curves for PHABSIM analysis.

Response to Comment S5-40

Comment noted. Please see Section E4 of Exhibit E for a full analysis of the ramping studies that PacifiCorp conducted and its proposed ramp rate for Copco No. 2 Bypass Reach and suite of proposed PM&E measures.

Response to Comment S5-41

In recognition of the rapid stage changes that can occur due to emergency plant shutdowns, PacifiCorp is proposing to install a synchronous bypass valve at the J.C. Boyle powerhouse. Please see the Fish Resources FTR for a detailed discussion of PacifiCorp's ramp rate study.

Response to Comment S5-42

Substantial information has been added to the analysis of water quality in the FLA (Exhibit E, chapter E3) and Water Resources FTR, including water quality modeling of the Klamath River from Link dam to Turwar (near the river's mouth). Measures proposed for enhancement of water quality are described in Exhibit E, section E3.8. PacifiCorp will consult with ODEQ and CSWRB to prepare a detailed analysis and application for 401 certification, included Project measures as needed, to ensure that the Project complies with the applicable provisions of CWA, including applicable State water quality standards or objectives.
Current conditions – The ODEQ administers the state water quality control program for the state of Oregon. The Klamath River is listed as water quality limited under Section 303(d) of the Clean Water Act (FSCD 4-23). There are approximately 55 miles of the Klamath River in Oregon affected by the Project, via bypass reaches, minimum flows and flow fluctuations. All 55 miles of the Project reaches are managed by ODFW exclusively for wild fish. All reaches were listed for one or more of the following water quality parameters: dissolved oxygen, temperature, nuisance phytoplankton growth, pH, and toxic substances. Many miles of the Klamath River in California from the Oregon state line to well below from Gate Dam are also affected by degraded water quality. Restoration of anadromous and resident fish populations will be dependent on improved water quality in both states.

Many of the water quality and macroinvertebrate studies are ongoing and there is incomplete analysis of Project facilities and operations on flow and water quality. Information is scattered in a variety of the documents including the Draft Executive Summary, Draft Exhibit B, the Draft Water Resources DTR, and the Consultation Record (Appendix E-Co). The DLA provides a limited amount of information and analysis of the water quality data that has been collected. The next step is to answer the “so what” and “how what” questions.

Draft Executive Summary (p. 3-7 to 8) states that the a series of water quality studies have been done to complete existing water quality data, characterize water quality conditions, and assess maintenance effects on water quality. PacifiCorp has also evaluated a water quality model to assess individual reaches, set of reaches or to simulate conditions throughout the system. While the DLA has a thorough discussion on USBR impacts, results on Project specific effects on water quality are not as well analyzed.

PacifiCorp’s DLA does not clearly separate their Project effects on short and long term water quality changes and does not complete a thorough within Project analysis. Primarily boundary conditions of inflow at Upper Klamath Lake (UKL) and outflow at iron Gate Dam (IGD) are assessed. There is inadequate assessment of Project impacts within the Project area and no proposed PM&E’s. This is a fundamental study area that in a major study that is important for understanding the results of many other studies such as fish resource assessments, fish passage, and hydrology. Misleading or the lack of conclusions from this study results in amplifying incorrect conclusions in other studies.

Information in Exhibit E and the Draft Water Resources DTR reports are incomplete and sometimes draw inappropriate conclusions. For example, the turbidity data from multiple sources are averaged and therefore inappropriate conclusions are made. Some of the historic and recently collected data have analyses that lump data inappropriately, and attempt to draw conclusions between seasons that are inappropriate.

There is no clear approach on how PacifiCorp plans to complete this section and fill in data and analyses gaps gap. For example, the without Project scenarios compare boundary conditions only at the top and bottom of the Project with an analysis of within Project impacts at and below each facility. PacifiCorp does not state how or when the water quality analyses will be completed. PacifiCorp has stated that there are only 7 days of active water storage in Project reservoirs but that conclusion is made only under existing conditions. PacifiCorp needs to analyze other scenarios that the Project could be operated.

Incomplete studies include aesthetics below IGD, sediment oxygen demand, bivalve, bioassay, and macroinvertebrates. In addition, there needs to be additional model simulations for certain conditions, calibration of dissolved oxygen due to algal impacts, algal dynamics and consequences to water quality. Many of the models are not ready for simulations since they are still in the calibration and validation phase.
Project impacts – PacifiCorp does not include an analysis of Project impacts section and there is no clear commitment or timeline when this section will be completed. There are many preliminary results, but few completed studies. While most of the studies are ongoing, the analyses and summaries completed thus far are weak or non-existent. ODFW's principle issues will be analysis of data, interpretation of results, conclusions on Project impacts and development of PME's that will clearly commit PacifiCorp to resolution on contributions to degradation of water quality. PacifiCorp, under the obligations of the Clean Water Act, through both hydro reusing and the TMDL process, will be required to identify Project impacts and implement mitigation measures to protect beneficial uses.

PacifiCorp states that there is limited control over activities that can affect water quality because the reservoirs provide little storage capacity (Draft Exhibit B p.3-7). According to the DLA, Project operations have only localized control of instream flow releases, mainly in the river segments downstream of Irish Creek, JC Boyle and Copco dams. While it is true that Upper Klamath Lake is a hypereutrophic lake with nutrient rich waters, and high temperatures throughout the summer, PacifiCorp has not adequately assessed Project impacts to changes in water quality. Preliminary data suggests the Keno Reach of Klamath River negatively affects water quality parameters by slowing and storing water, although this is not clearly stated in the DLA. Although there is no bypass reach or withdrawal for hydropower, the presence of the dam for regulating flows slows water through the entire reach from Lake Ewauna to below Keno Dam, increasing retention time and solar exposure, thereby contributing to water quality problems.

Some of the model runs have been completed but no conclusions drawn as to impacts, or potential PME’s. There is an emphasis on other water management in the basin that affects water quality, particularly the USBR Project, such as the Klamath Strait dams and the Klamath hatchery and the increase in nitrates below IGD. The DLA thoroughly describes water quality when the Klamath Straits Dam is in operation with subsequent impacts of water quality for temperature and turbidity. However, there is no analysis of the hydroelectric facility project impacts to water quality impacts. PacifiCorp’s DLA will need to focus more on hydroelectric project specific impacts and less on others.

PacifiCorp inconsistently describes Keno dam and reservoir. Keno Dam is described as a “run-of-the-river” facility (Draft Executive Summary (DES) p.3-3), with a “modest effect” on the general shape and trend of the hydrograph. Then, it is later described as a diversion and re-regulating facility”. “that helps buffer flows downstream of Keno Dam from inflow and outflow changes originating from USBR’s Project” (Draft Exhibit B 1-2). Then, Keno Reservoir is described as a reservoir to maintain lake elevations at minimal drawdown to maintain irrigation pumps (Draft Exhibit B 6-3). Finally, the Keno Reach is further characterized in the Fish Resources DTR (3-16) as flows that mimic instream flow patterns downstream of Iron Gate dam. However, Figure 2.2-2 on page 2-15 of the Fish Resources DTR demonstrates that Keno Dam is more of an oscillating than a re-regulating facility and typical flows in one month’s time can vary dramatically.

Modeling other scenarios besides the "with Project", run-of-river and without Project has not been done. Therefore, there are incomplete modeling scenarios, such as removing individual Projects and examining the restored condition for water quality.

PacifiCorp describes channel trout populations in the JC Boyle bypass reach and concludes they are healthy populations with multiple age classes. Along with the macroinvertebrate data, Pacificorp concludes that this reach of the Klamath River is “healthy” due to water quality from the springs and the low amount of river water. However, the bypass is much more accurately described as a river reach impacted by diversion. The Oregon Water Quality Commission denied the proposed Salt Creek Hydroelectric Project because further diversion of the water would further impact trout populations.

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September 16, 2003
PacifiCorp needs to provide clear descriptions of the hydrology conditions used to run the water quality model. The analysis in the DLA indicates that water quality is improved for some parameters as nitrates coming in at Link River with a lower amount of EGR. However, the comparison is not valid since it does not explain how water quality would have improved without the Project in place. Without Project condition may be much improved over the existing boundary conditions.

The storage and release of water in the Project reservoirs continues to affect water quality in the river by increasing retention time, exposure to sunlight, and thermal stratification. Reservoir stratification also alters other water quality parameters including dissolved oxygen (DO), biological oxygen demand (BOD), and production of toxic ammonia. Aquatic plants and algae in the reservoirs and river have a significant effect on fluctuations in DO and pH, which in combination with temperature-induced effects can expose acute and chronic health problems in fish. This was especially observed in the preliminary Klamath Reservoir results, which the consultant has been unable to successfully model empirical conditions measured in the reservoir. Reservoirs also modify nutrients by acting as a sump for nutrients and temperature, setting of particulate matter, mobilization of organic compounds, and nutrient uptake by phytoplankton. From the limited data collected thus far, it appears that Project impacts include growth of aquatic plants and algae which create daily and seasonal fluctuations in DO and pH, which in conjunction with temperature can cause chronic and acute stress in fish populations.

Rivers normally process and assimilate nutrients as water flows downstream and attached algae in river systems can filter and clean water. At a recent meeting of the Western Division of American Fisheries Society, a water model consultant indicated that one of the greatest impacts of reservoirs can be the lack of assimilation of nutrients, or that reservoirs can act as nutrient and reservoir sinks. Lack of nutrient assimilation may more likely occur in reservoirs that stratify such as Copco and Iron Gate reservoirs, where thermal barriers can prevent mixing and assimilation of nutrients. Therefore, in the case of the Klamath River, nutrient assimilation from Upper Klamath Lake releases may be delayed many miles downstream of the hydroelectric Project than would normally have occurred upstream in the absence of the Project reservoirs. In support of this concept, all reaches of the Klamath River were listed for 2024 violations for temperature. However, all hydroelectric Project reservoirs were listed for other water quality violations in addition to temperature. Those included but were not limited to dissolved oxygen, toxic ammonia, pH, and chlorophyll a.

ODFW's goals and objectives for the Klamath River fish populations are to maintain and restore water quality to support healthy native aquatic species including indigenous trout, suckers, lamprey, and anadromous salmonids. Water quality must remain within the range that maintains the biological, physical, and chemical integrity and benefits survival, growth, reproduction, and migration of native fish. Fish survival, growth, and egg incubation and emergence are related to water temperature and other water quality parameters, so if the Project impacts water temperature or DO or other water quality parameters, fish populations and their health can be affected. Project emergency shutdowns, maintenance, and reservoir operations have not been adequately documented. Water quality affects other life history characteristics such as fish migration. Temperature change may also affect fish passage, particularly at Iron Gate and Iron Gate fish ladder, where fish may be delayed or passage eliminated because they must choose between warm water from Iron Gate Reservoir and primary spring in the bypass reach. Studies have indicated that adult salmonids avoid temperature changes and prefer to remain in river temperature water, prefer cooler water when given no alternative, and take longer to pass through test facilities in water heated or cooled compared to river water (Weaver et al. 1972).

PM&E's – PacifiCorp proposes no PM&E's in the DLA.
Response to Comment S5-43

PacifiCorp has agreed to run the SLOM scenarios in addition to the three water quality modeling scenarios presented in the DLA as a means to address a range of alternatives. Please see Section 3E of Exhibit E for a detailed discussion on the Project's impact on water quality and PacifiCorp's proposed PM&E measures.

Response to Comment S5-44

PacifiCorp is working with the HMG to evaluate stream habitat upstream of Keno Dam. The HMG is currently examining possible chinook salmon production but may examine steelhead production in the future. Note, however, that the EDT model is not currently able to model lamprey due to a lack of biological rules for this species.
Response to Comment S5-45

Significant revisions have been made to the fisheries assessment since publishing the DLA. Please see Section 4E of Exhibit E for a detailed discussion on Project impacts to native fish and proposed PM&E measures. PacifiCorp maintains that the methodologies for inventorying fish as described in the Fish Resources FTR, are reasonable for subsequent impact analysis. Data collection to the extent requested by ODFW was somewhat hampered by unreconcilable site conditions. As presented in the FLA, PacifiCorp disagrees with ODFW's conclusion that redband trout are at risk from PacifiCorp's operations.
The fish assessment study is a key area of disagreement between ODFW and PacifiCorp regarding study methodology, analysis, results, and conclusions for the relicensing of the Project. ODFW also views PacifiCorp’s analysis of the data as a key dispute, since many of the conclusions PacifiCorp draws are misleading and inaccurate, and based on a technically flawed study.

This study plan was not approved by the Aquatic Working Group stakeholders due to misapplication of standard scientific methodology procedures and the insufficient collection of data over sample reaches, sample periods and number of seasons. PacifiCorp also did not follow the process agreed to by stakeholders to resolve the fish assessment disagreement for approving study plans as stated in the “Collaborative Process”.

Since release of the DLA, PacifiCorp has chosen to break apart the study plan into separate studies that are agreed to (i.e. fry sampling, reservoir sampling) and that are agreed to (i.e. riverine sampling that is considered inadequate by agency and tribal stakeholders).

