

December 12, 2014

Yakima Basin Storage Alliance Comments

The Yakima Basin Storage Alliance (YBSA) would like to commend the WSU Water Research Center team for an excellent and in-depth review of the controversial 2012 Bureau of Reclamation and Department of Ecology's Yakima Integrated Plan, given the Plan's multiple projects (seven elements) and your deadline of December 15, 2014, to issue a report to the Washington State Legislature. Please enter this document as our comment on or before the deadline of December 12, 2014.

The Washington State Water Research Center's Report (*The Report*) resulted from the direction of the Washington State Legislature to prepare "separate benefit-cost analyses for each of the (individual) projects proposed in the Integrated Plan" (emphasis added).¹ This direction required the total benefits of the Integrated Plan to be disaggregated to the individual projects. The Bureau of Reclamation's water resources planning process involves a "plan formulation step" in which the costs of potential measures/actions are tested against their economic monetary benefits. Essentially what this involves is building the Integrated Plan from an economically justified core to a final proposal of justified increments, and those increments, which because of other non-monetary attributes, should be included. In the case of the Integrated Plan, which is now before us, plan formulation did not occur in this manner. Rather, the concept was the synergistic nature of the Integrated Plan as a whole, which in this case, bypassed the plan formulation step. An equitable distribution of the total benefits at this time is difficult and can have significant impacts on how the Integrated Plan is perceived. It is not surprising that the disaggregation of the total benefit categories results in some individual projects not having positive net benefits and a benefit to cost ratio of 1 or greater.

Instream Benefits

The key to this legislative directive is how the anadromous fish benefits were estimated and how they are to be disaggregated. As noted in *The Report* (pages 48-50), the fish benefits are based on a survey of Washington State households and "their willingness to pay for anadromous fish populations" (a non-use valuation approach).² For the Integrated Plan, the resulting information from the survey of Washington State households was expanded to the State of Oregon households, resulting in a significant fishery present worth benefit (100 years at a 4% discount rate) of \$5.0 to \$7.4 billion. These anadromous fish benefits are associated with three proposed actions in the Integrated Plan: (1) providing fish passage at existing Yakima

¹ Section 507 of the State of Washington Capital Budget for 2013.

² This effort was commissioned by the Washington State Department of Ecology during 1998-1999.

Project storage reservoirs to allow access to spawning in tributaries entering the reservoirs of which the primary benefit is to facilitate the reintroduction of sockeye to the Yakima River basin; (2) habitat restoration in the mainstem Yakima and Naches Rivers and tributaries below the reservoirs; and (3) improving instream flows. For disaggregating the fish benefits, *The Report* assigns the benefits in proportion to the increased fish populations (sockeye and non-sockeye associated with reservoir access), to fish passage, with the residual going to habitat restoration/instream flows. This results in fish passage benefits of \$4.680 to \$6.350 billion and \$0.240 to \$1.050 billion to habitat restoration/instream flows (pages 77-78).³

The result of the foregoing is that all of the fish passage actions at the five existing reservoirs costing a total of \$347.5 million (present worth value of capital and OM+R costs) are economically justified with a combined benefit to cost ratio of 13 to 18 and individual projects ranging from 7.1 to 31.9 for the low benefit estimate and 12.5 to 33.5 for the high benefit estimate (page 78). The impact however, is that benefits from instream flows implemented with the Integrated Plan water storage projects must provide \$2.0 to \$2.5 billion for the storage projects to break-even as a group after taking into account the out-of-stream benefits (page 80). Since the total habitat restoration /instream flow benefits are \$0.240 to \$1.050 billion this is not possible. *The Report* states on page 83 the following:

“...it is not possible to discern the instream flow impact relative to other habitat restoration based on the existing studies, but our statistical analysis weakly suggests that instream flows have a weaker impact on abundance than do other restoration activities as a group.”

