Comments on
Ecology's Draft Amendment to 173-501 WAC

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Although it has been seven months since Ecology issued its preliminary draft amendment, the agency appears to have made little progress in addressing the most serious deficiency in the original document: a careful, comprehensive assessment of the potential benefits and costs of improving water-use efficiency (WUE) in WRIA 1. Thus my comments focus primarily on this crucial issue.

Water-Use Efficiency

Both the preliminary draft and the current *Draft Rule Supporting Document* include only one WUE project (46NG).[1] This project description is bereft of any details on who would implement the project; what measures would be included; the sectors to be targeted; promotion methods (e.g., workshops, written materials, and/or financial incentives for purchase and installation of WUE measures); and potential funding sources. And this project, unlike all the others proposed by Ecology, lacks any quantification of offset amounts (Table 6.1).

To illustrate the possible benefits of a robust WUE program consider the following comparison. Ecology's *Preliminary Regulatory Analysis* shows an average cost for three projects of $2,100 per acre-foot (Table 6, page 28), exclusive of annual operating and maintenance costs (which would raise the cost of new water).[2] Is this a reasonable price to pay for more water? Are there other projects that might be less expensive, require fewer regulatory approvals, and be less environmentally disruptive? And are water users willing to pay this much for additional supplies?

Water-use efficiency measures surely cost much less. Consider two simple examples (Exhibit 1). Providing free garden-hose timers to homeowners might cost about $168 per acre-foot. Encouraging farmers to adopt internet-based, advanced irrigation scheduling methods might cost even less, $139 per acre-foot. And these savings occur during the critical low-flow summer months. How can Ecology propose and approve so many expensive projects without at least considering what are likely to be much more cost-effective options?

[1] Page 41 of *Draft Rule Supporting Document*, Nov. 2019.
[2] The numbers reported by Ecology are 10 times higher than the number I use here for comparison. Ecology incorrectly in my view, mixed one-time capital costs with annual water supply additions. I requested clarification from Ecology but the agency declined to respond to my query.

Exhibit 1. Sample water-use efficiency programs[1]

Hose timer: Provide homeowners with a free timer, retail price about $15 plus 25% program overhead; 1 hour saved each time lawn watered, 180 gallons/hour, water 2 times/week, timer lasts 10 years; cost of conserved water is $168/acre-foot

Advanced irrigation scheduler: Workshop to inform/motivate farmers costs $10,000 plus 25% program overhead; 50 attendees, of whom 5% adopt the proposed method; 60 acre farm using 1.2 acre-feet/acre, with a 5% savings in irrigation water, savings last 10 years; cost of conserved water is $139/acre-foot

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[1]I am glad to share the spreadsheet used to derive these results so that others can test the effects of different assumptions.

The City of Bellingham provides a real-world response to my question on projects that might be more cost-effective than these supply projects. Bellingham's single-family residential rebate program has a cost of conserved water equal to approximately $1,200/acre-foot,[3] about half of what Ecology appears willing to spend to provide more water.

If water use efficiency is that inexpensive why does Ecology's portfolio include no (zero) substantive projects to save water? Why does Ecology consider it so much more important to expand supplies and storage than to improve efficiency of use? At a minimum, Ecology should explicitly address these concerns.

Ecology's determination to ignore WUE occurs even though my comments to Ecology on the preliminary draft amendment focused on this issue (Exhibit 2) and included an appendix "Water-Use Efficiency (WUE) Mitigation Options for WRIA 1 in Response to ESSB 6091." This memo, sent by the Environmental Caucus to the WRIA 1 Planning Unit in July 2018, includes several references I had hoped Ecology staff would read plus several experts on WUE I had hoped Ecology would contact. It appears that none of this happened. Nevertheless, I once again include the appendix and hope that this time Ecology will take seriously the large and largely untapped potential of WUE

Other Issues

Neither the *Draft Rule Supporting Document* nor the *Preliminary Regulatory Analyses* mentions compliance and enforcement of the 500-gpd indoor and the 1/12-acre outdoor water limit. How does Ecology plan to ensure compliance with this conservation standard? What is the role of metering here? Remarkably, the rule supporting document says nothing about metering in WRIA

[3] R. Grant, personal communication, City of Bellingham Public Works, Dec. 3, 2019.

