

Lessons Learned from the Listening Sessions for the Technology for Trade Project

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Summary of Effort

Technology for Trade is a USDA-funded research and extension effort focused on improving flexibility in water allocation and use by furthering the development and application of three promising and complementary emerging technologies: improved seasonal forecasting of water availability, estimation of crop water consumption using an energy balance approach on remotely sensed data, and computer-aided (smart) water markets. Those interested in more detail can read a [Project Overview](#). In addition, legal, regulatory, and contractual innovations can both enhance the utility of these technologies and be enhanced by them while protecting water rights.

To inform this project, we carried out four focus groups in eastern Washington in March 2019 (two focus groups in Yakima, plus one each in Okanogan and Walla Walla Counties). Individual interviews were held by phone from January through April 2019 with a number of participants who were unable to join a focus group, covering the same general topics and questions addressed at the focus groups. A total of forty-four individuals participated, including participants from government agencies (Tribal, federal, state), conservation districts, irrigation districts (more senior, more junior), non profits (environmental, agricultural), and farmers (hay, alfalfa seed, vegetable row crops).

Results

We captured and categorized major insights gathered from the focus groups. We first discuss insights related to the three focal technologies, followed by insights relating to institutions and to the project more generally.

Computer-Aided (Smart) Water Markets

- There is widespread interest in water markets as a means to reduce water-related issues, with tempered enthusiasm from those in basins having more experience with water markets. A white paper on water markets is available from Roza Irrigation District¹ and has been provided to the *Technology for Trade* team.
 - In Yakima, many saw implementation of computer-aided water markets as a logical next step. If implementation doesn't lead to increased market activity, then this may indicate that other barriers are more important than currently thought.
- Cost and the extended period of time it takes to transact water are both seen as substantial barriers. Current costs of an extent and validity review² are substantial, with quantitative estimates available from the Washington Water Trust and Dustin Garrick (Oxford). If computer-aided water markets could reduce these barriers, this is widely seen as a real benefit that would enhance water markets' potential in the region.
- Time is a substantial barrier in its own right (independent of the relationship with cost). For example, Washington Water Trust indicated that currently, from their perspective, producers would need to

¹ Roza Irrigation District. Water transfers overview. White paper provided March 2019. Roza Irrigation District, Sunnyside, WA.

² An extent and validity review is a review by the Washington Department of Ecology, during which they make a determination about the lawful origination of, and amounts of water associated with, an historical beneficial use of water. This determination is required by RCW 90.03.380 when a water right change or transfer is proposed.

make decisions about water leasing to WWT during the fall / winter for a given year and be well along in the process by Jan 1 (by spring, it's too late).

- A tension between anonymity and information was frequently voiced by participants. Potential water market participants mostly do not want others to know if they are interested in buying or particularly leasing/selling water – or the prices at which water transactions are made. Anonymity concerns also encompassed worry that regulatory agencies might be able to see or use the information entered into the computerized market. However, a number of people suggested that water markets that specifically reduced information asymmetry among different market participants and ensure that people get a more fair price for their water would be beneficial.
- One potential idea that was offered to help increase water market activity is to have the computer-aided market help screen out potential sellers who are not suitable (for one reason or another) – and explain next steps to those who have interest but are not yet at the stage where they have firm water to sell.
- There was some discussion of whether more functional water markets would lead to increased shift of water rights downstream with resulting negative impacts to economies in particular watersheds – though there were varying perceptions about whether this should be seen as a community concern, or an unavoidable side-effect of legitimate exercise of individual property rights. (As part of this conversation, it was noted that in 2001, an amendment to 90-66, the Family Farm Water Act, specifically includes restrictions on out-of-Water Rights Inventory Area (WRIA) transfers, in response to concerns about downstream movement of water rights. However, participants indicated that this amendment has had little impact, because leases are excluded from that restriction.)
 - In Okanogan, there was particular concern about movement of water rights downstream. If some combination of water marketing and remote consumptive use monitoring could make it easier to address impairment concerns and potentially move water rights upstream, that would be seen as beneficial.
- There was broad agreement that community interactions and involvement would be essential during development of a computer-aided water market, so that ultimately it would be trusted by people who might participate in it.
 - In Yakima, someone raised the question of whether the structure of the market could be explicitly tied to/informed by the Integrated Plan, as this reflects a long process of community input.
- One concern expressed generally relating to markets is a need to understand that a “lower” value use of water could still be economically critical to a particular area (i.e. especially a low income area), and that addressing equity issues in this case is likely to be important.
- Concerns were voiced about whether a computer-aided water market would facilitate individuals leasing water, holding it within the trust water rights program, and then turning around and lease it to someone else during a drought year. There was disagreement between participants whether actions of this type (characterized as “speculation” by some participants) would have negative or positive impacts overall.
- Skepticism was voiced that a computer-aided market could handle the hydrologic complexity of surface waters within specific watersheds of the state.
- A number of participants pointed out that flexibility currently often comes in the form of informal arrangements (i.e., between neighbors, between users within a single irrigation entity). Adjudication

can inhibit these informal arrangements and increase the risk of relinquishment.³ If formalized, these informal arrangements would no longer create risk of relinquishment – but at this scale, such a task would create an unmanageable administrative burden. Some participants wondered whether computer-aided water markets could reduce the administrative burden and make this strategy more feasible.

Water Markets from an Agricultural Perspective

- There is a widespread perception that some agricultural users would be “unwilling to lease water at any cost” – and that this is more true if the water is going to non-agricultural uses. This stimulated discussion of whether water market efforts in watersheds that have not previously had them might be more broadly accepted if they focused only on agricultural to agricultural water marketing.
 - This perception contrasts with recent evidence from the Yakima basin, described in full in Cook and Rabotyagov 2014⁴, that indicated that approximately 80% percent of respondents would participate in a split-season lease (70% for a full season lease) if the lease price were double their farm net revenues. This percentage rises with even higher lease prices. Although there may be a small group of growers who are completely insensitive to the lease price offered (unwilling to sell or lease “at any cost”), economic theory and the evidence in Cook and Rabotyagov suggests this group would be a relatively small proportion of the whole. Their work also found that although irrigators are less likely to sell water to a developer than to another irrigator, they are as likely to sell to Ecology [instream flows], as they are to sell to another irrigator.
- If a water market could offer opportunities for tribes who have water rights for potential irrigable acreage to put those water rights into a market until such time as they want to use them, this would be of interest to at least some tribes in the region.
- When a water right transfer is identified as not suitable because of third party impairment (impairment of another water right), could the computer-aided market offer some possibility to open a conversation that might lead to the participant buying out the impaired party (if the water is valuable enough based on the crop prices and if that third party were willing)? This would require a market infrastructure that could “look” beyond the pool of willing buyers and willing sellers – but might generate additional market activity in certain situations.

Water Marketing from an Instream Flow Perspective

- One idea that was raised was whether automated water markets could facilitate new types of arrangements not previously possible that might have beneficial results. For example, if it were possible to facilitate very short-term leasing of water and coordinate this across a particular watershed, could it facilitate “slugs” of water that could help move smolts out to the mainstem in the spring, while minimizing negative impacts on other users?
- Participants continued to question the impacts on market participation and prices when water is going from an agricultural use toward instream flows. Within this context, several participants wondered

³ Relinquishment is the return of water that is not being beneficially used to the State, as Washington’s water law includes the principle that a water right is confirmed and maintained through beneficial use.

⁴ Cook, J. and S.S. Rabotyagov. 2014. Assessing irrigators’ preferences for water market lease attributes with a stated preferences approach. *Water Resources and Economics*, 7, 19-38.

whether computer-aided water markets could help overcome negative perceptions or facilitate **new** ideas that could make people more willing to participate in markets when the buyer is environmental.

- E.g., Could computer-aided water markets generate additional information about the value of water that either confirms or refutes this perception that the allowable price ceilings for environmental flows aren't high enough – especially in a drought context- and thus prompt additional conversation around this?
- E.g., Could a specific incentive be offered, similar to the “one third, two-thirds split that guides the work of the Office of Columbia River, so that some of the water could be used to shore up irrigation rights, while the rest is reserved for instream flows?
- An opportunity was identified from the instream flow perspective to “build in” recognition of particular water rights that might be of interest from an instream flow perspective (e.g., seniority within a reach, opportunities within a reach to coordinate with a group of water users, water right “proved up”) – essentially, to help instream flow entities identify willing seller/lessors who enter their information.
- There was also a question about whether computer-aided markets could incentivize changes in practices that would benefit flows at times of year that are particularly key for fish (and compensate farmers for any negative financial impacts of this). This might be particularly beneficial in areas where there is not an opportunity to retime the water. One example of how this might work is replacing fall-planted winter wheat with triticale planted later in the fall. (Triticale can be planted later than winter wheat without a yield “penalty” but it is less profitable than wheat.)

Perspectives on the Interactions Between Markets and Institutions

- The Foster ruling in Washington⁵ provides a substantial barrier to implementation of computer-aided markets and markets more generally, especially in areas without substantial water infrastructure that allows for retiming of water. One participant asked whether it would be possible to illustrate how the legal changes that addressed these restrictions could work in tandem with computer-aided markets.

Forecasting

- Broadly speaking, forecast variables of interest included: stream flows, snowpack, and timing of melt-off (rain on snow events, rising temperatures).
- Forecasting information from any new tool could potentially complement other data sources considered by the Water Supply Advisory Committee in its recommendations relating to drought declarations in Washington⁶. Data sources currently used include the river forecast information provided by National Oceanic and Atmospheric Administration (daily ensemble forecast), and Natural

⁵ This refers to the 2015 Foster v. Ecology, City of Yelm, and Washington Pollution Control Hearings Board decision. The state Supreme Court made three key rulings in the case: 1) Over-riding Consideration of the Public Interest (OCPI) cannot be used to justify permanent allocations of water; 2) No level of impairment to instream flows is allowed, regardless of magnitude or ecological impact; and 3) Out-of-kind mitigation strategies, such as habitat improvements, cannot be used to address impairment of instream flows.

⁶ Drought conditions are defined in Washington State law when: A geographic area is experiencing, or projected to experience, a water supply that is below 75 percent of normal; and. Water users within the area will likely incur undue hardships as a result of the water shortage. See Chapter 43.83B RCW and Chapter 173-166 WAC for additional information.

Resource Conservation Service (streamflow forecast).

- Several documents of interest were also shared with the project team, including: the draft drought plan update for Washington (as of Oct 2019 in the process of being forwarded to the US Congress in accordance with the Section 204 of the Emergency Drought Relief Act)⁷, articles discussing the role of seasonal climate predictions in drought management⁸, and the experience with water supply forecasting in 1977 in Yakima.⁹
- One person emphasized the importance of understanding statewide soil water conditions in addition to likely water supplies, feeling that this is sometimes under-appreciated in current drought discussions in Washington State.
- Individuals in several basins questioned whether unique physical features of individual watersheds (e.g. complex topographical patterns that limit the ability of short-term forecasting) may be missed in a longer-term forecasting tool, limiting its utility.
- Related regional efforts that were identified through focus groups and that will be further explored include a forecasting tool for ambient temperatures, runoff, and snow water equivalent recently developed by Bureau of Reclamation, and efforts at Oregon State University (under the guidance of Phil Mote)¹⁰ exploring the likelihood of recovering from drought.
- There was some discussion of potential downside risk from an improved forecast. The question raised was whether a more reliable forecast might make it harder for people to prepare for a year when the forecast is wrong (as will still occur from time to time). The question is how to make it more likely that various individual and societal responses will include consideration of this risk, despite the fact that the forecast will more often be reliable.

Forecasting from an Agricultural Perspective – Irrigation Districts

- Many individuals associated with irrigation districts expressed interest in improved forecasting.
- Knowing how good the forecasts are on the low end (relating to droughts) is very important to irrigation districts that are curtailed during drought years. The question irrigation districts in Yakima ask USBR in drought years is, “What’s the lowest water runoff forecast we can reasonably expect?”
- Roza Irrigation District provided quite a bit of detail and documentation about their decision-making process and the actions they can take in response to a low forecast.¹¹ Broadly, decisions are driven by a desire to provide water to growers at the end of the water year, as approximately two-thirds of the crops in the district need water late in the season (as late as possible into September, and preferably into October).
- Wapato Irrigation Project was also interested in identifying low water years because their growers also receive less than desired amounts of water during a drought. They have more difficulty operationally during droughts (an older system makes it more difficult to move water around the Project service

⁷ Washington Department of Ecology. 2018. Washington State Drought Contingency Plan, Third Draft, Bureau of Reclamation Review. Washington Department of Ecology Publication No. 18-11-005, Olympia, WA.

⁸ Crimmins, M.A., and M.P McClaran. 2016. Where do seasonal climate predictions belong in the drought management toolbox? *Rangelands*, 38(4), 169-176.

⁹ Glantz, M.H. 1982. Consequences and responsibilities in drought forecasting: The case of Yakima, 1977. *Water Resources Research*, 18(1), 3-13.

¹⁰ Moruzzi, D. 2019. Developing a drought metric with water managers. A thesis submitted for the degree of Master of Science in Ocean, Earth, and Atmospheric Sciences. Oregon State University, Corvallis, OR.

¹¹ Revell, S. Drought year operating protocols. 2018. Memo prepared for the Board of Directors, December 11, 2018. Roza Irrigation District, Sunnyside, WA.

area in response), but they believe that some farmers might choose not to plant if they knew early enough.

- In Okanogan Irrigation District, forecast information would help the District make decisions relating to how much to fill versus spill from their reservoirs early in the year. In addition, in drought years they pump from the Okanogan River, which is very expensive, so knowing that this may be needed early is helpful. The last time they pumped was in 2005. In 2015, because of the cost, they decided to shut down two weeks early (9/15 instead of 10/1) instead of pumping.
- In Walla Walla, irrigation districts saw it as “one more piece of information they could provide in discussions with growers” to lend credibility to conversations they are already having with irrigators (e.g., asking them to adjust irrigation plans, or for alfalfa hay producers, adjusting cutting dates).

Forecasting from an Agricultural Perspective – Growers

- Growers voiced more interest in longer term forecasts than shorter term (e.g., 6-8 months was of more interest than 1-2 months, with a general feeling of “longer would be better”).
- More senior water rights holders who reliably receive their water may have relatively little interest in the forecast, and there was mixed opinion about whether or not a more reliable forecast tool might lead to some growers with relatively senior rights choosing to lease water instead of planting.
- Crop matters in complex ways.
 - Several growers (hay, alfalfa seed) suggested they made most decisions with more than a year of lead time, and that there was little they could do in response to forecasting information, limiting utility.
 - Hay replanting decisions (an action that could potentially be delayed in response to a water-short year) are generally already made late enough in the spring that hay growers felt they had a sense of the type of water year it is going to be. One decision that was discussed was whether forecasting information could help inform timing of a second cutting of hay during a water-short year (as water needs increase just after cutting).
 - In Walla Walla, the amount of time with temps above 90 degrees F is key information relating to fruit trees (as temperatures over 90 trigger evaporative cooling which is a substantial water use). This didn’t come up in other fruit-growing areas, so it’s not clear whether it is of interest there too.
 - For more detail related to potato production, orchards, or vineyards, we would need to reach out to those growers, as they were not represented at the listening sessions.

Forecasting from an Instream Flow Perspective – Regulated Portions of the Columbia River Basin

- On regulated portions of the Columbia River Basin, forecasting information would be helpful in areas where there is flexibility to manage in response. For example, forecast information could potentially help inform adaptive management on the mainstem. In contrast, in the Yakima, management of some water is dictated, while management of other water is more flexible.
- In dry years, forecasts could help inform when to add extra water to get juvenile fish out of the system early (for example, if it’s going to heat up earlier).
- It was also clear that participants focused on fish felt that they are still developing an understanding how to use limited water available for releases to best support fish populations – and they felt that

further developing this understanding might help them maximize the benefit of a new forecast product.

- Some participants suggested that forecasting good years may be important for fisheries, as these are years when there may be more flexibility to provide extra water to support fish populations.
- An individual working for natural resources for one Tribe indicated interest in the forecast related to long-term agreements they have made (and are likely to continue to make) where they invest in infrastructure upgrades in return for a portion of the additional flows being dedicated to fish. For example, in a recent project, the magnitude of flows committed to fish over the next 50 years is dependent on snow water equivalent (SWE) and the combined storage of the reservoirs on April 1. A new forecast could help them know what magnitude of releases are likely to be committed to fish in a given year, and could also inform what metrics they tie releases to in future agreements.
- In Yakima, one individual felt that there may be some ability to “deficit” the fish account late in the season if they know that extra flow is coming and they are not going to be infringing on someone’s right to water. One also felt that estimating what “carryover” (conserved water from the previous year) will be could be really beneficial to fish, especially during a drought year as it could make a difference in how much water they distribute.
- Each year in March, Oroville-Tonasket Irrigation District and the Canadian water managers and Department of Ecology hold a Fish Advisory meeting. Data that informs Fish Advisory discussions include the [River Forecast Centre of British Columbia](#), data from snowpack telemetry (SNOTEL) sites, and USGS data on flows and water levels throughout the state of Washington
- High water temperatures in the late summer / early fall were mentioned as an increasing problem in several watersheds, though it isn’t clear that the forecast could improve response to this issue.

