

**ECONOMIC MODELING OF RE-LICENSING AND
DECOMMISSIONING OPTIONS FOR THE
KLAMATH BASIN HYDROELECTRIC PROJECT**

ADDENDUM A

***Response to PacifiCorp's
Comments on the
Klamath Project Alternatives
Analysis Model***

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RESPONSE TO PACIFICORP'S COMMENTS ON THE KLAMATH PROJECT ALTERNATIVES ANALYSIS MODEL

After reviewing the PacifiCorp filing to the Federal Energy Regulatory Commission (FERC), the California Energy Commission issues this addendum to the original *Klamath Project Alternatives Analysis Model Consultant Report (KPAAM Consultant Report)*. This supplement includes new analysis based on information provided by PacifiCorp that shows that it makes more economic sense to remove the dams and buy replacement power than the earlier analysis had indicated. The Klamath Project Alternatives Analysis Model (KPAAM) original inputs were revised and the appropriate corrections from PacifiCorp's consultant were used. The results reconfirm and strengthen staff's original results -- based on the new inputs and assumptions, decommissioning the project, rather than relicensing, **increases** the economic benefits to PacifiCorp's ratepayers ranging from \$32 million to \$286 million.

Background

The Klamath River is one of the most important rivers for imperiled populations of Chinook salmon, Coho salmon, and steelhead trout on the West Coast of the United States. PacifiCorp's 169-megawatt Klamath Hydroelectric Project is a major contributor to the loss of salmon from more than 300 miles of habitat in the upper Klamath Basin. The FERC is reviewing the project's existing Federal Power Act license and will impose mitigation measures to reduce environmental impacts if it issues a new license. The *KPAAM Consultant Report* shows that decommissioning the project and replacing its electricity from other sources is more cost effective than relicensing the project and installing fish ladders and water quality improvement devices to meet modern legal and scientific standards.

The California Energy Commission–Department of Interior Consultant Report *Economic Modeling of Relicensing and Decommissioning Options for the Klamath Basin Hydroelectric Project* is the only thorough, objective and transparent assessment tool that analyzes the cost differences between two broad alternatives. The first option is to decommission the four hydroelectric dams (Copco 1 and 2, Irongate and JC Boyle), purchase replacement power over a 30-year license period and restore the Klamath Basin salmon fisheries. The second option is to relicense the four dams with full mitigation measures. This is the first time an objective study has been done that examines the complete economics of a hydroelectric facility and identify the optimal benefits for everyone – PacifiCorp's ratepayers and shareholders, farmers, tribes, salmon fishermen, salmon and the public.

The government agencies developed a rigorous and transparent economic model, KPAAM, to provide the parties involved with relicensing and settlement negotiations the best possible analysis of the economic pros and cons of the

relicensing and decommissioning options. Dr. Richard McCann of M.Cubed, a well qualified and highly regarded energy economics firm¹ prepared the model and report. The study uses standard economic analysis methods and the best available public data in a broad range of technical areas, including mitigation costs, operational and investment costs, risk factors and power forecasts. Because PacifiCorp declined to contribute to the modeling work with specific, relevant inputs or assumptions, much of the data was drawn from PacifiCorp's own certified filings with the Federal Energy Regulatory Commission (FERC) and filings and attestations before the Public Utilities Commissions in Oregon and California.

KPAAM was designed as a tool for public discourse and clearly states that the inputs can and should be changed to reflect different assumptions or accommodate new information as it becomes available. The analysis was not intended to provide a "precise" forecast, instead offering a range of plausible economic outcomes.

The Energy Commission and other agencies welcome a good faith scrutiny of the KPAAM. This model was developed to allow other stakeholders to add their preferred assumptions and data to the model.

Review of PacifiCorp/Christensen Associates' Critique

PacifiCorp retained Christensen Associates Energy Consulting, LLC (CAEC), to review the KPAAM. CAEC contended that it found a "number of flaws" and in their judgment determined that KPAAM is not "capable of providing an adequate assessment of whether the Klamath Project should be relicensed."

This assertion that the model is not credible is not supported by the CAEC report. PacifiCorp's consultants did not fault the fundamental principles and structure of KPAAM. The staffs of both the California Energy Commission and the Department of the Interior (DOI) agree that the CAEC review supports KPAAM as a rigorous, flexible and well-designed model that is appropriate as the primary economic analytic tool for the Klamath project. The KPAAM is the only economic analysis model that has been developed and made available to all parties in the settlement negotiations and relicensing proceedings.