Your report on page 99 states: “Reservoir fish passage projects are likely to provide positive net benefits through their pivotal role in supporting wild Sockeye reintroduction into the basin. A deconstruction of the Four Accounts analysis suggests that fish passage could contribute from \$4 billion to \$6 billion in net benefits at a cost of about 0.35 billion (\$350 million), and B/C ratio of 13 or higher. These benefit estimates are likely biased upward, but existing data are insufficient to convincingly refute them. Nonetheless, these estimates could be biased upward by a factor of 13 and still support investment in fish passage.” We are concerned about the use of “likely” being biased upward and counts benefits for households throughout the State of Oregon. They cannot be relied on to justify non-related water storage projects as no description of a management system is mentioned.

Out-of Stream Benefits:

Irrigation Benefits and their Disaggregation:

The same irrigated agricultural crop acreage, cropping patterns, and crop production model used in the Integrated Plan were also used in *The Report* to estimate irrigation benefits attributed to improving a proratable water supply in dry years based on the historical distribution of irrigation curtailment. The information is provided for three conditions: (1) no

³ A discussion of fish abundance methods and estimates of sockeye populations appear on page 82 and for non-sockeye populations on page 83.

trade, involving proportional fallowing of crops in each district, (2) intra-district trades within districts, and (3) full inter-district trading with some restrictions. The present worth value of the irrigation benefits of the Integrated Plan estimated in *The Report* is \$154 million with no trade, \$ 67.5 million with intra-district trade, and \$40.9 million with full trade (page 60). *The Report* states this illustrates that markets attenuate the value of additional water storage because they reduce the impacts of water curtailment” (page 60). It is noted in *The Report* however, that this present worth value of \$154 million is only 19.4 percent, about one-fifth of the irrigation benefits, of \$800 million in the Integrated Plan including water trades. According to *The Report* the primary reason for this is the difference in the assumed frequency and magnitude of water curtailment used in the Integrated Plan (page 60).

The following table shows the irrigation benefits of the Integrated Plan estimated in *The Report* with continuation of historical conditions and the three climate change scenarios (page 63, Table 15).

Climate Scenario	Integrated Plan Condition (million dollars)		
	No Trade	Intra-District	Full Trade
Historic	154.0	67.5	40.9
Less Adverse	214.0	97.5	57.1
Moderately Adverse	390.9	194.0	111.4
More Adverse	649.2	315.2	184.3

The Report is more sophisticated with respect to the irrigation benefits as it illustrates (1) diminishing marginal economic returns to water storage projects as more storage is added; (2) more robust “frictionless” trades reducing the impacts of water curtailment and economic returns to new storage; and (3) as climatic conditions change from the historical to the more adverse scenario an increase in the economic value of water storage occurs.

Municipal and Domestic Benefits:

The Integrated Plan estimated the total present worth value of municipal and domestic benefits at about \$400 million, whereas in *The Report* these benefits are estimated at a present worth value of \$32 million, about 12.5 times lower. The following is noted in *The Report*:

“These estimates represent the cost to acquire uninterrupted water rights, and should not be confused with the economic impact of municipal water curtailments, which can have much larger impacts relative to the costs of water acquisition. Nevertheless, an avoidance cost approach as relied on here is appropriate given the legal requirements of municipalities to provide secure water for their populace, and an ability to do so.” (page 71)

Disaggregation of Out-of-Stream Benefits:

Out-of-stream benefits are disaggregated to individual projects for two scenarios: (1) with the rest of the water supply measures/actions being implemented; and (2) implemented alone assuming no other water supply projects. These scenarios were then applied to three conditions of No Trade, Intra-District Trade, and Full Trade, and two climate change scenarios, Less Adverse and More Adverse.⁴ These disaggregated benefits are then compared to the individual project's full cost and a net benefit and a benefit-cost ratio are determined. What this means is the full cost of the project is shown as being **borne by the out-of-stream benefits** resulting in negative net benefits and benefit-cost ratios of less than 1 **except in the case of** the Keechelus to Kachess Conveyance + the Kachess Inactive Storage (KKC+KDRPP) and Bumping Lake Enlargement in the “project alone” situation and the “more adverse” climate change scenario in which the benefit to cost ratios are 1.53 and 1.03 respectively. This approach indicates that the negative net benefits must be provided from instream flows for the project to break even. An example of this follows using the KKC+KDRPP. However, as noted even if all of the habitat restoration/instream flow benefits are assigned to instream flow benefits they do not cover the deficit collectively. There has been no separation of the habitat restoration/instream flow benefits and no disaggregation of benefits to the water storage projects.