1 although it does mention metering in WRIA 5; if metering is called for there, why not in WRIA 1?[4]

The quantity limit standard (both indoor and outdoor), according to Ecology, "promotes conservation [that] is necessary to protect instream resources/" (p 20). Nowhere in the two supporting documents does Ecology explain how either the 500 gpd or 1/12 acre limit promotes conservation. (And if conservation is an important goal, why is project 46NG "WRIA 1 Conservation Program" devoid of even the barest explanation?).

Exhibit 2. Hirst Comments on WUE for Proposed Draft Amendment, 4/22/2019

Chapter 6 of the Supporting Document lists 13 projects that Ecology believes, in aggregate, will "achieve offsets and NEB." Even though a demand/supply imbalance can be met equally well by either increasing supply or decreasing demand, only one of the 13 projects includes WUE. And that project (46NG modified) has no details at all. Indeed, it is the only one of the 13 for which no estimates of offset amounts are provided.

This lack of information is both disappointing and surprising. Disappointing because WUE is likely a large and largely untapped resource in WRIA 1, saves water when it is most needed (summer), is likely very cost effective, is distributed throughout all nine subbasins, and requires no regulatory approvals for its implementation. Surprising because the environmental caucus distributed a paper to Ecology, Whatcom County Public Works, and the Planning Unit in July 2018 on "Water-Use Efficiency (WUE) Mitigation Options for WRIA 1 in Response to ESSB 6091. The paper, included here as Appendix A, offered several specific programmatic suggestions, references, and experts to consult with on the design and implementation of WUE programs. In addition, several local organizations can likely help Ecology in fashioning WUE programs and projects, including the six agricultural watershed improvement districts and their coordinating body, the Ag Water Board; Whatcom Family Farmers; and Whatcom Conservation District.

Because some of the projects that Ecology selected for offsets are already underway, it is inappropriate to include their water production as offsets. Salmon and other instream resources gain no additional benefits from projects that would have been implemented in the absence of the Streamflow Restoration Act. Such projects include Coldstream Farm (#1), Bertrand stream augmentation (#2), shifting from surface to ground water (#26), and the two Whatcom Land Trust projects [Skookum Creek (#19) and Stewart Mountain (#21)]. Ecology should explain its

[4] The regulatory analysis says: "In past rulemakings related to water resources, for example, compliance costs included the costs of metering and reporting." (page viii). Again, what is different about WRIA 1 such that metering is not even considered an option?

basis for selecting these (and perhaps other projects that are either underway or were already planned) and how they meet the offset requirements.

Ecology offers no rationale for picking some projects and rejecting others. How important, in Ecology's view, are various factors that might affect the feasibility and attractiveness of different projects: capital cost, operating cost, overall cost effectiveness (in $/acre-foot of water provided, stored, or saved), environmental effects, regulatory obstacles, and political support? It appears (page 39) that the sole factor for project selection was "likelihood of implementation." Even here, Ecology offers not a clue as to how they determined this likelihood.

There is no way to ensure that the projects identified in Chapter 6 actually get done and are completed within the 20-year time frame. For example, the Birch Bay deep wells project (#24) has no contracts, now or planned, to build the infrastructure to pump water up from these wells and deliver that water to users;[5] what, therefore, is Ecology's basis for assuming this project will offset 440 acre-feet of water?

Along similar lines, what assurance does Ecology have from Whatcom Land Trust that its projects (Skookum Creek and Stewart Mountain) will yield additional water supplies and do so by 2038? "Protecting these areas will improve slope stability, retention, water quality and other human and species benefits, but I don't see how it would improve quantity. If so, that would be insignificant for addressing instream flow in the watershed."[6]

Chapter 7 notes that nothing in the Streamflow Restoration Act "require[s] that there be an obligation on any party to ensure that plans, or projects and actions in those plans or associated with rulemaking, are implemented." This suggests that 20 years out we may find our streams further depleted because of new rural residential construction with little or no offset. What, if anything, is Ecology doing to encourage the legislature to modify the law to ensure that realistic offset projects are approved *before* new wells are drilled?

The adaptive management plan requires Whatcom County to submit a brief progress-report memo each year. Why does Ecology propose to limit this memo to "less than 5 pages"? Why not encourage the County to write as much or as little as is required to appropriately report progress?

The adaptive management plan requires project proponents to provide self assessments every five years. Why such a long lag time between reports? Would not Ecology and Whatcom County be better served by annual reports to ensure timely responses to changing circumstances? Also, what compels project proponents to comply with this requirement?

[5] D. Eisses, General Manager, Birch Bay Water & Sewer District, personal communication, Dec. 5, 2019.
[6] R. Bowers, Executive Director, Whatcom Land Trust, Dec. 6, 2019.

Conclusions

A recent UN report emphasizes the importance of responding quickly and aggressively to the increasingly adverse effects of climate change.[7] Ecology could use the Streamflow Restoration Act as an opportunity to respond broadly to the many water-supply problems in the Nooksack Basin (e.g., flows in the mainstem and tributaries that often fall well below the limits in Ecology's instream flow rule especially in the summer, and the large amount of water used without legal authorization for agricultural irrigation). Instead, Ecology chose to take a very narrow, limited approach to meet the letter of the law and no more. What a missed opportunity!

Because of Ecology's overly cautious approach, the Draft Amendment is substantively the same as the Preliminary Draft Amendment with after-the-fact justification in the *Draft Rule Supporting Document* and *Preliminary Regulatory Analyses*. That is, Ecology appears to have worked backward in preparing this draft amendment: change as little as possible from the Preliminary Draft and then justify this lack of imagination.

A key example of this lack of imagination and initiative is the absence of independent investigation and assessment of options to offset permit-exempt well water use. Ecology began – and ended – with the list of projects developed by the local planning process in 2018. Surely, Ecology had time during the ten months since the failure of the local planning effort and publication of this draft to explore new ideas and projects. As far as I can tell, Ecology made no effort to independently verify the existence and viability of the projects it did include. My contacts with Birch Bay Water & Sewer District and Whatcom Land Trust indicate that Ecology's estimates are wildly optimistic.

Fortunately, the nine months between publication of this draft and issuance of a final rule in August 2020 gives Ecology an important chance to develop and adopt a rule that truly solves local water supply problems. In particular, Ecology should independently and seriously investigate the potential benefits (as well as costs) of ambitious water-use efficiency across all sectors of society.

I urge Ecology staff to contact me (EricHirst@comcast.net) if I can assist in this effort.

[7] U.N. Environment Programme, *Emissions Gap Report 2019*, Nov. 2019.

APPENDIX A:
WATER-USE EFFICIENCY (WUE) MITIGATION OPTIONS FOR WRIA 1 IN RESPONSE TO ESSB 6091

Environmental Caucus to WRIA 1 Planning Unit
July 9, 2018

INTRODUCTION

The environmental caucus believes that improving WUE represents an important and largely untapped class of options to increase streamflows in WRIA 1 watersheds. Generally, these options can cost-effectively and flexibly meet the requirements of ESSB 6091 to directly offset (water-for-water, in time, and in place) the consumptive water use from rural homes using permit-exempt wells. In particular, WUE measures and programs aimed at rural residential and agricultural irrigation water uses can directly address Ecology's requirements on the "amount, location and timing of benefits" needed to offset consumptive water use.[8]

The WUE programs suggested below meet many of the criteria in the June 28, 2018 Project Master List and Evaluation Matrix. Specifically, WUE has positive attributes in terms of

- Status (many of the technologies and programs are well established and far beyond the conceptual stage),
- Quantity, the amount of water saved to offset well water use is reasonably well known (and can be measured through water meters[9]),
- Seasonality, saves water during the summer months when it is most needed to protect and restore streamflows,
- Financial, is likely less expensive and more cost-effective ($/acre-foot) than many supply and storage projects,
- Flexible, because these WUE efforts can be ramped up or down as needed to match construction and water use for rural homes.

This note focuses on Residential and Agricultural water uses because those are the uses most common in the areas where rural exempt wells are located. That is, commercial and industrial users are more concentrated in the urban areas.

[8] Washington State Dept. of Ecology, *Interim Guidance for Determining Net Ecological Benefit*, Publication 18-11-009, June 2018 (page 5).

[9] Because no data exist on water use for rural homes in Whatcom County, it is essential to collect and manage such data for at least a representative sample of these homes. Data from Skagit and Kittitas counties show similarities in the monthly pattern of water use but stark differences in outdoor water use.

RESIDENTIAL

New construction standards: Require installation of high-efficiency water-use fixtures and equipment in all new rural homes (toilets, showerheads, front-loading washing machines, etc). These standards should also apply to irrigation systems. The standards would be set at the maximum cost-effective level.

Provide incentives to encourage WUE adoption in and outside existing rural homes: Offer financial assistance to help pay for more efficient residential water-using fixtures and equipment in existing rural homes, including lawn-watering and other outdoor water uses. Use the City of Bellingham program as a starting point.[10]

Purchase of indoor or indoor+outdoor water use package: Review Dungeness[11] and Kittitas[12] programs to mitigate rural residential water use. Develop mitigation packages to sell to rural homeowners: indoor-use only or indoor-plus-outdoor use. An outdoor option offers a way to limit outdoor water use and is much more palatable than a ban on outdoor water use in watersheds where summer flows are especially low. Include an enforcement clause (aerial photos, drone flights) in permits to ensure compliance with limits or prohibition on outdoor water use. The fees yielded by such a program (to replace the one set in ESSB 6091 of $500) would be more closely related to the actual cost of mitigation in Whatcom County and would provide money to pay for other mitigation projects in WRA 1.[13]

Information and education: Offer workshops to rural households on efficient outdoor water techniques and equipment. Conduct these programs with rural water associations and districts, building on their existing WUE programs. Although the benefits of such programs are hard to measure, they are very inexpensive and lay the groundwork for future actions to promote WUE.

AGRICULTURAL IRRIGATION

Because agricultural irrigation is, by far, the dominant water use during the summer, improving its efficiency could yield major savings, far more than needed to offset the consumptive water use from new rural homes.[14] [15]

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[10] Discuss with Riley Grant, City of Bellingham Natural Resources Division of Public Works, for additional ideas on WUE measures and program design. See also the Saving Water Partnership (Seattle and other local water utilities, https://www.savingwater.org/; talk with Phil Paschke (206-684-5883), Seattle Public Utilities).

[11] For more information on the Dungeness Water Exchange, contact Mike Gallagher, Section Manager in Ecology's SW Regional Office, 360-407-6305, MGAL461@ECY.WA.GOV.

[12] For more information on the Kittitas County program, contact Erin Moore, Kittitas County Environmental Health Dept., 509-962-7698, Erin.Moore@co.kittitas, wa.us.

[13] Any such program should ensure that low-income households are able to afford rural housing and use water to grow food.

[14] Talk with George Boggs and others at WCD to see what they are doing to improve agricultural WUE and help with those programs. Conduct similar conversations with the six WIDs and Whatcom Family Farmers.

[15] The Washington State Conservation Commission (WCC) runs an Irrigation Efficiencies Grant Program (IEP), funded by Ecology, to reduce agricultural water use and apply the saved water to instream flows for salmon

Improve irrigation scheduling efficiency: Washington State University developed software that farmers can use with a personal computer or smart phone to schedule use of their irrigation systems (when to turn on and how long to water) for the next seven days on the basis of various factors, such as soil type and depth; soil moisture; recent, current, and forecast weather conditions from a local weather station; type of crop, daily crop ET; and irrigation system efficiency.[16] "Improved irrigation scheduling … [could] decrease irrigation water use by 10-30% while resulting in equivalent or better crop yields and quality."

Focus on improved irrigation scheduling techniques, especially the one developed by Troy Peters and others at WSU – Prosser. Work with Troy Peters and Don McMoran, WSU Mt. Vernon, to implement such a program. Improved scheduling methods require no capital investment, although they may require some training for farmers in how best to use these systems.[17]

Improve irrigation system maintenance: In a similar fashion, develop, demonstrate and apply best-practices for maintaining irrigation equipment, including leak detection and repair.