The goal of the fishery assessment study was to characterize existing riverine and reservoir fish communities. Specific objectives were to assess relative abundance, growth, length frequency distribution, condition factor, and age structure of fish populations. This is a fundamental study that is important for understanding the results of many other studies such as fish passage, recreation, and water quality. Misleading conclusions from this study amplify mistakes in other studies. The study indicates that most results are qualitative in nature (Fish Resources DTR p.2-2) and then goes on to draw conclusions based on quantitative results that are questionable and based on inadequate sample design.

PacifiCorp conducted a test of sampling methodologies in fall 2001 and then a general fisheries assessment of the riverine sections in 2002. The fish assessment has a sample size of one in most cases, sampling only one to four days for each reach, and then draws conclusions on the general abundance of fish communities and populations in each reach. While other biological data was gathered on length, scales, and condition factor, this information was not presented in the DLA. Stakeholders have repeatedly asked for additional field sampling with larger sample sizes, sampling representative reaches with representative habitat types, and a more thorough analysis. PacifiCorp declined to conduct more extensive data collection in the 2003 and has stated that there is adequate information to draw conclusions.

ODFW requested a stock assessment in response to the FSCF for each extantaneous fish species to evaluate potential reintroduction of salmon, steelhead, and lamprey. No information was presented in the DLA regarding stock assessments or genetics. The steelhead life history morphology was historically present in the Upper Klamath Basin, but is now considered extant (ODFW 1995). This life history probably was introduced into the Upper Klamath Basin after the Picnicsove Lake Modoc opened to the Pacific Ocean (Behnke 1992). The diverse traits in the Upper Klamath Basin group may have resulted from the interbreeding of the newly introduced Oncorhynchus mykiss with the original resident fish of the basin (ODFW 1995, Behnke 1992). Steelhead were documented as far up as the Link River (Fortune et al. 1966).

Fall Chinook and spring Chinook salmon potentially spawned within the Sprague River (Klamath River Basin Fisheries Task Force 1992). Runs were seen as far up the Sprague River in Oregon, and spawning was reported in the North and South Forks of the Sprague. Historically, entry timing for spring Chinook appeared to occur in March to upper Klamath River area. Fall Chinook entry to the Sprague River was noted in September and October. The color adapted to the Upper Klamath Basin had been lost.

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sometime prior to the earliest documented fisheries assessment and collections, and prior to fish collections between 1914-1918 at Klamath Rocks (Klamath River Basin Fisheries Task Force 1992). Currently the Southern Oregon Northern California Coastal coho salmon Evolutionarily Significant Unit, of which the Klamath River populations downstream of Iron Gate Dam are included, was listed as threatened under the “Endangered Species Act” in 1997 (62 FR 25488). Designated critical habitat for Southern Oregon Northern California Coastal coho salmon occurs downstream of Iron Gate Dam (May 5, 1999; 64 FR 24649).

Rainbow trout, Pacific salmon and many other species exhibit genetic adaptations to local environmental conditions, demonstrating the stock concept. PacifiCorp has only recently introduced a conceptual idea to look at genetics of fish populations. However, PacifiCorp has not proposed a study, nor are there results available to identify Project impacts, and propose PM&E’s.

Preliminary results of the PacifiCorp 2002 sampling effort were presented at the January 2003 Aquatics Work Group meeting in Yreka, California. ODFW and many other stakeholders offered many comments and recommendations such as including sample size, sample dates, time of day, flow (i.e. JC Boyle peak discharge ranges from 359 to over 1500 cfs each day), and other basic scientific collection information. Other comments were to identify outliers of information, for example, most of the culverts and manholes in the Keno Reach were observed near the dam and not found farther downstream. Sample sizes were not stated and conclusions are inappropriately drawn on very small sample sizes (i.e. 4 trout in the Link River in spring 2002 and none in any other season). An incidentally high capture of rainbow trout in the JC Boyle bypass reach weighted a higher relative abundance and an apparent greater length at age that was not representative of the population. Roger Smith, ODFW District Fish Biologist, indicated at that meeting that sampling effort in low flow periods in the JC Boyle peaking reach just before dark yields high CPUE rates. Therefore, relative abundance is difficult to make conclusions given the variability of sampling conditions and the very limited sampling effort put forth by PacifiCorp.

Some of the sampling results presented at the January 2003 Yreka meeting were questionable due to inappropriate analyses and in comparison to previous studies by other researchers that had spent far more time sampling fish populations using standardized methodology. For example, the PacifiCorp results of sampling in the JC Boyle peaking in California had a relatively high CPUE of rainbow trout. However, the data is not shown in the DLA that these fish were all 50-75 mm, or age 0+ fish that are young of the year. All caught below Shedeed Creek, a known spawning tributary. The truss length at age comparisons showed that in a comparison of age 3, 5, and 6 fish, average length of fish sampled in the summer were sometimes smaller than average length of fish sampled in the spring. Since this is not biologically possible, it is apparent that age/length data was inappropriately analyzed. ODFW suggested that PacifiCorp reanalyze the scale data to produce a back-calculated length at age that would give more meaningful results of growth in selected reaches of the Klamath River.

For example, the two reaches of Link River were sampled during different seasons with a sample size of one sample per reach. This is not a defensible estimate of relative abundance. Correctly conducted sampling is to stratify variability is expected and collect multiple samples. In addition, the methods were not adequately described but what is described has serious flaws in data collection. There is no structure to the sampling effort that allows a statistical analysis.

None of the length data that was presented as preliminary results at the Yreka January 2003 were in the DLA. The fish length information discussed at the Yreka meeting showed that Keno fish are larger on average than fish in the JC Boyle peaking and bypass reaches. This has been found in studies by ODFW research as well in the 1988-91 studies. However, in most cases, data were inconclusive due to limited sampling and analysis.

Attachment 2: ODFW Comments on Klamath DLA

September 10, 2003
A June 26, 2002 technical memorandum by Forrest Olson (CH2M Hill consultant for PacifiCorp) concluded that the use of the fish ladder by trout has declined dramatically since the dam was built but not according to his reasoning, due to ladder function or entrance conditions. He notes that "the fact that fewer trout fish used the ladder 30 years after the dam was built may merely suggest that movement upstream through JC Boyle Dam has become a less favorable strategy for the local trout population than it was historically without the dam in place. This conclusion is unwarranted and contrary to the evidence that ODFW has assembled on fish populations and fish passage at the JC Boyle ladder. ODFW has implemented very conservative angling regulations below JC Boyle Dam as a consequence of fish passage problems and impacts to the native redband trout populations.

The agency, tribal and NGO stakeholders concluded at the January 2003 Yreka meeting that the objectives of the PacifiCorp fish assessment could not possibly be met with the present level of sampling effort and analysis. Therefore, in the absence of a good administrative record, other studies will be used as the administrative evidence to demonstrate that passage, entrainment and instream flow, all controllable factors by the Project facilities or operations, are responsible for apparent changes in fish populations.

Several conclusions made from the ODFW research Project have shown that the Project has affected redband trout populations via poor passage, entrainment and mortality or altered flows. Studies by the Native Trout Research Project showed that Klamath River rainbow trout from the Keno Reach, Spencer Creek, JC Boyle diversion reach, and the "Salt caves" reach are a similar, unique stock of fish that adapted to local habitat conditions (Buchanan 1993). This population is unique, as they have adapted to water temperatures up to 5°F in the summer and down to 0°F in the winter, extremely alkaline pH, and high nutrient levels. Prior to the construction of JC Boyle Dam in the late 1950's, the Klamath River wild trout population was noted for its abundance and size of fish. Trout migrated freely through all reaches and many spawned in Spencer Creek, a principal tributary of the Klamath River. Following completion of JC Boyle Dam, trout passage estimates dropped from over 5,500 fish in 1959 to less than 500 in the late 1980's. Further, the average size of trout ascending JC Boyle Fishway diminished from 12 inches to 5 to 9 inches in length in the same time period.

Some of the conclusions from the ODFW research (January 29, 1997 ODFW memorandum, AI Hemmingsen, Buchanan 1991, Hemmingsen et al. 1992) are:

- Abundance and average size of redband trout that migrated upstream past JC Boyle Dam have declined dramatically since the dam was built. Reasons for that are unclear but likely related to hydroelectric facilities.

- Abundance of redband trout that migrated upstream past Keno or Link River dams was much less than that seen at JC Boyle Dam. Some fish that passed the two former dams returned to spawn downstream in Spencer Creek. That behavior may be influenced by hydroelectric facilities.

- Genetic relationships between redband trout of the Klamath River and certain populations higher in the basin are not likely to be maintained since few fish appear able to successfully pass into and through Upper Klamath Lake. Prevention of migration between populations may enhance genetic divergence between them, and possibly threaten long-term existence of tributary populations upstream.

- Rainbow trout both upstream and downstream of JC Boyle spawn in Spencer Creek. Good access must be maintained for all that intend to get there.

Attachment 2: Page 46 ODFW Comments on Klamath DLA

September 16, 2003
- Safe passage downstream past JC Boyle Dam for migrants of all sizes must be assured.

In summary, the methodology used for the fisheries assessment by PacifiCorp was flawed, with inadequate data collection and analysis that do not reflect current conditions. The method used by PacifiCorp was akin to a "grab sample" with one data point, and therefore cannot be used to assess Project impacts on fish populations. PacifiCorp made an independent decision to conduct one sample per reach per season as a baseline assessment for fish populations.

**Project impacts** - ODFW Research staff provided input to PacifiCorp regarding Study Plan 1.9 Fisheries Assessment (ODFW email January 22, 2003). Their comments were that the objectives could not possibly be met and the proposal had many shortcomings. These included misrepresentation of fish sizes based on capture techniques, lack of specific sampling procedures, and extrapolating findings beyond the capability of the data. The comment on PacifiCorp's third objective of assessing the influence of environmental factors, including Project operations, on fisheries resources, was that it was the most problematic and overestimated the limits of the data. Since long term data sets with comprehensive measurements of environmental variables and statistically rigorous abundance of data are not included, it was unlikely that PacifiCorp could explain Project impacts.

The inadequate data collection and analysis leads PacifiCorp to misleading conclusions for both the fish assessment and other studies. PacifiCorp incorrectly concludes that the JC Boyle ladder is no longer needed (June 26, 2002 Technical Memorandum: Review of Adult Trout Passage at JC Boyle Dam). In meetings, PacifiCorp staff has suggested that a reintroduction of anadromous fish will fail due to a high abundance of predators in Project reservoirs and poor habitat conditions in the upper basin. This fish assessment is a critical study with a high level of importance in relicensing. However, it has been conducted independently by PacifiCorp utilizing inappropriate methodology and conclusions, despite agency, tribal and NGO stakeholder disagreement on these issues.

Draft Exhibit 5-1, p. 4-2 states that the Fish Resources DFR has been prepared to provide the detailed analysis of the fish resource issues...this report contains the information needed to comply with 8CFR4 51(45). Given the inadequate administrative record, misleading conclusions, the lack of Project impact analysis, and no PM&E's, ODFW believes that PacifiCorp is not meeting the intent of the Federal Power Act. Alternative information has been presented from research conducted by ODFW that provides contrary evidence to PacifiCorp's conclusions. Therefore, our conclusions are that the evidence supports that passage, entrainment and instream flow, all caused by the Project facilities or operations, are responsible for apparent changes in fish populations. Given this evidence, ODFW will recommend to FERC that effective, additional upstream and downstream fish passage be implemented at all hydroelectric facilities and monitoring and evaluation and modifications made at each facility to ensure safe, effective passage for native fish species.

In addition to the ODFW research, other supporting evidence is the FERC 1990 Final EIS for the proposed Salt Creeks Project which noted low adult trout densities in the upper end of the peaking reach. The EIS reported that trout in the upper peaking reach, where peaking impacts would be most visible, had relatively low growth rates and that large trout were not represented in the age structure. The EIS cited 5 years of investigation compiled by the City of Klamath Falls. The FERC EIS concluded that flow fluctuations below the JC Boyle powerhouse caused chronic stress on trout and stranded of eggs, fry, and juveniles. Stress occurred from daily flow fluctuations and related changes in water temperature and water quality. These flow fluctuations caused trout to continue to seek new feeding and resting habitat while water temperature changed metabolisms and feeding rates.

Attachme...
Response to Comment S5-46

The FLA presents Project impacts to terrestrial resources and proposed PM&E measures. PM&E measures provided in the FLA include proposals to develop a Wildlife Habitat Management Plan and a Vegetation Management Plan. These plans will guide wildlife enhancement measures and land management practices on PacifiCorp ownership within the Project boundary. Practices and enhancement measures implemented under these plans will be enhancements to existing baseline conditions.
riverine drawdowns, facilities or reservoirs that block animal movement and migrations, and upland management activities. These combined impacts reduce habitat quantity and quality available to support wildlife, reduce connectivity, and fragment populations. Potential Project impacts occur to big game, small mammals, eagles, raptors and other avian species, waterfowl, bats, and amphibians and reptiles.

