California Department of Fish and Game
601 Locust Street
Redding, California 96001
(530) 225-2363

June 6, 2004

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

Mr. Toby Freeman
PacifiCorp
825 N.E. Multnomah, Suite 1500
Portland, OR 97232

Dear Ms. Salas and Mr. Freeman:

Additional Study Request
PacifiCorp's Final Application for New Major License
Klamath Hydroelectric Project, Federal Energy Regulatory Commission (FERC) Project No. 2082

The California Department of Fish and Game (DFG) respectfully submits the following additional study request in response to the February 23, 2004, final license application (FLA) prepared by PacifiCorp (Licensee) for the Klamath hydroelectric project (Project). This request is based upon a review of the FLA and submitted to FERC and the Licensee in accordance with Section 4.32(b)(7), Title 18, Code of Federal Regulation (CFR).

General Comments

As the DFG noted in our September 19, 2003, comments on the Licensee's draft license application (DLA), the data presented thus far are insufficient to identify project impacts and subsequently make informed recommendations regarding license conditions. While the FLA is a large document (over 7,000 pages), it fails to identify several significant project impacts and to propose appropriate protection, mitigation, and enhancement (PM&E) measures. We conclude that the Licensee has seriously underestimated the resources necessary to characterize the existing environment, identify project impacts, and develop appropriate license conditions.

In responding to our comment that the DLA lacked a discussion of Project impacts and PM&E measures, the Licensee explained that without sufficient

information they cannot justify proposing changes to the existing Project and, absent information to the

contrary, existing facilities and operations are deemed appropriate (Exhibit E-1A, Appendix B, Second Stage, page 35). DFG cannot concur with this approach. In the absence of new information revealing unexpected benefits of proposed project facilities and operations, we conclude there is ample evidence of severe impairment of aquatic resources in the Klamath watershed resulting from the Project and advocate a significant rebalancing of priorities in the next license.

Another general issue discussed in our September 19, 2003, letter that unfortunately continues to apply is the misrepresentation of the collaborative process. The Licensee lists the number of meetings they have hosted as evidence of significant effort on their part as well as a justification for delays in their untimely completion of necessary studies. However, the magnitude of "PacifiCorp's Consultation Efforts" (Executive Summary (ES) Section 2.2) must be viewed in comparison to the even larger effort expended by the stakeholder groups which have actively participated in the 178 meetings hosted by the Licensee over the past 3 years. The continued investment of scarce resources by core stakeholder groups to participate in this semicollaborative process speaks to the importance of the Klamath watershed to agencies, tribes, and nongovernmental organizations. As an active participant in PacifiCorp's consultation process and witness to the collective effort of other participants, the Department is disappointed in the lack of progress on critical and fundamental resource issues such as fishery assessment and fish passage. We intend to continue to participate in the process in the hope of assisting the Licensee to fulfill their commitments to perform appropriate studies and analyses but we cannot describe the consultation experience to date as satisfactory.

Specific Comments and Study Requests

The DFG's specific comments on the contents of the application and our additional study requests generally follow the same order as the exhibits and reports provided by the Licensee in the application. In the interest of providing timely comments of a (somewhat) reasonable length, we have limited our comments and study requests to aquatic resources.

Water Use and Quality

Comments

The FLA identifies the operations of the US Bureau of Reclamation (USBR) and the Klamath Irrigation Project as primarily responsible for determining instream flow both within and downstream of the hydro Project (ES pages 3-1 and 2). The Licensee avoids accepting any responsibility for

determining an appropriate hydrologic regime within or downstream of the Project. Explicit in this approach is the assumption that current administrative obligations between the Licensee and the USBR as well as the biological opinion issued by the National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries) will remain in effect for the duration of the next license term. Given the length of the next license term and the volatile nature of interagency agreements in the Klamath basin, this is an inappropriate assumption.

The basic hydrology of the Project area of impact receives only cursory discussion in the Executive Summary (ES). The only hydrologic impact mentioned in the "Assessment of Project Impacts" (ES page 3-7) involves the flow fluctuations associated with peaking operations in the river reach downstream of the J. C. Boyle powerhouse. The FLA concludes that a modification of peaking operations may be necessary to mitigate for the unproductive varial zone created by flow fluctuations but also notes that the relevant instream flow and peaking impacts studies have yet to be completed (page ES 3-9). The FLA depicts limited operational modeling that does not even include an analysis of the flow regime proposed by the Licensee, much less a comprehensive range of operational scenarios. Without an evaluation of a meaningful range of hydrologic options, it will not be possible to develop license conditions that provide for a balance between power generation needs and natural resource benefits.

An appropriate hydrologic analysis should cover a wide range of operational scenarios to identify how the Project could be managed to mimic a more natural historic regime given non-Project constraints within the watershed. In response to our September 19, 2003, request for this information, the FLA argues current Project flows establish the "baseline" and understanding the unimpaired hydrology of the system is "not appropriate" for a FERC relicensing (E-1A, Appendix B, Second Stage, page 40). We disagree. Understanding the complete, unimpaired hydrologic context in which the Project exists is fundamental for determining flow-related impacts on both resident and anadromous fish populations and for developing optimal flow regimes for spawning, incubation, emergence, and migration of native salmonids. In addition, stakeholders need an operational model to explore possible hydrologic options and associated power benefits that could be realized in a new license.

The appendices of the Water Resources Technical Report (WRTR) contain a large amount of raw water quality data, particularly for temperature and dissolved oxygen. However, model outputs for nutrients, ammonia, and pH are still pending. Delays in receiving the complete data set are compounded by the need to process this large amount of information in a compressed time frame.

While we appreciate the water quality information provided in the FLA, it is unfortunate that, given the delayed release, there is very little accompanying analysis to facilitate independent analyses. We had anticipated that the data would be released in conjunction with technical memoranda providing meaningful context. The FLA analysis is limited to a narrative comparison between summary plots of select data with no interpretation of how current or modeled water conditions would impact natural resources. For example, while the FLA notes that Lake Ewauna/Keno Reservoir has highly impaired water temperature, dissolved oxygen, and nutrient levels, there is no discussion of how Project operations or facilities contribute to this problem. In fact, the ES impact section makes no reference to Project impacts on water quality above J.C. Boyle (page 3-7). The only change in Project operations at Lake Ewauna/Keno Reservoir proposed within the water quality section is to exclude the Keno development from the relicensed Project as it does not provide substantial generation benefit. The FLA presents these two concepts:

- that water quality in Lake Ewauna/Keno Reservoir is highly impaired and there is no ability to generate power at Keno dam
- and then, moves to downstream water quality issues as if there was no obligation to determine the Licensee's impacts on this portion of the ecosystem and no obligation to develop appropriate PM&E measures.

The Department cannot concur that a lack of power benefit justifies excluding the Keno development from regulatory oversight. Even if the Licensee declines to admit it, basic limnological principles predict that the impoundment of eutrophic water, such as that released from Upper Klamath Lake (UKL), in a shallow, low velocity reservoir (such as Keno), will result in impaired water temperature, dissolved oxygen, and nutrient levels during warm weather. As the owner and operator of the Keno development, it is clearly the Licensee's responsibility to mitigate for this severe and ongoing impact of their Project.

A similar omission of Project impacts and appropriate PM&E measures occurs for each of the downstream Project reservoirs (i.e., J. C. Boyle, Copco 1 and 2, and Iron Gate). One brief conclusion that is presented in the modeling section compares existing dissolved oxygen conditions with predicted, without Project (WOP) conditions. The FLA suggests that the Project reservoirs enhance water quality by delaying transit time and allowing the high nutrient load of the Upper Klamath River to settle out within the Project (WRTR, pages 4-84 through 91). This theory of Project reservoirs serving as vital nutrient sinks trapping a large organic load is not borne out by either the bathymetry study results (WRTR Section 6.7) or the reservoir sediment core sampling (WRTR Section 9.7) which indicate minimal trapping of sediment overall and a relatively low organic content in the sediments which do accumulate.

The water quality modeling section also predicts drastic dissolved oxygen swings initiating around river mile 185 (near Hornbrook), in the WOP scenario, presumably from the sudden initiation of photosynthetic activity in a hypereutrophic river (WRTR Figure 4.8-70). Again, this theory of river function is not borne out by existing water quality data which illustrate an ongoing tendency for the free flowing sections of the river to approach saturation due to both mechanical aeration and nutrient assimilation from attached algae (WRTR page 4-31). As the FLA notes, an improved daily mean dissolved oxygen level is "expected in a riverine environment compared to a lake-like environment" (WRTR page 4-34) and "local lake phytoplankton species will not fare well in river reaches" (WRTR page 4-35). The FLA does not provide a description of the model assumptions for nutrient dynamics under a WOP scenario but we suspect that the result illustrated in Figure 4.8-70 is an artifact of the modeling process that seriously underestimates the assimilative capacity of a free flowing Klamath River.

Beyond the hypothesis that the Project "benefits" water quality by delaying the transit of nutrient rich water, the FLA also notes that the Project reservoirs cause a dampening of temperature extremes in the river below Iron Gate Dam (IGD) as far downstream as Seiad Valley (WRTR page 4-79). The dampening of extremes is caused by the greater thermal mass of the reservoirs as compared to a free flowing river. The biological significance of this "benefit" is not discussed in the FLA. While it is true that daily mean water temperatures approaching 20°C or more serve as an indicator of adverse conditions for most salmonids, it is important to note that Klamath fish stocks evolved in a relatively warm and nutrient rich environment and exhibit unusual tolerances for higher temperatures.

Currently, there is no numeric water temperature objective within the North Coast Regional Water Quality Control Board's (NCRWQCB) Water Quality Plan for this portion of the Klamath River but rather a generic narrative objective that reads, in part; "[t]he natural receiving water temperature of intrastate waters shall not be altered unless it can be demonstrated to the satisfaction of the NCRWQCB that such alteration in temperature does not adversely affect beneficial uses. At no time or place shall the temperature of any COLD water be increased by more than 5°F above natural receiving water temperature." (NCRWQCB, 2001, pages 2 through 3-4.00). The Figure 4.8-57 which illustrates the dampening of temperature extremes and also illustrates repeated instances of the Project increasing mean daily water temperature by as much as 5°C (or 9°F) above the WOP condition at IGD throughout late summer and early fall. This thermal lag apparently violates the NCRWQB temperature objective and occurs during the critical migration and spawning season for fall Chinook. Additionally, there is a similar thermal lag during the late winter and early spring

incubation and rearing time period. Figure 4.8-57 illustrates mean daily water temperatures under the exiting Project to be lowered by as much as 5°C in comparison with the WOP condition starting around March 1 and throughout the spring. This unnaturally cool water, contrary to providing a "modest benefit" as purported in the FLA (WRTR page 4-79), actually may prolong incubation, delay hatching and emergence, slow growth rates, and delay smoltification and the onset of out-migration of anadromous species. This alteration of natural receiving water temperature should be considered a potentially adverse and a Project impact.

