



Independent Scientific Review Panel
for the Northwest Power Planning Council
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May 31, 2002

MEMORANDUM

TO: Doug Marker, Fish and Wildlife Division Director
Northwest Power Planning Council

FROM: Rick Williams, ISRP Chair

SUBJECT: Review of Project 200101500, *Echo Meadow Project- Winter Artificial Recharge to Cool Rivers*

Introduction

At the Council's request, the ISRP reviewed the proposal for phase 2 and 3 of Project 200101500, *Echo Meadow Project- Winter Artificial Recharge to Cool Rivers*. The project, sponsored by IRZ Consulting, attempts to use cyclic storage to supplement summer streamflows with cooler water stored in aquifers. In the fiscal year 2001 innovative project selection process, the ISRP reviewed the proposal and ranked it 18 out of 20 proposals found to meet the innovative criteria (66 total proposals were submitted but only 20 were ranked; see attachment 1). Subsequently, the Council recommended that BPA fund Phase 1 of the project, baseline data collection. Phase 1 is now complete, and as part of this review, the ISRP examined the results from Phase 1 as reported in IRZ Consulting's *Draft Progress Report, 2001 Baseline Data* (January 7, 2002).

The Council's decision to fund phase 1 acknowledged the multi-year phased approach necessary to complete the testing of the innovative idea proposed through this project (Phases 2 and 3). The Council was mindful of subsequent requests to fund these additional phases and specifically instructed the sponsor to secure funds through alternative routes provided through the provincial reviews. However, the current regional schedule did not offer a convenient opportunity to submit this proposal for provincial review. Consequently, the Council provided the sponsor the opportunity to submit a proposal for funding through the unallocated placeholder for the Fish and Wildlife Program and for the ISRP to review the proposal consistent with the conditions imposed on proposals submitted for funding in Provincial reviews. As in the provincial reviews, the sponsor is provided the opportunity to address ISRP's preliminary comments contained in this memorandum before the ISRP makes its final recommendation.

Final ISRP Recommendation: Fundable if the proponents adequately address the ISRP concerns below during the Council review or BPA contracting process.

This is a good research proposal that should be funded. It is an important field test of the feasibility of artificially replicating the normative groundwater cycle by applying cold irrigation flows outside the normal irrigation season when the water is usually abundant and cold. The cold irrigation water is expected to augment the aquifer water and allow sustained inflow to the stream over time spans extending into the low-flow and warm-water seasons of summer and fall.

The progress to date by the project is good, considering the limitation of funding to examining baseline conditions only. The initial work has given the investigators a better understanding of the experimental system that they might use. They have gathered streamflow, aquifer flow, aquifer level, water temperature, and other data useful for making comparisons when experimental flows are initiated.

The current proposal has attempted to meet the ISRP's earlier criticisms. It includes discussion of water rights. It has clear objectives and tasks that are a good experimental design for testing the principles sought. No study area is perfect for a demonstration of scientific principle, but Echo Meadows seems to be suitable from a number of standpoints. This is a demonstration of a principle that groundwater (hyporheic zone) augmentation in winter can lead to cooler stream flows in summer, not an actual remediation of the Umatilla site.

However, the proponents should address the following concerns on monitoring and evaluation and other comments/questions before funding.

Simply put, how will we really know that there is an increase in cool water returning to the river in the face of annual variation in rainfall, variation in water pumped from the aquifer for irrigation, warm water added to the aquifer during summer irrigation, etc.? The proponents state that that "A calibrated and verified model, using both base conditions (pre-2002) and trial water applications (2002), provides the best short-term method to verify if the Echo Meadows Recharge Project is a viable and cost effective method of enhancing summertime and early fall stream flows. However, when the project has been fully implemented and groundwater levels increase to their historic levels, it will be possible to show the effect of the project through streamflow measurements along the Umatilla River." We assume that the evaluation is more or less entirely based on a model, i.e., they will use the model to see if the measured parameters suggest an effect of the test water application, comparing measured groundwater levels, temperatures, etc. against the modeled no-addition condition and the measured baseline conditions. It is disconcerting to read that it may not be possible to show the effect of the project with real measured data through streamflow measurements along the Umatilla River until groundwater levels increase to historic levels (a condition that may never be realized).