Forecasting from an Instream Flow Perspective – Unregulated Portions of the COLUMBIA River Basin

- While forecasting information cannot be used to support flows for fish on the unregulated tributaries, supporting earlier drought declarations is also key to improving fish flows, because this releases funding via Ecology for water acquisitions to improve fish flows.
- Specifically within Yakima, Total Water Supply Available (TWSA) does not capture all issues related to fish (and that was / is not the purpose of TWSA). Several participants wondered whether the forecast could augment the TWSA and provide information that would be helpful to inform a more holistic decision-making framework which the various actors in Yakima are trying to work towards.
- Hatcheries managers were not included in the listening sessions, but might possibly have interest in forecasting tools.

Perspectives on the Interactions Between Forecasts and Institutions

- Specific to the Yakima and TWSA, it appears that from a regulatory perspective, the USBR is not constrained from waiting until mid-March to release a forecast of TWSA. However, the water supply forecasting bust in the Yakima Basin in 1977 may have contributed to this tradition.
- Some participants also wondered whether even prior to a drought declaration, if an improved/more long range forecast could help Ecology act more quickly to get water markets prepared and running (though acknowledging that the forecast is probabilistic, rather than predictive in nature).

- In two different watersheds, participants asked whether the forecasting effort could provide information about where better information collection is needed regionally – i.e., adding new or maintaining existing SNOTEL sites or additional stream gauges.

Remote Measurement of Crop Water Consumption via METRIC

Agricultural Perspective on Remote Consumptive Use Estimation

- METRIC could provide an important tool within an irrigation district. Generally speaking, districts have a lot of flexibility in how they irrigate, and METRIC could help validate (or suggest adjustments to) an overall management plan. Comparing consumptive use to diversions could identify places in the system where delivery issues, underwatering, or overwatering are occurring.
- If METRIC could be used to identify inefficient areas across a wider landscape such as a watershed, it could potentially provide data to support grant applications by conservation districts or other entities. It could also be used within a watershed to target use of limited funding for upgrading irrigation equipment. The challenge in such uses would be matching up information from METRIC with diversion information to understand where there's inefficiency.
- From an individual farm management perspective, there was general agreement that METRIC might be of most interest if the information was available as close to "real time" as possible (i.e., every few days) – and to identify overwatering, it would need to be paired with diversion data (whereas identifying underwatering would be more straight forward.). There was also a feeling that this might become more useful as irrigation equipment continues to evolve to increase the ability to "fine tune" water delivery across a field. However, some equipment (i.e., mechanical timers to overcome the inefficiency of a 12-hour set) has already become quite inexpensive.
- There was also mention of potential interest in remote consumptive use monitoring by particular producer sub-groups:
 - In one watershed, there was discussion of fruit growers who are required to meet "Global GAPs" (Good Agricultural Practices). These producers have already been asking irrigation districts for help calculating their diversions for the purpose of Global GAPs reporting. (It's not clear whether fruit growers in other areas are also reporting water use as part of Global GAPs.)
 - There was some discussion that wine growers may be especially interested in understanding consumptive use and comparing to diversions, because providing too much water damages fruit quality.
 - Wine grape, treefruit, potatoes are other industries may be seeking to avoid overwatering from a quality perspective. Additional conversation would be needed to confirm and understand their interests due to the limited number of these producers involved in the focus group conversations.
- For growers, evidence over time would need to show that the new technology provides better information than growers' own intuition and experience. In one watershed in particular, a past soil moisture monitoring project indicated overwatering – but there were detrimental crop impacts when growers reduced water applications.
- Noted barrier for adoption of METRIC by farmers for improving water efficiency: when

- efficiency improvements are made, farmers do not get to use any of the “saved” water (e.g., either for spreading, or for making a junior right they may have on other property “whole”).
- For those using groundwater, enhancing water efficiency does mean energy and cost savings, and cutting costs is critical for staying viable and maintaining land ownership.
 - Over longer time frames, remote consumptive use measurement might be a useful tool to help growers evaluate the impacts of changes they have made to irrigation systems. Or it could perhaps be a tool for irrigation system consultants who are often the ones recommending changes to irrigation systems.
 - There was discussion of whether METRIC could be used to better understand consumptive water use for non-agricultural purposes (e.g., for vegetative strips along riparian areas).
 - A number of other remote consumptive use estimation tools exist in the region, and the team is following up to learn more about these efforts.

Perspectives on Planning and Agency Uses

- There was a widespread perception that voluntary use of remote consumptive use monitoring information by individual water rights holders would be accepted and desired.
 - It could provide another (perhaps cheaper, more widely available) estimate of consumptive use to support change applications or water transactions, alongside other estimates currently used.
 - Water donated to the trust program specifically for instream flow use doesn’t undergo a full extent and validity review – instead, it undergoes a “checkback” over the last 5 years. Remote consumptive use monitoring could be useful for this.
 - Participants agreed that it would reduce the cost of verifying following during transactions that include following.
- Widespread nervousness was also expressed that consumptive use monitoring information could be used by regulatory agencies for water rights that are not being transacted.
 - Fear of relinquishment drives hesitation about remote consumptive use measurement. This is true even though the relinquishment statutes do list crop change and weather-related issues as sufficient causes of non-use.
 - Strong sentiment that remote consumptive use monitoring should not be used to identify individuals who are irrigating small acreages for which they do not have a water right.
 - Within Yakima, participants generally felt that METRIC needs to be kept separate from the process of confirming that the users in the Yakima basin are using water in accordance with the adjudication (though monitoring and enforcement will need to increase at Ecology given the end of the Yakima adjudication).
- For large/complex areas such as the Columbia Basin Project or across an entire watershed, METRIC could support planning efforts by providing information about consumptive water use (e.g., average annual use, variability of annual use).
- One key future risk for fish flows – and for other users in basins reliant on return flows is that consumptive use will increase (via conservation, climate change, etc.). Could remote consumptive use measurement be used to analyze how consumptive use has changed over the recent past? Could modeling be used to explore that risk into the future?
- METRIC could also improve understanding of variability in consumptive water use for a crop, i.e., across the landscape or across years.

- There was some desire for more information about how Idaho used METRIC data to support a water adjudication.
- If remote consumptive use monitoring tools could be used to help identify impairment to third parties (other water users), or to the source, this would be considered valuable.
- It might be valuable to compare data from remote consumptive use monitoring to data from the “old” Washington Irrigation Guide (WIG) and the “proposed/updated” Washington Irrigation Guide.

Institutions

While this section summarizes comments from the listening session about the general concept of institutions, see the previous sections for thoughts relating to institutions and the three focal technologies.

- Understanding the differences in water law between Oregon and Washington may provide additional insight to the team about the institutional context. For example, one participant pointed out that the approach to relinquishment is applied differently in the two states (more rigorously in Washington). Another participant hypothesized that computer-aided water markets may be of different utility in the Oregon versus the Washington portion of the Walla Walla watershed, given different legal contexts.

Drought Response

- Drought declaration is a key institutional process, as it releases funds for purchase of environmental flows, facilitates transfers of water (e.g., they can be approved in 15 days instead of years), and puts a cascade of other possible responses into play.¹²

Relinquishment / Prior Appropriations

- Risk of relinquishment is a widespread and significant current concern in non-adjudicated basins in Washington. In some cases, this may lead an irrigation district to bank water “to take care of it” – while in other cases, it is seen as a disincentive to market participation (i.e., fear of “the Ecology haircut” or losing a portion of the water right).
- More widespread metering has made some irrigators nervous about their water rights, especially if they find they are not using all of their water right, and have plans to change, lease, or sell it. In some cases, this has provided incentive for people to explore water banking, but many people are hesitant about that option as well.
- Skepticism was expressed by some about the idea of exploring the potential impacts related to changing or eliminating the principle of relinquishment: “*What are you actually buying if there's no relinquishment requirement?*”
- Participants also suggested that the team avoid looking at changes to the prior appropriations system. “*While it has its weaknesses, it's the system we have, it has a significant body of court cases behind it,*

¹² For more on drought responses, see Chapter 173-166 WAC and Washington Department of Ecology. 2018. Washington State Drought Contingency Plan,

and ‘it works’”.