Objectives of the terrestrial studies were to develop baseline information on terrestrial resources and assess how Project facilities and operations affected those resources and identify PMAE's for Project effects on sediment transport. The same studies included vegetation cover mapping, wetland and riparian plant community characterization, amphibian and reptile surveys, TES surveys, wildlife movement, wildlife habitat association, erosion/weed inventory, grazing analysis and a spring-assocated method inventory. Some results are presented in the 9 studies on current conditions such as the vegetation survey. Many of the studies are ongoing and expected to be completed in 2003. There is some discussion of potential Project impacts in Exhibit E 5.7 on continuing impacts of the Project, but PacifiCorp acknowledges that much of the information is preliminary and will be more fully analyzed and completed in 2003.

The Terrestrial Resources DTR is a summation of study plans, but fairly general with limited results thus far. Inventory and mapping of plant communities and wildlife habitat features focused on a one-quarter mile bandwidth along the river and around reservoirs, and added additional upland areas requested by stakeholders.

The Riparian and Wetland Characterization study is not yet complete and there is still not a lot of information available to stakeholders. Information in Exhibit E 5.8 primarily is a large scale vegetation mapping and generally describes riparian information, but is not useful to understand impacts. Generally it is a good study plan, but analysis, results, Project impacts and potential PMAE's are not in the DLA. Stakeholders have requested and PacifiCorp has agreed to analyze ongoing impacts of inundated riparian to former riparian habitat. PacifiCorp will use pre-Project photos and government land office (GLO) surveys to evaluate reference conditions for lands under the J.C. Boyle, Copco 1 and Iron Gate reservoirs. Early photos (i.e. J.C. Boyle, 30 years on the Klamath) illustrate historical conditions that show COPCO has a lush fertile valley with excellent riparian zone. The Riparian and Wetland Characterization study also will evaluate vegetation changes as a result of peaking and flow frequency, duration and magnitude of flow events.

Project impacts Exhibit E 5.7 is a summary of continuing impacts of Project facilities and operations on riparian and wildlife resources.

The small animal and avian connectivity study (Exhibit E5 5.5.3) documented riparian habitat connectivity along Project reservoirs and riverine sections affected by inundation. This section demonstrated that the average break in riparian patches along reservoirs was significantly different than along riverine reaches. In addition, the 2-mile long J.C. Boyle canal disconnects upland habitats from riparian habitats.

The assessment of Project effects on big game movement (Exhibit E5 5.5.1) is based on anecdotal studies of watching a few deer and one report of an elk with radio-telemetry crossing the Project. There is not enough information to make this a scientifically conclusive statement since information is anecdotal.

The assessment of wildlife entrainment (Exhibit E5 5.5.2) in canals is confusing. Pages 5-99 reports that only a small portion (4%) of the J.C. Boyle canal is accessible and the entire length of East Side, West side and Fall Creek canals are accessible to wildlife. The section concludes that entrainment data of medium and large animals indicate little mortality. Conversely, page 5-139 in the section on continuing...
impacts (ES.7) indicates that 49% of the J.C. Boyle flow canal (1514 of 11,000 meters) is a potential entry point for wildlife. It also indicates that information from the entrainment study at East and West side canals on Link River documented mortalities of wildlife including mink, raccoon, muskrat, garter snake, bullfrogs, rough-skinned newt, and various waterfowl. Therefore, it is clear that mortalities of wildlife at the J.C. Boyle canal has not been adequately assessed. An ongoing trapping study of small animals is underway in 2000 to determine if small animals use the vicinity of the canal.

The assessment of transmission lines on avian species (Exhibit E5.5.4) suggested that transmission lines are not a problem for avian electrocutions or collisions. However, PacifiCorp only counted 10% of the power lines as transmission lines, while the remaining 90% are "distribution lines". PacifiCorp has a database of bird mortalities associated with Project lines but this has not been shared with stakeholders. ODFW requests that PacifiCorp present information or records on bird mortalities or injuries associated with any Klamath hydroelectric transmission or distribution lines.

The information on effects of reservoirs on wildlife is still preliminary. Results indicate that large gaps in riparian/wetland habitat, particularly along lower Gehrke and Copco reservoirs, but also along J.C. Boyle, limit habitat quality for amphibians, reptiles and some small species and reduce connectivity (ES.7.1.3). One of the focal species, the yellow warbler, had lower habitat quality at J.C. Boyle Reservoir, possibly due to daily water level fluctuations that reduce shoreline riparian shrub habitat. Also, most reservoirs, except Keno, provide very little habitat for breeding amphibians due to frequent water level fluctuations. Western pond turtles were affected by shoreline habitats of fluctuating reservoirs with reduced basking habitat and water level fluctuations that reduced juvenile habitat.

Riverine reaches that had flow fluctuations also showed preliminary information that flow fluctuations reduced shoreline habitat and diminished riparian habitat for riparian focal species. Further information on Project effects will be provided when the vegetation/flow fluctuation analysis and pre- and post-Project aerial photography comparisons are completed.

PacifiCorp analyzed other non-hydroelectric impacts and described fairly thoroughly the impact of grazing along river and reservoir reaches, and effects from recreation such as trampling.

Analysis has been incomplete regarding effects of peaking operations on downstream riparian habitat. Information provided by ODFW at the testimony of the proposed Salt Creek Hydro Project and in the ODFW response to PacifiCorp's PSCD indicated preliminary impacts of flow fluctuations on the wetted fluctuating zone and non-woody riparian zone.

FM&E's: PacifiCorp proposes no FM&E's in the DLA for wildlife and botanical resources. PacifiCorp proposes to continue existing measures of maintenance of two wildlife escapees along the J.C. Boyle power canal and environmental training programs for maintenance personnel to protect sensitive resources.

ODFW Recommendations:
ODFW recommends that PacifiCorp, through consultation with ODFW and other stakeholders develop a comprehensive wildlife mitigation plan for the Project area and related company-owned lands. The plan should provide routine monitoring and evaluation of wildlife and their habitats associated with the Project, mitigation strategies, and a long-term plan for implementation and monitoring of mitigation coordinated with federal, state, local and tribal wildlife management objectives. The mitigation plan should compensate in-kind to the extent feasible for Project development and ongoing operational and facility impacts. Any new Project development or impacts authorized by Project relicensing should be consistent with ODFW's Fish and Wildlife
Response to Comment S5-47

FTR Sections 6.7.2.2 and 6.7.2.3 provide assessment of the risks and restrictions to wildlife movement associated with Project canals and other linear facilities. The results of these assessments were used to develop PM&E measures. PM&E measures include a detailed consideration of the installation and placement of wildlife access and crossing structures as appropriate.

Response to Comment S5-48(B)

Cumulative impacts will be addressed by FERC in the NEPA process. Those familiar with the Klamath Basin understand there are numerous impacts on natural resources that, in when considered cumulatively, render the current environment. The Klamath Hydroelectric Project is just one of many developments that influences the state of the natural environment.

Response to Comment S5-48

PacifiCorp has coordinated with ODFW representatives at all stages of the relicensing process through the TRWG. PacifiCorp expects to work with ODFW to prioritize enhancement efforts for wildlife and associated habitat in the Project boundary.
Response to Comment S5-49(B)

PacifiCorp has acknowledged the desire by some stakeholders that PacifiCorp conduct a detailed analysis of alternatives, including dam decommissioning. This issue is documented in the consultation record (Appendix E1-A) as an area of disagreement.

Response to Comment S5-49

The description of the existing socioeconomic condition includes information related to the importance of recreation, commercial fishing, and agriculture to the communities along the Klamath River as well as coastal communities in the Klamath Management Zone. The baseline condition for evaluating proposed Projects is a continuation of the existing license. PacifiCorp's proposed Project and PM&Es are anticipated to improve rather than degrade resource conditions (measured relative to continued Project operations under the existing license) and the socioeconomic condition of the communities that rely upon those resources. Some modest trade-offs are likely. These changes have been assessed in the Phase 3 socioeconomic study. In this context, the recommendation to conduct a cumulative effects analysis does not appear to be relevant.

Response to Comment S5-50

PacifiCorp maintains the fish passage cost estimates are appropriate at the conceptual level.
Response to Comment S5-51

This comment includes several wide-ranging statements about the recreation flow analysis as well as some comments about findings for specific segments (although the links between comments and specific segments are not always clear). Rather than respond point-by-point, we have re-organized the major ideas of this comment in order to respond more systematically.

Overall, this comment appears to focus on two fundamental sets of issues. The first set critiques the study methods and conclusions related to flows and fishability. The second set focuses on general assertions by ODFW about how different flow regimes will create improved fisheries and (presumably) fishing opportunities. Both are discussed below.

Study methods and conclusions

ODFW appears to be critical of three study issues: 1) the number of anglers involved in the study; 2) the focus on existing fishing opportunities and flow regimes; and 3) separating concerns about the fishery from evaluations of fishability.

Number of anglers in the study

The size of the panel during the J.C. Boyle Bypass and Hell's Corner Reach controlled flow studies was small, but it is comparable to those in other fishability studies. More importantly, the similarity of assessments among panel members and consistency with conclusions from the Phase I interview component tell a compelling story about current angler preferences. As discussed in the Recreation Resources FTR, a larger panel might improve the precision of evaluation.
curves or ranges, but PacifiCorp firmly believes the substance of the findings would not change.

As discussed in the FTR, wading-based anglers generally prefer lower flows on various Klamath segments because they are less turbid, more wadeable, and provide more fishable water (runs and pocket water that can be accessed by wading or from the shore). ODFW appears to agree, and even suggests an additional reason for this preference by noting that lower flows concentrate fish and improve perceived fishing success. PacifiCorp's interpretation is that ODFW agrees that current wading-based anglers prefer to fish lower flows on the river given the current hydrological regime and fishery, which were the focus of the study. If ODFW has evidence that other anglers prefer and use higher flows (in the spring or during peaking periods), we would like to see that evidence.

Focus on current fishing opportunities

ODFW appears more broadly critical of the study because it focuses on assessing flows for current bank- and wading-based trout angling opportunities (which are based on the existing fishery and current flow regimes). ODFW appears to believe alternative flow regimes in Hell's Corner Reach would improve the fishery, which anglers would learn to fish, which would create improved fishing opportunities. The report clearly specifies that current opportunities are better at lower flows (particularly current wading-based fly-angling opportunities). However, it also notes that anglers might learn to fish higher flows by modifying where and how they fish (including changes in tackle, technique, or use of boats). PacifiCorp's findings were qualified because we don't have evidence that anglers would fish those higher flows effectively; ODFW is simply asserting this to be the case. Furthermore, FERC relicensing proceedings focus on the current resource conditions and analysis of how the proposed Project may effect or enhance the current resource conditions.

We stand behind the study's conclusion: lower flows in Hell's Corner Reach resulting from the peaking regime provide high quality wading-based and shore fishing opportunities, even though new opportunities might develop if higher sustained flows were to occur.

Separating fishery from fishability evaluations

ODFW asserts that the fishery would improve with higher flows and no fluctuations. ODFW appears concerned that fishability evaluations favoring lower flows are inconsistent with this assertion. The apparent "inconsistency" makes sense precisely because anglers were successful in separating evaluations of fishability from evaluations of the fishery (as we asked them to do in the study). ODFW appears to be confounding evaluations of the fishery with fishability. Anglers appropriately distinguished the two.

The recreation flow analysis focused on how flows affect fishability independent of biological issues. The conclusion that lower flows are preferred fits with the way anglers fish this river, as well as findings from other rivers. The study does not offer information about flow effects on the fishery, and we think everyone anticipates that the results of the biological studies will elucidate those issues.

Assertions about an improved fishery and fishing opportunities

ODFW appears to have broader concerns relating to the fishery, and how its protection or improvement should "trump" fishability. It makes sense that high quality fishing requires a healthy fishery. But it is necessary to specify fishing characteristics in order to assess how they interact with fishability
evaluations of different flow regimes.

ODFW asserts that the fishery on several reaches of the Upper Klamath River used to be better, could be improved with alternative flow regimes, and would necessarily improve angler satisfaction. The current Hell's Corner Reach fishery appears to be among the best in Oregon (USDI, 1994). The debate over the relative quality of historic, current, and possible future fisheries is clearly outside the scope of the recreation flow analysis.

It is speculative to simply assume that an unspecified "better fishery" equates with improved success or satisfaction. To wading-based fly anglers for example, higher catch-rates or larger fish might not be good trade-offs if they have to fish from a boat or the bank using bait or spinners. Anglers may also prefer "easier" fishing conditions (e.g., wadeable low flows where fish are concentrated) to those that are "harder," even if the latter increased the density or size of fish.

It is possible to determine anglers' preferences for different types of fishing opportunities, and assess their responses to potential trade-offs of different flow regimes. However, the opportunities must be carefully specified. Preferences shift depending upon 1) the abundance, size, and distribution of the current versus new fishery; 2) whether the new fishery will include new species (e.g., salmon and/or steelhead); 3) how new species might affect existing species; 4) relationships between flow regimes and fishing success; and 5) how flow regimes would affect the way anglers fish (technique and tackle, and whether it was boat, shore, or wading-based).