Three questions/comments should be addressed and added to the proposal during the contracting period:

First. Is the "best" model being used? Several models exist for modeling ground water levels, temperature and movement (see Proposal #34030 in the fiscal year 2002

Innovative solicitation “Enhancing Instream Flow by Adopting Best Agricultural Management Practices” for three candidate models). How was the model MODFLOW selected and how will a war of models be averted? Should more than one model be used, because they must be different and have different strengths and weaknesses?

Second. There could have been more detail on the temperature measurements, which should not be just part of quarterly water quality samples, but continuous monitors at several locations through the study area, including shoreline seeps and other places of groundwater additions. The ISRP recommends that temperature monitoring be enhanced and included in a design for a long term monitoring program.

Third. Address the potential for collection of additional streamflow measurements that will corroborate the model-based evaluations during the life of the study.

The following specific comments/questions should also be addressed:

1. What is the magnitude of water to be added to the system and is the input large enough for the effect to be measured in comparison to the amount of water naturally discharged or pumped from the system and the amount of water added to the system via irrigation in the summer and rainfall/snowfall? That is, is there a chance of measuring/modeling an effect in the face of natural annual variation and ongoing irrigation practices?
2. The water situation in the Umatilla Basin is extremely complex. A major source of water is the Columbia River, from where water is pumped to fill McKay reservoir as a source of irrigation water later in the year. When does this happen relative to the time proposed for application to the fields? In other words, what is the basic source of water to be used for the winter application they have proposed? Will it be Columbia River water from the reservoir? Does it make a difference where the water comes from?
3. Is there site specificity that may interfere with the proof of effectiveness of the “treatment” at this site and/or the eventual extrapolation to sites where it might be applied in practice? For example, if the groundwater reservoir is large, the winter water addition may not affect the temperature much and it could stay near the earth-average 50F. However, if the reservoir is smaller, the cold winter water may largely replace the warm summer water and leave the aquifer (both water and rock) colder than the earth-average near 50F. What is the size of the Echo Meadows aquifer and what is the potential to decrease the temperature of aquifer water below the earth-average? Are there other factors that may limit the extrapolation to other sites and how can their effects be minimized?

Attachment 1. ISRP Review of FY 2001 Innovative Proposal

ProjectID: 22010

Echo Meadow Project - Winter Artificial Recharge to Cool Rivers

Sponsor: IRZ Consulting

505 East Main

Hermiston, OR 97838

Total Request: \$660,714

Target Species: Coho, Spring & Fall Chinook and Steelhead

Short Description: Document the linkages between winter artificial recharge of groundwater to the return flows and river temperature cooling in a 13000 acre study area. Collect & analyze data that shows this method may be the sure-set way to reduce river water temperature

Rank: 18; Yes - B

Comments:

This is an interesting proposal to use cyclic storage to supplement summer streamflows with cooler water stored in aquifers. It is innovative in the sense that the approach, while not new or novel for water management purposes, has apparently not previously been used in the basin for habitat improvement. The proposal has three major shortcomings. First, the cost exceeds the limits specified in the RFP, which makes the proposal non-responsive. Second, no attention is given to water rights considerations. What reason is there that, if the project were implemented and the claimed benefits (in terms of water temperature and increased low flows) were realized, that the water would not simply be diverted for agricultural use? Unless this hurdle was overcome first, there would be no point in proceeding. Third, the proposal would proceed directly to implementation, without prior feasibility studies (which might have been more appropriate to this solicitation). For these reasons, this project should be given low priority for funding.

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