Verification

- For the project to best help meet competing water demands, there need to be new tools for documenting the results (quantity, location, and timing) of actions that aim to increase instream flows for fish. This came up as a need with regard to demonstrating impact to various individuals (funders, other water users, etc.), and also as a regulatory need to enable states to **recognize/measure, monitor, protect, and enforce** these flows. This need was expressed by a number of individuals across several geographic areas, and Confederated Tribes of the Umatilla Indian Reservation in particular emphasized that this is needed for benefits to accrue from any other actions that are taken. Consumptive use monitoring could help with demonstrating the quantity, location, and timing of the purchased flows, but then OTHER tools would be needed for monitoring and protecting that water instream so that states could enforce these water rights and non-profits can demonstrate the impact of their work.
- Participants noted that multiple factors, including uncertainty and nervousness about not having enough water, may sometimes lead to overestimation of irrigation delivery needs during the implementation of efficiency improvement projects. This ultimately leads to funders for instream flows feeling that they (or the public) are being asked to pay for the same water twice -- once when the public paid for the efficiency project, then again if they are asked to pay for banking the “extra” water the district has. But if they don’t pay “twice”, then a more junior user who would otherwise be regulated may take that water to meet their water right.
- Particularly in Walla Walla, several participants stated that past market transactions and efficiency projects have not led to increased instream flows for water, because the water tends not to go to instream flows, but instead to either a water rights holder whose rights were previously interrupted – or to someone who holds “paper water.”

Adjudication

- Statewide, adjudication is a high priority issue. Ecology’s Water Resources Program is currently assessing where the next adjudication should take place, following a statutory process. The study will consider 66 existing adjudication request areas, plus additional possible locations (<https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-rights/Adjudications>).

Options Contracts

- The idea of options contracts (agreements that are arranged ahead of time, that move water from one use to another when specific drought conditions are met) was met with a combination of interest and skepticism.
- Participants said that part of the appeal of options contracts is that they would help shift the mindset towards one that sees drought as a long term issue which will reoccur periodically.
- One perceived barrier is that growers may be unwilling to enter into an options contract because it limits future flexibility in crop rotations in response to markets. Even if a grower produces hay (lower value) in some years, they may grow other crops (higher value) at other times.

- Another barrier discussed is that options agreements are not possible right now for most environmental lessors, because the funders that pay for instream flow-type projects won't pay in non-drought years, and won't commit to paying in future years. If this funding constraint could be addressed, then computer-aided markets might better deliver in terms of drought response. Walla Walla Watershed Management Program holds one options contract. There are no payments in years when the option is not exercised, and they have not so far exercised this option (drought conditions have not been met).
- In at least one example, an irrigation district also was unable to enter options contracts due to constraints of the Board (they are not allowed to, or do not want to commit to paying in a future year). That irrigation district had also explored the possibility of purchasing acreage in a more senior irrigation district, to in essence provide similar flexibility as an options contract – but they were worried that the irrigation district might not allow them to move the water during drought conditions.
- One participant suggested that this might be piloted with irrigation districts that have both paired agricultural and suburban/urban uses.
- [The Freshwater Trust](#) was mentioned as one potential model for innovative agreements (including but not limited to options contracts performance monitoring).

Project Gaps

- Some participants felt that the project could benefit from more attention to the interaction between technologies and infrastructure including primarily storage but also potentially other physical infrastructure (providing flexibility to respond, use the technology more effectively). In all watersheds where focus groups were held, the need for additional large storage projects was mentioned due to the flexibility this would add to “retime” water. Participants also discussed that infrastructure often “drives the conversation” relating to water.
- Several participants also mentioned concerns that the project team make sure to recognize that even after development, technologies also need to be maintained over time. They wanted to ensure that these costs were recognized alongside the potential benefits.
- Broadly, participants raised a number of questions that are not directly addressed by the project:
 - Does enhanced efficiency of water use (i.e., through high density plantings, more efficient irrigation) lead to reduced resilience in the case of drought?
- Other regional trends receiving attention, noted by participants that provide the context for our project:
 - Ongoing agricultural consolidation, which provides certain opportunities in terms of water management (larger firms tend to have more capital to invest, decisions can be coordinated).
 - Recognition of groundwater sustainability issues
 - Groundwater – surface water interactions
 - Aquifer recharge
 - Columbia River Treaty renegotiation – is there the potential for the dam system to provide substantial benefits to fish while reducing somewhat the flood control (without hugely negative impacts on people or infrastructure)?

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