The recreation flow analysis was not designed to evaluate an unspecified future fishery (with more or different fish). The recreation flow analysis indicates that other fishing opportunities might develop under new flow regimes. But we think it is speculative and simplistic to assert they will be preferred by all anglers. Our analysis shows that substantially higher flows would dramatically change existing opportunities. If changed flow regimes improve the fishery but decrease fishability, analyzing these trade-offs is an important but formidable task.
Response to Comment S5-51(C)

The correspondence record for this licensing procedure is extensive as evidenced by the size of Appendix E1-A. Both PacifiCorp and FERC welcome notification on any inadvertently omitted correspondence to the record.

Response to Comment S5-51(B)

As presented in the FLA, PacifiCorp has used a term of 30 years to conservatively estimate power production costs and returns on investments.

generally resulted in an increase to winter flows, and a decrease in late-spring and early-summer flows in the river just downstream of Iron Gate dam.

Project impacts – Based on how anglers were asked to characterize optimum angling conditions given existing project conditions, inappropriate flow evaluation curves were drawn for acceptable and optimum fishing conditions. These curves inappropriately underestimate and recommend minimum flows for fishing well below the natural flows of the river. For example, the Link River flow evaluation curve for fishing with optimum flows is 100 to 1,500 cfs with best flows at the lower end (Recreation Resources DTR p. 2-16). The report states that minimum flows in the Link River bypass have been higher than 90 cfs even in the driest period and are often in the 250 cfs to 600 cfs range from May through December, and therefore concludes that the power diversion effects are beneficial because the Project generally prevents higher flows that would be caused by the additional flow of 1,450 cfs from the Eastside canal. The 1,450 cfs diversion is higher than the allocated take of water for the Eastside diversion and may be in violation of the certified water right for the diversion. Additionally, ODFW biologists have frequently observed flows in the bypass reach of less than 50 cfs.

Similarly, flow duration curves report optimum fishing conditions in the Keno Reach of 200 cfs are optimum while flows of over 1,000 cfs are sub-marginal (Recreation Resources DTR p. 2-47). It then reports that 300 to 600 cfs is optimal although aesthetics above 200 cfs (what is considered a flow to cover the bottom of the channel) “might decrease as the river becomes more turbid, inundates vegetation, or loses some definition”. This information is misleading and speculative at best. Anglers may choose to fish a river at lower flows that concentrate fish but given a choice between a river with large abundant fish and a river with reduced population abundance and size, anglers will generally prefer more productive systems.

PM&E’s – There are no PM&E’s proposed in the DLA.

ODFW Recommendations -
ODFW recommends that the portion of the study associated with flow duration curves be deleted from the administrative record because it is technically flawed. Low sample sizes, misrepresenting questions and false conclusions result in a study that disregards the historical information that showed that the river, in the absence of the JC Boyle facility, was once a highly productive system with abundant trout populations and known for its large-sized trout.

LICENSE LENGTH

The current license length of 50 years is too long, and a new license should be issued for no more than 30 years. The Project has considerable impacts on a multitude of environmental resources and produces a relatively low amount of power.

CORRESPONDENCE RECORD

The correspondence record is a record of all information exchanges between PacifiCorp and stakeholders. Some ODFW letters and emails were not included. For example, two January 2003 emails that documented ODFW concerns on Study Plan 1.9 Fisheries Assessment and Study Plan 1.15 Trout Movement were not included in the record.
Response to Comment S5-52

Comment noted. Substantial revision has been made to the FLA.

Response to Comment S5-53

The consequence of Keno reservoir fluctuations on irrigators, residents that surround the reservoir, and ODFW's wildlife refuge is not fully known. PacifiCorp is not planning on conducting an instream flow modeling study in the Keno Reach, and has proposed in the FLA to not include this facility in the FERC boundary.

Response to Comment S5-54

Comment noted. PacifiCorp maintains that its characterizations of these reaches are reasonable.

Response to Comment S5-55

These graphics have been revised for added clarity.

Response to Comment S5-56

Comment noted.

Response to Comment S5-57

PacifiCorp has conducted additional fry sampling in the J. C. Boyle bypass and peaking reaches. Please see the Fish Resources FTR for sampling results.
Response to Comment S5-58

Comment noted. The unknown and disagreeable factor here is the reason that fish ladder use has declined. See the Fish Resources FTR for PacifiCorp's viewpoint.
Response to Comment S5-59

Smallmouth bass has been removed from the task. The sighting of small mouth bass was apparently erroneous.

Response to Comment S5-60

The water quality in the Link River bypass reach is a function of the water quality in Upper Klamath Lake. PacifiCorp agrees that water quality itself is not the causative agent for the fish die-offs in the Upper Basin, but it is certainly one of the triggers. Dead fish may not have been reported in the short Link River bypass reach since it is very likely that fish dying in this reach would float down to Lake Ewauna/Keno Reservoir. PacifiCorp does not assume that since no dead fish have been found in this reach, that the poor water quality does not stress fish beyond their tolerance limits and contributes to fish die-offs.

Response to Comment S5-61

The entrapment study was designed to collect all fish species of catchable size. As such, the trout observations are valid.

Response to Comment S5-62

Comment noted.

Response to Comment S5-63

Comment noted.

Response to Comment S5-64

Although fish use of J.C. Boyle is less than observed historically, fish population data collected in both the Keno
and J.C. Boyle stream reaches show large numbers of resident fish, with a normal age distribution. The data do not support the ODFW's hypothesis about an imminent run failure for this species. We also note that although ODFW has placed some conservative regulations on this species, it still allows sport harvest in both reaches.

PacifiCorp conducted an engineering review and an analysis of several sources of information to assess whether the current ladder was restricting the upstream passage of rainbow trout. In addition, a trout radiotelemetry study was conducted in 2003 to determine if adult trout were tending to move upstream toward the dam and ladder, and, if so, whether they were passing through the ladder without delay. Results of these studies indicated that the ladder is functioning properly, and that few of the downstream fish are inclined to migrate upstream toward the dam. While a decline in use of the ladder has occurred since the dam was constructed, the evidence suggests that the trout population has modified its migratory behavior in response to the dam, reservoir, and changed hydrology and water quality below the dam. The fact that the "runs" of trout moving above the dam have declined, does not necessarily indicate that the population below the dam has declined.

Final results of the ladder assessment and radiotelemetry study will be provided in the FTR.

Response to Comment S5-65

PacifiCorp is unaware of any spawning observations made by others in the J.C. Boyle bypass reach prior to 2003. PacifiCorp disagrees with statement that peaking has eliminated almost all angler use days. Under most water year types low water fishing in the peaking reach is available both in the morning and evening hours.
Response to Comment S5-66

The National Park Service indicated that there was an immense quantity of macroinvertebrates in the peaking reach and did not mention the varial zone. Rick Hafele's comments were specific to the varial zone in the peaking reach and did not describe the general condition of the peaking reach.

Response to Comment S5-67

Comment noted.

Response to Comment S5-68

Typically, fish population estimates have wide confidence intervals around them. Fish managers generally look at length frequency distributions, age and growth patterns and condition factors to assess the "health" of a fishery's and not the numbers. The data that has been collected in the past is presented to give the reader context.

Response to Comment S5-69

See the Fish Resources FTR for the results of PacifiCorp's Fry Distribution and Abundance Study.

Response to Comment S5-70

The Trout telemetry study showed fish can pass through the ladder in a relatively short period. See Fish Resources FTR for study results.

Response to Comment S5-71

Comments noted. Valid changes have been incorporated into the FLA.
Response to Comment S5-72

PacifiCorp does not agree that management of J.C. Boyle dam or the design of the ladder has contributed to the reduced trout use of the facilities. While a decline in use of the ladder has occurred since the dam was constructed, the evidence suggests that the trout population has modified its migratory behavior in response to the dam, reservoir, and changed hydrology and water quality below dam.

Response to Comment S5-73

The reference to smallmouth bass has been removed as it was an obvious error.

Response to Comment S5-74

The isolation of the Link River dam fish ladder from continuous observation and its proximity to Klamath Falls has played a factor in vandalism to the fish ladder. Project staff continuously worked to keep the ladder operating, however, vandals often returned to modify the ladder. USBR is now overseeing the operation of the fish ladder. In addition USBR is constructing a new fish ladder at the dam.
LITERATURE CITED


Fishpro. 2000. Fish passage conditions on the Upper Klamath River. Submitted to the Karuk Tribe and PacifiCorp. Fort Orick, WA.


ODFW. 2001. Letter to Todd Olson, PacifiCorp. Oregon Department of Fish and Wildlife, Comments on First Stage Consultation Document for the Klamath hydroelectric Project, FERC #2082. Prineville, OR.


September 16, 2003

Mr. Toby Freeman, Relicensing
Manager
Mr. Todd Olson, Project Relicensing
Manager
PacifiCorp
825 NE Multnomah, Suite 1500
Portland, Oregon 97232

Subject: OPRD Comments on the Draft License Application
Klamath Hydroelectric Project - FERC Project No. 2082

Dear Mr. Freeman and Mr. Olson:

Following are the Oregon Parks and Recreation Department’s (OPRD) comments on PacifiCorp’s Draft License Application (DLA) for the Klamath Hydroelectric Project. OPRD Statutes, Policies and Rules, the Federal Wild and Scenic River Act, and the Federal Power Act, are the basis from which these comments are made. The most relevant sections of OPRD regulations and the Wild and Scenic Rivers Act are quoted below for your reference. Relevant sections of the Federal Power Act are cited within the comments.

OPRD Statutes, Policies and Rules

ORS 390.815 Policy; establishment of Scenic Waterways system. The people of Oregon find that many of the free-flowing rivers of Oregon and Waldo Lake and lands adjacent to such lake and rivers possess outstanding scenic, fish, wildlife, geological, botanical, historic, archaeological, and outdoor recreation values of present and future benefit to the public. The people of Oregon also find that the policy of permitting construction of dams and other impoundment facilities at appropriate sections of the rivers of Oregon and Waldo Lake needs to be complemented by a policy that would preserve Waldo Lake and selected rivers or sections thereof in a free-flowing condition and would protect and preserve the natural setting and water quality of the lake and such rivers and fulfill other conservation purposes. It is therefore the policy of Oregon to preserve for the benefit of the public Waldo Lake and selected parts of the state’s free-flowing rivers. For these purposes there is established an Oregon Scenic Waterways System to be composed of areas designated in accordance with ORS 390.805 to 390.925 and any subsequent Acts.

ORS 390.826 Designated scenic waterways. The following lakes and rivers, or segments of rivers, and related adjacent land are designated as scenic waterways:

(2) The Klamath Scenic Waterway which includes the Klamath River from the John Boyle Dam powerhouse downstream to the Oregon-California border.
OAR 736-040-9053 Klamath River Scenic Waterway

(1) Scenic River Area:
   (a) That segment of scenic waterway beginning at the J.C. Boyle Dam Powerhouse to the California border (11 miles) is classified as a Scenic River Area.
   (b) This Scenic River Area shall be administered consistent with the standards set by Oregon Administrative Rules 736-040-0036 and Oregon Administrative Rules 736-040-0040(1)(b)(B). In addition to these standards, all new development in resource zones (i.e., forest-related dwellings) shall comply with Klamath County land use regulations.
   (c) New structures and associated improvements shall be totally screened from view from the river by topography and/or vegetation, except as provided under Oregon Administrative Rules 736-040-0036(3), and except those minimal facilities needed for public outdoor recreation or resource protection. If inadequate topographic or vegetative screening exists on the site, the structure or improvement may be permitted if native vegetation can be established to provide total screening of the proposed structure or improvement within a reasonable time (4-5 years). The condition of “total screening,” as used in this rule, shall consist of adequate topography and/or density and mixture of native evergreen and deciduous vegetation to totally (100 percent) obscure the improvement.
   (d) Commercial public service facilities, including resorts, motels, lodges, and trailer parks that are visible from the river shall not be permitted.
   (e) New mining operations, except recreational placer mining and recreational prospecting, as those terms are defined and used in Oregon Revised Statutes 390.835, and similar improvements, shall be permitted only when they are totally screened from view from the river by topography and/or vegetation. The condition of “total screening,” as used in this rule, shall consist of adequate topography and/or density and mixture of native evergreen and deciduous vegetation to totally (100 percent) obscure the new mining operation. If inadequate topographic or vegetative screening exists to totally screen the proposed mining site, the mining operation may be permitted if native vegetation can be established to provide total screening of the proposed mining site within a reasonable time (4-5 years).
   (f) New roads may be permitted only when totally screened from view from the river by topography and/or vegetation. The condition of “total screening,” as used in this rule, shall consist of adequate topography and/or density and mixture of native evergreen and deciduous vegetation to totally (100 percent) obscure the new road. If inadequate topographic or vegetative screening exists to totally screen the proposed road, the road may be permitted if acceptable topography can be created, or road design techniques used to totally (100 percent) screen the road at the time of construction or native vegetation can be established to provide total screening of the proposed road within a reasonable time (4-5 years).
   (g) Where existing roads are visible from the river, major extensions, realignments, or upgrades to existing roads shall be totally screened from view from the river. The condition of “total screening,” as used in this rule, shall consist of adequate topography and/or density and mixture of native evergreen and deciduous vegetation to totally (100 percent) obscure the subject improvement.