To address water temperature impairment below IGD the FLA describes a "potential measure being considered" (ES, page 3-8), namely implementing a low-level release of cooler hypolimnetic water from Iron Gate Reservoir during the summer. The FLA concludes that the benefit of the low-level release would be limited in temporal and geographic scope and then defers further evaluation of this proposal until the Section 401 water quality certification process. Given the information provided to date, we tend to concur that the low level release option has limited temperature benefits. We also want to emphasize that a low-level release structure would likely jeopardize the cool water supply for the Iron Gate Hatchery at a time of year when water temperature already approaches marginal conditions in many years (Kim Rushton, Hatchery Manager, personal communication). We request that further evaluations of this option clearly consider the need to provide a reliable cool water supply for the hatchery. Beyond temperature enhancement, it is unclear what other water quality results the Licensee predicts would occur with a low-level release. A corollary proposal to oxygenate the hypolimnion of Iron Gate Reservoir indicates that dissolved oxygen is also a target water quality parameter of this measure. However, the FLA does not describe the magnitude of dissolved oxygen benefit, predict the period of oxygenation, nor estimate the downstream geographic scope of the expected benefits. More elaboration is needed to describe the full range of resource(s) issues associated with implementation of a low-level release and hypolimnion oxygenation measure.

A significant water temperature impact of the Project which the Licensee continues to omit from the current Project description is the inundation and isolation of coldwater refugia. In response to our DLA comments, the Licensee merely notes "[t]he value of cold water refugia for fish is being discussed as part of on-going modeling efforts" (E-1A, Appendix B, Second Stage, page 39). Such a nonresponse exemplifies the lack of meaningful discussion and progress under

the Licensee's current relicensing strategy. As early as January 2002, at Water Quality Workgroup meetings, the DFG and other stakeholders have repeatedly brought up the need to:

1. identify coldwater refugia within and downstream of the Project
2. identify how current Project facilities and operations impact these refugia
3. model how different Project facilities and operations could enhance access to and benefit of these refugia.

The consistent response from the Licensee and their consultants has been, "that's a good question, but we will be unable to answer it with the water quality model." For over two years they have "discussed" this issue without proposing a study or analytical approach to address this important information gap.

Since the FLA declines to expand on the topic, for the record, thermal refugia are essential for the survival of anadromous species with life histories that include holding in the main stem during the warmer months (e.g., spring-run Chinook and summer steelhead). Coldwater refugia on the Klamath are found not only in tributaries such as Jenny, Fall, Shovel and Spenser creeks but in the main stem springs documented in the J.C. Boyle bypass reach today and described historically in the Copco area prior to 1910 (Boyle, 1976). The geographic extent of main stem springs appears to have extended downstream of Copco as indicated by the presence of spring-run Chinook in at least one pool below the Copco facilities pre-IGD (Michael Belchik, Yurok Fisheries Biologist, personal communication). Once IGD was completed in 1962 and access to thermal refugia (both tributary and main stem springs) was blocked, the spring-run Chinook population downstream of the dam began a serious decline. By 1980 the Iron Gate Hatchery stopped trying to trap spring-run adults due to almost nonexistent returns. Today, the mouth of the Salmon River (over 130 miles downstream of IGD) marks the upper limit of a remnant spring-run population in the Klamath River. Based on the timing of the decline of the spring-run population below Copco, it is reasonable to conclude that the presence of the Project dams and reservoirs and the associated loss of access to thermal refugia constitute a significant impact on the health and distribution.

A final water temperature comment concerns the apparent inaccuracy of predicted temperatures during the winter. The WRTR water quality modeling results (Section 4.8) frequently depict temperatures of 0°C or less under both existing conditions and the WOP condition from Keno Reservoir down to below IGD under the 2000 and 2001 meteorological conditions beginning around the end of November through February. Given the understandable focus on adverse water temperatures in the warmer months, we suspect that the winter water

temperature data did not receive the same degree of scrutiny and still needs to be calibrated. However, an important consequence of not correcting winter temperature data is that the water quality information will be used to support fish habitat modeling efforts. Relying on the uncalibrated data could cause the "Ecosystem Diagnosis and Treatment" (ETD) model to seriously underestimate fish production in the watershed.

Additional Study and Information Requests

Based on the above comments, DFG requests at a minimum, FERC require that the following studies be implemented and the associated information be provided to stakeholders as soon as feasible.

1. Hydrologic Modeling and Analyses

A complete operational modeling effort is necessary to provide a basis for developing appropriate Project operations that minimize impacts to aquatic and riparian resources while providing Project generation. Current and potential Project hydrology is also necessary to understand and integrate other study results such as the fish resource assessment and water quality studies. Subsequent to describing basic operational flexibility, the Licensee must also perform an analysis to assess the impacts of current Project operations. DFG and other stakeholders continue to request that the Licensee apply the "Indicators of Hydrologic Alteration" (IHA) method developed by Richter et al. (1996) to provide this information. The IHA approach is a standard methodology frequently employed to understand hydrologic processes in relicensing proceedings in California including the Pit 3, 4, and 5 Project (FERC No. 233), the Mokelumne Project (FERC No. 137), and the Stanislaus Project (FERC No. 2130).

2. Explanation of Water Quality Modeling Assumptions and Inputs

In general it is unclear what assumptions were utilized by the model in describing the WOP. The WRTR Appendix 4A has a brief section on "Model Application" (page 282 through 286) describing how the geometry, meteorology, hydrology, and operations were adjusted to create a WOP scenario. The only description of how water quality processes were adjusted for the WOP is one paragraph describing why there would be little SOD in a free flowing system due to scour. There is no discussion of other WOP phenomena that could influence water quality such as mechanical aeration, attached algae assimilation, riparian shading, or wetland filtering. Given the likelihood that a model artifact may be

involved in the unusual magnitude of dissolved oxygen swings predicted under the WOP scenario, a better understanding of model assumptions is essential. We request that additional information be provided describing how the WOP was defined, particularly from a nutrient chemistry perspective. We also request calibration of water temperature from November through February.

3. Additional Water Quality Modeling Runs

To guide development of appropriate PM&E measures addressing water quality impacts of the Project, once the model assumptions and inputs have been clarified and receive general concurrence from the Water Quality Workgroup, we request additional water quality model runs be performed. Since the Licensee has already made the initial investment in developing the water quality model and the model has been utilized to make preliminary runs, additional runs should entail reasonable cost. We also refer to numerous Water Quality Workgroup meetings where a range of different scenarios was proposed for analysis. We were repeatedly informed that, due to time constraints, the first set of water quality modeling runs would be limited to "side-board conditions" of the existing condition and the without Project condition. It is now time for the Licensee to follow through and perform additional, more incremental runs.

Given the FLA's proposed FERC boundary changes, one additional set of model runs should focus on the consequences of different operational scenarios involving the Keno development. In particular, the DFG requests a model run that includes drawdown of Keno Reservoir during likely periods of water quality impairment. We also request a run simulating relocation of Keno dam as far upstream as feasible while still maintaining the ability to provide stable reservoir levels for irrigation purposes. Additionally, given that the primary purpose of the Keno development is nonpower, we request a WOP model run that removes all Project facilities except Keno since there may be a compelling reason to allow that one facility remain to benefit regional irrigation interests.

We also request model runs that utilize reasonably foreseeable restoration of water quality in the upper basin as a boundary condition. At a minimum, current water quality values should be replaced with the restored values expected to be obtained during the ongoing total maximum daily load (TMDL) process to approximate a "restored WOP" condition. Another operational scenario that has been proposed for analysis numerous times in both the fish passage and Water Quality Workgroups is a hybrid that removes all of the California facilities but leaves the Oregon facilities in place. One important assumption associated with such a scenario is that peaking operations at the J. C. Boyle facility would cease. We request that a "California WOP" condition also be analyzed for potential water quality implications.

Finally, given that the full set of water quality modeling runs performed to date has yet to be released and that there have been no technical memoranda provided to facilitate independent analyses, we request the option to pursue additional runs as appropriate in the future.

4. More Complete Description of Proposed Water Quality Enhancement Measures

Given the level of detail provided to date, the proposed water quality enhancement measures under consideration only add to the confusion of trying to analyze Project impacts and develop appropriate PM&E measures. We are particularly interested in knowing the complete suite of water quality consequences and associated biological benefits (or impacts) predicted by the water quality model. Without this broader context it is not possible to evaluate the proposals and offer meaningful input.

5. Development of a Recommendation for a Numeric Water Temperature Objective for the Klamath River below Iron Gate Dam

Staff from both NCRWQCB and the State Water Resources Control Board (SWRCB) have previously requested the Licensee develop a recommendation for a numeric water temperature objective. The purpose of developing information in support of a numeric objective would be to provide resource agencies with an important tool for evaluating the effect of various Project PM&E measures on downstream fish populations. Based on the contradictory information provided in the FLA on impacts of the Project on water temperature below Iron Gate (i.e., dampening mid-summer maximums while delaying spring warm up and fall cool down) and given anecdotal information indicating unusual temperature tolerances in Klamath fish stocks, we concur that a numeric water temperature objective for the Klamath River is essential to guide development of appropriate recommendations.

6. Investigation of Coldwater Refugia Within and Downstream of Project

In addition to needing a better understanding of the general temperature requirements of Klamath River fish, DFG considers investigation of thermal refugia location and use within the Klamath as a critical information need. Currently, employees of both the US Fish and Wildlife Service (USFWS) and the Yurok Tribe have inventoried thermal refugia in the lower river and are implementing a radio tagging study to monitor migratory adult salmonids in the Lower Klamath River (Michael Belchik, Yurok Tribal Fishery Biologist, Personal Communication). The purpose of the study is to increase understanding of the

ecological role of thermal refugia during stressful water quality conditions. The Licensee should be supporting and expanding upon the geographic scope of these efforts to help describe the "value of cold water refugia for fish" instead of just hosting discussions. Additionally, the Licensee should inventory the cool water resources within the Project boundary by reviewing historic maps and conducting a thorough literature review. This information could then be utilized to develop appropriate PM&E measures to facilitate optimal access to and benefit of thermal refugia.

Fish Resources

Comments

The fish resource sections of the FLA have the same fundamental flaw as the corresponding sections of the DLA, namely reliance on a number of incomplete and inadequate studies, including fishery assessment, out-migration of juvenile salmonids, fish passage evaluation and planning, hatchery assessment, and entrainment. There are also several incomplete flow studies with significant fishery implications. Following the theory that a lack of data signifies a lack of impacts, the FLA offers a limited assortment of "enhancements" including minimal to no increase in current bypass flows, a capping of peaking flow fluctuations at 1,400 cubic feet per second (cfs) per day, an experimental surface collection system at the J. C. Boyle reservoir, and construction of a mass-marking facility at the Iron Gate Hatchery. We want to acknowledge the mitigation measures proposed for Shovel, Negro and Fall Creek, tributaries in the California portion of the Project. These PM&Es include increased in-stream flows and screening and laddering of diversions. Upon initial evaluation these measures appear reasonable, worthy of further discussion, and a positive illustration of collaborative progress. Unfortunately, in the context of the entire Project, these tributaries are minor components and cannot compensate for the lack of meaningful progress elsewhere.