CAEC did not criticize the model's basic principle that "options should be evaluated when directly comparing relicensing to decommissioning." As stated in the *KPAAM Consultant Report*, PacifiCorp must invest substantially in either mitigation or decommissioning to bring the Klamath into conformance with modern environmental regulations. The FERC license expired March 2006 for this facility and status quo operations will end when a new license is issued.²

¹ The U.S. Bureau of Reclamation's Technical Services Center prepared the hydrological model for KPAAM.

² PacifiCorp is currently operating the Klamath Project on an annual FERC license extension using the old license conditions until a decision is made by FERC.

More importantly, the CAEC critique makes a **stronger** case for decommissioning when their data is used in the KPAAM model.

CAEC identified 14 "errors" that can be sorted into four categories:

1. Input and logic flow errors due to the complexity of data and model
2. Data inputs incorrectly labeled by CAEC as "errors" when the "best available public data" was used because PacifiCorp did not share or disclose the necessary information.
3. Incorrect changes by CAEC to the original KPAAM assumptions and inputs that remain unchanged because they are accurate.
4. Differences in professional practices between CAEC and California and federal government economists and analysts that result in differing perspectives and must continue to be discussed.

CAEC argues that with their corrections to KPAAM, relicensing the Klamath hydro project would be \$46 million less than decommissioning (using the assumptions for the midline case and PacifiCorp's 2005 power forecast). The cost increase results described in CAEC report using the KPAAM model cannot be duplicated.

Putting Risk and Costs in the Proper Context – Considering Additional Factors

Relicensing with the associated mitigation costs creates the highest risk for PacifiCorp ratepayers. The engineering and scientific issues associated with trying to maintain power production and mitigate impacts are complex and expensive. The *KPAAM Consultant Report* finds that mitigation to stop and begin reversing the environmental damage from the Klamath hydroelectric operations will cost between \$230 and \$470 million, power production will be reduced by 23 percent, and the project will be unable to provide quick power during peak periods of electricity demand. The PacifiCorp ratepayers will bear the greatest economic risk for unsuccessful mitigation strategies aimed at fisheries and water quality. PacifiCorp shareholders and ratepayers risk not recouping all of the potential costs associated with long-term mitigation and power production. Ultimately, the Oregon and California Public Utilities Commissions will determine the accurateness of the cost accounting.

Cost is just one of the parameters used by the FERC and the regulatory agencies to determine the best possible outcome for the endangered salmon fisheries, tribes, salmon fishermen, basin farmers, and PacifiCorp ratepayers. The correct interpretation of the *KPAAM Consultant Report* is that within a range of power cost estimates and mitigation estimates, it would be less costly to decommission than to relicense. To account for uncertainty and the need for ongoing refinement of potential relicensing and decommissioning costs, the *KPAAM Consultant Report* includes an error range of plus or minus 30 percent. The resulting range of the cost differences - from low to high - is nearly \$300 million over a 30-year study period. The changes recommended by the CAEC,

and the CAEC contention that their results using the corrections are correct, are well within this error range and do not alter the overall conclusion that decommissioning costs are lower than relicensing costs.

PacifiCorp asserts that KPAAM ignores significant additional risks associated with decommissioning and securing replacement power, including: 1) risk of removing an emissions-free generating resource in an era of increasing regulatory scrutiny on greenhouse gas emissions, 2) unknown costs of sediment removal and mitigation (including sediment management); and 3) possible ongoing legal liability related to unexpected outcomes of removal.

1) Risks of Greenhouse Gas Emissions and Replacement Power

Decommissioning the Klamath project will require PacifiCorp to find replacement power. The 169-megawatt (MW) Klamath project represents about two percent of PacifiCorp's total capacity and about one percent of PacifiCorp's average electricity production. Electricity generated from PacifiCorp's 6,585 megawatts (MW) of coal accounts for 78 percent of PacifiCorp's generating capacity and 68 percent of its total power production.

Replacing electricity from the Klamath Project can be done without increasing greenhouse gas emissions, while allowing for the restoration of a significant salmon fishery. The *KPAAM Consultant Report* includes a carbon neutral energy replacement option – the Oregon Department of Energy (DOE) proposal for 30 MW of energy efficiency and 30 MW of biomass – at an estimated cost below the cost of natural gas power plant replacement options.