Necessary minor road improvements shall be substantially screened from view from the river. The condition of “substantial screening,” as used in this rule, shall consist of adequate topography and/or density and mixture of native, evergreen and deciduous vegetation to substantially obscure (at least 75 percent) the minor road improvement. If inadequate topographic or vegetation exists to substantially screen the road improvement, it may be permitted if acceptable topography can be created, or road design techniques used to substantially screen the road at the time of construction; or native vegetation can be established to provide substantial screening of the road improvement within a reasonable time (4-5 years). When an existing road is realigned, no side cast into or visible from the river shall be permitted.
Response to Comment S6-1

The draft license application (DLA) included a thorough description of the existing Project, its operation, and the Project's effect on the surrounding environment, to the extent it could be described based upon available study results. PacifiCorp and relicensing participants had agreed prior to development of the DLA that it would not be appropriate for PacifiCorp to draw conclusions in the application about the effects of the existing Project on the surrounding environment, unless those conclusions were based upon study results.

Excess material shall be hauled to locations out of view from the river and placed in a manner that the excess material will not reach the waters of the scenic waterway due to wind, water or other means of erosion or transport.

Visible tree harvest or other vegetation management may be permitted provided that:

(A) The operation complies with relevant Forest Practices Act rules;
(B) Harvest and management methods with low visual impact are used; and,
(C) Harvest or vegetation management is designed to enhance the scenic view within a reasonable time (5-10 years). Within this paragraph, “enhance” means to benefit forest ecosystem function and vegetative health by optimizing forest stand densities and vegetative composition, fostering forest landscape diversity and promoting sustainable forest values.

(i) Improvements needed for public recreation use or resource protection may be visible from the river, but shall be primitive in character and designed to blend with the natural character of the landscape.

(x) Proposed utility facilities shall share existing utility corridors, minimize any ground and vegetation disturbance, and employ non-visible alternatives when reasonably possible.

(ii) Whenever standards of Oregon Administrative Rules 736-040-0035 and 736-040-0053 section (1), subsections (b) through (i) are more restrictive than Klamath County’s land use and development ordinances, scenic waterway regulations shall apply.

16 U.S.C. 28 Wild and Scenic Rivers Act
Section 2 (a) The national wild and scenic rivers system shall comprise rivers… (ii) that are designated as wild, scenic or recreational rivers by or pursuant to an act of the legislature of the State or States through which they flow, that are to be permanently administered as wild, scenic or recreational rivers by an agency or political subdivision of the State or States concerned, that are found by the Secretary of the Interior, upon application of the Governor of the State or the Governors of the States concerned, or a criteria supplementary thereto as he may prescribe, and that are approved by him for inclusion in the system… Each river designated under clause (ii) shall be administered by the State or political subdivision thereof without expense to the United States other than for administration and management of federally owned lands.… Nothing in this subsection shall be construed to provide for the transfer to, or administration by, a State or local authority of any federally owned lands which are within the boundaries of any river included within the system under clause (ii).

SECTION 10. (a) Each component of the national wild and scenic rivers system shall be administered in such manner as to protect and enhance the values which caused it to be included in said system without, insofar as is consistent therewith, limiting other uses that do not substantially interfere with public use and enjoyment of these values. In such administration primary emphasis shall be given to protecting its aesthetic, scenic, historic, archaeological, and scientific features. Management plans for any such component may establish varying degrees of intensity for its protection and development, based on the special attributes of the area.

General Comments

Overall Assessment of the Draft License Application

The OPRD is not surprised by the content of the DLA as PacifiCorp has been very clear that the DLA would not contain elements required by FERC (18 CFR 16.8 (c) (4)). OPRD is very disappointed that PacifiCorp chose not to provide examples of each of its projects critical elements (i.e. project impacts, mitigation measures) so that interested parties and agencies with mandatory authorities could discern what the proposed project might look like and evaluate the available information accordingly. PacifiCorp’s decision to provide a DLA lacking such details...
PacifiCorp
Klamath Hydroelectric Project
FERC No. 2082

Response to Comment S6-2

The License Application was prepared according to FERC guidelines to describe the Project impacts and enhancement measures to balance social and environmental resources including hydropower generation.

Response to Comment S6-3

Study results were shared with stakeholders as soon as, and sometimes before, draft technical reports were prepared.

Response to Comment S6-4

The goal of the Collaborative process was to work towards gaining study plan approval on all Klamath relicensing studies. However, due to timing issues and disagreement on the scope of the studies, some did not receive working group or Plenary approval.

Response to Comment S6-1

requires that commenting parties provide conservative recommendations that meet their individual needs and regulations. Had the DLA met FERC requirements and presented a detailed description of what the proposed project might look like, including proposed protection, mitigation and enhancement measures (PM&E's), agencies and interested parties would be able to make constructive, evaluative recommendations.

State scenic wayway and federal wild and scenic river designation of the Klamath River from the J.C. Boyle Powerhouse to the Oregon-California state line was based on the significance of particular values of the river specifically, these are Recreation, Wildlife, Fish, Prehistoric, Historic and Scenic values (USDI, 1990).

Recommendation: Protection and enhancement of the river values is paramount to the development of PacifiCorp's proposed project. The FLA must detail the purpose, content and methodology of the studies used to determine project-related impacts, the scientific analysis used to evaluate those studies and the PM&E's that will balance all of the resource needs. The required two-year study season should be employed to obtain a thorough base of data. This data then would be available to all interested parties to deliberate and develop the best beneficial project.

Overall Assessment of the Consultation Process

OPRD thanks PacifiCorp, Kearns and West, EDAW, Bo Shelby and Doug Whitaker for providing an open and collaborative process in the Recreation, Land Use, Visual and Aesthetic Technical Working Group. This environment enabled us to develop and amend study plans, evaluate study results as they became available and foster a positive work atmosphere. However, we found that this process was not afforded other work groups.

In offering a collaborative approach to develop study plans, PacifiCorp consistently listed stakeholder recommendations as "ongoing issues," seemed to come to work group meetings with narrowly defined and inadequate study plan objectives and showed true reluctance to expand evaluations beyond those predetermined objectives. This posture resulted in studies beginning without collaborative approval, a lack of trust that the studies would be objective and thorough, or would include pertinent and necessary information for that particular work group. Trust was further undermined when, in the DLA, PacifiCorp repeatedly stated that study results would be available in the FLA. Not sharing interim data leaves stakeholders believing that the proposed project and corresponding PM&E's are being developed under a Traditional Process and not the "robust collaborative effort" as described by the applicant.

Recommendation: PacifiCorp should conduct studies in a true collaborative process, including stakeholder approval of study plans, prior to study initiation. Share information gathered in the studies as it becomes available so stakeholders can begin their evaluations as early as possible. Use results to collaboratively evaluate a host of proposed projects so that when the FLA is filed, FERC has sufficient information to do its work and is not inundated with Additional Study Requests (ASR's).

Specific Comments

OPRD is most concerned with protecting the values for which the Klamath River was designated a state scenic wayway and federal wild and scenic river. Therefore, our comments are limited to the section of river designated a state scenic wayway and federal wild and scenic river (Hell's Corner Reach).
Response to Comment S6-5

Comment noted. This information is included in the FLA.

Response to Comment S6-6

Comment noted. This information has been corrected in the FLA.

Response to Comment S6-7

Comment noted. This information is included in the FLA.

Response to Comment S6-8

An additional observation was made after the DLA. This information is included in Section 4.7 of the Land Use, Visual, and Aesthetic Resources FTR.

Response to Comment S6-9

PM&E's for visual/aesthetic impacts are included in the final license application.
Response to Comment S6-10

In response to the recommendation, PacifiCorp has included the access road below the J.C. Boyle Powerhouse within the FERC boundary. The boundary was extended past the access road to Spring Creek Island boat launch site to the turn-around on the existing road. This provides room for safe vehicle turn-around, which is required to access the boat launch site. PacifiCorp has also included the old J.C. Boyle housing site within the FERC boundary so that it can be used for a raft staging area and overflow parking. However, PacifiCorp must retain rights for using the site for critical hydro operational requirements and material storage. There are no other level areas near the powerhouse that would be suitable for emergency construction and operational requirements.

Response to Comment S6-11

A trail study was included as a component of the Recreation Capacity Analysis (Section 5.4.3 of the FTR for Recreation Resources). The trail study was completed in the interim between the DTR/DLA and the FTR/FLA. Results of the trail study, as well as a general discussion of BLM proposed trails (per the Draft Upper Klamath River Management Plan), are included in the FTR and FLA for Recreation Resources. Additionally, trail needs and potential actions to meet those needs are included in the Draft RRMP.

Response to Comment S6-12

Comment noted. Minimizing potential recreation-related impacts to terrestrial and cultural resources is a goal of the Draft RRMP. Specific actions to meet this goal are described...
in the Draft RRMP for areas within the proposed FERC Project boundary.

Response to Comment S6-13

Comment noted. Whitewater boating-related flows are discussed in the FTR and Section 7.0 of the Exhibit E, as well as in the Draft RRMP. The Recreation Flow Analysis in the DTR presented preliminary findings only, as the study was still in process. The complete Recreation Flow Analysis can be found in Section 2.0 of the FTR for Recreation Resources. Revisions and additional recreation flow information was also added to the FLA and the Draft RRMP.
Response to Comment S6-14

The results of the fisheries studies are provided in the Fish Resources FTR. PacifiCorp has considered the fisheries, recreation, and other resource study results in developing the proposed J.C. Boyle powerhouse operations, including instream flows and ramp rates. PacifiCorp believes the proposed operation of J.C. Boyle powerhouse protects state scenic waywater and federal wild and scenic rivers values.

Response to Comment S6-15

See response to comment S2-10.

Response to Comment S6-16

Comment noted. The complete description of PM&Es to be included in the Draft RRMP, are discussed in section E7.5 of the FLA.
Response to Comment S7-1

Comments noted. Many of these suggestions have been incorporated into the extensively revised DTR.

North Coast Regional Water Quality Control Board Comments on the Klamath Hydroelectric Project Draft License Application for New License, FERC # 2082

September 18, 2003

Draft Technical Report (DTR) for Water Resources and Exhibit E 3
Water Use and Quality

Water Resources DTR Review – Chapter 1.0 Introduction

General Comments:
- needs editing to reduce redundancy and improve on readability—first paragraph is a good example.

Water Resources DTR Review – Chapter 2.0 Compilation and Assessment of Existing Water Quality Data

This was reviewed with the understanding that it is support material for the Water Use and Quality section of the Application, Exhibit E, and that comparison of findings to water quality standards are presented in Exhibit E.

General Comments:
- S7-1
  - The existing data represent a significant body of information—over 4,000 observations at 248 sites for the 248 miles of river were selected for assessment. While the sources of the data are mentioned, it is not clear if certain sources were not used, e.g., Regional Water Board data from the CWA Section 104(b) grant, Dept. of Water Resources reservoir data, etc.
  - The data should be discussed in the context of what was happening on the river through this period, such as known discharges, log rafting upstream of Keslo, etc.
  - The data should not be treated as individual parameters, rather in relation to one another and the dynamics of primary productivity, decomposition, and basic water chemistry.
  - pH should be presented and discussed.
  - Add a data gaps section per Objective 3, “Identify data gaps to be filled by further study.”
  - A discussion subsection should be added at the end of this section that provides a cogent treatment of the results of the analysis with respect to the stated objectives for the assessment.
  - Many statements are unsupported, and should be better explained with more analysis of the data, or cavetated as speculative and the reasoning behind the speculation presented more clearly.
Response to Comment S7-2

The database was developed according to the study plan approved by the Plenary.

Response to Comment S7-3

The Water Resources DTR was significantly revised to address stakeholder comments and to update studies. This section has been modified to address this comment.

Response to Comment S7-4

This section has been modified to address this comment.

Response to Comment S7-5

This section has been modified to address this comment.
While alkalinity is controlled by some dissolved material, the whole story should be told—alkalinity is much more than that.

The patterns of conductance and alkalinity may be similar, however, alkalinity is more appropriately evaluated in context with pH and primary productivity.

Treatment of the data is inconsistent. Conductance is addressed by a bar chart, then alkalinity is compared to it with a statistical test.

2.7.2.2 Dissolved Oxygen
Page 2-11, sentence 4—states that "Dissolved oxygen concentration in the outflow of Iron Gate dam was probably influenced by conditions within the reservoir." Most certainly! Were reservoir data included in the analysis? This important water quality parameter should not be separated from discussion of primary productivity and reservoir dynamics.

The use of average dissolved oxygen is a not sensitive to the dynamics of primary production, water temperature, and respiration. At the very least, some representation of the distribution of the data should be available—box plots would help.

2.7.2.3 Nutrients
The data should be expressed as box plots. The use of an average for lognormal data is inappropriate.

Paragraph 1, page 2-11—Klamath River “immediately below Iron Gate dam” is identified as a possible area where nitrate sources may occur. Are there Iron Gate Hatchery discharge data that could be used in the analysis? Were the dynamics of the nitrogen cycle from Iron Gate release to the lower site considered?

