Northwest Power and Conservation Council

January 26, 2011

DECISION MEMORANDUM

TO: Council members

FROM: Terry Morlan
Director, Power Planning

SUBJECT: Council Decision on Proposed IEAB Task 176

PROPOSED ACTION: Staff recommends approval of IEAB Task 176 to examine the effects of irrigation efficiency improvement on in-stream water enhancement and the production and use of electricity.

SIGNIFICANCE: Irrigation efficiency is sometimes proposed as a way to both improve in-stream flows and increase electricity production. An alternative approach to improving in-stream flows is direct acquisition of water rights from willing sellers. This analysis will compare the costs and effects of these alternative approaches.

BUDGETARY/ECONOMIC IMPACTS
The estimated cost of this analysis is $25,000, which is available in the IEAB budget.

BACKGROUND
See background section of the attached Task Order 176

ANALYSIS
See statement of work in the attached Task Order 176

ALTERNATIVES
Staff recommends approval of the proposed task. However, alternative decisions could include:

- Disapproval of the task
- Require specific modifications to the statement of work or budget
- Request the IEAB to redraft the proposal to address particular concerns

ATTACHMENTS
IEAB Task Order 176

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Independent Economic Analysis Board

Task Number 176

Implications of Changes in Irrigation Efficiency for Fish and Power

BACKGROUND

Irrigation is by far the largest consumptive use of water in the Columbia Basin. Many people look to irrigation efficiency improvements to enhance in-stream flows and improve water quality for fish. While some believe that irrigation efficiency improvements reduce power demand and increase downstream hydropower production, others hold the opposite view. The Council's Fish and Wildlife Program includes projects that improve irrigation efficiency (usually with work elements that improve infrastructure such as piping projects, lining ditches, or installing wells) with the objective of enhancing in-stream flows to benefit fish habitat and passage. Changes in irrigation efficiency may affect power demand and changes in stream flows may also affect hydropower supply and timing, which might affect the cost-effectiveness of irrigation efficiency projects motivated by concerns for fish.

This task is motivated by the following questions. First, are irrigation efficiency projects a cost-effective tool for fish flow and habitat restoration? Second, how does the cost effectiveness of irrigation efficiency improvement compare to that of water acquisitions, such as those funded by the Columbia Basin Water Transactions Program? Third, will increased competition for water from municipalities and industrial users, increased returns to irrigation water use resulting from high prices for farm commodities, and decreased water supplies resulting from climate change put upward pressure on the water prices faced by water transactions projects? Under what future conditions might irrigation efficiency programs be more cost effective than water acquisitions projects?

We hypothesize that the effects of irrigation efficiency programs and water transaction programs can be characterized according to the scale of the basin, making the effects highly site-specific. In small basins where summer temperature or stream dewatering is a problem, changes in irrigation efficiency may be able to aid fish rearing and passage, and irrigation efficiency might be cost-effective compared to water transactions. Irrigation efficiency changes in medium basins such as the Yakima, Deschutes, and Umatilla may contribute toward fish flow and habitat, and such projects may be large enough to have significant effects on local power demand and hydropower production and timing. For both medium and small basins the cost effectiveness of either approach is likely to depend on return flow characteristics, and on the ability to protect enhanced flows from appropriation by other users under state law.

For large basins such as the Columbia Basin and the upper Snake River Basin surface-aquifer linkages may mean that irrigation efficiency improvements may have little effect on water quality or quantity for power or fish. Efficiency improvements may even reduce supplies for fish and hydropower if improved irrigation results in increased crop water use, or if the saved water is used to expand irrigation. These large basins are generally not targets of BPA Fish and Wildlife Program programs aimed at irrigation efficiency. However, these basins have seen

significant changes in irrigation efficiency and technology in recent years, some of them stimulated by programs such as USDA's EQIP program. However, these irrigation efficiency improvements may have little effect on fish or wildlife.

This project will lay out the current state of knowledge about efficiency projects and water transactions projects and derive implications about the strengths, weaknesses, and relative cost effectiveness of these two approaches.

STATEMENT OF WORK

This project will have three components:

1. General Principles

The first section will investigate and report on general principles and experience regarding approaches for enhancing instream flow and fish habitat. The investigation will cover

- irrigation efficiency concepts such as surface-aquifer interactions and the importance of return flow;
- water and power use under closed conveyance systems and high efficiency application systems such as sprinklers and drip systems;
- the use of irrigation efficiency including sprinkler conversion, conveyance improvements, and water markets to improve fish habitat;
- the role of irrigation and conveyance efficiency in water markets, water banks, and water trusts, and practical problems in enforcement, measurement, and protection of water made available by irrigation efficiency;
- the use of water transactions to improve in-stream flow and fish habitat based on recent transactions funded by the Columbia Basin Water Transaction Program, noting any problems or limitations from using this approach to improve fish habitat and enhance instream flow.

This step will include a literature review, initial compilation of data from relevant projects through Taurus and information in project proposals, and consultation with personnel involved in irrigation efficiency programs and water transaction programs, especially BPA and the Columbia Basin Water Transaction Program.

2. Case Studies

The second section will develop several detailed case studies of tributary basins where Fish and Wildlife Program projects have used changes in irrigation practices or efficiency to improve water conditions for fish. Candidate cases include the Yakima Basin, the Umatilla Basin, the Methow Project, the John Day River, the Deschutes Basin, Salmon Creek and projects on the Lemhi and Bitterroot Rivers. Case studies will be selected in consultation with personnel involved in efficiency programs, especially BPA and the Columbia Basin Water Transaction Program. Some projects have been in place long enough to provide useful knowledge about possible program effects and pitfalls, and some should provide useful cost data and measurable

results. The IEAB will work with project managers and other experts to obtain and analyze more detailed data regarding the costs and effects of irrigation efficiency in the case study basins.

3. Implications for Cost Effectiveness

The third section will summarize and lay out the implications for cost effectiveness of irrigation improvements and water transactions projects. However we caution that the budget being proposed for this project will limit the detail of our analysis, and the number of case studies we will be able to look at. While some of the implemented projects have been in place long enough to have measurable results, others have too short a history for their effects to be measured with confidence. We will note the extent to which this is the case, and may propose follow on studies that can use monitoring and evaluation data as it becomes available.

DELIVERABLES

This task will result in a final report that will be presented to the Council and posted on the IEAB section of the Council web page.

ESTIMATED LEVEL OF EFFORT AND COST

250 hours of IEAB time at $90 per hour (25 hours each for 7 IEAB members, plus 75 hours for task leader)	22,500
Travel costs	2,500
Total Task 176 Cost	25,000

COUNCIL APPROVAL OF TASK

By: _____ Date: _____
Bruce Measure, Chair