Condition and Climate Scenario	Cost	No Trade			Intra-District Trade			Full Trade		
		Benefits		B/C	Benefits		B/C	Benefits		B/C
		Total	Net		Total	Net		Total	Net	
(present worth value, million dollars)										
With other supply and Less Adverse	334	57	-277	0.17	29	-305	0.09	19	-315	0.06
Alone and Less Adverse	334	157	-177	0.47	85	-249	0.25	61	-273	0.18
Alone and more Adverse	334	511	177	1.53	281	-54	0.84	172	-162	0.51

Instream Flow Benefits:

As previously indicated, restoration/instream flow benefits are estimated to range from \$0.240 to \$1.050 billion and were not separated between the two categories. It is indicated that “given the dearth of information to separate out the impact of instream flows from those of habitat restoration, we cannot provide any information on these two categories separately” (page 80). The Report however, does discuss the cost effectiveness of purchasing senior water rights for instream flows in lieu of their inclusion in water storage and refers to the possibility of water from senior right owners in Kittitas County which are not a part of a single irrigation district with water entitlements of about 220,000 acre-feet (page 27). While up to 77,000 acre-feet of water for instream flows **might be acquired and be a cost effective alternative to**

⁴ I could not follow the process used in The Report for disaggregating irrigation benefits. Municipal and domestic benefits were disaggregated in portion to the acre-feet of water associated with each water supply measure/action (page 70, Table 19).

stored water, such action could adversely impact local economies. (Subjective and Speculative)

Impacts of Water Markets on the Economics of Storage Projects:

The Report, while indicating the potential cost effectiveness of water markets, does so “with tongue in cheek” while emphasizing some of the following (page 94);

- Water scarcity increases net gains from trade.
- Water markets are more valuable without the Integrated Plan and with the more adverse climate change.
- The results (from trade) are based on a number of strong assumptions about market performance and the simulations herein assume frictionless trade such that the marginal value of water is equilibrated within and across districts, and there are no costs associated with transactions that allow this to happen.

It is also noted that to date the Integrated Plan provides no detail on a market of how it would function and be different from those currently in use. While progress in water market infrastructure has been made in the State of Washington, there seems to be the potential for stronger emphasis on developing long-term contractual solutions to prepare for droughts rather than having to pursue water marketing in an emergency response to droughts (page 96).

Your draft report illustrates the concerns of many members of the community and organizations that the Bureau of Reclamation and Department of Ecology’s efforts to combine the Yakima Plan benefits and costs together (“Four Accounts analysis”) appear to be flawed. The “Four Accounts” analysis is fatally flawed as there is no evidence stating that it was carried out using the current Federal water project Principles & Guidelines.

On page 99 your report states: “Water markets show substantive for reducing the impacts of curtailment. We estimate gains from trade net of transaction costs to range between \$88 million and \$1.5 billion depending on climate and the extent of market development. Further, we show that markets act as a substitute for IP water storage infrastructure in that more active markets reduce the value of IP water storage infrastructure.” We are not sure of the accuracy of this statement in that acquisition of private lands made, such as the Teanaway River Basin, may not offset the mitigation required to serve as the losses of ecosystem areas around Bumping Lake due to additional storage. You state that storage capacity would be used annually to improve instream flows upstream and downstream of the reservoirs. Yet, there have been no solid published events of how much flow is required for fish alone, yet you state an improvement would be made for an unknown demand. If there are instream flows to be modified, how would the 1945 Consent Decree be affected without alteration?

You have identified that flaws exist in the Four Accounts aggregate fish impact/benefit data. We agree that fishery resources add some level of undefined (intrinsic) economic benefits that are hard to determine. When unknown economic benefits are used to state benefits to undetermined water storage projects, this needs to be stated as separate issues and points of

order. We believe there should be more evidence provided to support the Four Accounts Sockeye values.