As the FLA neglects to mention several impacts of the Project on fish resources and limits the scope of proposed enhancements, we feel obligated to mention the following impacts. The continued presence of three Project dams in California lacking any passage facilities blocks access to more than 300 miles of migration, spawning, and rearing habitat for salmon, steelhead, and Pacific lamprey. All species of anadromous fish in the Klamath Basin have been on a general decline for much of the past century and this decline coincides with the construction of the Project. Existing Project operations and facilities also impact the surviving resident fish populations by seasonally exacerbating impaired water quality conditions, impeding migration, stranding, entrainment, limiting spawning and rearing habitat, depleting the macroinvertebrate prey base, eroding streambanks, and diminishing stream margin habitat.

The Fish Resources Technical Report (FRTR) provides a literature review of past fish assessments but cites only a limited number of the historic accounts available on this topic. The DFG considers the historic account presented in the FLA to be not only limited but biased. In particular, we object to the statements that "[t]he primary anadromous fish species historically using the Upper Klamath River basin above Upper Klamath Lake was Chinook salmon" and that the spring-run Chinook salmon in the upper basin was gone "before the time when white men came to the area." (FRTR page 2-34). Based on our current understanding of anadromous life histories in general and the Klamath stocks in particular, we would counter that both steelhead and spring-run Chinook would have been well adapted to utilize the resources of the Upper Klamath Basin up until the construction of Copco 1. We refer to three historical references not cited in the FLA, "Salmon of the Klamath River California," (Snyder, 1931) "The Copco Dams and the Fisheries of the Klamath Tribe" (Lane and Lane, 1981) and "Pristine Production of Anadromous Salmonids – Klamath River" (D. W. Chapman, 1981) that give support to an alternative conclusion that healthy steelhead and spring-run Chinook populations occurred in the Upper Klamath Basin prior to the construction of the Project. We also object to the treatment of conflicting eyewitness accounts involving salmonid identification in the early 1900s. The Licensee chooses to interpret a lack of precise taxonomic expertise in 1900 as "no conclusive evidence that steelhead trout ever existed above Upper Klamath Lake" (FRTR page 2-34). One could argue just as effectively that there is no conclusive evidence that steelhead were <u>not</u> present above UKL. As a consequence of the limited historic review, the FLA lacks a thorough discussion of the impacts of the Project on historic native fish distribution and abundance, a significant issue not only for the DFG but virtually every other stakeholder in this relicensing as well. To provide a more balanced perspective on estimating the range of both historic and current anadromous fish habitat above IGD, we reference the recent technical April 9, 2004, memorandum prepared by Clearwater Bio Studies, Inc., for the Klamath Tribe.

The fish sampling and analyses performed by the Licensee are inadequate. The FLA presents only one full year of fishery assessment data (along with a limited pilot study) that is characterized by an inconsistent effort across different habitat types and seasons. The Licensee continues to decline to collect even a second year of fishery data or utilize standard fish sampling methodologies (E-1A, Appendix B, Second Stage, page 41). Given that the fish assessment lays the foundation for many subsequent analyses, including fish passage, instream flow, and water quality studies, the lack of a statistically valid description of the current fish community within the Project area of impact will

undermine multiple efforts to document Project impacts and design appropriate PM&E measures. Reliance on this flawed fish assessment dataset has already resulted in serious underestimation in the FLA of Project impacts concerning spawning, rearing, growth, and migration.

The Project controls the instream flow regime of approximately 45 miles of the Klamath River within Oregon and over 18 miles within California. Low flows and peaking operations affect both bypass reaches and peaking reaches within the Project area of impact. There are no FERC mandated minimum streamflow requirements in Project bypass reaches except for below the J. C. Boyle Dam where a total of 100 cfs is released via the fish ladder, screened bypass, and dam leakage. Artificially low flows reduce available fish habitat and exacerbate water quality problems. In the case of the J. C. Boyle and Copco 2 facilities, Project operations essentially dewater the majority of stream channel between the dams and the powerhouses. Fish that attempt to enter these bypass reaches face substantially altered river characteristics.

In addition to lowering flows in bypass reaches, the Project significantly impacts the instream flow regime during peaking and ramping operations. Currently licensed Project manipulation of flow reduces habitat, strands fish, diminishes stream edge habitat, and reduces macroinvertebrate productivity in impacted reaches. Peaking also causes bank erosion and can detrimentally affect the extent and character of riparian vegetation. In the absence of mitigation the combined Project impacts of dewatering and peaking operations will continue to degrade aquatic and riparian habitat and water quality.

Department representatives have worked extensively with the Licensee in an effort to collaboratively develop an instream flow study plan to document flow-dependent impacts of the Project. In general, there has been consensus on the approach used in the flow data collection performed to date. However, the analytical effort is not complete. Habitat suitability criteria are yet to be finalized and neither the two-dimensional (2D) modeling nor the bioenergetics study results have been presented. These last two analyses will be particularly important for interpreting the effects of Project peaking operations on fish resources.

In addition to the pending peaking analyses, important field data still needs to be collected to accurately characterize macroinvertebrate drift. Macroinvertebrates are an important food resource for fish, in particular macroinvertebrates drifting in the water column. The FLA describes a macroinvertebrate drift sampling effort that occurred only once at one location without replication. Based on this scanty effort the Licensee could not determine

whether the drift patterns and densities observed were due to Project peaking flow changes. Following the (inappropriate) theory that the burden of proof is on the resource and not the Licensee, the FLA concludes that peaking must not be an important impact on macroinvertebrate abundance or richness (FRTR, page 8-39). In contrast, based on our understanding of preliminary bioenergetics modeling results (not presented in the FLA), low invertebrate drift rates may well be limiting fish growth in the J. C. Boyle peaking reach.

Another weakness in the peaking analysis involves the definition of the varial zone. In the FRTR Section 6.0, the Licensee presents a "Quantification of Varial Zone" analysis based on changes in wetted perimeter. However, the run-or-river flow scenarios this wetted perimeter analysis utilizes represent neither an existing condition nor a proposed Project operation. The analysis is, therefore, irrelevant and cannot produce appropriate comparisons or conclusions. Together the incomplete macroinvertebrate draft sampling and inappropriate varial zone definition seriously handicap the FLA assessment of peaking impacts.

While acknowledging the need to understand flow impacts within the Project boundary, the Licensee has declined to perform any instream flow evaluations downstream of IGD citing a lack of responsibility, a lack of control, and the existence of previous flow studies. As mentioned in the hydrology section, DFG disagrees with the argument that, due to the activities of other parties in the watershed (particularly the USBR), the Licensee has no obligation to identify appropriate instream flows and operate the Project to the best of their ability to meet those flows. We are unaware of any FERC license that does not include an instream flow release requirement as a primary PM&E measure and cannot envision a new license that abdicates all responsibility for flow management to non-Project entities. In the case of the Klamath River basin, current regulation of flows out of Upper Klamath Lake by the USBR is very dynamic and any assumptions regarding future releases are subject to substantial error. It is inappropriate to ignore the Licensee's responsibility to actively participate in investigations to develop long-term solutions to flow issues in the Klamath River watershed.

In response to the Licensee's assertion that they have limited storage and, thus, an insignificant amount of control over downstream flow, we concur that the current active storage at the facilities is relatively small (i.e., around 6,000 acre-feet (ac-ft) for Copco 1 and less than 4,000 ac-ft for IGD). However, this limited storage is a result of current structural constraints. Installation of low-level release structures and reoperation of the reservoirs could access the total storage capacity of these reservoirs which, at 77,000 and 59,000 ac-ft respectively, have the potential for providing a significant amount of sustained

flow to meet the needs of downstream resources. Together these two reservoirs could sustain a minimum release of 710 cfs, independent of USBR inflow, for almost 3 months. In response to our DLA comments the Licensee asserted that "deep or complete reservoir drawdown is not necessary to meet instream flow needs." (E-1A Appendix B, Second Stage, page 43). Beyond this statement, the FLA provides no rationale for how the Licensee determined was unnecessary to fully explore their role in providing for the instream flow needs below IGD. Given that the overadjudication of water resources in the Klamath Basin continues to receive national attention on a regular basis, we do not agree that investigation of periodic reservoir drawdown and associated resource benefits is unnecessary.

The DFG also asserts that, while an instream flow study has been performed in the Klamath River below IGD (i.e., the 2001 Hardy Phase II Report), the goals and objectives of previous work were not designed to support a new FERC license application. In addition, the USBR has declined to adopt the flow regime recommended in the Hardy Report. Instead, the USBR is currently operating the Klamath Irrigation Project consistent with the May 2002, BO issued by NOAA Fisheries which has substantially different minimum flow requirements than those recommended by the Hardy Phase II Report. The difference in the Hardy Report objectives as well as the decision by the USBR not to implement the Hardy recommendations, limits the applicability of this work to this relicensing.

One reason the Hardy Phase II Report by itself is insufficient is that the report focuses on the relationship between flow and habitat suitability criteria (HSC). The report did not address passage issues such as how much flow is necessary to trigger upstream migration of salmonids. The Hardy Report assumes that the recommended flows based on HSC would be more than sufficient to provide unimpeded passage. However, with the implementation of significantly lower flows based on the 2002 BO instead of the Hardy Report, this assumption was invalidated. In the wake of the 2002 fish kill in the Lower Klamath River, it is of great concern to the Department to understand the relationship of flow and passage at critical points below IGD such as Coon Creek and Ishi Pishi falls (see the Department's 2003 preliminary fish kill analysis). The Hardy Report has no information on what flows block passage, what flows delay passage, and what flows provide unimpeded passage. Answers to these critical questions cannot be found in any existing instream flow study. Furthermore, solutions to these passage problems could well be found within the current storage capacity of the Licensee's reservoirs, not to mention the enhanced range of storage which could be created through the new release structures recommended previously.