Again, the map is not of scale for the reader to even see where the sites are and if inflows occur between the sites.

Paragraph 2, page 2-11—orthophosphate is discussed briefly, but no data are presented, nor are the dynamics of the phosphate cycle and relevance of orthophosphate.

Paragraph 2, page 2-11—the speculation that "...high productivity probably contributed substantial dissolved and particulate organic matter..." is unsubstantiated and should be evaluated with the conductance, nutrient, chlorophyll a, and turbidity data.

2.7.2.4 Organic Matter
Organic matter should be discussed along with primary productivity and known sources in the river at the time. Speculation that "...high productivity probably contributed substantial dissolved and particulate organic matter..." should be evaluated along with the conductance, nutrient, and turbidity data.

2.7.2.6 Chlorophyll a

Response to Comment S7-6
Comment noted.

Response to Comment S7-7
This section has been modified to avoid inconsistent comparisons.

Response to Comment S7-8
Comment noted. Most parameters are displayed as box plots in the FTR. Please see Section E3 of Exhibit E for an updated and detailed discussion on the Project’s impact on water quality and PacifiCorp’s proposed PM&Es.

Response to Comment S7-9
Box plots are used in the Water Resources FTR.

Response to Comment S7-10
No data from the fish hatchery were available to PacifiCorp for this analysis. The map has been modified to address this comment.

Response to Comment S7-11
This section has been modified to address this comment.

Response to Comment S7-12
This section has been modified to address this comment.
Response to Comment S7-13

ODEQ water quality action levels are included in Section E3 of Exhibit E.
Response to Comment S7-14

Comment noted.

Response to Comment S7-15

This section has been significantly modified to address these comments.

Response to Comment S7-16

This section has been modified to address these comments.

That the concentrations of chlorophyll are observed below JC Boyle as lower than above should be explored in the context of the influence of the springs in the bypass reach, as well as changes in the primary productivity that may occur in the diversion channel and subsequently released through the turbines. Reference to the ODEQ water quality action level for chlorophyll—please provide that level for the reader.

2.7.2.7 Interpretation of Spatial Trends

The section opens with “It is wise to attempt a detailed interpretation of spatial trends in these historical data for several reasons. The data were collected over many years during which important changes occurred in the basin.”

Is this meant to say that temporal changes were so dramatic and variable that any spatial analysis is meaningless? If so, that negates all the discussion that occurred in the pages preceding. Also, I don’t believe it—presentation of the data as simple plots over time and compared on a site-by-site basis may indeed serve the interpretation of spatial differences, and support the observations already brought forth in Section 2.7.2.

Evaluation of spatial differences and how they change over time, especially with changes in the river hydrology (e.g., dam construction), are valuable as hindcast in evaluating current conditions and proposed changes. An understanding of the changes that have occurred is essential to an understanding of the current situation and what may occur as a result of any proposed changes.

Page 2-15, paragraph 3—mention is made here of possible nitrogen sources between the Iron Gate outflow and the site below Iron Gate.

- A better scale map is needed
- Discharge from the Iron Gate hatchery should be evaluated along with the data for these two sites.

Page 2-16, paragraph 2—a statement is made that “The Trinity River enters the Klamath between Orleans (KR05912) and the site near Klamath, suggesting that the Trinity River may have been introducing a load of suspended material and phosphorus to the Klamath River.”

- That statement is unsupported by any presentation of data from the Trinity River and without any temporal analysis of data for these three sites (upstream at Orleans, Trinity River, and downstream at Klamath).
- No consideration of the 30 or so miles between the confluence of the Trinity and the site at Klamath, nor the 51 miles between Orleans and Klamath, is expressed. A lot can happen in that 51-mile stretch of river.

2.7.3 Temporal Trends in the Historical Data

Three paragraphs and simple linear regressions at two sites are not adequate to explain temporal trends for over 4,000 sampling events at 20 sites over 245 miles of river.

At a minimum the data for each site should be plotted on a time scale and evaluated in the context of changes in conditions upstream of the site and at other sites over time.
Response to Comment S7-17
Comment noted. Please see the revised Water Resources Technical Report for a methodology discussion. Please also see Section E3 of Exhibit E for a detailed discussion on the Project's impact on water quality and PacifiCorp's proposed mitigation measures.

Response to Comment S7-18
General Comments  This chapter has been modified to address these comments. Site IDs were developed to provide useful information about the site location while also being amenable to sorting and meaningful manipulation by statistical analysis software. Site IDs had to be amenable to adding new sites without upsetting the organization. Acronyms are not suitable for these purposes. The text has been modified to provide easier site identification.

Objectives  The text of this chapter has been modified to address this comment.

Figure 3.4-1 and Table 3.4-2  PacifiCorp has incorporated these comments in the FTR.

The data should be evaluated in the context of the physical and biological dynamics of the system—e.g., dissolved oxygen, pH, alkalinity evaluated in the context of primary productivity, along with nutrients and organic matter.

Water Resources DTR Review - Chapter 3.0 Monitoring of Water Temperature and Water Quality Conditions in the Project Area

General Comments:
- A substantial amount of data were collected in this effort. Better displays are provided than for the historical data set, but the same problems with readability and clarity exist as in the previous chapter.
- Maps should be larger or cover smaller areas so the reader can refer to them in discussions of spatial differences.
- Acronyms should be used on the maps and figures instead of site IDs to avoid going back and forth from table to map. The use of site IDs makes evaluation of the data difficult and frustrating.
- Plots from upstream to downstream should have the x-axis on a river mile scale, with sites identified. That is, the x-axis scale as presented gives the impression that all sites are equidistant.
- All plots should be checked to ensure that the sites are in order.
- Parametric and nonparametric statistics are interleaved in the discussions. For instance, averages are discussed in the text, while some of the data are presented as box plots.
- The data are presented as distributions for the most part, an improvement over the previous section. However, averages are still used in many of the discussions, insensitive to the diel and seasonal nature of the system dynamics.
- Nutrient data are discussed as means, which is inappropriate for lognormal data unless transformed into a normal distribution.
- Scatter plots should use the data on the x-axis as with other plots, instead of day of year, e.g., Figure 3.7-8.
- Redox potential is mentioned as a measurement parameter, but is not discussed nor used in discussions of nutrient cycling.

3.2 Objectives
paragraph 1, page 3-1—The primary objective includes combining current and historic data: "...to collect current water quality data (since 2000) that, combined with the historic data..." Please explain how this is done. It is not apparent in reading the section that it was done.

Paragraph 1, page 3-2—Warm water and nutrient enrichment are not "...the primary cause of water quality problems...," rather they are the water quality problems.
Response to Comment S7-19

3.7.1 Temperature The FTR clarifies temperature ranges between grab samples and logged data, and where data were collected in reservoirs. The sentence referring to Jenny Creek has been removed.

Response to Comment S7-20

This chapter has been modified to address these comments.
"At the river sites, the range in oxygen concentration is largely the result of low summertime values experienced at sites in Lake Ewauna...." This says that low DOs result in low DOs. Isn’t it more likely that higher oxygen demand, lower primary productivity, and lower aeration contributed?

Last sentence references a median, when the section begins by using averages, neither of which mean much in light of the diel and seasonal variability.

3.3.3 pH
No discussion of seasonality is offered.

3.7.4 Conductivity
Rename to Specific Conductance to be consistent.

3.7.5.2 Nitrogen
Mean and median are both used in this section.

Paragraph 2, page 3-35—The following sentence is unnecessary. “This pattern appears to be a consequence of the spatial distribution of nitrate concentration in the river samples.”

Paragraph 2, page 3-40—“the pattern of ammonia concentration for the rest of the river sites is very nearly the opposite of that seen for nitrate.” Considering the chemistry of nitrogen in water, this is expected. Statements like this serve to highlight the need to discuss the nutrients in the context of primary productivity and redox.

3.7.6.1 Chlorophyll a
These data are presented with mean and median in a bar chart, and skew is mentioned.
Box plots would provide the reader with the distribution and avoid mixing parametric (mean) and nonparametric (median) statistics.

Figure 3.7-23, page 3-46—scaling the plots the same would facilitate the statements regarding river sites having higher chlorophyll concentrations.

The spatial relationships of the data should be discussed.

3.8 Discussion
This section opens by dividing the project area into four functional divisions based on the water quality data. This was not discussed, nor made evident in the presentation of the data preceding this section.

3.8.1 Lake Ewauna and Keno Reservoir
This section includes discussion on the interrelationships of nutrient chemistry, primary production, decomposition, and nutrient cycling. It is a good summary of the river section water quality, but a bit abbreviated if it is to support Exhibit E. It could benefit from some enhancements:
Response to Comment S7-21

The Klamath basin is, in general, data limited. Efforts made to provide a representative description of the system required examining, in some cases, up to ten years of data to estimate inflow conditions. This was particularly challenging because the models were simulating continuous time series (at an hourly time step) for complete calendar years.

With respect to the temperature comment, in an attempt to represent as many tributaries and inputs as practicable, "composite" records are created where data is not readily available. These records, although not replicates of exact field conditions, provide a means of representing seasonal variations in tributary inputs. Whenever composite records are applied, it is noted.

With respect to accretions and depletions, examination of the accretions and depletions in non-winter periods indicate that overall such inflow are small. For both the Keno dam to J.C. Boyle reach and from J.C. Boyle powerhouse to Copco dam, the average accretion/depletion from May through October is less than 5 cfs. It is true that in winter months these accretions and depletions can be considerably larger, but impacts are small because during those periods the transit time in the system is typically short, water temperatures are low, reservoirs are isothermal with short residence times, and biological and chemical rate reactions are at the annual minimum. Sensitivity of simulated model results to the placement of the accretion and depletion was completed, but because the value is typically small compared to main stem flows, the location was insensitive.

Below Iron Gate dam the accretions/depletion were assigned

- Figures 3.8-1 and 2—include major features on the plots along with river mile, such as Lake Ewauna, Link River, Klamath Stratis Drain, Keno, etc.
- The chlorophyll discussion relates high nutrients to high chlorophyll concentrations, however the supporting information is not presented, rather, the previous section 3.7.6.1, discusses chlorophyll seasonality, not spatial relationships.
- Elucidate on the release of nitrogen from sediments, bringing in the redox data that were mentioned as a parameter, but never discussed.
- The discussion of N/P ratio could benefit from explanation of the range of ratios and importance of the Redfield ratio.

3.8.2 River Reaches
The discussion appears reasonable, however the data are not presented to support the discussion. Reference the sections preceding this one and provide displays to support the discussion.

Figure 3.8-3, page 3-52—would be more useful if the x-axis was plotted as river miles and major features were provided as reference points.

3.8.3 Reservoirs
These discussions benefit from evaluation of the redox potential measurements.

The reservoirs are considered productive. Presentation of the chlorophyll data may enhance and provide support for the discussion.

3.8.4 Klamath River below Iron Gate Dam
Temporal relationships beyond temperature should be discussed and provided for this section.

Provide temporal relationships plots for the Iron Gate outflow and Klamath River below Iron Gate miles to support the statement of an increase in nitrate in that section, and discuss seasonality and magnitude of differences.

Water Resources DTR Review – Chapter 4.0 Water Quality Analysis and Modeling Process

General Comments:
- It would be useful to state early in this section the model input data use philosophy. For example, in several cases, temperature input data is developed from field data collected in several different years. As another example, in several cases, reach accretions/depletions are assigned to a single tributary input node, when it is likely that accretions may occur as distributed inputs from springs or other similar sources. What is the modeler’s basis for concluding that these simplifications and approximations are suitable and appropriate? Is there a data hierarchy that is used when constructing input files? How are the effects of data simplifications and approximations on model results evaluated?

S7-21

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E-1A Appendix B Second Stage.doc
to streams as per previous completed work and ongoing work by USGS (1995)\(^1\). The methods presented, although simple, are common practice in water flow and quality modeling. Further, model results indicate that the approach was effective in representing system inflows during the critical periods of the year. It is given that during winter storms water is entering at many small tributaries in the Klamath River below Iron Gate dam that are not included in the framework. As noted above, these periods are not typically of concern with water quality.

Overall, because accretions and depletions are small, particularly in the upper basin, during the mid-spring through early fall months (the period of critical concern) the impacts on location and quality are minor. The effects on location and quality of accretions/depletions were assessed by moving them to different locations, with little effect because of the small inflows.

A final point on accretions and depletions: accretions and depletions are calculated based on a mass balance between gages and represent accretions and depletions between the known gaging points as well as any gage error. Where known inputs and outputs existed and were sufficiently quantified or readily estimated, they were included in the mass balance. Because the accretions/depletions term is an aggregate value, it is difficult to assign any meaningful quality to the inflow (no quality is assigned to the outflow, a depletion). Thus, for example, in the J.C. Boyle peaking reach the accretion/depletion enters the river system at the same quality as the river at that point (Stateline). A contrasting example is downstream of Iron Gate dam where each tributary input is assigned temperature and quality attributes (except where noted) because, although often minor, in accumulation these inflows are an important consideration.

Response to Comment S7-22

Please see the Water Resources FTR, which has been updated with additional information. Also see Section E3 of Exhibit E for a detailed discussion on the Project's impact on water quality and PacifiCorp's proposed mitigation measures.