Page 77 states “Further, because Sockeye modeling implicitly assumes that non-passage restoration activities do not affect sockeye success, non-sockeye species convey 100 percent of the restoration benefits.” Without defined instream flows for fish and possible limiting factors for inadequate flows, you may need to consider changing the percentage stated for the Sockeye success that would be with realized with the improvements stated.

Continuing with this concern, it is stated on pages 77 and 78; “Another perspective on this result is that given the valuation methods used in the Four Accounts analysis, fish passage as a group of projects must contribute only about 10,000 fish per year in abundance to pay for the \$350 million in fish passage project costs. This is an order of magnitude lower than the Four Accounts estimates listed in Table 25. Notice that this value represents \$35,000 per fish at this very low end of the population distribution.” We are concerned the value of \$35,000 per fish would be used to justify a positive B/C ratio.

The assessment by the WRC as previously mentioned is much more sophisticated with regard to irrigation than that of the Integrated Plan which requires more assumptions as to the economic value of irrigation water with and without trading and with the advent of the three climate change scenarios. We believe you would not find this level of sophistication in any Corps of Engineers water resources planning documents.

Irrigation benefits are computed as the net farm revenue generated from agricultural production resulting from the proposed action; in this case providing a supplemental water supply in dry years. Net revenues reflect the crops grown, the values of those crops, and the costs incurred by the farmer in producing the crops. These are “direct benefits” and do not include “indirect benefits” which are generated as a by-product of farm production in the regional economic area and throughout the State of Washington.

The reality is the Federal NED (National Economic Development) requires that direct irrigation benefits be used for economic justification while the indirect benefits RED (Regional Economic Development) benefits are not but are normally shown in the reports, but in most cases are probably ignored, or forgotten by the reader. The RED benefits are discussed in the Four Account Analysis of the Integrated Plan (October 2012) and can be found on pages 73-76. We do not see where these indirect benefits are discussed in the WRC report. In this case the anadromous fishery benefits are based on a “non-use” concept and the irrigation benefits as traditionally evaluated on a “use concept”.

Have you considered using an Economic Input-Output model to determine the indirect economic impact to the region under the different scenarios? We are concerned the economic impact to the broader region of trading senior and junior water rights and the buying back of water rights is not fully realized or analyzed in the Integrated Plan.

It seems somewhat ironic with regard to Federal water resource planning that they now require non-Federal cost share and yet they continue to consider only NED benefits for economic justification and cost allocation.

Conclusions:

The task assigned by the Washington Legislature to the Water Research Center is most difficult and the individuals that prepared this report did a commendable job in the time and the funds allotted, particularly in view of the fact it was probably an additional activity to prior scheduled work at the respective Universities.

Following are our conclusions which have been prepared without the opportunity to clarify some of the questions we have regarding the computation and disaggregation of the irrigation benefits and some other items:

1. It appears the plan formulation step of the Bureau of Reclamation's water resources planning activities in which the benefits of proposed plan measures/actions are assessed with respect to their costs was bypassed in the Integrated Plan process. This appears to be the result of promoting the "synergistic concept" of the Integrated Plan "as a whole". It also could be a recognition that the economic viability rested on maintaining the "whole" and not looking internally at the individual components.
2. The application of a "non-use, willingness to pay" methodology in estimating anadromous fish monetary benefits applied to the combined households of Washington and Oregon and the magnitude of estimated sockeye production relative to other species resulted in significant fish benefits which, at a present worth value, are 4 to 6 times greater than the combined irrigation and municipal and domestic water supply monetary benefits. While this significantly impacts economic justification when the Integrated Plan is viewed as a whole, it also has a significant impact on the allocation of the multipurpose costs to the project purposes.
3. There is a significant difference in the present worth value of the irrigation benefits in the Integrated Plan (\$800 million) and those in the Water Research Center's report (\$154 million). Also noted is the difference in the municipal and domestic benefits of \$400 million in the Integrated Plan and \$32 million in the Water Research Center's report. These differences should be resolved as they impact not only the economic justification but also the cost allocation and the extent of reimbursable and non-reimbursable costs. If the combined irrigation and municipal and domestic benefits of \$186 million are substituted for those currently used in the preliminary cost allocation

(\$1.2 million), the costs allocated to the Ecological Restoration purpose would be significantly greater.