2) Risks of Dam Removal

PacifiCorp alleges the KPAAM does not account for financial risks associated with dam removal, sediment management and site restoration. This is not correct. The *KPAAM Consultant Report* relies on *Klamath River Sediment and Dam Investigation*³. The report concludes that the toxicity of the sediment is low and will not affect the method or cost of dam removal, and that downstream erosion of sediment is a feasible method of sediment management under a dam removal scenario. The same consultant has done similar engineering studies for other dam decommissioning projects in the Pacific Northwest. Energy Commission staff is not aware of any documented engineering analysis that contradicts these results.

3) Risks of Legal Liabilities

PacifiCorp is correct that KPAAM does not quantify potential legal liabilities for the decommissioning scenario. The model makes no representations about potential legal liabilities for either scenario. Both scenarios entail some risk of legal liabilities; for relicensing these would include the Clean Water Act TMDL

³ *Klamath River Sediment and Dam Investigation*, Gathard Engineering, November 2006, and submitted to the FERC record by the California Coastal Conservancy

process, dam safety, the potential for additional species to be listed under the Endangered Species Act and other legislation.

Results of Revised KPAAM and Analysis Based on CAEC Inputs

The model inputs were revised and the appropriate corrections from CAEC used. The results reconfirm and strengthen staff's original results: based on the new inputs and assumptions, decommissioning the project rather than relicensing it **increases** the economic benefits to ratepayers from a range of \$32 million to \$286 million. In the original *KPAAM Consultant Report* the difference between decommissioning and relicensing ranged from a cost of \$14 million to an economic benefit of \$285 million. For the revised midline case using PacifiCorp's 2005 power cost forecast, decommissioning would now be \$114 million less expensive than relicensing, a savings of \$13 million more than suggested in the original *KPAAM Consultant Report*.

The following tables from the *KPAAM Consultant Report* have been revised using the appropriate corrections and changes in assumptions identified in the CAEC report. The revised KPAAM model run incorporates about half of the recommendations from CAEC. The remainders are not used because they are incorrect or reflect differences in perspective between PacifiCorp and the government agencies. Please refer to the *KPAAM Consultant Report* for full explanations of methods, data and results.

The revised Table ES-3 from the *KPAAM Consultant Report* shows the net benefits of decommissioning compared to relicensing, or the total cost differences between the two project options. Another way to interpret the table is to imagine "A - B = C," where A is the cost of relicensing with mitigation shown in Table ES-1, B is the cost of decommissioning with 30 years of replacement power shown in Table ES-2, and C is the net difference between the two project options. Table ES-3 shows the C values.

REVISED TABLE ES-3

Net Differences Between **Relicensing with Mitigation Costs** and
Decommissioning plus Replacement Power Costs
Power Forecast Scenarios, Mitigation Estimates and Decommissioning Cost Estimates
(Millions of 2006 Dollars)

Power Price Forecasts	Net Present Value (\$MM)		
	Low	Midline	High
US Department of Interior (DOI)	\$127	\$207	\$286
US DOI-PacifiCorp+Energy Information Agency	\$102	\$182	\$261
Northwest Power Planning Council 5th Power Plan	\$79	\$159	\$238
Oregon Department of Energy – Biomass + DSM	\$74	\$154	\$233
PacifiCorp 2005 Filing with Oregon PUC *	\$34	\$114	\$193
California Public Utilities Commission MPR *	\$32	\$112	\$191

* Costs are for new combined-cycle power plant.

All values are positive, indicating that decommissioning and procuring replacement power for 30 years provides **greater** net benefits to PacifiCorp ratepayers than relicensing with mitigation. In the initial KPAAM, results ranged from a cost to ratepayers of \$14 million, to a benefit to ratepayers of \$285 million. Using the revised data, the net savings from the decommissioning option range from \$32 to \$286 million. For the midline revised case, using PacifiCorp's 2005 power forecast, decommissioning would be \$114 million **less costly** than relicensing with mitigation - \$13 million more than in the original KPAAM results.

Revised Table ES-1 shows the new ranges in total mitigation costs, from \$223 to \$415 million, with a midline estimate of \$320 million. This is somewhat lower than the original range in KPAAM of \$230 to \$470 million, and a \$360 million midline. On a megawatt-hour (MWh) basis, the estimated \$41.78 per MWh increase in Klamath electricity production costs is somewhat lower than the initial estimated midline increase of \$47 per MWh. Revised total production costs for Klamath are estimated to be \$60.78 per MWh for the midline case, with a range of \$48.12 to \$73.19 per MWh.