Response to Comment S7-23

4.7.1.1 p 4.9: There were six cross sections used to create the model grid for this reach. Table 4.7-3 is correct. The "River Width" section should read that trapezoidal sections were 1:1 for the junctions and 20:1 at all other locations.

4.7.1.1 p 4.9: Clarification - topographic contours where they cross the river represent the approximate water surface elevation. The assumption that is made is that the bed slope is approximately equal to the water surface slope. This does not pick up micro-topography issues, but is sufficient for the one-dimensional approximation.

4.7.1.1 p 4.10: BC refers to boundary condition

4.7.1.1 p 4.10: Junctions are required in the model to create a branching network. As seen in Figure 4.7-2, the powerhouse returns are represented as small "branches" (one element in length and each element has three nodes) flowing into Link River. Where the branches join Link River in the model, a special "junction" element is necessary. Junctions are used because the flows entering the Link River from East and West Side Powerhouses can make up an appreciable portion of the flow in the river and junctions assist in properly accounting for conservation of mass and momentum to simulate flow and water surface. The two additional elements and the special junction element result in an additional eight nodes in the
4.7.1.1 p 4.10: A-Canal actually leaves Upper Klamath Lake upstream of Link dam and not directly from Link dam.

4.7.1.2 p 4-16: Concerning the rainfall events from 1992: "[C]ontributing drainage basins were delineated on USGS quad maps. Storm water runoff was estimated using Q=CIА" (CH2M Hill and Wells, 1995)².

4.7.1.2 p. 4-30: For model implementation, there were no water quality data available at Keno dam, so upstream values were used to set up the input files and test the model to ensure proper function. Subsequently, the model was calibrated and applied with data from Keno dam.

4.7.15 p 4-36: Water temperatures were compared between the water released from J.C. Boyle to the Klamath River below J.C. Boyle dam, and water released from the J.C. Boyle powerhouse. The figures below illustrate that there is no appreciable heating. During the evening and early morning hours, the powerhouse temperature drops because the flows through the powerhouse are turned off. The temperature reflects leakage through the system. When the power plant is online the temperature trace matches that at J.C. Boyle dam, generally within the resolution of the temperature datalogger (±0.2°C)

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![Temperature Graph](image-url)
Water temperatures released from J.C. Boyle Dam and the J.C. Boyle Powerhouse (2002)

4.7.15 p 4-36: Certain high volume springs can produce waters that are at or near saturation because source waters are well oxygenated with little organic input and little oxygen demand in the geologic matrix. This was assumed for the springs in the bypass reach because both the water quality monitoring, as well as the modeling indicated that the springs were at or near saturation.

4.7.1.6 p4-37: Correct layer thickness is 2 meters.

4.7.1.7 p 4-44: Branch 2 inflow was set to 0.003 cfs (essentially no flow). Thus the inflow quality did not matter. However, this has been updated to reflect more appropriate conditions. The model documentation in section 4 of the Water Resources FTR includes a description of the tributary inputs to Iron Gate reservoir.

4.7.1.7 p 4-40 and 4-44: Equation is the same on both pages, but the description of h is incorrect. $E_{\text{Copco/Iron Gate}}$ should be defined as $E_{\text{Lower}}$ in equation 3 on page 4-40.

4.7.1.8 Figure 4.7-13 Comment noted.

4.7.1.8 Page 4-49: Comment noted.

4.7.1.8 Table 4.7-25: Based on water quality monitoring results from 2000 (Watercourse, 2003), seasonal variations in water quality, possibly due to agricultural activities in the Shasta River, were observed in the sampling data. To accommodate these variations the input data streams were compiled to reflect these observations.

4.7.2 p 4-59: The calibration objective was to minimize differences between observed and simulated values. Visual observation (graphics) were used in combination with summary statistics including bias, mean absolute error, and root mean squared error on an hourly and daily basis. Because the
Klamath Basin overall is not a data rich system, general guidelines were presented to the stakeholder group on target criteria. The goal was to generally have the calibration of mean absolute error less than or equal to: temperature ±1°C, and dissolved oxygen ±2.0 mg/l. The nutrient data was so sparse that these values were not formally calibrated (with the exception of the reach from Iron Gate dam to Turwar), but instead were graphically compared to ensure they were within the expected range given the available field data. Model performance was within these ranges for much of the system, and where deviations occurred they were documented. Simulated nutrients concentrations in most cases corresponded closely with field observations.

4.7.2 Figures 4.7-41 and 4.7-43: Comment noted.

4.7.2 4-98: Results of water quality modeling are provided in the FLA (Exhibit E, chapter E3) and section 4 of the Water Resources FTR. As the modeling framework was being developed and implemented, methods and results were presented and discussed on several occasions with the Water Quality Work Group.

p. 4-30. Water Quality Data. The text states that Lake Ewauna temperature and constituent values were used in the Keno reach. Does this mean the lake Ewauna values were used as input boundary conditions to the reach, or that the values were fixed at the Lake Ewauna values throughout the reach.

4.7.1.5 J.C. Boyle Bypass and Full Flow (or Peaking) Reach

p. 4-36. Water Quality Data. Please explain the basis for the assumption that there is insignificant change in temperature of water passed through the diversion and powerhouse.

p. 4-36, Constituent Concentration. Please explain the basis for assuming that spring inflow is saturated with respect to dissolved oxygen, and for using nitrate and orthophosphate concentrations of 0.15 mg/L.

4.7.1.6 Copco Reservoir

p. 4-37 Section 4.7.1.6, Reservoir Bathymetry. The text states layer thickness as both 1m and 2m. Please clarify.

4.7.1.7 Iron Gate Reservoir

p. 4-44. Please explain why Lake Ewauna concentrations were used for the Branch 2 inflow. What other options were considered and rejected?

Equations 3 (page 4-46) and 4 (page 4-44) appear to be the same formula though the details differ. Please review and reconcile or explain the differences.

4.7.1.8 Iron Gate Dam to Turvar

Figure 4.7-13. The labels are not very clear on this map.

p. 4-49. Numbering on this page is not clear.

Table 4.7-25. Please provide some explanation for the selection of Shasta River NH4 and PO4 concentrations notably different and broken in mid-summer.

4.7.2 Model Calibration and Validation

p. 4-59 The statement regarding successful calibration is not substantiated. At a minimum, the report must include a complete discussion of calibration procedures, results, and an evaluation of the results.

Figures 4.7-41 (page 4-87) to 4.7-43 (page 4-89). The graphs appear to be missing at least one trace of the three listed in the legend. The Lake Ewauna/Keno results appear to be missing from Figure 4.7-41.
Response to Comment S7-24

Substantial information has been added to the analysis of hydrology in section 5 of Water Resources FTR to describe relevant past studies (including Hardy) and existing data.

Response to Comment S7-25

Comment noted.

Response to Comment S7-26

Response to Comment S7-27

Geomorphic reaches were identified from aerial photographs and site visits. At least one study site was selected in each geomorphic reach. One or two study sites per geomorphic reach is adequate to collect basic geomorphic information for each reach. Pebble counts were taken at a great frequency to add to the data collected at each study site.
reach below Copco 2 dam, and five downstream Iron Gate dam a length of 61.5 miles. It is difficult to understand how this limited number of widely spaced reaches can provide a statistically significant sample of the project reaches.

6.4.7.5 Surficial Bed Material Size Sampling and Channel Reconnaissance Throughout the Study Area

This section is the most flawed in this chapter as it starts out with the assumption about high flows that is not justified, and then drops any further study of high flows. The quote is "because of the small size of project reservoirs relative to the river's annual runoff, the Project's reservoirs are unlikely to significantly affect high flows, because the Project's reservoirs are relatively small compared with the river's annual runoff (e.g., Iron Gate reservoir impounds only 4 percent, and Copco reservoir 5 percent, of annual runoff), and because the project reservoirs are not operated for flood control, it is unlikely that the Project's reservoirs significantly affect high flows, except in bypassed reaches". This is not justified as no mention is made of the full impact of all five dams and 9 percent of the annual flow does not take into account the effect that all the dams may have during individual storms especially in drought years when many storms may be picked off before any overflow is possible. Additionally, the report states in the results section, "in late winter and spring, particularly for average to wetter years, the PacifiCorp Project reservoirs are typically full". This indicates that the fall and early to late winter that the reservoirs are filling and do not provide high flows and in under average years to dry years the reservoirs are also not typically full. Both these scenarios indicate there must be a resulting impact to high flow most of the time.

Dismissing the significance of the Project on high flows is a serious limitation of this study but is further compounded by not considering the cumulative effects of the Upper and Lower Klamath Lakes flood control and recoupling in combination with the 5 dams in the Project area. The "Analysis of Project Effects on Sediment Transport and River Geomorphology" is seriously flawed by not considering the Klamath River system above the Project and dismissing the impact of high flows of the 5 dams within the Project.

6.4.9 Bedload and Suspended Sediment Sampling

This section yields little useful information due to a lack of sufficient flows to conduct the study, except at the I.C. Boyle bypass reach. Most of the sections were given a quick touch and put off because the study sites "will be revisited in June 2006 and this analysis will be completed at that point."

The report also states that "it was not feasible in this study to make direct measurements of most sediment sources in the basin, the field team conducted reconnaissance-level surveys and took advantage of opportunities to measure erosion, sediment transport, and deposition." No justification was offered within the report for why it was not feasible to study sediment sources of why "most sediment sources were not of the sort detailed in Reid and Dunne (1996)." This severely limits the usefulness of this section.

6.7.10 Bedload and Suspended Sediment Sampling

Response to Comment S7-28

See revised section 6.7.15.2 of the Water Resources FTR. The FTR examines both flow and sediment conditions that could potentially occur without the Project. The quoted text in this comment was presented as justification for the study design and did not prevent the geomorphology study from assessing the potential impacts noted in this comment.

Response to Comment S7-29

The measured sediment sources were rare and localized, and were included in the sediment budget presented in the Water Resources FTR. (see section 6.7.14). Beyond these measured sediment inputs, direct sediment contribution to the active channel from slopes was extremely small when compared to inputs from tributaries. See section 6.7.12 of the FTR for revised tracer gravel results.
This section states that few obvious sediment sources could be found and then proceeds to list and measure some very significant sediment sources. "Reconnaissance-level examination of aerial photographs and field observations has yielded relatively few obviously active, measurable sources of sediment." This is followed by a list of significant "obvious and measurable sources of sediment." The J.C. Boyle canal emergency spillway "blowout" approximately 1,056,000 cubic ft, a left bank is undercut that produced an estimated 276,000 cubic ft and four gullies that yielded 40,880 cubic ft of sediment. The lack of analysis of these significant sediment sources puts the entire chapter into question. These sources contribute substantial amounts of sediment to the system and must be addressed and discussed in detail in the application.

6.7.1.1 Tracer Gravel Study

Typical of this chapter we have a study which "As of March 2003, tracer gravels have not moved at any of the established tracer gravel sites. Therefore, there are no results to present from this study. However, high flows in late March and April could have mobilized tracers. Tracer sites will be revisited in June 2003 and this analysis will be completed at that point." The number of studies that are put off to the summer of 2003 and are not included in this report make review a moot point.

Water Resources DTR Review – Chapter 8.0 Fall 2002 Macroinvertebrate Monitoring

(Also see comments in Exhibit E...E3.7.3 Fall 2002 Macroinvertebrate Study and E3.3.2.7 Macroinvertebrates)

General Comments

- The analysis of Macroinvertebrate data is incomplete and does not attempt to relate macro findings to project features. There is no discussion in the text of whether conditions are better, the same, or worse upstream or downstream of project features.
- What are the criteria for good vs. bad conditions in relation to macroinvertebrates?
- What constitutes a healthy and diverse population? Literature source, Index of Biological Integrity, Reference Stream, etc for determination?
- (Relating to the above bullet) There is no discussion of whether conditions are good or bad at monitoring locations. The discussions are generally vague and don’t give detail of areas where good conditions exist, or where conditions may be degraded.
- Macroinvertebrate data is not discussed in context with water quality conditions, nor in relation to substrate conditions. There is mention of water quality and substrate, but no discussion on how macro assemblages change with changes in these parameters.
- Many statements are unfounded/unsupported, and need be better explained and supported. Conclusions are made without providing the reader the data, standards, or criteria by which they are reached.
Response to Comment S7-31

See the Water Resources FTR for an updated and more detailed analysis of the fall and spring macroinvertebrate sampling.
The scale of the y-axis needs to be smaller so the relative values of the parameters can be easily determined. Site names need to be added to this figure (see figure 8.7-10 for good example)... or the River miles have no reference points and the meaning of the data by sample site is lost.

Figure 8.7-3, page 8-20
The intention of this figure is very unclear, even with the explanation. There should be another way to present this information, as cluster diagrams are difficult for many people to interpret and understand. A table should be placed along with the graph listing the statistical analysis to display how the figure was created.

Figure 8.7-4, page 8-21
There is no reference to this figure in the text. See previous comment about cluster diagrams.

Page 8-21, "It is apparent that in-channel substrate conditions demonstrate a longitudinal series of changes with elevation." It isn't apparent to the reader. An explanation of substrate condition and how they change with elevation should be placed here to support this statement. Add a table which lists the elevation vs. substrate conditions from site to site so it is clearer to the reader.

Page 8-21, "In contrast, measures of channel erosion, bank stability, and riparian condition do not demonstrate the same geographic clusters (Figure 8.7-3). These factors are more variable by geographic location than substrate characteristics (Figure 8.7-3)." Again, this statement is unsupported in the text. Clarify, discuss, add a table, etc. Figure 8.7-3 does nothing to support the statement for the reader.

Page 8-21, "Water quality conditions did not change appreciably through the study reach during Fall 2002 sampling." This statement is untrue. Temperature and dissolved oxygen vary greatly. What caused these variations? Need to discuss the features in between points of large changes.

Temperature (just two examples here, but there are more... see Figure 8.7-2):
RM 230-220 (19C-12C)
RM 200-180 (16C-22C)
ETC
Dissolved Oxygen
RM 225-212 (8-12mg/L)
RM 190-180 (9-14 mg/L)

Page 8-21, "Some factors, like pH and DO, are expected to be dynamic on a daily basis and the individual, one-time measurements shown in Figure 8.7-2 are not particularly indicative of the station." Where is support for this statement? Need to describe what IS indicative of the station to support statement.

8.7.1.2 Physical Habitats
page 8-22, “The data appear to show effects of the reservoirs on downstream water quality...” How? There should be a discussion to support this statement. Does other water quality data show this too?

Page 8-22, “Nevertheless, despite possible reservoir influences, neither pH nor DO appeared to exceed limits of concern for aquatic invertebrates or fish (Figure 8.7-2).” What are the limits of concern used to make this statement? How do those numbers compare with govt. standards/requirements. Needs discussion/support.

Page 8-22, “For this study, stream water temperatures ranged from 8.5 to 22 degrees C. These single values can not capture the important range of daily, monthly, or seasonal variation.” The values do not enable calculation of MWATs etc, however some of the temperatures at the sampling locations are extremely high (for example 22C). This needs to be addressed. Find literature on suitable/unsuitable temperatures and discuss why elevated temperatures were found at certain locations. What effect do these temperatures have on Macros and therefore food supply for fish?

Page 8-22, “Several important pair-wise comparisons of stations were tested for statistical similarities related to physical habitat as a means of relating patterns to those of macroinvertebrate community structure.” This statement and the paragraph following it, do not contain a discussion of the results of the above tests as they pertain to the macroinvertebrate community structure. Need discussion of results in more than one sentence.

Page 8-22, “The major changes in physical habitat are longitudinal and elevation related (for example, substrate percentages at sites are depicted in Figure 8.7-1.” As was previously requested, an explanation of substrate condition and how they change with elevation should be placed here to support this statement. How does this affect macros?

Table 8.7-1, page 8-22
What standard is used to determine which station has a “higher habitat quality value”. What does this mean for macroinvertebrates? What were macro. results at these stations (to support statement of higher habitat value).

8.7.1.2 Macroinvertebrate Communities
Page 8-23, “When examining the percentages in various functional feeding groups, Fall Creek was the most distinct outlier (Figure 8.7-5).” An outlier in what sense? Show statistically how it was an outlier and how it is different.

Page 8-23, “When comparing sites on the basis of diversity and tolerance indices, the Fall Creek and J.C. Boyle varial zones appeared as distinct groups (Figure 8.7-6).” Again, talk about why and how they are distinct groups. What makes them different from others and the same as each other? Details.

Page 8-26, “The analysis of statistically different metrics by station helps to confirm the cluster analysis results.” Show statistical analysis.
Page 8-26, "Table 8.7-3 shows selected comparisons among reaches and, of those, which reach ranks as "less impaired" (better average condition) as a result of the comparison. Why were those parameters/sites chosen for comparison/presentation? Glad to see an analysis of which reach is "less impaired" for selected parameters, but this doesn't tell the reader whether overall conditions were good or bad at these locations and how project features affect (improve/grade) conditions for macroinvertebrates. Further discussion necessary.

Page 8-27, "When compared among river reaches on the basis of density by major molluscan taxonomic groups, Fall creek had statistically higher numbers of both Pelecypod (snail) and gastropod (clam) species than all other riverine sites (P<0.05, ANOVA)." Is this good/bad? How does this relate to impairment or positive effects of the project on this species' welfare, habitat, etc?

Page 8-29, There is no Figure 8.7-9 in the text.

Page 8-29, The second paragraph on this page summarizes "trends" in macroinvertebrates moving downstream, but doesn't interpret whether conditions are good or bad. What does it all mean? The fact that "EPT index peaks in the J.C. Boyle full flow (or peaking) reaches and gradually declines downriver..." means what? Further analysis of results necessary.

Page 8-29, Are the changes discussed from upstream to downstream statistically significant?

Page 8-29, Where applicable, trend lines should be added to the figures on this and subsequent pages.

8.7.2 Lentic Stations (Reservoirs)
Page 8-32, "Some limited patterns are evident in the reservoir results." Nevertheless, when grouped by reservoir, limited patterns were observable." What were these patterns? They are not discussed here.

Page 8-32, "The invertebrate fauna of Lake Ewauna showed evidence of impairment as compared to the communities of the other lakes. Results are summarized in Table 8.7-4." What was different that may have led to these results and a less diverse community? What standards are being used to determine what is a good vs. a bad community?

Page 8-33, "In general, the fauna from all lakes was dominated by "tolerant" taxa, those taxa judged most tolerant of impaired conditions. The tolerant taxa group was dominated by Chironomid midges in all reservoirs (Appendix 8A, Table 8A-8)." What does this mean...is this good or bad? Further interpretation/support necessary. The prevalence of tolerant taxa would indicate degraded conditions...is this true?
Response to Comment S7-32

General Comments: The SOD study was done specifically to address the needs of the model, as stated in the Study Plan. The results are being used for modeling.

9.4 Methods and Geographic Scope:

The methods and scope balanced geographic coverage and cost. Replicate cores were obtained from each reservoir based on the sediment characterization from the recent bathymetric survey.

9.4.2 Methods: Recent in situ work by the USGS, posted on their web site, are in close agreement with results obtained by PacifiCorp.

9.7 Results and Discussion: Three different measurement techniques were used. Methods are outlined in section 9 of the Water Resources FTR. Text has been modified to address this comment.
program should be evaluated based on the sensitivity of the model to variations in 
SOD rates.

9.4 Methods and Geographic Scope
What criteria were used to select locations and numbers of SOD measurements?

9.4.2 Methods
Please provide an assessment, with references for supporting research, describing the 
comparative accuracy of measurements made on cores vs. measurements made in situ.

9.7 Results and Discussion
page 5-9 third paragraph. Please discuss how the independent verification of anaerobic 
conditions was done.

Response to Comment S7-33
Comment noted. Please see Sections 8 and 12 in the Water 
Quality FTR for a detailed discussion on the fall and spring 
macroinvertebrate sampling.

Response to Comment S7-34
Please see Section E3 of Exhibit E for an updated and detailed 
discussion on macroinvertebrate studies. The FLA addresses 
the Project's impact on water quality and PacifiCorp's 
proposed PM&Es.

Response to Comment S7-35
Comments noted. Section E3.4 has been revised as 
appropriate. Regarding fish passage at Iron Gate and Copco 
facilities, PacifiCorp's fish resources studies (as described in 
chapter E4 of Exhibit E and the Fish Resources FTR) includes 
information on fish passage options, and use of EDT and 
PasRAS models to assess potential anadromous fish 
reintroduction.
Response to Comment S7-36

The text of this section has been modified to provide more clarifying language and thus address this comment. This section dealt specifically with water quality data. Fish migration, spawning, and survival data are dealt with in the Fish Resources FTR and chapter E4 of Exhibit E (Report on Fish Resources).

Response to Comment S7-37

Section E3.5 of Exhibit E has been revised to provide an assessment of how current water quality conditions in the proposed Project area compared to relevant water quality standards or objectives. Barriers to migration are not discussed in this section. PacifiCorp's fish resources studies (as described in chapter E4 of Exhibit E and the Fish Resources FTR) includes information on fish movement and migration, and fish passage options, and use of EDT and PasRAS models to assess potential anadromous fish reintroduction.
Response to Comment S7-38

This section of the FLA has been modified to address the questions and concerns expressed in this comment.

Response to Comment S7-39

Comment noted. This section of the FLA has been modified to address the questions and concerns expressed in this comment.

Response to Comment S7-40

This section of the report has been modified to address this comment.

Response to Comment S7-41

Nutrients are retained in the project reservoirs.

Response to Comment S7-42

Comment noted.

Response to Comment S7-43

Comment noted.

Response to Comment S7-44

This section of the report has been modified in the FLA.
Response to Comment S7-45

Comment noted. This section has been corrected as suggested.

Response to Comment S7-46

An analysis for toxics was beyond the scope of the study plan approved by the Water Quality Working Group and the Plenary. Toxics in fish tissue are the subject of a separate study described in section 10 of the Water Resources FTR.

Response to Comment S7-47

Page 3-142: The models represent sediment oxygen demand through a BOD compartment in the bed model. Similarly, nutrient fluxes are represented in the bed model. These processes could be implemented in the model, but they would act strictly as calibration parameters because there is little or no data to support the models in this respect. Model results (calibration) from Iron Gate dam to Turvar indicate that the existing modeled processes (phytoplankton washout from the reservoirs, benthic algae, BOD, inorganic and organic nutrients, and temperature) capture temporal and spatial characteristics of the system well, both diurnally, longitudinally, and seasonally.

Page 3-143: With the exception of the flow in the J.C. Boyle peaking reach and releases from J.C. Boyle dam and Copco dam, all flow is daily average flow from USGS, USBR, and PacifiCorp. A grab sample on any particular day or water quality probe deployment were assigned the corresponding flow from the USGS, USBR, and PacifiCorp data. Tributaries and other inflows, return flows, diversions, and accretions and depletions are explicitly modeled in the hydrodynamic phase so that at any sampling point an estimate of the sub-daily flow could be made. Flow measurements at main stem sampling
locations (e.g., Stateline, above Copco reservoir, above Salmon River to name a few) was infeasible. One exception to this approach was sampling in the J.C. Boyle peaking reach where morning and afternoon sampling was intended to coincide with off-line conditions and peaking conditions. Attempts were made to coordinate with PacifiCorp operators to capture water quality differences. By and large the sampling efforts were successful (see calibration data).

Page 3-144: All instances of estimated data are documented. In many cases estimated data were for small inputs, such as municipal and industrial inputs in the Klamath Falls area. No formal sensitivity analysis was completed because these discharges - on the order of a few cfs - are small. The system was initially modeled without them, and when added the results were virtually identical. Similar tests were completed on all reaches where "generic" water quality was applied during implementation, and when "actual" data were applied in calibration and application the results did not significantly change. Certain parameters that were essentially absent from the historic data sets include total inorganic carbon (TIC), and the partitioning of organic matter among the dissolved and particulate, and labile and refractory forms. The TIC is currently estimated using an atmospheric equilibrium model. The organic matter partitioning assumptions were, to some degree addressed in parameter sensitivity testing of decay rates because this affects partitioning in the system. The models showed moderate sensitivity to these parameters.

Page 3-144-145: For 2000 and 2001 there are complete data sets only for Klamath Falls and Yreka (partial). There are some air temperature data for the lower river (near river locations), but no complete data sets are available. Although there are new stations at Iron Gate reservoir, Copco reservoir, and a station at Weitchpec, these stations were not placed in service until after 2001. To maintain the ability to create a comparable set of scenarios, the decision was made to adopt the long-term station at Klamath Falls and modify the data on a reach-by-reach basis.

Page 3-145: Analysis of similar river systems have shown that the Klamath River is sufficiently wide that the impacts of riparian shading are minimal in most reaches. For riparian shade to be effective, persistence in shade-providing capability is important. Further, especially in the Klamath River below the Scott River, the hydrology and geomorphology create an adverse environment for woody riparian vegetation to persist and dominate near-shore areas, and thus shading opportunities are restricted.

With respect to nutrient assimilative capacities of vegetation, there was no attempt to model hyporheic flow or near-shore shallow groundwater exchange that would be necessary to address nutrient update by riparian vegetation (either herbaceous or woody).

Page 3-145: Results of water quality modeling are provided in the FLA (Exhibit E, chapter E3) and section 4 of the Water Resources FTR. As the modeling framework was being developed and implemented, methods and results were presented and discussed on several occasions with the Water Quality Work Group.
Gerber Reservoir and Clear Lake have little impact on monthly or annual flow quantities; i.e., monthly or annual flow quantities in the Klamath River would be similar with or without Gerber Reservoir and Clear Lake. KPOPSIM results are discussed in section 5 of Water Resources FTR. Substantial information has been added to the analysis of hydrology in the FLA (Exhibit E, chapter E3) and section 5 of Water Resources FTR, including analysis based on hourly data. Water years for this data has been clarified.

Response to Comment S7-49

Comment noted.