4. The key to the economic justification of individual projects is how the total fish benefits are assigned to fish passage and habitat restoration/instream flows. The Programmatic Environmental Impact Statement of the Integrated Plan states the following: *“Fish passage facilities at existing Yakima Project dams would be designed and operated within existing operational considerations and constraints outlined in the Interim Comprehensive Basin Operating Plan. Basin operations would continue to serve existing Reclamation contracts, and potential operation changes would be considered that might enhance fish passage without adversely impacting existing contracts or irrigation water supply”* (page 2-14). With the foregoing, it appears to be difficult to dispute the Water Research Center’s benefit assignment.

Stored water for irrigation purposes are for use in supplementing deficient proration water supplies of KRD, RID, and WIP in drought years. The by-product of these stored water releases are instream flow maintenance which otherwise are diminished due to irrigation supply deficiencies. The Water Research Center’s report indicates irrigation benefits increase with the climate change scenarios yet the value of this water for instream flows, the by-product of these releases appears to remain constant. Doesn’t the value of dry-year instream flows also increase?

5. Water marketing has been an elusive measure since initiation of the State-Federal effort in the Yakima River Basin in the 1980s. The Water Research Center’s report acknowledges the merits of “a robust market” for securing water for instream flows and dry-year irrigation. However, the concept of moving water from low value crops to high value crops has not really materialized to any great extent. To base the future of the Yakima Basin’s extensive irrigated agricultural economy on such action as well as assuring a viable ecosystem seems extremely risky. In addition, the assumption in the Integrated Plan that 100,000 acre-feet of intra-district trades and 30,000 acre-feet of inter-district trades in drought years will occur by fallowing irrigated lands is unfounded. The direct and indirect impacts to local economies have not been fully addressed and the reality of accomplishing the level of frictionless trades considered in the Water Research Center’s report is questionable.

*We suggest an appropriate question that should be asked by all of us is “at what point have we crossed the line of too much refinement of the economics of the projects?” While the task is to look at the irrigation benefits, economic justification also has another critical component - - **the costs!** The Water Research Center’s report deals only*

with the benefits. This is not implying they should have looked at the costs or that the cost estimates are inappropriate at this time, but rather the reality that the focus is on only one side of the benefit-cost ratio. At this time, the cost estimates do include significant cost contingencies. Costs today must be contingent on inflation rates during the years of inconclusive decision and agreements.

6. To date the matter of repayment of the reimbursable costs of the Integrated Plan (irrigation and municipal and domestic water) and their cost to the ultimate user has not been identified. It is important this be done including the manner in which these costs are to be repaid. This affects the reasonableness of providing such water as well as the effects on water marketing. One way to encourage the effective use of dry-year water supplies may be through a Tri-County water marketing authority and pooling of the supplemental water supply to be provided from an Integrated Plan. This would increase flexibility to address future changes in water uses. What is the economic impact to the Yakima River Basin Community (all economic value-added considerations) for “De-Watering “, or buying back water rights, of agricultural production lands?
7. It is noted the Water Research Center’s report indicates that agricultural and municipal water conservation are not economically justified.
8. Not included in this task but a requirement of 2SSB 5367 is that “funds may not be expended for construction from the accounts established for the Integrated Plan until the Washington State Department of Ecology addresses specific items including “alternative means of supplying water to meet the needs” (Section 5 of 2SSB 5367).

YBSA commends the Water Research Center’s efforts to conduct this difficult task described in the Legislative Scope of Work in a relatively short period of time. If you have questions or require clarifications, we would attempt to provide answers.

Sincerely,

Sid Morrison
Chairman, Yakima Storage Alliance: