

Benefit-Cost Analyses of the Yakima River Basin Integrated Plan Projects

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1 Legislative Charge

Legislative charge

2013 Capital Budget (5035-S.SL), Section 5057

- The State of Washington Water Research Center (SWWRC) and WSU are to prepare separate benefit-cost analyses for each proposed project in Yakima Basin Integrated Plan.
- Directed to use existing studies to the extent possible, supplemented by primary research.
- Report economic benefits of each project on a disaggregated basis, showing contributions of individual projects to:
 - increases in fish populations,
 - increases in irrigation water reliability during severe drought,
 - improvements in municipal and domestic water supply.

Projects identified in the legislation

- **Surface water storage:** Wymer dam, Kachess inactive storage, Bumping enlargement, Cle Elum pool raise.

- **Aquifer storage & recovery projects.**
- **Structural & operational changes:** power Subordination at Roza & Chandler; K to K transfer.
- **Fish passage:** Cle Elum, Bumping, Rimrock, Keechelus, Kachess, Box Canyon.
- **Agricultural & municipal conservation projects.**
- **Tributary/mainstem habitat enhancements.**
- **Water bank exchange programs.**

2 Research Plan

Principal Investigators

Researchers from WSU, UW, and U. Idaho

- Economics:
 - **Yoder**, Sch. of Economic Sci., WSU.
 - **Joseph Cook**, UW Evans School of Public Policy and the Benefit-Cost Analysis Center.
 - **Michael Brady**, Sch. of Economic Sci., WSU.
- Fish biology: **Stephen Katz**, Sch. of the Environment, WSU.
- Hydrology: **Jennifer Adam**, Civil & Env. Engineering, WSU.
- Water law: **Barbara Cosens**, College of Law, U. Idaho.
- Graduate students, post-doctoral Fellows, research associates.

Taking “*Integrated*” seriously

- The Yakima Basin is *integrated* by the nature of water itself.
- Project outcomes are not necessarily separable: benefits/costs of one project may depend on implementation of others.
- To the extent possible, the analysis will provide a set of estimates for each project conditioned on implementation status of other projects.

Research Plan

Two Phases

- **Phase 1:** Assessment of existing studies.
- **Phase 2:** Additional analysis to augment available information to meet our charge.
- Phase 2 activities depend on Phase 1 findings.
- Wrapping up phase 1 now.

2.1 Phase 1

Phase 1 activities

- Collate and infer B-C estimates from existing YB studies to the extent possible.
- Assess the existing estimates for satisfying our charge.
- Develop a research plan to complement and/or replace existing estimates as necessary.

Phase 1 conclusions

- Coverage of existing studies:
 - Aggregate B-C estimates for IP (“Four Accounts”).
 - A few project-specific cost & benefit estimates.
 - Some project-specific estimates can be inferred.
- Shortcomings for our project-specific needs:
 - *Conditional* estimates needed, but are not available.
 - Published estimates: disparate assumptions; some outdated.
 - Will review methods & use alternatives when justified.
- Conclusion: New analysis required to satisfy legislative charge. Existing studies are key points of departure & comparison.

2.2 Phase 2

Phase 2 plan of work

- Hydrological modeling.
- Fish response modeling.
- Associated economic benefits:
 - Agricultural irrigation benefits.
 - Fish benefits.
 - Municipal benefits.
 - Other (energy, recreation, etc.).
- Project-specific costs.

Hydrological modeling

- Riverware & VIC (Variable Infiltration Capacity) models.
- Account for climate, demographic, and market projections.
- Examine project-specific effects conditional on implementation (or not) of other projects.
- Allows examining water use potential across competing uses, and shortage/curtailment risk.

Fish population impacts

- Estimate fish population impact potential from changes in habitat due to IP projects.
- Use historical data from Yakima basin to model habitat potential - fish productivity relationship.
- Estimate expected fish impacts by integrating these models.

Economics: Fish valuation

- Impact on fish need to be monetized for comparability.
- Four Accounts fish benefit analysis is a starting point.
- Analyses will be revisited:
 - Nonmarket valuation methods used
 - Application to Yakima & YBIP (i.e. benefits transfer).

Economics: Irrigation benefits

- Approaches to estimating irrigation benefits:
 - Enterprise budget approach.
 - Land market modeling using hedonic analysis.
 - Will integrate meta-analysis and primary analysis.
- Use benefit estimates along with hydrological modeling to estimate aggregate estimates.

Economics: Municipal, domestic, and other benefits

- Municipal and domestic benefits.
 - Account for demographic and water demand projections for muni/domestic/exempt wells.
 - Rely on water rights structure and market costs to estimate the value of avoided shortages.
- Other (e.g. energy production).

Timeline

- Report due December 15 2014 (one year from now).
- Tentative date for posting draft report for public comment: early November 2014.

Questions?

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