

A River in the Balance: Benefits and Costs of Restoring Natural Water Flows to the Eel River

**A Report Prepared by
The Center for Environmental Economic Development (CEED)
1175 G Street, Suite B, Arcata, CA 95521; P.O. Box 4167 Arcata, CA 95518
Tel (707) 822-8347; Fax (707) 822-8347 ceed@humboldt1.com**



for



FRIENDS OF THE EEL RIVER
P.O. Box 2305, Redway, CA 95560
Tel 707-923-2146; fax 707-923-1902; email: foer@eelriver.org

Summer 2002

TABLE OF CONTENTS

Executive Summary 1

I. Introduction 6

A. Basic Background Regarding the Potter Valley Project (PVP) 6

B. Why Consider the Option of Removing the Potter Valley Project Dams to Restore Natural Water Flows to the Eel River? 6

II. What Are the Benefits and Costs of Removing Potter Valley Project Dams and Restoring Natural Flows to the Eel River? 11

A. Eel River Benefits 11

1. Market Valuation of Eel River Fisheries 11

a. Fish Populations 11

b. Market Valuation of the Entire Eel River Fishery 12

c. Effects of PVP on Eel River Fisheries - Fish Impacts Above Cape Horn Dam: Loss of Spawning Habitat 13

d. Effects of PVP on Eel River Fisheries - Fish Impacts Below Cape Horn Dam 13

i. Eel River Water Flows.. 13

ii. Salmonid Life History and Effect of Changes in Natural Flow 14

iii. Pikeminnow (*Ptychocheilus grandis*) 16

e. Overall Contribution of PVP to Loss of Fishery Resources 17

f. Some Relevant Fish Prices 17

2. Other Market Values – Rafting 18

3. Market Values Lost 19

4. Intrinsic or Non-market Values 20

5. Native American Resources of Value 20

B. Russian River Costs and Benefits 21

1. PVP Hydroelectric Power Generation 21

2. Benefits and Costs of Water Diverted from the Eel River for Use in the Russian River Basin 22

a. Review of Some Previous Approaches 22

i. Sonoma County Water Agency (SCWA) Apportionment of Benefits from Eel River Water 22

ii. The FERC FEIS Approach to Costs of Minimum Flow Alternatives .. 24

iii. SCWA – Northwest Associates Input-Output Approach to Estimating Costs. 25

b. A More Comprehensive Approach to Understanding Benefits and Costs of Water Diverted from the Eel River for Use in the Russian River Basin 25

c. Alternative Water Sources 27

d. Some Benefits of Restoring Natural Water Flows to the Russian River ... 28

C. Other Costs and Benefits 29

Summary 30

References 32

Appendices 35

APPENDIX A: BASIC INFORMATION

APPENDIX B: ECONOMIC MODEL – BENEFITS AND COSTS OF NATURAL WATER FLOWS TO THE EEL RIVER

APPENDIX C: ESTIMATION OF FISH POPULATIONS

APPENDIX D: CALCULATION OF WATER FLOWS

APPENDIX E: MARKET VALUATION OF FISH

APPENDIX F: THE POTENTIAL ECONOMIC BENEFITS OF REBUILDING HEALTHY SALMON POPULATIONS IN THE EEL RIVER: ERNEST NIEMI – ECONORTHWEST.

APPENDIX G: MARKET VALUE TOPICS – CONSUMER SURPLUS AND PRESENT VALUE

APPENDIX H: CONTINGENT VALUATION

APPENDIX I: WHOLESALE PRICE OF ELECTRICITY

APPENDIX J: RUSSIAN RIVER BASIN USE OF EEL RIVER WATER

APPENDIX K: COMMENTS ON THE APPLICATION OF INPUT-OUTPUT ANALYSIS TO THE POTTER VALLEY

APPENDIX L: SUGGESTIONS FOR FURTHER RESEARCH

ACKNOWLEDGEMENTS

I wish to thank Friends of the Eel River (FOER) for the opportunity and resources to conduct this study. In particular I wish to thank Nandananda, FOER founder and executive director, the FOER Board of Directors, and their legal counsel Stephan Volker. I also wish to thank Doug Wallace and the FOER staff for their assistance.

In addition I wish to thank Ernie Niemi and ECONorthwest for their contributions regarding salmon valuation and regional economic analysis, as well as for a variety of useful suggestions and comments. Thanks also to Steven Hackett for a wide variety of suggested improvements. And thanks also go to Matthew Marshall for his research and analysis regarding water flows, fish prices, and other topics.

A wide range of others assisted in providing me with information: Pat Higgins, Terry Roelofs, Jaimie O'Donnell, Don Tuttle, David Keller, Robert Curry, Fred Coyote Downey, Craig Bell, Jim Childs, Steve Eliot, Miles Ferris, Suzie Van Kirk, and Michael Welch to name just a few. Their assistance was very valuable. The responsibility for any errors contained in this study is solely mine.

I wish to thank my co-worker at CEED, Ruthanne Cecil, for pitching in especially while I finished this report, and the CEED Board of Directors for my being fortunate to have a “job” of helping work toward an environmentally sustainable future. I wish to thank my family, particularly my wife Nancy, for her patience while I was absorbed in this project. And finally I wish to acknowledge the Eel River and all rivers and the life they support. It is their future, as well as our own, that depends on humans restoring themselves to balance with nature.

Dan Ihara
Humboldt County
June 2002

A River in the Balance: Benefits and Costs of Restoring Natural Water Flows to the Eel River



EXECUTIVE SUMMARY

INTRODUCTION

The complex of facilities (including dams, reservoirs, tunnel and machinery) used to store water and generate electricity located on the main stem of the Eel River is known collectively as “The Potter Valley Project” (PVP). Since 1908 the PVP has diverted water from the Eel River to run its electrical generators and then “abandons” the water to the East Fork of the Russian River.

In regard to the relationship between natural water flows and dams Raphals points out,

The natural flow regime represents perhaps the most important driving force in a river ecosystem because it sustains key natural processes. For example, natural flows maintain the dynamic geomorphology of the channel and surrounding terrestrial areas during floods, sustain the quality of water on which native organisms depend, facilitate nutrient flows along the river corridor and between the river and upland areas, and help regulate the life cycles of river organisms (Raphals, 2001, p. 37).

And furthermore,

Dams are intended to alter the natural distribution and timing of stream flows. As such, they also alter essential processes for river ecosystems. By changing the pattern of downstream flow (i.e., intensity, timing and frequency), they modify sediment and nutrient regimes and alter water temperature and chemistry. These parameters are the basic building blocks of freshwater ecosystems and when these change, many species, habitats and functions that depend directly or indirectly on these forces decline or disappear (*ibid*).

Considering the option of removing PVP dams and restoring natural water flows to the Eel River is warranted for several reasons. In addition to basic ecosystem and public trust reasons, removing PVP dams is warranted due to specific institutional circumstances of the license to operate the PVP, the possibility of the transfer of ownership, and the proposed increase in Sonoma County Water Agency (SCWA) diversion of water from the Russian River.

This report examines the several components of benefits and costs of restoring natural water flows to the Eel River.

BENEFITS

FISHING: The Eel River salmonid fishery has precipitously declined from pre-PVP annual runs of over half a million fish: the value of such a fishery could exceed \$50 million dollars annually today. But over the last century most of that value has been lost.

It is difficult to imagine now, but: “In the early 1900s the Eel River supported runs of salmon and steelhead trout that were estimated to exceed one-half million fish” (California Fish and Game 2001). The value of a fishery that size could exceed \$50 million dollars annually. Over the last century most of that value has been lost.

PVP plays key roles in this loss.

- PVP, to the detriment of fish populations, greatly diverts the water that would otherwise naturally flow into the Eel River. For example, between 1911 and 2000 the average July water flow released into the main stem of the Eel from Van Arsdale reservoir was 12% of the “unimpaired” flow. In other words, for these years the PVP dams diverted 88% of the water that would have flowed in July naturally without the PVP dams. In some years the percentage taken from the Eel in a late-summer month is higher than this average.
- PVP dams block over 100 miles of salmon and steelhead habitat on the Eel River.
- The invasive pikeminnow was introduced into a PVP reservoir, Lake Pillsbury. This predator, which continues to breed in Lake Pillsbury, has spread through the Eel River system feeding voraciously on juvenile fish that are native to the Eel River basin.

To appreciate the economic value of commercial and sports fishing, the following is useful to note:

- Smoked salmon’s wholesale price is \$6 - \$8 per pound. For a fish yielding ten pounds of smoked salmon, that would be \$60 - \$80 per fish.
- A study on recreational fishing in the Central Valley found that the average expenditure per fish is about \$106-108.
- River guides charge \$300 per day.

RAFTING: Restoring natural water flows to the Eel River would increase and enhance recreational opportunities on the Eel and has the potential of adding millions of dollars per year to the local economy.

Rafting alone has the potential for generating over two million dollars of revenue annually through increased river rafting operations on the main stem of the Eel. The natural water flow of the Eel River would extend the current rafting and kayaking season by approximately 6 weeks. For example, using a conservative estimate of the number of rafting parties that could commence on the river each day, the expenditures on the rafting trip alone would total \$2.3 million dollars. Combined with other expenditures rafters would make in the area, the total expenditures increase to \$2.875 million. This does not include the indirect or multiplier effects of these expenditures on the local economy.

MARKET VALUES LOST:

The study shows how the Eel River basin may suffer market-valued losses due to the PVP of more than \$5 million annually. Over the ninety-four years since the start of the PVP, the present value of the cumulative losses totals in the hundreds of millions of dollars. Although pre-development-sized runs may not be seen again, potential market-valued benefits from restoration of natural water flows to the Eel are still very significant. In addition to increases in sustainable commercial fish harvests, sports fishing and rafting possess great and increasing future market values that are compatible with a naturally flowing river.

"INTRINSIC" OR NON-MARKET VALUE OF FISH: Non-market or "intrinsic" values are recognized by economists as significant when considering the value of salmon.

As economist Ernie Niemi of EcoNorthwest puts it, "A person doesn't have to eat a fish to value it." He notes that a carefully conducted survey of the residents of Washington and Oregon found that, on average, they are willing to pay \$30-97 per household per year to protect salmon (over and above what they would pay to consume fish individually). If Californians' willingness to pay for actions to protect salmon is at the low end of what was found in Washington and Oregon—\$30 per household per year—then multiplying this amount times 5 million households in northern California suggests a total intrinsic value placed by residents of the region on protecting and rebuilding salmon populations of \$150 million per year."

"The Eel River likely supports the largest remaining native coho salmon population in California" (California Department of Fish and Game 2001) and would therefore be a significant portion of total intrinsic value of salmon to all residents of California.

RESOURCES OF VALUE TO NATIVE AMERICAN TRIBES:

California Indian Legal Services (CILS) stated in their 1999 comments to FERC that "The [Federal Energy Regulatory] Commission must protect resources of value to the Tribes, such as the Eel River fishery on which the Tribe relies for the exercise of statutory and federally reserved fishing rights." The Round Valley Indian Tribes have stated that "FERC has already allowed PG&E to do tremendous damage to the Eel River fishery and has squandered the opportunity to help reverse that damaging trend by allowing PG&E to conduct a study to examine its own impact on the fishery" (comment on Draft Environmental Impact Statement). Native American opportunities for fishing have been greatly diminished, for example, by the above-mentioned loss of spawning habitat.

