SPAC Discussion: Streamflows & Groundwater

The SPAC has discussed current conditions, desired future conditions, strategies, and potential performance measures related to floodplains at the October SPAC meeting. In the matrices below we are beginning to link the key components of the Strategic Plan related to Streamflows and Groundwater (where we are, where we want to be, how we will get there, and how we will measure success).

Today's discussion will focus on potential strategies to address protections for instream flows and groundwater. The list of strategies below was brainstormed by the Ecological Function Working Group. The goal of today's SPAC discussion is to give the Working Groups clear direction on how to proceed. Please consider these questions:

1. Are there **strategies you would like added** to the lists for further exploration?
2. Which strategies, in any, should be **deleted** from consideration?
3. Which strategies are **most important for short-term implementation** (next 5 years)?
4. Which strategies are **most important for long-term consideration**?
5. Do you have comments on other material in the matrix (current conditions, desired future conditions, gap identification, or performance measures)?

Next Steps:

- After input from the SPAC, the WGs will build out the details on the list of potential strategies, as well as conduct a multi-criteria analysis.

GROUNDWATER

Alluvial Aquifer

Where we are now (Current Conditions / Challenges)	**Where we want to be** (Desired Future Conditions)	**How we will measure success** (Performance Measures)	**Potential Strategies to Address Gaps**
In gaining reaches, the alluvial aquifer discharges cool, high-quality water locally to the Walla Walla River, Touchet River, and Mill Creek (and their tributaries) and feeds wetlands, springs, and seeps. In losing reaches, the river loses water to the alluvial aquifer and recharges it. Water levels are declining throughout a significant part of the basin. Long-term trends (70 years) in Oregon indicate a decline of 0.25-0.50 feet per year. Of 141 monitored alluvial wells: • 33 wells (23%) trending upward; • 53 (38%) trending flat (i.e., less than a one-foot difference in the beginning and end of the linear regression line) • 55 (39%) trending downward No new consumptive, unmitigated, alluvial aquifer water rights have been issued on the WA side of the basin since 2003.	Stabilized water levels. Sustaining springs flowing at historical rates (aquifer full and functioning). Enhanced wetlands. Wetlands and springs re-connected. Lower temperature groundwater feeding springs, creeks, and rivers in late spring through fall. Natural surface to groundwater exchange with sinuous channel well-connected to floodplains for recharge. Physical protection and healthy vegetation around spring sources (in upland forests and valley). **Potential roadblocks to meeting DFCs:** • Existing wetland data is focused on larger wetlands. WW wetlands are much smaller, so there are no	Metrics include, but not limited to: • Water levels • Flow rates, temperature, conductivity • Flow gains/losses • Presence of microbes, macroinvertebrates, and fish in surface water connected to alluvial aquifer groundwater	**Groundwater Recharge** • Increase recharge via healthy floodplain function and expanded MAR. • Use of floodplains during high flow events. • Floodplain infiltration of high flows storage can be a valuable source of recharge to aquifer. **Water Conservation** • Reduce alluvial aquifer withdrawals via replacement water source, e.g. the Columbia River pump-exchange. • Municipal and agricultural water conservation. **Policy & Regulatory Actions** • Further closure of water withdrawals in the alluvial aquifer. • Mitigation of current and future rural-domestic (or potentially other uses as well) alluvial aquifer groundwater withdrawals throughout the Basin. **Monitoring & Metering** • Instream, hyporheic zone*, and groundwater monitoring to show complex beneficial exchanges between surface water and groundwater along rivers and creeks. • Floodplain water level, temperature, and conductivity monitoring to show seasonal

Alluvial aquifer closed to new consumptive (non-domestic) use in 2007. City of WW basalt ASR provides flow upward into the alluvial aquifer; about 6% of injected flow to the basalt aquifer moves upward into the alluvial aquifer.	functional assessments of these wetlands. • Underutilization of the alluvial fan is a challenge • Finding viable source water exchange options • Water right regulation and over appropriation is a hinderance. • Land use – Protect existing floodplains and allocate land for MAR programs. • Competing demands for Ag productivity and infiltration; need to reallocate land for infiltration and balance with Ag use.		hydraulic connection to adjacent river and creek. • Recurring vegetation surveys around springs. • Dye studies showing connection between river and creeks, springs, and floodplain, as well as time of travel. This is the most cost-efficient method. • Thermal refuge survey (e.g. FLIR) picks up spring/groundwater inputs to streams, identify where inputs exists and where fish can benefit from more refuge. **Potential roadblocks for implementing these strategies:** • Legal protection of recharged water. • Competing goals for 'surplus' late fall – early spring water that can be conveyed off-channel for recharge • MAR, in some areas, is cost prohibitive ○ Water quality monitoring is expensive on WA side • Adoption of new regulatory measures is challenging
Gap Identification: • Increased long-term storage in alluvial aquifer is needed to increase and stabilize water levels overall.			