The fish passage portion of the FRTR begins with a section entitled "Previous Reviews of Anadromous Fish Introduction to the Upper Klamath Basin." (FRTR page 7-2). The section summaries excerpts from the Fortune et al. Report (1966), an Upper Klamath River Basin Amendment to the Long Range Plan prepared by the Klamath River Basin Fisheries Task Force (1992) and the Oregon Department of Fish and Wildlife (ODFW) Klamath River Basin Fish Management Plan (1997). While these are certainly relevant documents, the FLA presents a narrow and biased summary of their conclusions. We believe that a broader context of the excerpts is essential to evaluating their applicability to the current relicensing effort. This FLA review is pivotal as the Licensee chooses to rely on it "to assess whether re-establishment of sustainable runs of anadromous fish in the Upper Klamath basin could be achieved by constructing fish passage facilities" (FRTR page 7-2). In other words, based on a selective review of three sources, the Licensee makes a unilateral decision as to whether or not they should mitigate for a direct impact of their Project of the anadromous fish resources of the Klamath River. They conclude that providing appropriate fish passage for anadromous species is not worth the cost (to them) and offer no solutions for the lack of passage at the three California main stem dams. Given the resource implications of this reasoning, we feel it is necessary to supplement the administrative record provided by the Licensee with a more comprehensive and balanced analysis of the three subject reviews.

While the interagency steering committee which commissioned and reviewed the "Fortune Report" did eventually advise against reintroduction of anadromous fish runs to the Upper Klamath Basin in 1996, the on-going barrier to passage created by the Project's three main stem dams in California was the major factor behind this recommendation. As the steering committee minority recommendation from the Fortune Report summarizes:

> The findings of the steering committee, based on the above report, indicate that it is biologically feasible for spring Chinook salmon and steelhead trout to be re-established in the Upper Klamath Basin, since both species migrate at such times that the water temperature and dissolved oxygen content of the waters of this basin would be satisfactory.
>
> It also appears that there is ample spawning area available and that there is little or no question regarding the suitability of the basin for a spawning area for spring Chinook salmon and steelhead.

> The Study indicates that there is no biological problem with the reestablishment of steelhead and/or Chinook salmon as far as Keno at this time and, in all probability, as far as Upper Klamath Lake in the State of Oregon. The basic problem is physical, and that is the existence of three dams constructed by a public utility in the State of California with no fish passage provided.

In terms of the Klamath Fishery Task Force's (Task Force) Amendment to the long range plan, the FLA cites five reasons not to proceed with reintroduction:

1. disease risk - particularly infectious hematopoietic necrosis (IHN),
2. genetic risks of out-of-basin transfers,
3. suitability of current stocks,
4. habitat quality - particularly water quality in UKL, and
5. passage impediments created by the Project including not only dams but also reservoirs that are inhospitable to out-migrating juveniles and the cumulative stress of having multiple obstacles.

Perhaps the Licensee hoped to downplay the prominent role of the Project facilities themselves in thwarting reintroduction efforts by listing it as the last consideration but, in our opinion, the Project remains the primary impediment to successful reintroduction.

The issue of engineering fish passage through the Project receives detailed treatment later in our comments. We do want to reinforce the Task Force's concern regarding the survival of out-migrating juvenile salmonids through Project reservoirs. Quantifying impacts of the existing reservoirs on yet-to-be reestablished native anadromous populations has proven problematic to say the least. We believe the pilot study currently underway that releases radio tagged Chinook and coho smolts reared at Iron Gate Hatchery into riverine reaches above the Copco 1 and Iron Gate Reservoir will provide an initial indication of the possible success and effort involved in out-migration through these facilities. We note that the pilot study is quite limited in scope and provides a one time assessment of only two species under current operating conditions. The uncertainty around the full range of out-migrant behavior in the reservoirs and how to optimize survival through Project modification will require further study.

Concerning the four non-Project issues attributed to the Task Force document, we offer the following comments. While disease risks are of course ever present, it is important to note that prior to construction of the Project, the native species currently isolated below IGD migrated into the Upper Klamath

Basin and coexisted with native nonanadromous species and contributed to a stable, productive and diverse aquatic ecosystem. Records from the Iron Gate Hatchery reveal that the facility (built in 1962) has never had an outbreak of IHN (William Cox, DFG Fish Pathologist, personal communication). Additionally, as part of a restoration effort it would be possible to test the ovarian fluid of females returning to the hatchery for IHN and certify harvested eggs as disease free (Kim Rushton, Iron Gate Hatchery Manager, personal communication). Thus, we believe the statement of "strong possibility of introducing" IHN to the Upper Basin (FRTR, page 7-4) is overstated.

Concerning the related concepts of genetic risks and suitable stocks, we would argue that these are issues that should guide reintroduction strategies, not reasons to abandon the effort completely. We concur with the Task Force that out-of-basin transfers are not to be implemented causally and would require a compelling and scientifically sound rationale. That said, we believe that the concern over a lack of suitable in-basin stocks is exaggerated. The selection of appropriate stocks of fish for reintroduction is actually an issue best addressed by fish resource management agencies, not the Licensee. The Licensee should provide basic supporting information such as a genetic analysis of the current in-basin stocks but refrain from making policy decisions. A common objective of the relicensing should be the restoration of access to those habitats from which native anadromous species have been extirpated. Providing the existing populations of salmon and steelhead with access to the Upper Klamath Basin would facilitate natural evolutionary processes such as straying and colonization.

In terms of impaired habitat quality above IGD within the Project boundaries, the impairment is often a result of the Licensee's facilities and operations. Dewatered bypass reaches, fluctuating flows in the peaking reach, and impoundment of nutrient rich, warm water are all Project-driven impairments. Upstream of the Project, within the Upper Klamath Basin, there are numerous restoration efforts underway such as the ongoing total maximum daily load (TMDL) process. Literally hundreds of millions of dollars have been devoted to improving habitat conditions in the upper basin and while no one anticipates recreating a pristine environment, significantly improved water quality and fish habitat are reasonably foreseeable.

The FLA also cites an excerpt from the Oregon Department of Fish and Wildlife (ODFW) that appears to argue against reintroduction of native salmonids. The FLA omits the second half of the subject paragraph, which goes on to state: "However, ODFW will support such reintroductions if and when the biological and physical questions are addressed and show that such actions are feasible and prudent. Further, ODFW would support future studies addressing that feasibility and the habitat restoration that would be conducive to successful reintroductions.

Still the welfare of remaining native fish stocks in the Upper Klamath River Basin ecosystem should be the paramount deciding factor in any future deliberations." (Oregon Department of Fish and Wildlife (1997), page 67). We assert that the full context of the ODFW statement emphasizes the need for the Licensee to gather relevant information on Project impacts and develops appropriate PM&E measures, not excuse them from their responsibility to mitigate for blocking anadromous fish passage.

The concept of developing information to guide development of effective PM&E measures is central to our participation in the relicensing consultation process. Again, we object to the Licensee putting the burden of proof on resource agencies by arguing that before they would be willing to provide appropriate fish passage mitigation "it must be demonstrated that the reintroduction effort will produce healthy, viable anadromous fish populations" (ES page 4-14). This is akin to a patient demanding a guarantee from their physician that a recommended course of treatment will provide immediate and complete relief. While we can understand the Licensee wanting to get a "second opinion" regarding a relatively costly investment, to our knowledge no resource agency involved in this relicensing has recommended against providing unimpeded fish passage for native anadromous species. Rather, the agencies consistently have advocated performing the necessary studies to guide development of the most effective suite of fish passage PM&E measures. By choosing to omit viable fish passage alternatives from the FLA's set of proposed actions, the Licensee is going against the collective professional judgment of the resource agencies participating in this relicensing.

Members of the "DFG Fisheries Engineering Team" (FET) reviewed the engineering portion of the FRTR and offer the following comments regarding the Licensee's proposed enhancement measures for fish passage and their cost estimates for the fish passage facilities. The comments regarding the cost estimates are nearly identical to those provided last September on the DLA as that portion of the FLA remains basically unchanged. As ecological processes do not segregate along jurisdictional boundaries such as state borders and, since environmental impacts in the Oregon portion of the river have significant implications for resources in the California portion of the river, the analysis includes facilities in Oregon. However, we defer to the ODFW for final recommendations at Oregon facilities.

The FET supports the decommissioning of the diversions to the east side and west side developments as a measure to eliminate entrainment of downstream migrating fish. In regard to enhancing upstream passage at Link River Dam, we understand that the USBR anticipates that construction will begin

on a new fishway in early-May. Notwithstanding the Licensee's request to also remove the Keno development from the FERC Project boundary, the FRTR acknowledges that modifications may be needed to improve both upstream and downstream fish passage including modifications to the fish ladder to improve passage conditions for suckers, lamprey, and salmonids. In addition, the FRTR identifies possible changes to the spillway gates to improve passage conditions for downstream migrating fish. The Licensee should be held responsible for addressing these fish passage issues regardless of future FERC decisions on Project boundaries.

In the FRTR, the Licensee acknowledges that the traveling fish screens at the J.C. Boyle power intake do not meet current fish screening criteria. In fact, the approach velocity for the existing screens is noted as being nearly six times the modern criteria of 0.4 feet per second. To address this issue, the Licensee proposes to install a gulper-type surface collector in the reservoir near the intake including a full-depth guide net between the fish ladder exit and the left bank. According to the FLA, the guide net will meet NOAA Fisheries Southwest Region screening criteria. As is noted in Table 7.8-20 of the FRTR, the fisheries resources agencies (DFG, ODFW, USFWS, and NOAA Fisheries) do not generally support the use of gulper-type surface collectors. The FET recommends that the intake of the J.C. Boyle powerhouse be equipped with properly designed fish screens including a fish screen cleaning system. As is noted in the FRTR, fish screens of a similar size have been installed at the "Rocky Reach" project on the Columbia River near Wenatchee, Washington.

The FRTR notes that the existing fish ladder at J.C. Boyle Reservoir does not conform to current standards for drop per pool, ladder slope, and "turbulence factor." Rather than construct a new fishway, the Licensee proposes to simply add another pool at the entrance and to change the trashrack bar spacing at the fishway exit. The FET recommends that upstream fish passage be enhanced through the use of well designed, commonly accepted fish passage technologies. The FET would support the use of a properly designed fish ladder, fish lift, or Borland-type fish lock at J.C. Boyle Dam. The Licensee also proposes to install two synchronous bypass valves at the J.C. Boyle powerhouse. The FET supports this project, which should reduce sudden changes in river stage associated with unit trips.

The Copco No. 1 development does not currently include facilities for upstream or downstream fish passage and the Licensee has not proposed any fish passage facilities for this development. The FET believes that the intake to

the Copco 1 powerhouse should be equipped with properly designed fish screens. In addition, upstream fish passage should be provided through the use of well designed, commonly accepted fish passage technologies. The FET would support the use of a properly designed fish ladder, fish lift, or Borland-type fish lock at Copco 1 Dam.

The Copco No. 2 development does not currently include facilities for upstream or downstream fish passage. Except for changes necessary to automate the 10 cfs instream release below Copco No. 2 Dam, the Licensee has not proposed any fish passage facilities at this development. The FET believes that the intake to the Copco No. 2 powerhouse should be equipped with properly designed fish screens. In addition, upstream fish passage should be provided through the use of well designed, commonly accepted fish passage technologies. The FET would support the use of a properly designed fish ladder, fish lift, or Borland-type fish lock at Copco No. 2 Dam.