To highlight the importance of salmon, it is worth keeping in mind economist Philip Meyer's comment that "Indian elders link the survival of salmon with survival of their tribe as a people." Moreover, traditional elders value water (along with the air, the sun and the land) as one of the four life-givers on which all living things—all humans, all plants and all animals—depend. Although placing a dollar amount on resources of value to tribes (including spiritual values related to salmon and water) is inappropriate and inadequate, such resources are, nonetheless, real values that need to be fully recognized and acknowledged.

“COSTS”

ELECTRICITY: The PVP hydroelectric facility, which PG&E is attempting to auction off, may not be an economically feasible operation and as such would have a zero asset value.

The Sonoma County Water Agency’s report *Allocation of Water Supply Benefits of the Potter Valley Project* states, “...the project is not economic as a hydroelectric project.” This statement is consistent with a comparison of estimates of the PVP’s operation expenditures and its revenue from sale of electricity. In other words, if the PVP were closed, then the money spent on efficient generators of electricity or on energy-conservation measures would be a net gain, not a net loss to society.

CURTAILED ACCESS BY SOME TO SUBSIDIZED WATER:

Many Russian River area users pay nothing to get diverted Eel River water. Others may pay a fee to a water wholesaler, but for the most part this charge is for transmission, treatment and operating costs, not for the water itself. Water in the Eel River, however, has real economic value. Hence, those who pay nothing for it are being subsidized. Furthermore, allowing water users to pay nothing for their use of the Eel River’s water has promoted over-consumption and socially inefficient use. For purposes of illustration, payment of as small a price as \$30 per acre-foot for acquisition of water diverted from the Eel River could exceed \$5 million per year.

Rather than there being a cost from ceasing to divert water from the Eel to the Russian River, water diverted from the Eel River can be considered as having been subsidized for almost 100 years. Russian River area users of Eel River water have not had to pay the externalized environmental and other costs associated with diversion of Eel River water.

ALTERNATIVE WATER SUPPLY: Alternative water supply exists that can supply water to the Russian River basin to replace Eel River water.

Professional geologist Robert Curry has detailed in testimony prepared for FOER that “several groups of options for meeting the [Russian River basin] water demands [exist] in lieu of the Potter Valley diversions...The most promising for upstream sites as well as some Middle Reach sites is increased use of groundwater. The next largest source of untapped water is Lake Sonoma...At present, nearly 1.1 million acre-feet of water in the Russian River system is untapped, and most passes to the sea in the winter.”

Though development costs of such water supplies may be lower than some might expect, such development still requires expenditures. As noted above, the level of these expenditures, rather than a new or additional cost, can be viewed as what the Russian River area would have paid had they not gotten free Eel River water. Consequently the level of expenditures to develop alternative water supply can be seen as a reflection of the level of subsidy that the Russian River area has received. In other words, each year the PVP operates as it has, the Russian River area receives free water that allows it to delay expenditures on an alternative water source. ***Ironically, the larger the expenditure to develop an alternative to free Eel River water is, the larger is the subsidy the Russian River area has received and continues to receive.***

BENEFITS TO RUSSIAN RIVER FISHERIES:

Restoring the natural water flow regimes to the Russian River may have benefits to the Russian River area. For example, not adding water diverted from the Eel River to the Russian River would reduce rainy season flooding. Russian River natural water flows are better for spawning of anadromous fish than augmented water flows to the Russian River.

CONCLUSIONS

In the distant past it may have appeared to make economic sense to some people to dam the Eel River and divert water to the Russian River basin. Such a view is not tenable today. Now there is no economic sense in extending the operation of out-of-date electric generators and the subsidies to some users of scarce, valuable water.

In the final analysis, the issue is not between benefits to the Eel River system and “costs” to the Russian River system. For nearly 100 years, in *both* these two river systems, “human-constructed capital,” ranging from irrigated orchards to housing developments, has been promoted while the “natural capital” values of *both* river basins have been degraded. Similar processes have been occurring worldwide. There is growing scientific evidence that ecosystems, which are under increasing stress throughout the world, are susceptible to relatively sudden collapse. Restoring natural water flows to rivers is part of the larger necessity of restoring humans to balance with the natural world on which all life depends.