Soil-moisture sensors: These sensors can help farmers decide when and how much to irrigate. Some soils permit application of large amounts of water at infrequent intervals, while other soils require smaller applications more frequently.[18]

CONCLUSION

As shown above, many options exist to improve water-use efficiency in WRIA 1. Developing and then adopting these options, along with cost-effective and environmentally benign supply and storage options, will result in a robust package of measures to best meet the requirements of ESSB 6091. The overall goal is to assess and rank individual efficiency and supply options to develop a portfolio of programs/projects that will best meet the ESSB 6091 requirements.

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recovery. The IEP projects deal with delivery systems (replace unlined ditches with liners or put water in pipes) and application systems (more efficient irrigation). As of 2015, 62 projects had been completed through the IEP, saving nearly 16,000 acre feet of water and 66 cubic feet per second of flow back into 23 tributaries.

[16] http://weather.wsu.edu/is/ISMManual.pdf, R. T. Peters, *irrigation scheduler mobile, User's Manual and Documentation*, Washington State University.

[17] A California study of the California Irrigation Management Information System "found that on average, the use of CIMIS increased yields by 8% and reduced water use by 13% [increasing productivity by 23%]." (H. Cooley et al., *Sustaining California Agriculture in an Uncertain Future*, Pacific Institute, July 2009)

[18] R. T. Peters, "Managing Irrigation Water on Different Soils in the Same Field," *Whatcom Ag Monthly*, 2(8), August 15, 2013.

SUGGESTED REFERENCES ON RESIDENTIAL AND AGRICULTURAL IRRIGATION WATER USE AND WATER-USE EFFICIENCY

General

http://www.allianceforwaterefficiency.org/resource-library/default.aspx
Alliance for Water Use Efficiency, Resources Library

https://www.epa.gov/sites/production/files/20162/documents/wc_best_practices_to_avoid_supply_expansion_2016_508.pdf
U.S. Environmental Protection Agency, *Best Practices to Consider When Evaluating Water Conservation and Efficiency as an Alternative for Water Supply Expansion*, EPA-810-B-16-005, Dec. 2016.

http://www.slcdocs.com/utilities/PDF%20Files/2014%20SLC%20Water%20Conservation%20Master%20Plan.pdf
2014 Salt Lake City Water Conservation Master Plan

Residential water use and efficiency references

http://www.waterrf.org/Pages/Projects.aspx?PID=4309
W.B. DeOreo et al, Residential End Uses of Water, Version 2: Executive Report, Water Research Foundation, April 2016.

W. B. DeOreo, "Some Key Results from Residential End Use of Water Study," Water Smart Innovations Conference, Las Vegas, NV, Oct. 2014.

W. B. DeOreo and M. Hayden, *Analysis of Water use Patterns in Multi-Family Residences*, for Irvine Ranch Water District, Oct. 2008.

Agricultural irrigation water use and efficiency references

https://www.ers.usda.gov/publications/pub-details/?pubid=44699
G.D. Schaible and M.P. Aillery, *Water Conservation in Irrigated Agriculture: Trends and Challenges in the Face of Emerging Demands*, U.S. Dept. of Agriculture, Sept. 2012.

https://www2.gov.bc.ca/gov/content/industry/agriculture-seafood/agricultural-land-and-environment/water/irrigation/irrigation-system-assessment-guide
British Columbia Agriculture Council, *Irrigation System Assessment Guide*, June 2005.

https://www.pacinst.org/reports/california_agriculture/final.pdf
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http://irrigation.wsu.edu/Content/Fact-Sheets/Drip-Irrigation-For-Ag-Producers.pdf
R. T. Peters, "Drip Irrigation for Agricultural Producers," Washington State University, Extension Service, undated.

https://www.researchgate.net/publication/271421378_Revising_Crop_Coefficient_for_Washington_Sate
T. Karimi, *Revising Crop Coefficients for Washington State*, MS Thesis, Dept. of Biological System Engineering, Washington State University, May 2012.