The Fall Creek development including the Spring Creek diversion, does not currently include upstream or downstream fish passage facilities. The Licensee has proposed the construction of in-canal fish screens that meet the criteria established by NOAA Fisheries SW Region. It should be noted that the fish screens must also meet the fish screening criteria established by the Department of Fish and Game (which are for the most part consistent with the NOAA Fisheries criteria). In the FLA, the Licensee identifies specific criteria that will be applied to the design of the fish screens. However, please note that the NOAA Fisheries SW Region fish screening criteria specifically requires a 24-inch bypass pipe, rather than a 12-inch pipe, unless specifically approved otherwise.

The Licensee has also proposed to construct pool-and-weir-type fish ladders at both diversion sites with the Fall Creek ladder being constructed of rock. While the FLA does not include a detailed design of the fishways, the FET supports the use of properly designed fish ladders at both sites. The FET recommends that the Licensee convene a technical committee of resource agency fish passage experts and other interested parties to assist them with the design of the fish screens and fish ladders on the Fall Creek development.

The Iron Gate development does not currently include facilities that provide fish passage to or from Iron Gate Reservoir. Except for changes that may be needed to facilitate use of the low-level release, the Licensee has not proposed any fish passage facilities for the Iron Gate development. The FET believes that the intake of the Iron Gate powerhouse should be equipped with properly designed fish screens. In addition, upstream fish passage should be provided through the use of well-designed, commonly accepted fish passage technologies. The FET would support the use of a properly designed fish ladder, fish lift, or Borland-type fish lock at IGD.

In general, the Licensee's estimates of the capital costs to construct new fish screens and fish ladders appear excessive. In many cases, the estimates appear to be inflated when compared to the estimates developed by their consultant, CH2M Hill, in February 2003. Although the FLA makes it difficult to verify the estimates by providing only minimal supporting documentation, the summary tables supplied by CH2M Hill provide some, albeit limited, information on the basis of the cost estimates.

Notwithstanding the limited documentation, the DFG has 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 these cost estimates with those developed by both the Licensee and CH2M Hill. Unfortunately, we have not been able to verify the cost estimates for fish locks, fish lifts, trap and haul facilities, or tailrace barriers.

Comparison of Klamath River Fish Passage Facility Cost Estimated (2003 Dollars)

	Licensee Estimate	CH2M Hill Estimate	CDFG Estimate
	I. Iron Gate Dam		
Fish Ladder (140 ft.)	$21.0M	$16.0M	$4.2M - $8.5M
Fish Screen	$15.1M	$ 7.6M	$8.9 M
	II. Copco 1		
Fish Ladder (125 ft.)	$18.9M	$18M	$3.8M - $7.6M
Fish Screen	$23.4M	$18.8M	$16.4M
	III. Copco 2		
Fish Ladder (22 ft.)	$3.3M	$2.2M	$0.7M - $1.3M
Fish Ladder (147 ft.)	$22.1M	$18M	$4.5M - $8.9M
Fish Screen	$21.4M	$18.8M	$16.4M

[1] Estimate does not include costs associated with modifications to existing ladders or sorting facilities.

When developing our cost estimates for fish ladders, we relied upon the criteria presented by Charles H. Clay in "Design of Fishways and Other Fish Facilities, Second Edition." 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 Milo Bell in "The Fisheries Handbook of Engineering Requirements and Biological Criteria," we 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. We then researched the average change in the Consumer Price Index (CPI) between 1987 and 2003 (3.1%) and used this value to convert the 1987 cost estimates to 2003 dollars.

When developing the cost estimates for fish screens, we relied upon information compiled by the Washington Department of Fish and Wildlife (WDFW) regarding the average cost per cfs of screens constructed in the Pacific Northwest. The average costs range from $5,837 per cfs for screens between 50 and 100 cfs to $4,537 for screens greater than 1,000 cfs (1999 dollars). The required screen size was determined by dividing the diversion rate by the allowable approach velocity. The screen size was then multiplied by the applicable WDFW cost range to estimate the screening costs in 1999 dollars. For consistency, we converted the 1999 estimates to 2003 dollars using the same change in the CPI (3.1%).

Please note that in their estimate of costs, the Licensee appears to have used an interest rate of 6.6%. The difference between CPI-based interest rate and their selected interest rate has a significant impact on costs when converting from 1987 to 2003 dollars. For example, our estimate of the cost to construct a new fishway at IGD ranges from $4.2M to $8.5M using the CPI-based interest rate to convert between 1987 dollars and 2003 dollars. However, if we applied PacifiCorp's interest rate to convert between 1987 dollars and 2003 dollars, the costs would increase substantially to between $7.2M to $14.5M – comparable to the estimate developed by CH2M Hill.

The following is an excerpt from CH2M Hill's Technical Memorandum No. 9, dated February 26, 2003, regarding the Klamath Hydroelectric Project Iron Gate Fish Passage Facilities "Based on an approximate cost of $100,000 per foot, the 140-foot ladder plus the modifications to the existing ladders and sorting facilities would cost approximately $16.0 million. The new ladder would require approximately 40 cfs to operate." In contrast, the applicable paragraph in the FRTR (page 7-72) reads "Based on an approximate construction cost of $100,000 per foot, the 140-foot ladder, plus the modifications to the existing

ladders and sorting facilities, would cost approximately $21.0 million. The new ladder would require approximately 40 cfs to operate." As can be seen, the cost estimate increased by $5 million between CH2M Hill's technical memo and the FLA. In fact, the costs reported in the FRTR are 25% higher than the latest "Capital Construction Cost" estimates developed by CH2M Hill.

The Iron Gate Hatchery currently provides the only mitigation for the Project impacts on anadromous salmonids. It is important to note that the hatchery provides mitigation for construction of the Iron Gate development and the associated loss of access to the main stem and tributaries between IGD and Copco 2 Dam. The hatchery does not address any other component of Project impacts. Given this limited geographic scope, the hatchery should be evaluated not only for effectiveness at meeting goals set back in the 1960s to address a relatively small portion of the Project but also for the potential to contribute to and be effected by future mitigation measures. Constraints on rearing space and less than optimal water quality conditions limit current hatchery operational flexibility and resource management options. The FLA proposes only one future modification of the hatchery as part of a PM&E package, that of purchasing a mass-marking facility to increase the current level of marking of Chinook smolts from 5% to 25%. While we support this measure it should have been implemented at the start of the relicensing process as it is an information gathering mechanism and not an "enhancement" measure. In addition, building the mass marking facility is only one step and by itself does not begin to fully evaluate the hatchery role.

To evaluate the hatchery, in our March 27, 2001, first stage consultation the DFG recommended:

> that the [Licensee] fund and participate in development of methods for evaluating current hatchery operations as they relate to meeting existing license mitigation requirements, as well as impacts of hatchery operations on the naturally producing Klamath River fishery. There is a similar effort already underway at the Department's Trinity River Hatchery funded by the [US Bureau of Reclamation] with contract oversight by the Hoopa Valley Tribe. The [Licensee] should coordinate with this research and, at a minimum: Fund studies that would (1) identify potential hatchery operational and structural improvements, (2) develop an on-going monitoring program with adaptive management objectives, (3) evaluate the effects of hatchery fish on natural stocks and (4) evaluate the hatchery role in the recovery of ESA-listed fish

In response to our request for a comprehensive evaluation of hatchery operations and impacts, the Licensee distributed an audit questionnaire to the Iron Gate Hatchery staff in 2001. This questionnaire was originally developed for assessment of the Columbia River system's federally run hatcheries which have different constraints as well as different management goals and objectives. Upon completion, it was generally agreed by DFG representatives, as well as the Licensee's consultants, that the questionnaire was not applicable to the Iron Gate facilities and had limited utility for informing the current relicensing effort. That summarizes the extent of the Licensee's evaluation of the hatchery operations and impacts. We assert it has been an inadequate effort.

Beyond the lack of information gathered and provided, the Licensee's approach to the role of the Iron Gate Hatchery in mitigating impacts of the Project has been a source of concern to the DFG ever since 1961. At that time, the DFG petitioned the FERC to require the Licensee to erect and maintain a fish hatchery to mitigate for the displacement of salmon and steelhead trout by construction of the Iron Gate development. The Licensee answered our petition by denying the need for a hatchery or other fish facilities, citing the benefits to the anadromous fishery resulting from elimination of flow fluctuations (fluctuations caused by the Licensee's own peaking operations upstream) as well as the recreational benefits provided by Iron Gate Reservoir as fulfilling their mitigation obligation. While the FERC did issue an order dated March 14, 1963, to construct, operate, and maintain a fish hatchery, they assigned only 80% of the combined annual cost of operation and maintenance for the hatchery to the Licensee. The remaining 20% of hatchery costs were left to be assumed by the State of California. This division of costs was apparently based on the State of California's commitment back in 1919 to assume financial responsibility for the Fall Creek facility which had been built by the Licensee to mitigate for construction of the Copco No. 1 dam. In 1966, the DFG appealed the partial funding aspect of the FERC order to the US Supreme Court but did not receive a favorable decision. As a result, for almost 40 years, citizens of the State of California have funded 20% of the Iron Gate Hatchery operations, providing mitigation for the Project impacts on anadromous salmonids. The DFG continues to believe this is an inequitable arrangement and that the Licensee should bear the full cost of any measures necessary to mitigate Project impacts on fish and wildlife resources.

We also object to the characterization of the fish produced by Iron Gate Hatchery and subsequently harvested by commercial, tribal, and recreational anglers as part of the social benefit provided by the Project (Socioeconomic Resource Technical Report, Table 4.7-13, page 4-43). While we agree that fish produced by the hatchery and subsequently harvested are of significant social and economic value, this hatchery product is mitigation to compensate for the loss of spawning habitat created by construction of IGD. At best, the hatchery compensates for the socioeconomic cost of constructing IGD; it certainly does not provide some new social benefit that would not exist without the Project. In fact, the Licensee should extrapolate from the multimillion dollar benefit of the hatchery fish listed in Table 4.7-13 and estimate the value of the fish resources lost due to blocked access to hundreds of miles of spawning habitat above Copco 2 (for which the Licensee provides no mitigation). Such a value would begin to quantify the social costs of the Project.

In the biological modeling portion of the fish passage section the FLA provides an overview of two related modeling efforts: KlamRAS to compare the risks of fish passage alternatives to the survival of salmon and EDT to estimate the relative value of fish habitat and production of fish passage alternatives. These models were proposed to evaluate the potential of a variety of fish passage alternatives from a complete-decommissioning-and-removal-of-Project alternative to a status-quo-with-no-changes alternative. Development of the assumptions and rules which provide the foundation for these complex models has been painstakingly slow. It was our understanding that by the time the FLA was distributed no substantive model runs would be available for review and that the Licensee would incorporate language into the FLA explaining progress to date as well as necessary future work such as finalizing parameterization of model inputs. Instead, in an inappropriate and misleading use of the models and indirect contradiction to Fish Passage Workgroup discussions, the Licensee took the results of a calibration run (intended to verify whether or not the two models communicated well) and included these meaningless numbers as “initial and very preliminary” estimates of fish production. The Licensee then used the information to conclude that “self-sustaining runs of fall Chinook could not be achieved in the Project area” (FRTR, page 7-146).

First of all, in an approach that is blind to ongoing Project impacts, the preliminary EDT model run did not include any potential fish production from habitat currently inundated by Project reservoirs or dewatered by Project operations. It also failed to calculate any contribution to salmon production from the extensive Upper Klamath Basin. These “preliminary” results assume a worst case, status quo scenario. Secondly, even when the models are fully populated and parameterized, they are not designed to predict accurate numbers of fish per

mile but rather allow comparisons of the effectiveness of various fish passage options. Another desired outcome of the modeling efforts was to provide the opportunity to conduct a sensitivity analysis to identify which input variables have the most influence on model outputs. The promised results of EDT were to be a ”consumer report” rating of the influence of habitat variables - such as water temperature, sediment supply, and flow - on outcomes ranging from impaired to restored. There was never an expectation on our part that these models would predict with any accuracy the number of adult fish that would be ”produced” under different fish passage scenarios. Based on the unfinished status as well as the limitations inherent in the two biological models, we recommend that the FERC disregard the initial and very preliminary EDT results presented in the FLA.

As a final fish passage issue, the FLA also fails to provide any mitigation for impacts on nonanadromous species in the main stem California portion of the Project. Fish moving downstream in the Klamath River, including fully protected suckers, are entrained into Project generation facilities with unknown and unquantified but likely significant mortality. With the exception of the J.C. Boyle facility, there are no downstream fish screens or other exclusion devices to prevent entrainment and mortality. DFG and other stakeholders have repeatedly requested that the Licensee conduct entrainment studies at all of the Project facility intakes in order to provide a quantified and site-specific description of Project impacts.

The Licensee declined this request and instead performed a literature review of several midwestern reservoirs. This review determined that no mitigation of Project entrainment impacts is warranted. In contrast to the midwestern literature review findings, significant entrainment of suckers was documented in the Klamath basin at the Link River Dam hydroelectric facilities between 1997 and 1999 (Gutermuth et al. 2000). Gutermuth also revealed site specific interactions between diurnal behavior and seasonal activity and the entrainment rates of both suckers and redband trout. We consider the Klamath River, its impoundments, and resident fish communities to constitute a unique and impacted ecosystem which cannot be represented by a literature review. Unique water quality conditions within the Project=s eutrophic reservoirs likely influence fish communities and fish behavior and may exacerbate the exposure of young fish to entrainment. In addition, the fish assemblages and life histories impacted by the Project are quite different from those evaluated in the literature review. Trying to determine which portions of the literature review might be relevant to the Klamath system is compounded by the inadequate sampling of Project reservoirs (see previous comments in the fish assessment portion).

Besides a unique ecosystem and fish assemblage, the Project facilities themselves are quite different from those evaluated in the Licensee's literature review. Those facilities were generally operated on a run-of-the-river basis. Comparison of entrainment at the Project facilities to low-head facilities, located in the upper midwest on mesotrophic or oligotrophic impoundments, is simply inappropriate.

Additional Study and Information Requests

Based on the above comments, the DFG requests at a minimum, the FERC require that the following studies be implemented and the associated information provided to stakeholders as soon as feasible.

1. Additional Fish Assessment Surveys in both Riverine and Reservoir Habitats

We request additional field sampling in both riverine and reservoir habitats of the Project. The purpose of the additional surveys would be to improve and expand upon the existing fish assessment data the Licensee has collected to date. We request that the Licensee utilize the expertise represented in the Aquatics Workgroup to develop an approved fish survey study plan that follows standardized riverine and reservoir sampling protocols.

2. Completion of Instream Flow Study per Pervious Aquatics Workgroup Commitments

DFG recommends that the Licensee complete a thorough assessment of instream flow needs for rainbow trout, other native resident species, and potential anadromous species including steelhead and Chinook in each Project-affected reach. Assessment should include the 2D analysis agreed upon by the "Aquatics Workgroup." While an instream flow study has been ongoing for the past 2 years, key elements have not been completed yet and, in several cases, analyses that have been completed rely on inappropriate methods. The evaluation should expand the Licensee's assessment of flow and habitat availability to year-round and include an assessment of the behavioral changes and energetic impacts to the various species and life stages associated with peaking. Further, the Licensee should repeat habitat simulations performed to date using methods agreed to within the Aquatics Workgroup. These include but are not limited to:

a. Run PHABSIM 1-dimensional hydraulic and habitat models using both of the depth/velocity calibration data sets that were collected. The analysis presented in the FLA uses only one depth/velocity calibration data set.

b. The habitat computation algorithm used should be changed to "geometric mean" rather than "multiplicative."
c. The transect weighting used in the FLA habitat analysis is incorrect. Previously the Licensee had agreed to the use of a fully proportional weighting scheme, where each transect is weighted according to how much it represents in its respective habitat unit which is then expanded to the full set of that habitat unit type. In contrast, the FLA presents data that relies on uniform transect weighting with habitat unit types.
d. The FLA states that habitat was simulated in two ways, with and without functional cover types, and that substrate was not used in the computations. Previously, the Licensee had agreed to use cover types and substrate and these critical parameters should be included.

The FLA acknowledges the need for additional study based on further consultation with the Aquatics Workgroup and requested the FERC to also acknowledge the need for additional work. The DFG requests that FERC recommend additional collaboration, refinement of model input variables, and analysis with stakeholders to meet the Licensee's commitment to complete the instream flow study needed to provide a good technical basis for instream flow recommendations (see Appendix A - Fish Passage and Instream Flow Insert Language).

3. Peaking Impacts Assessment as per Previous Aquatics Workgroup Commitments

We request that the Licensee reassess Project impacts of peaking using updated information from additional data collection and analysis as part of the additional "Fisheries Assessment and Instream Flow Studies" requested above. The Licensee should complete the bioenergetics study as described in the FLA and conduct additional sampling for macroinvertebrate drift during critical time frames to supplement the limited sampling conducted to date. Additionally, the Licensee should correct the wetted perimeter analysis to reflect existing peaking operations rather than a hypothetical "run of river" operation that does not currently exist. Specifically, the Licensee should reanalyze the wetted perimeter information to evaluate existing peaking operations that vary between 350 cfs and the two typical peaking operations flow levels, approximately 1500 to 1800 cfs with one turbine and 2800 to 3200 cfs with two turbines. These requests for additional data collection and analysis will affect conclusions and analysis derived in the peaking study as a result of their interrelated nature.

4. Flow Dependent Barrier Assessment Downstream of Iron Gate Dam

The Licensee should perform a salmonid passage barrier assessment similar to the study performed on Battle Creek by Thomas R. Payne and Associates (TRPA) in 1998 to evaluate flow dependent barriers below IGD. TRPA's study assisted the DFG and other interested parties in developing restoration alternatives for Pacific Gas and Electric Company's Battle Creek Hydroelectric Project (FERC No. 1121). Such an analysis could reveal additional beneficial aspects (beyond increased flexibility for water quality management) to the low level release structure in IGD that is under consideration by the Licensee.

5. Expansion of Juvenile Out-Migration Reservoir Survival and Transit Time Study

To predict the impact of Project reservoirs on reintroduced anadromous species, it is important to design a study that mimics the life stages and timing of historic out-migrations through the subject reaches. The dilemma, of course, is that, given the age of the facilities, the relevant historic information is limited. Based on our best professional judgment and results of ongoing DFG studies in the Klamath River estuary, we believe young of the year (YOY) Chinook out-migrating in the fall were an important part of the historic out-migration behavior. We request that the FERC require the Licensee to conduct a mark and recapture study of Iron Gate Hatchery YOY Chinook. The study should utilize coded wire tags as opposed to radio tags to permit a much larger sample size (in the 1,000s instead of 100s) and provide a statistically robust data set. The release window of the subject fish would be approximately November subject to meteorological conditions. This information would provide a valuable supplement to the study currently underway with the radio tagged spring release smolts. Both the radio tag and coded wire tag efforts should be repeated in 2005 to begin to account for natural variability in the system.

6. Meaningful Assessment of the Full Range of Fish Passage Options, Including Dam Decommissioning

We request that the FERC require the licensee to engage in a meaningful analysis of a full range of fish passage alternatives, particularly alternatives such as dam decommissioning and volitional fish passage facilities which will provide the highest degree of passage. We request the Licensee reconvene the Fish Passage Workgroup for the purpose of finalizing the parameterization of KlamRAS and EDT and providing modeling tools that have credibility with a broad group of stakeholders. Once the modeling tools are approved, a full range

of fish passage alternatives should be evaluated to provide guidance in developing appropriate PM&E measures. Given the complexity of the two modeling tools, as well as a general lack of stakeholder experience in working with these tools, we also request that the modeling results be submitted for peer review to provide a greater degree of confidence in the outputs.

7. Comprehensive Evaluation of Iron Gate Hatchery Operations and Impacts

The "purpose" of the Iron Gate Hatchery is to compensate for the loss of spawning habitat created by the construction of the Iron Gate development. The original mitigation goals were set by the Federal Power Commission in 1961 and were modified in 1979 and 1996 by DFG and the Licensee to include some yearling production. To guide development of future hatchery goals, it is essential to document and assess the current performance of the hatchery and the effects of artificially propagated fish on the remaining naturally occurring stocks in the basin. A hatchery's success cannot simply be measured based on the number of fish that are released. A meaningful hatchery assessment must include a consistent and rigorous marking and monitoring program. The construction of a 25% constant fractional marking trailer is just the beginning. The Licensee should fully fund the operation of the marking facility as well as all monitoring efforts associated with the marking program. Further, this marking and monitoring effort should have begun back in 2001 when it was first identified by the DFG and other stakeholders as an essential source of information to guide development of PM&E measures involving future hatchery operations. To offer to build a structure sometime in the future as an "enhancement" in the next license ignores the obligation of the Licensee to develop the information now (necessary) during relicensing. Currently the Licensee contributes no funds to support ongoing monitoring of hatchery operations. Not only should they be funding 100% of the ongoing assessment of this mitigation hatchery, the monitoring effort will require a commensurate expansion to account for an increased marking rate of 25%.

8. Entrainment Studies at California Reservoir Intakes

Entrainment studies are needed to evaluate losses due to Project facilities and operations. The studies need to include an estimation of entrainment based on empirical, site-specific data collected during a range of representative conditions and over an adequate period of time. Studies also need to determine temporal and vertical distribution fish passage through generation facilities and across the spillway at IGD. Little is known about the temporal and vertical distribution of native fish of interest in the Klamath system and their associated vulnerability to entrainment. This information has important implications for development of PM&E measures.

We request that FERC require the Licensee to apply the methods of Guttermuth at the relatively shallow Copco 2 intake and utilize a split-beam, digital echosounder approach at the intakes of the Copco 1 and Iron Gate facilities. Refer to the attached study proposal from BioSonics for an example of this second methodology. Species composition for hydro acoustics analysis should be established by subsampling with netting and applied to acoustical data. In addition to the fully protected suckers, studies should assess entrainment of other resident fishes that are known or are likely to be migratory within the Project area. These include: rainbow trout (*Onchorynchus mykiss*), resident lamprey species (*Lampetra* spp.), blue chub (*Gila coerulea),* and Klamath large-scale (*Catostomus snyderi*) and small-scale (*Catostomus rimiculus*) suckers.

Next Step – The National Environmental Protection Act (NEPA) and California Environmental Quality Act (CEQA)

One of the DFG's greatest concerns with the overall scope and content of the FLA is how poorly this document sets the stage for the next phase of relicensing: the initiation of the appropriate Federal and State environmental reviews as described in Section 16.8 (d) and (f), Title 18, CFR. Acceptance of a complete application triggers initiation of the NEPA review process under the direction of the FERC. The complete application must include a request for Clean Water Act, Section 401, and Water Quality Certification from the appropriate State water quality agencies - in this instance both the Oregon Department of Environmental Quality (ODEQ) and the California State Water Quality Control Board (SWRCB). In California, an application for 401 Water Quality Certification must comply with the requirements of the California Environmental Quality Act (CEQA).

The "Interagency Task Force (ITF) Report" dated April 26, 2001, on NEPA Procedures in FERC Hydroelectric Licensing recommends that a detailed analysis of a decommissioning alternative should begin early in the NEPA process. In response to repeated requests from stakeholders to develop information based on a full range of alternatives including decommissioning, the Licensee has consistently refused, arguing that it is not their responsibility to do a NEPA analysis. While we agree the actual NEPA alternatives analysis is performed by the FERC, the Licensee has the responsibility to supply sufficient information in an application to allow an analysis by the FERC. Similarly, the SWRCB (the lead CEQA agency for this Project) notified the Licensee in a December 23, 2002, letter that development of a study plan to address

decommissioning issues would be necessary to fully assess the impacts of the Project under CEQA. The December 2002 letter noted the SWRCB concern that the Licensee had not begun development of all the information considered necessary to support a complete application for Section 401 Certification. To date, the Licensee has not responded to this letter.

Perhaps in anticipation of the general reluctance of applicants to pursue decommissioning studies, the ITF also encourages resource agencies to provide information as soon as feasible relating to the beneficial or adverse effects of decommissioning a given project on a variety of resources and interests including but not limited to:

(1) Listed or threatened or endangered species.
(2) Economic viability of the project including the costs of PM&E measures.
(3) Potential for fish recovery.
(4) Feasibility of fish passage.
(5) Consistency with comprehensive plans.
(6) Protected river status.
(7) Effectiveness of past and the availability of future mitigation measures.
(8) Support by the applicant or other party.
(9) Tribal lands, resources, or interests.
(10) Water quality issues.
(11) Recreational opportunities.
(12) Physical condition of the project.
(13) Project-dependent developments.
(14) Nonpower project dependent benefits.
(15) Project-dependent resources.
(16) Need for power and ancillary services.
(17) Historic properties.

Several of the topics recommended for early consideration by the ITF are outside the DFG's area of expertise but the majorities are of great concern to us. In the interest of facilitating comprehensive and timely NEPA and CEQA processes and, given the absence of relevant information in the FLA, we offer the following comments, in roughly the order listed in the ITF report.

(1) There are special status fish species above, within, and below the Project. As described in the sections on water quality and fish resources, we assert that the Project has adverse impacts on a variety of aquatic resources including blocked access to coldwater refugia, seasonal exacerbation of impaired water quality, scouring of potential rearing and feeding habitat

in varial zones, impediment of passage for both anadromous and resident species, and entrainment at unscreened intakes. These adverse effects are not unique to coho or listed suckers but impact the entire aquatic ecosystem within the area of Project impact.

(3), (5), (9), and (11) In terms of the ITF issues that involve restoration, planning, Tribal, and recreational resources: in 1986 Congress found that "the Klamath and Trinity Rivers have outstanding anadromous fishery values and provide fishery resources necessary for Indian subsistence and ceremonial purposes, ocean commercial harvest, recreational fishing, and the economic health of many local communities" (16 CFR §460 et al; a.k.a. the "Klamath Act"). While Congress also noted a significant reduction in the anadromous resources due to a variety of impacts (including dams and hydroelectric projects), they did not deem the river beyond restoration. Instead they budgeted over 20 million dollars to be spent over 20 years to restore the anadromous fish, primarily salmon and steelhead, of the Klamath River basin. One of the first products of the restoration effort was development of the "Long Range Plan" for the Klamath River Basin Conservation Area Fishery Restoration Program which, as noted previously, has been submitted to the FERC as a comprehensive plan with relevancy to this relicensing. The Long Range Plan specifically speaks to a goal of restoring "the biological productivity of the Klamath River Basin in order to provide for viable commercial and recreational ocean fisheries and in-river tribal (subsistence, ceremonial, and commercial) and recreational fisheries" (page 1-12). The Long Range Plan goes on to formally state the objective of protecting salmon and steelhead habitat from harmful effects of water and power projects in the Klamath basin (page 8-10).

(4) As discussed in the fish passage section of our comments, we object to the lack of meaningful discussion of viable fish passage alternatives within the FLA. We believe volitional fish passage facilities are not only feasible, they would likely form the basis of a DFG 10(j) recommendation unless the Licensee provides new information in the interim. We submit that the main rationale for the Licensee's reluctance to consider fish passage solutions is an economic one. We cannot argue that effective volitional fish passage for this Project would involve a substantial investment by the Licensee. In comparison, the relatively low cost of decommissioning the Project is yet another reason to include the decommissioning alternative in the NEPA analysis.

(6) In 1974, the six-mile reach of the Klamath River upstream of Copco Lake to the Oregon border was designated as a wild trout area by the California Fish and Game Commission and is currently managed by the Department's wild trout program. In 1994, the 11 miles of the Klamath River upstream of the

California-Oregon border to the J.C. Boyle powerhouse was designated as a "Wild and Scenic River." Additionally, beginning less than a mile below IGD, 197 miles of the Klamath River (i.e., downstream to the mouth) were designated as "Wild and Scenic" in 1981.

(7) The current mitigation provided by the Licensee for the lack of anadromous fish passage involves funding a portion of the operations at Iron Gate Hatchery. The Iron Gate Hatchery currently operates under stocking goals and constraints mutually agreed upon by DFG and Pacific Power and Light Company (PacifiCorp's predecessor) in 1996. The goals and constraints are designed to mitigate for the loss of salmon and steelhead spawning and nursery habitat resulting from the construction of IGD (i.e., the loss of access to seven miles of main stem plus Jenny and Fall creeks). The hatchery currently meets the goals for Chinook and coho salmon but not for steelhead trout. As discussed previously in the fish passage section, the Licensee has declined to perform a meaningful evaluation of the current hatchery operations. The Project provides no mitigation for the lack of fish passage at the two Copco facilities. Moving upstream, as discussed previously, the ODFW has noted on-going problems with the existing fish ladders at the Boyle and Keno facilities.

(8) The Licensee does not support decommissioning of any portion of the Project. However, consideration of a full range of fish passage alternatives, including decommissioning of part or the entire Project, has been requested numerous times by a majority of the stakeholders actively participating in the relicensing process. Supporters of a comprehensive evaluation of the benefits and costs of a decommissioning alternative include representatives of tribes, agencies and nongovernmental organizations.

(9) The tribal interests cited in the Long Range Plan include the Klamath, the Shasta, the Karuk, the Hoopa, and the Yurok tribes. Tribal lands follow a pattern similar to the listed species discussed under item (1) and include portions of the watershed above, within, and below the Project boundary.

(10) Degraded water quality in the Klamath River is an important issue for many resource management agencies including the DFG. Based on the information available, the Project seasonally exacerbates poor water quality conditions and blocks access to essential coldwater refugia. While there may be operational and technological remedies for these impacts, removal of the two largest dam-reservoir complexes, (Iron Gate and Copco 1) would mitigate for a significant proportion of the Project impacts to water quality.

(11) The Klamath River downstream of the Project as well as much of the riverine portion within the Project, has Wild and Scenic River status. The US Forest Service notes the lower river is popular with rafters as well as campers seeking a rustic experience (see the Six Rivers National Forest recreation website at www.fs.fed.us/r5/sixrivers/recreation/orleans). The Klamath River below the Project is one of the finest steelhead rivers in the nation and is popular for trout, steelhead, coho, and Chinook salmon, with multiple access sites. Historic accounts of pre-Project conditions indicate that this exceptional fishery once extended all the way to UKL. It is reasonably foreseeable that decommissioning would result in the reestablishment of steelhead and salmon angling opportunities throughout the current Project boundary. Conversion of the Project reservoirs to riverine reaches would likely shift current reservoir-based recreation patterns towards the activities experienced downstream in the Wild and Scenic portion in the National Forests (e.g., rafting instead of waterskiing, wading instead of trolling).

(12) While the Department cannot specifically address the physical condition of the Project, we note that many of the facilities are quite old. For example, the Fall Creek powerhouse is 100 years old while the Copco 1 development and the westside and eastside powerhouses are over 90 years old and the Copco 2 development is roughly 80 years old. The remaining facilities are relatively modern with the J.C. Boyle dam being about 50 years old and the Keno and Iron Gate developments around 40 years old.

(14) According to the Licensee, they have very limited control of flow due to the lack of active storage in their reservoirs (Water Resources DTR, page 5-17) and, thus, cannot provide significant flood control benefits. The primary purpose of Keno dam appears to be to stabilize water surface elevations in Keno reservoir for the benefit of upstream irrigators.

(15) Several commercial outfitters take advantage of the intermittently high flows provided by peaking operations at the J.C. Boyle powerhouse. There is an active Copco Sportsman's Club which utilizes the warmwater fishery provided at Copco 1. The FLA contains a fairly comprehensive listing of current recreational uses but does not present any analysis of how these resources would shift if portions or the entire Project were decommissioned. Clearly, reservoir based activities would be lost and in some fashion eventually replaced by river oriented recreation. We consider recreational patterns in the free flowing portions of the river within and immediately below the Project (see item (11) above) to offer the best projection of how recreation use postdecommissioning would develop.