Basalt Aquifer

Where we are now (Current Conditions / Challenges)	**Where we want to be** (Desired Future Conditions)	**How we will measure success** (Performance Measures)	**Potential Strategies to Address Gaps**
In the most recent decades, basalt water levels throughout the basin have been declining (approximately one to four feet per year on the Oregon side of the basin). Total declines of over 100 feet in some areas. Declines limit water supply for irrigators and municipalities. Sub-areas of substantial water decline may indicate ideal hydrogeologic settings for aquifer storage and recovery (ASR). No new consumptive water rights from the basalt aquifer have been issued on the Washington side of the basin since 1995. No new basalt aquifer water rights are currently allowed within a five-mile radius of the City of Milton-Freewater. WA has an aquifer protection zone that is enforced under Critical Area Ordinance under WW county code 1808. No similar protection zones in OR. ECY conducts thorough review of injected water quality; meets state standards	Stable or increasing water levels. Continue applying water quality standards for injected water ASR source water, but find ways to reduce costs and increase ASR feasibility. Established aquifer protection zones (for both quality and quantity). Regulation and enforcement needed to protect aquifer protection zones. **Potential roadblocks to meeting these DFCs:** Finding viable source water exchange options. In OR, over appropriation of surface water has driven up groundwater use, establishing a heavy reliance on wells.	Metrics include, but not limited to: • Water levels • Flow rates, temperature, conductivity • Flow gains/losses, eco-system health, and fish presence in the headwater reaches where basalt aquifer groundwater is connected to streamflows.	**Basalt Groundwater Recharge** • Examine and implement ways to drive more widespread ASR, if source water is available. • Conduct systematic study of the basalt aquifer, basin-wide, to examine ASR potential: look at geologic, hydraulic, and geochemical characteristics in regions where ASR source water is potentially available. (USGS study will shed light on this). • Focus on water level declines, pumping history, aquifers penetrated, and faults – cracks in aquifer system that lead to co-mingling versus confinement. **Water Conservation** • Reduce alluvial aquifer withdrawals via replacement water source, e.g. the Columbia River pump-exchange. • Municipal and agricultural water conservation. • Meet water needs via Columbia River pump-exchange or other anchor project which decrease basalt aquifer pumping. **Policy & Regulatory Actions** • Closure of water withdrawals in the basalt aquifer. • Mitigation of current and future withdrawals in the basalt aquifer throughout the Basin. **Monitoring & Metering** • Water level monitoring in OR and WA.

			• ECY Water Resources Program - groundwater monitoring program. • Use work done on OR side aimed at understanding blocks, pump tests, and other metering and monitoring to potentially adopt on WA side. • Develop a program to hand off USGS monitoring to local (WWBWC and WWCCD) and state agencies (OWRD and WDOE). **Potential roadblocks to implementing these strategies:** • Significant technical and economic burden to prove basalt ASR is feasible and then implement via permitting. • Adoption of new regulatory measures is challenging.
Gap Identification: • Aquifer protection, ASR programs, and monitoring are needed to increase and stabilize declining basalt aquifer water levels. • WA-side basalt well and basalt aquifer water level monitoring			

STREAMFLOWS

Walla Walla River Subbasin

Where we are now (Current Conditions / Challenges)	**Where we want to be** (Desired Future Conditions)	**How we will measure success** (Performance Measures)	**Potential Strategies to Address Gaps**

Follows an inland PNW mountain and maritime runoff pattern that responds rapidly to rainfall and snowmelt events and has minimal summer and fall baseflows.
 	
The Walla Walla River is closed to new appropriations from June 1 to November 30. Any future appropriations during non-closure are limited to environmental enhancement.
 	
Irrigation diversions significantly impact daily flow (50-66%) during naturally low flow periods (late June - end of Oct).
 	
From July through November, the river on average:
 	
• Gains water in upper reaches.
• Loses water in the three-mile reach downstream of Nursery Bridge.
• Gains water from Mauer Lane to just upstream of Beet Road.
	Ensure enough water for fish year-round, while balancing water needs for agriculture, and other water users.
	
	More natural flow needed in and through the LWWR system.
	
	More water conserved (e.g. through irrigation efficiency) in LWWR agricultural areas to increase flows through LWWR system.
	
	Targets:
	
	• Analysis of target flows in the WWR-Tumalum branch are forthcoming
	  - Stillwater Report
	  - CTUIR data
	• Should there be target flows for the LWWR system?
	
	Barriers:
	
	• Legal protection of water conserved and/or left instream
		• Flow rates
		• Percent of time target flow met during target period
		• Water availability – enough water available to meet needs.
		• No call on junior water right users.
		• % increase in floodplain areas.
			Streamflow Enhancement Projects
			• Water right acquisition to restore streamflows.
			• Activate LWWR natural function by diverting more flow down the LWWR.
			• MAR and controlled field flooding using 'surplus' or high flows which are defined by by reach, season, and year type (wet, average, dry, drought.
			• Substitute surface water diversions for stored water where possible.
			
			Water Conservation
			• Municipal and agricultural water conservation.
			
			Floodplain and Habitat Restoration Projects
			• Mimic the natural alluvial fan and floodplain system developed over millennia while protecting existing assets and infrastructure.
			• Improve floodplain connectivity.
			
			Policy/Regulatory
			• Identify year-round ecologically based flow targets on the WWR mainstem - Tumalum.
			• Protect surface flows from further groundwater development.

- Variably loses and gains water to near the mouth at the Columbia River RV Park.

Low/summer flows, locally, are order of magnitude 1 to 10 cfs (ref: WG members)

Lower reaches have been dewatered during low flow periods. Water management efforts have had positive impacts on low flows in some reaches.

High flows from Jan-May: 3,000-13,000 cfs (1949-2019)

LWWR:

- Historically, LWWR flows more water than Tumalum (mainstem); LWWR 2x flow of Tumalum.
- Gate built in 1936 or 1938 carried 70 cfs related to the Mill.
- Gate and USACOE worked to reduce flooding in M-F by placing more than historic flow in the Tumalum; help reduce flooding in M-F and LWWR system. Important history of flood control and the LWWR system.
- The gate to the LWWR system has a capacity of 150 cfs.
- Lower gate in LWWR became necessary during ESA listings ~20 years ago. Last 4 years gate open.
- Document text on OR v WA in Supreme Court case has good language describing the WWR-LWWR system. Consider incorporating in the Plan.

within OR or WA, and as water crosses state line.

Monitoring & Metering

- Use existing and new data (USGS) backed up with analysis/models to support decisions about strategic water redistribution.
- Develop a forecasting system for precipitation events to help water managers make real-time and fast decisions about how much and when water can be redistributed from the WWR mainstem - Tumalum and conveyed strategically to locations in the Valley.
- Quantify the downstream benefits of more water (flow through and storage) in the LWWR system. Examine spring branches and lower reaches of WWR benefits.

Implementation Barriers

- Working with water rights requires voluntary participation from private water right holders.
- Protection of instream flows across the OR-WA border has not been resolved.

• 5 cfs passed through LWWR system this year and the benefit were noticed downstream in WA.			
Gap Identification: • A re-distribution of water is needed from locations and times of 'surplus' flow to locations and times of deficit flow/storage. • Need to increase year-round water flows, particularly in low flow months, to sustain fish, agriculture, and other uses.			

Touchet River Subbasin

Where we are now (Current Conditions / Challenges)	**Where we want to be** (Desired Future Conditions)	**How we will measure success** (Performance Measures)	**Potential Strategies to Address Gaps**
Follows a typical runoff pattern – responds rapidly to precipitation and snowmelt events and has minimal summer through late fall baseflows. The Touchet River is closed to new appropriations from May 1 to November 30. Any future appropriations during non-closure are limited to env enhancement. Downstream irrigation district has very senior water right which triggers water right regulation. Irrigation diversions significantly impact daily flow (25-45%) during naturally low flow periods (late June - end of Oct). From June through September, the river on average: • Loses water along all reaches except one (Harvey Shaw to Petty John). • From Harvey Shaw to Petty John the river gains water. Typical low/summer flows: xx cfs	Ensure enough water for fish year-round, while balancing water needs for agriculture, and other water users. • Flow targets should reflect presence and life cycle of species. • Stillwater Ecological Flows report • Monitoring points: Important to look at all gauges. • Data gaps-Coppei CR gauge no longer there; NF gauge **Barriers:** • Limited opportunities to improve instream flows. • Requires participation from private landowners.	• Flow rates • Instream monitoring to measure water levels • Percent target flow met • Water availability – enough water available to meet needs. • No call on junior water right users. • % of increase in floodplain area	**Streamflow Enhancement Projects** • Water right acquisitions to restore streamflows. • Further engagement with Touchet- Eastside Westside on irrigation efficiency project to protect saved water instream. • Work with Dayton Area Irrigation District to save additional water instream- pending issuance of ROE post irrigation efficiency project, diversion change, measurement challenges. **Water Conservation** • Small scale opportunities for irrigation efficiency. **Floodplain and Habitat Restoration Projects** • Improve floodplain connectivity. • Floodplain restoration projects- associated with 2020 flooded projects. **Policy & Regulatory Actions** • Mitigation for current and new PE (and other uses). Enforce mitigation requirements. • Protect surface flows from further groundwater development **Implementation Barriers:** • Working with water rights requires voluntary participation from private water right holders • Limited opportunities to improve instream flows

Lower reaches have been dewatered during low flow periods. Water management efforts have had positive impacts on low flows in some reaches. High flows from Jan-May: 100-6,000 cfs (1942-1965)			• Requires participation from private landowners
Gap Identification: • Need to increase year-round water flows, particularly in low flow months, to sustain fish, Ag, and other uses. • Need to better understand losing and gaining reaches upstream of Dayton • Need to understand water use on Coppei (Steelhead stream) and entire Touchet system			

Mill Creek

Where we are now (Current Conditions / Challenges)	**Where we want to be** (Desired Future Conditions)	**How we will measure success** (Performance Measures)	**Potential Strategies to Address Gaps**
Follows a typical runoff pattern – responds rapidly to precipitation and snowmelt events and has minimal summer through late fall base flows. Mill Creek is closed to new appropriations from June 1 to November 30. Any future appropriations during non-closure are limited to env enhancement. Irrigation diversions significantly impact daily flow (25-45%) during naturally low flow periods (late June - end of Oct). From June through October, the creek on average: Loses water along parts of upper, mid-upper, and lower reaches. Gains water in approximately half of its entire reach length. Typical low/summer flows: 6-9 cfs (2010-2018). Lower reaches have been dewatered during low flow periods. Water management efforts have had positive impacts on low flows.	Ensure enough water for fish year-round, while balancing water needs for agriculture, and other water users. Identify target/goal for year-round hydrograph that will help achieve the above goal. • Peak flows: Stillwater Report targets • Freshet flows Stillwater Report targets • Low flows: Stillwater Report targets **Barriers:** • Tracking and protecting in-stream flows in trust or lease, not just cross state line boundary, but from source to the mouth. • Protection across state line (City of WW OR water right) • Difficulty monitoring water rights with no gauge info and securing funding for restoration with limited data.	• Flow rates • Instream monitoring to measure water levels • Percent target flow met • Water availability – enough water available to meet needs. • No call on junior water right users. • Use CTUIR streamflow targets identified in Stillwater Sciences 2013 Walla Walla River Ecological Flows. - Recommended stream flows to support fisheries habitat and floodplain function	**Streamflow Improvement Projects** • Water right acquisitions to restore streamflows. • Restore flushing flows to Yellowhawk to move sediment. • Enhance/restore streamflows using alteration of Corps flood control rules. • Decrease City of WW surface water diversion or substitute for basalt wells during low flow periods. • MAR in mid-& lower Cottonwood Rd. Great MAR potential and sinuosity/side channel reestablishment. **Water Conservation** • Municipal and agricultural Water Conservation. **Fish passage projects** • CTUIR habitat program: potential artificial transport of sediment from upstream to incised mile below Gose Street bridge (~RM 4.8). **Floodplain and Habitat Restoration Projects** • Complete installation of low-flow channel through the weired section. • Adjustments to concrete channel and weirs to increase flows and decrease temps. • Levee setback and floodplain restoration could reduce erosive force both above diversion (~RM11) in and below Gose Street Bridge (~RM4.8). • Focus on access to quality upstream habitat **Policy & Regulatory Actions**

High flows from Jan-May: 500-2,000 cfs (1942-2010) At OR/WA state line near Kooskooskie 25-35cfs, lease agreement could double summer flows, allowing downstream areas to approach instream flow targets. CTUIR & City of WW agreements to lease 5.5 cfs (Aug & Sept) under CBWTP. Theoretically protected by age date. Increased development along Mill Creek (highly desirable development area) has impacts on floodplain restoration.	• TMDL testing intermittent (once a decade in some places).		• Critical Area Ordinance updates needed for floodplains and riparian areas, currently going off to outdated 1983 map. • County/city planning and development use minimum requirement and do not account for impervious surfaces, only structures; need more specific development regulation. • More land use protection for Cottonwood/Yellowhawk. **Metering and Monitoring:** • Need additional gauges. Good spots may include: - Above Cottonwood Creek mouth with Yellowhawk - Stateline Rd & Yellowhawk - Headgate area of Yellowhawk **Implementation Barriers:** • Working with water rights requires voluntary participation from private water right holders • Requires participation from private landowners
Gap Identification: • Need to increase year-round water flows, particularly in low flow months, to sustain fish, Ag, and other uses. • Need to provide the same info for Yellowhawk, Reser, Cottonwood, Russell & Tributaries (alluvial fan distributary of Mill Creek- not single stream system).			