REVISED TABLE ES-1

Net Present Values of Klamath Relicensing Mitigation Costs
(Millions of 2006 Dollars)

	Low	Midline	High
Fish Passage	\$164	\$235	\$305
Nonfish Passage	\$14	\$20	\$26
Water Quality	\$45	\$65	\$84
Total	\$223	\$320	\$415

The fish passage mitigation includes the costs of full volitional upstream and downstream fish passage across the four Klamath power dams (Boyle, Copco's 1 and 2, and Iron Gate). Note that the water quality estimates may be low due to serious, unresolved water quality issues and the presence of toxic algae in the project reservoirs.

Revised Table ES-2 shows total net present values (NPV) for decommissioning cost estimates, 30 years of replacement power for each of the six replacement power price forecasts used in KPAAM, and the combined replacement power plus decommissioning costs. The ranges in mitigation costs are shown at the bottom of the table for reference.

REVISED TABLE ES-2				
Total NPV Costs of Decommissioning: Dam Removal plus Replacement Power				
(Millions of 2006 Dollars)				
Total Decommissioning Costs		<i>Low</i>	<i>Midline</i>	<i>High</i>
		\$38	\$55	\$71
Replacement Power Cost Forecast	30-Year Total Replacement Power Costs	Replacement Power plus Dam Removal Costs		
		<i>Low</i>	<i>Midline</i>	<i>High</i>
<i>US Department of Interior (DOI)</i>	\$58	\$96	\$113	\$129
<i>US DOI-PacifiCorp+Energy Information Agency</i>	\$83	\$121	\$138	\$154
<i>Northwest Power Planning Council 5th Power Plan</i>	\$106	\$144	\$161	\$177
<i>Oregon Dept of Energy</i>	\$111	\$149	\$166	\$182
<i>PacifiCorp 2005 Filing with Oregon PUC</i>	\$151	\$189	\$206	\$222
<i>California Public Utilities Commission MPR</i>	\$153	\$191	\$208	\$224
Relicensing Mitigation Costs		\$223	\$320	\$415

Decommissioning cost estimates are now lower than for the original KPAAM model run because the remaining book value of \$38.5 million (the non-recovered, non-depreciated capital investment due shareholders) has been removed at CAEC's recommendation. When combined with other changes, this reduces the net present value decommissioning cost estimate to \$55 million from \$94 million. The nominal dollar cost estimate developed by the California Coastal Conservancy and its consultant to remove the four power dams is about \$90 million.

Thirty-year replacement power cost estimates for the six price forecasts used in KPAAM are moderately lower due to changes in discounting for the forecasts.

The range in decommissioning and replacement power costs are now about \$50 million lower than the original KPAAM results, ranging from the low decommissioning-low replacement power cost scenario of \$96 million to the high decommissioning-high replacement power cost scenario of \$224 million. For the midline case using PacifiCorp's 2005 power forecast, total decommissioning costs are estimated to be \$206 million, \$53 million less than the initial KPAAM results.

Point-by-Point Response to Christensen Associates' Review

The KPAAM is the only transparent, comprehensive, objective and reproducible analysis in this proceeding that provides a full economic comparison of the relicensing and mitigation options for the Klamath hydro project. The model is a flexible analytical tool⁴ to inform stakeholders and the results in the *KPAAM Consultant Report* were never intended to be the final word on this assessment. The assumptions and inputs are transparent, using publicly available information, including project-specific information provided under attestation, so each party can have access to the complete set of data and assess almost every single aspect of the model.⁵

Again, it is important to note that CAEC did not criticize the basic premise of the model - "options should be evaluated when directly comparing relicensing to decommissioning." The CAEC report contains no criticisms of the relationships between cost components, therefore apparently endorsing the general approach used in KPAAM.

KPAAM was never intended to provide a "precise" future forecast because no such forecast is possible. For this reason several known simplifications were made and a range of plausible outcomes were presented. It is the general direction of these outcomes and identification of potential risks that are the key findings from KPAAM, not specific dollar amounts.

⁴ "The alternative futures for the Klamath Hydro Project are evaluated and compared using an Excel spreadsheet-modeling platform named Klamath Project Alternatives Analysis Model (KPAAM). The model integrates hydrologic simulations from current and future operational and decommissioning scenarios, future generation levels under numerous operational scenarios, cost inputs for comprehensive mitigation should the project remain in place, decommissioning cost estimates, and replacement power cost estimates from a range of publicly available wholesale price forecasts. The primary model outputs are cost comparisons of the relicensing and decommissioning cases across a range of mitigation cost estimates and a range of replacement power cost estimates. Current costs and conditions are estimated in the model to provide a basis for the relicensing and decommissioning cases." (*Economic Modeling of Relicensing and Decommissioning Options for the Klamath Basin Hydroelectric Project*, December 2006, p.10).