(16) Staff at the California Energy Commission (CEC) have completed a preliminary analysis of the energy issues associated with decommissioning of one or more dams in the Project (April 2003). The assessment indicates "from the perspective of potential impacts to electric resource adequacy, decommissioning is a viable alternative that should be examined during the Federal Energy Regulatory Commission (FERC) proceedings on renewal of the hydroelectric license for these facilities" (page 1).

Given the lack of information contained in the FLA which could facilitate an evaluation of any alternative that involves removal of part of or all of the Project, stakeholders have begun independent assessments to address some of the above issues. As mentioned above, the CEC at the request of staff from the SWRCB and the California Resources Agency has conducted a preliminary analysis of the impacts on energy supply of decommissioning. Similarly NOAA Fisheries has conducted a preliminary analysis of the potential changes in coho habitat under different scenarios including decommissioning (Steve Edmondson, NOAA Fisheries, personal communication). The DFG supports these independent efforts and commends those organizations for devoting time and resources to address these critical information needs. However, we must emphasize that collection of adequate information to describe Project impacts and design appropriate PM&E measures is a basic responsibility of the Licensee as described in the Federal Power Act's requirements for consultation (Section 16.8, Title 18, CFR). The information provided to date by the Licensee does not meet the definition of an adequate first stage consultation document, much less an FLA.

Summary

The information provided in the FLA will not allow a full and adequate consideration of relevant resource issues as required by the Federal Power Act and other applicable laws. We believe that the Licensee's delay in developing and implementing rigorous study plans has compromised the quality and availability of information necessary to form the basis for our recommendations. The FLA provides only general literature reviews or high level analyses on critical areas such as unimpaired hydrology and fish entrainment. Adequate study plans for other resource areas have finally been implemented after three years of consultation but in some cases portions of the raw data have yet to be released, much less analyzed. Finally, the FLA relies on a biased review of the literature and the inappropriate results of an incomplete model to arrive at the erroneous conclusion that anadromous fish passage is not feasible. We request that the FERC require the Licensee to address the numerous information and additional

study needs identified in these comments. Without a comprehensive identification and quantification of Project impacts and an exploration of the full range of alternatives available to the Licensee, the DFG will be unable to develop balanced PM&E measures that address Project impacts while still providing a reliable source of energy. This concludes the DFG's comments on the Licensee's FLA. If you should have any questions regarding these comments, please contact Environmental Scientist Annie Manji, at the letterhead address or telephone (530) 225-3846.

Sincerely,

DONALD B. KOCH
Regional Manager

Enclosure

cc: See pages 41-45

References

Bell, M.C. 1991. Fisheries Handbook of Engineering Requirements and Biological Criteria. Portland, Oregon. Fish Passage Development and Evaluation Program, Corps of Engineers, North Pacific Division.

Boyle, J.C. 1976. 50 Years on the Klamath. Klocker Printery, Medford, OR. 146p.

California Department of Fish and Game. 2003. September 2002 Klamath River fish kill: preliminary analysis of contributing factors. Prepared by the Northern California North Coast Region, Redding CA 63p.

California Energy Commission. 2003. Preliminary assessment of energy issues associated with the Klamath Hydroelectric Project. California Energy Commission Report. Prepared for the California Resources Agency and State Water Resources Control Board. Sacramento, CA 15p.

Chapman, D.W. 1981. Pristine Production of Anadromous Salmonids – Klamath River. Final Report from Bureau of Indian Affairs. Portland OR 77p.

Clay, C.H. 1995. Design of Fishways and Other Fish Facilities. 2nd ed. Boca Raton: Lewis Publishers.

Fortune, J.D., A.R. Gerlach, and C.J. Hanel. 1966. A study to determine the feasibility of establishing salmon and steelhead in the Upper Klamath Basin. Oregon State Game Commission and Pacific Power and Light. 129p.

Gutermuth, B., C. Watson and J. Kelly. 2000. Link River Hydroelectric Project (Eastside and Westside Powerhouses) Final Entrainment Study Report March 1997 - October 1999, Cell Tech: Research and Development; PacifiCorp Environmental Services.

Hardy, T.B., and R.C. Addley. 2001. Evaluation of interim instream flow needs in the Klamath River. Phase II. Final Report. Prepared for the U.S. Department of Interior. November 21, 2001.

Klamath River Basin Fisheries Task Force. 1991. Long Range Plan for the Klamath River Basin Conservation Area Fishery Restoration Program, Yreka.

Lane & Lane Associates. 1981. The Copco Dams and the Fisheries of the Klamath Tribe. Prepared for the Bureau of Indian Affairs, Portland, OR 220p.

National Oceanic and Atmospheric Administration Fisheries. 2002. Biological Opinion regarding the Bureau of Reclamation's Klamath Project operations from June 1, 2002, through March 31, 2021, on Southern Oregon/Northern California Coasts (SONCC) Coho salmon (*Oncorhynchus kisutch*).

North Coast Regional Water Quality Control Board. 2001. Water Quality Control Plan for the North Coast Region. Santa Rosa, CA.

Oregon Department of Fish and Wildlife. 1997. Klamath River Basin, Oregon Fish Management Plan. August 22, 1997.

Richter, B.D., J.V. Baumgartner, J. Powell, and D.P. Braun. 1996. A method for assessing hydrologic alteration within ecosystems. Conservation Biology, 10, pp 1163-1174.

Synder, J.O. 1931. Salmon of the Klamath River. California Department of Fish and Game, Fish Bulletin No. 34. 130p.

Thomas R. Payne and Associates. 1998. Battle Creek fisheries studies task 4: surveys of barriers to the upstream migration of anadromous salmonids. Prepared for the California Department of Fish and Game, June 1998. 36p.

U.S. Fish and Wildlife Service. 2001. Fish Passageways and Bypass Facilities Course Notebook, National Conservation Training Center.

Washington Department of Fish and Wildlife. 1999. Washington State Fish Screening Unit Costs. Fish Passage Technical Assistance.

cc: Ms. Magalie R. Salas, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426
(eight copies)

Mr. John Mudre
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Ms. Frankie Green
The Louis Berger Group, Inc.
620 Jones Way
Sacramento, CA 95818

Mr. David Diamond
Department of the Interior
Office of Policy Analysis
1849 C Street, N.W.
Washington, D.C. 20426

Ms. Barbara Machado
Bureau of Land Management
1301 South G Street
Lakeview, OR 97603

Mr. John Hamilton
US Fish and Wildlife Service
1829 South Oregon Street
Yreka, CA 96097

Mr. Randy Brown
US Fish and Wildlife Service
1655 Heindon Road
Arcata, CA 95521

Mr. Ron Larson
US Fish and Wildlife Service
6610 Washburn Way
Klamath Falls, OR 97603

cc: Ms. Robbie Vandewater
Klamath Forest
US Forest Service
1312 Fairlane Road
Yreka, CA 96097

Ms. Julie Tupper
US Forest Service
650 Capitol Mall, Suite 200
Sacramento, CA 95814

Mr. Steve Edmondson and Mr. David White
National Oceanic and Atmospheric Administration Fisheries
777 Sonoma Avenue, Suite 325
Santa Rosa, CA 95403

Mr. Harry Williamson
National Park Service
801 I Street, Room 156-B
Sacramento, CA 95814-2510

Mr. Dave Sabo, Area Manager
Klamath Basin Area Office
US Bureau of Reclamation
6600 Washburn Way
Klamath Falls, OR 97603

Ms. Ronnie Pierce
Intertribal Commission
1111 Forson Road
McKinleyville, CA 95521

Mr. Ron Reed
Karuk Tribe
Post Office Box 282
Orleans, CA 95556

Mr. Mike Belchik
Yurok Tribal Fisheries
15900 Highway 101 North
Klamath, CA 95548

cc: Mr. Dave Hillemeier
Yurok Tribe
15900 North Hwy 101
Klamath, CA 95548

Messrs. Elwood Miller and Larry Dunsmoor
Klamath Tribes
Post Office Box 436
Chiloquin, OR 97624

Mr. Mike Orcutt
Hoopa Valley Tribal Fisheries Dept
P.O. Box 417
Hoopa, CA 95546-0417

Mr. Paul DeVito
Oregon Department of Environmental Quality
2146 NE Fourth Street, Suite 104
Bend, OR 97701

Ms. Amy Stuart
Oregon Department of Fish and Wildlife
3042 SE Paulina Highway
Prineville, OR 97754

Mr. Roger Smith
Oregon Department of Fish and Wildlife
1850 Miller Island Road W
Klamath Falls, OR 97603

Mr. David Leland
North Coast Regional Water Quality Control Board
5550 Skylane Boulevard, Suite A
Santa Rosa, CA 95403

Mr. Russ Kanz
Division of Water Rights
State Water Resources Control Board
Post Office Box 2000
Sacramento, CA 95812-2000

cc: Mr. James McKinney and Mr. Crawford Tuttle
Resources Agency
1416 Ninth Street, Suite 1311
Sacramento, CA 95814

Mr. Todd Olson
PacifiCorp
825 N.E. Multnomah, Suite 1500
Portland, OR 97232

Mr. Curtis Knight
California Trout, Inc.
Post Office Box 650
Mt. Shasta, CA 96067-0650

Mr. Chuck Bonham
Trout Unlimited
828 San Pablo Avenue, Suite 208
Albany, CA 94706

Mr. Steve Rothert
American Rivers, California Region
409 Spring Street
Nevada City, CA 95959

Mr. Felice Pace
Klamath Forest Alliance
P.O. Box 820
Etna, CA 96027-0820

Mr. Glen Spain
Pacific Coast Federation Fisherman's Association
Post Office Box 11170
Eugene, OR 97440-3370

Ms. Keri Green
288 Ninth Street Alley
Ashland, OR 97520

Ms. Anna West
Kearns & West, Inc.
475 Sansome, Ste. 570
San Francisco, CA 94111

cc: Mr. Kim Rushton
Department of Fish and Game
8638 Lakeview Road
Hornbrook, CA 96044

Mr. Mike Rode
Department of Fish and Game
#3 North Old Stage Road
Mt. Shasta, CA 96067

Mr. Mike Wallace
Department of Fish and Game
5341 Ericson Way
Arcata, CA 95521

Mr. Stephen G. Puccini
Legal Office
Department of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Messrs. Gary Smith and Robert Hughes
Native Anadromous Fish and Watershed Branch
Department of Fish and Game
1807 13th Street
Sacramento, CA 95814

Messrs. Mark Stopher, Gary Stacey, Steve Turek,
Pat Overton, Bob McAllister, Neil Manji
and Ms. Annie Manji
Department of Fish and Game
601 Locust Street
Redding, CA 96001

Mr. Brian Barr
World Wildlife Fund
116 Lithia Way
Ashland, Oregon 97520

Ms. Kelly Catlin
Friends of the River
915 20th Street
Sacramento, California 95814