⁵ In some cases where CAEC felt the model was not clear, particularly on the power price forecasts, CAEC simply failed to pursue the appropriate references.

The following is a point-by-point response to CAEC's findings:

Mitigation Costs

- *Discount rate for mitigation costs (Page 7)* – The discounting on O&M costs is corrected. The PV method is correct. These two changes reduce relicensing costs about \$25 million.
- *Present value calculation for mitigation costs (Page 7)* – PacifiCorp's number is now used in KPAAM.
- *Water quality mitigation scenario (Page 7)* – This was an artifact of a sensitivity case used in model development and testing and inadvertently retained in the final version of the model. It has been removed.
- *O&M costs over time (Page 8)* -- How the duration of the measures was addressed has been corrected.
- *Data entry errors and inclusion of duplicative costs (Pages 8-11)* – These are not errors but unresolved issues between PacifiCorp and the regulatory agencies regarding proposed relicensing mitigation measures. The inputs represent the best public data available for the KPAAM analysis. KPAAM is structured so that PacifiCorp may run its own assumptions about these apparent costs.

Incorporating the appropriate changes to the mitigation costs reduces the initial KPAAM results by about \$33 million for the middle case, rather than \$80 million as suggested by CAEC.

Conservative Assumptions for the Relicensing Case

It is important to remember that the relicensing scenario represents a conservative "midline case" based on engineering cost estimates for probable license measures inducing the following.

- FERC may impose lower cost alternatives under the Federal Power Act Sections 4(e) and 18 than are specified by federal agencies. However, significantly more costly measures may be required by California and Oregon water quality agencies under the Clean Water Act Section (CWA) 401. The relicensing case did not include measures to address, for example, toxic algae, which is becoming a serious water quality problem in the Klamath project reservoirs.
- The relicensing scenario only uses flow restrictions for the JC Boyle power plant. While fewer restrictions could be imposed at Boyle, it is also possible (and indeed likely) that FERC will add flow restrictions at Copco 1 and 2 and Iron Gate Dam that would be based on agency fish and wildlife recommendations.
- The relicensing case did not include most of the mitigation measures recommended to FERC by the state and federal fish and wildlife agencies

under Section 10(j) of the Federal Power Act. It is likely that the license will include more, rather than fewer, of these measures, based on the record currently before FERC regarding project impacts to fish and wildlife resources.

- The relicensing scenario does not include reasonable and prudent measures that may be required through the Endangered Species Act for threatened Coho salmon. As with CWA 401, that regulatory process comes later, and it is not possible to currently predict what might result beyond fish passage measures.
- The relicensing scenario does not include the necessary maintenance and upgrade costs to keep the power plants running because PacifiCorp has not provided this information. PacifiCorp told FERC in the final license application that generator rewinds and runner replacements would be required for the various power plants over the next license term, but did not include cost estimates or a schedule for those necessary maintenance operations.

Operational and Investment Costs

- *Ongoing O&M costs* – This was a coding error now corrected in KPAAM. However, correcting this omission adds about \$46 million to relicensing. The impacts asserted by CAEC cannot be duplicated.
- *Remaining book value* – CAEC is correct in treating this as a sunk cost that should be ignored (*KPAAM Consultant Report*, Page 38). It was only included because of PacifiCorp's insistence on compensation. Removing the remaining book value decreases the cost for decommissioning by \$39 million.
- *Ongoing capital costs for relicensing* – This is not a model flaw or error but rather an identification of a future data requirement. This data is currently unavailable and the data gap can only be filled with PacifiCorp's cooperation. Consideration of such costs would *further increase* the cost of relicensing and reinforce the conclusion that decommissioning represents the least-cost solution for PacifiCorp and its ratepayers.
- *Ongoing decommissioning monitoring and mitigation* – This is not a model flaw or error but rather a failure by CAEC to carefully review the documentation provided in the *KPAAM Consultant Report*. As noted, the Gathard Engineering sediment and decommissioning study provides cost elements for site mitigation.

Power Forecasts

- *Documentation of electricity price forecasts* - Sufficient documentation for each of these forecasts is contained in the referenced documents. It appears that CAEC simply failed to review the relicensing docket and the underlying referenced price forecasts, such as the PacifiCorp forecast using the Energy Information Administration forecast and the CPUC's market price referent (MPR). For example, CAEC did not use the gas price forecast from the MPR Excel model as expected; instead they relied only on the outdated CPUC Resolution document. It has never been the intention of the authors of this report to express an opinion on the relative suitability of each power forecast used in the KPAAM. Instead the range is provided to show the opinions regarding potential futures course. Given that these price forecasts are built on deep uncertainty for which probabilities cannot be assigned, it is not possible to weigh the forecasts for use in this context.

Two noteworthy forecasts:

- The Oregon DOE price forecast for a combined energy efficiency program and biomass power plant is presented in the *KPAAM Consultant Report* as it was presented to the modeling team by Oregon DOE's consultants. It represents an equally plausible future and deserves equal weight. The Oregon DOE price forecast is also an important carbon neutral replacement power option.
- The Energy Commission's Preliminary Forecast was inappropriately included in the previously released version of KPAAM. It was an artifact from an early test version of the model and has been removed.
- *Replacement power prices* – The discount rates have been corrected to be consistent with the basis of each forecast type (real or nominal). The prices are calculated in a recognized simplified manner to eliminate added model complexity that would have provided no meaningful precision to the results. In addition, CAEC proposes to extend the power price forecasts by creating fictional forecasts. This assumption is considered an inappropriate answer to the problem of addressing “end point” effects in the model. KPAAM presents an appropriate and economically sound means of addressing this problem.
- *Water flow calibration* – PacifiCorp declined to provide stream flow data that would have allowed more detailed modeling of these flows. KPAAM relies on a model that is a simplification of the Project, but reflects what is believed to be a reasonable and accurate interpretation of the project's future operations. The model results appear to be unbiased, particularly since other KPAAM cases show **higher** output than PacifiCorp has reported. Using PacifiCorp reported output would further increase relicensing costs and the disparity between relicensing and decommissioning costs.

- *Discount rate* – This is a dispute over policy perspective and not a flaw or error. No single discount rate is appropriate in all cases; for example, climate change policy analysis requires discounting of future impacts that would have zero value to us under traditional discounting methods. The choice of a discount rate depends on many factors. The rule applied in KPAAM is that the discount rate should be the same as PacifiCorp's weighted average cost of capital. This is the discount rate used by the California and Oregon Public Utilities Commissions and reflected in PacifiCorp's filings before those commissions. CAEC relies on an alternative interpretation presented to the Utah Public Service Commission. Since the Klamath project is in Oregon and California, the former perspective is appropriate, which is why KPAAM uses the same discount rate used by the Public Utilities Commissions in the Klamath project area.
- *Tax impacts or benefits* – Again this is an important avenue for future research identified by CAEC, but it is not a flaw or error in KPAAM and can be addressed with PacifiCorp's future cooperation.
- *Site-specific outcomes* – While the model is not programmed to immediately address every individual change suggested by CAEC, it is flexible enough to look at different decommissioning dates. More importantly, KPAAM can easily import data from new hydrological model runs that reflect different decommissioning scenarios. However, CAEC's comments reflect their lack of understanding of the Project's operations. While Copco 2 seems to have substantial "benefits" from continued operation, it is in fact heavily dependent on the continued operation of both Copco 1 and Irongate and cannot operate alone. For example, removing Irongate from the Klamath project eliminates its re-regulation of operational flows and would subject the entire 300-mile length of the river to environmentally damaging fluctuations in flow and depth levels.

Considering the Future of the Klamath River

The Klamath River is one of the most important rivers for imperiled populations of Chinook salmon, Coho salmon and steel head trout on the West Coast of the United States. Salmon populations reached such critically low levels in 2006 that the entire commercial salmon fishing industry in Northern California and Southern Oregon was severely curtailed to protect the Klamath River salmon.

As the FERC considers renewing the Federal Power Act license for PacifiCorp's Klamath Project it is imperative that the best available information comparing the costs for decommissioning and relicensing is used. The KPAAM is the only transparent, comprehensive, objective and reproducible tool and resulting analysis in this proceeding that provides a full economic comparison of the relicensing and mitigation options for the Klamath hydro project.

The *KPAAM Consultant Report* and this revised addendum based on the new inputs and assumptions has determined that decommissioning the project, rather

than relicensing, **increases** the economic benefits to PacifiCorp's ratepayers ranging from \$32 million to \$286 million.