Northwest **Power** and
Conservation Council

November 7, 2023

MEMORANDUM

TO: **Council Members**

FROM: **Stacy Horton, Washington Staff Policy Analyst/Biologist**

SUBJECT: **Groundwater Replenishment Approaches to Improve Water Resiliency in the Walla Walla Basin**

Walla Walla Basinwide Tributary Passage and Flow, Project No. 2007-396-00

BACKGROUND:

Presenter: Troy Baker, Executive Director Walla Walla Basin Watershed Council, Steven Patten, Public Works Engineering Technician, City of Milton-Freewater, OR

Summary: Troy Baker and Steven Patten will discuss the Walla Walla Basin Watershed Council's role in groundwater replenishment within the Walla Walla Watershed. Their presentation will highlight the innovative tools and methodologies employed to bolster water resiliency within the Walla Walla Basin. Furthermore, they will discuss basin characteristics that render the basin exceptionally reliant on its groundwater resources, emphasizing the critical interplay between surface flow and groundwater.

Relevance: Ecosystem function is a restoration strategy in the Northwest Power and Conservation Council's 2014 Columbia River Basin Fish and Wildlife Program (Program) that calls for the protection and restoration of habitats and biological diversity where feasible and is critical to the long-term success of the measures in the Program in terms of achieving healthy,

851 S.W. Sixth Avenue, Suite 1100
Portland, Oregon 97204-1348
www.nwcouncil.org

Bill Edmonds
Executive Director

503-222-5161
800-452-5161

self-sustaining and harvestable populations of native fish and wildlife. This strategy utilizes a landscape perspective and management approach that emphasizes the regeneration of natural processes to maintain the redundancies that make for resilient ecosystems. One of the measures under the ecosystem function strategy is to protect, enhance, restore, and connect freshwater habitat in the mainstem and tributaries. Climate change can affect freshwater habitat investments as snowpacks are expected to diminish as warmer temperatures result in more rain and less snow. The impact to lower elevation watersheds will be the alteration of stream flow timing like shifts in peak river flows to earlier in the spring, and rising water temperatures. Temperature and hydrologic changes are expected to have many interrelated impacts on aquatic and terrestrial ecosystems. We already see many places in the Columbia River Basin where the demand for water exceeds the supply.

The Program notes that successful protection, mitigation, and recovery efforts require the collaborative efforts of many programs and strategies. The Walla Walla Basin Watershed Council (WWBWC) is an example of success through partnerships. Their approach provides some valuable tools needed as we strive to acquire the water quantity and quality required to provide robust habitats for fish and wildlife.

Background: The Walla Walla Subbasin Plan describes this subbasin as "encompasses 1,758 square miles located in Walla Walla and Columbia Counties in southeast Washington State and Umatilla County in northeast Oregon State. Primary waterbodies include the Walla Walla River and Touchet River, both of which originate in the Blue Mountains. The Touchet River is a tributary to the Walla Walla, which is a direct tributary to the Columbia River. Melting snow from the Blue Mountains provides much of the annual runoff to the streams and rivers in the subbasin; the water level in many streams diminishes greatly during the summer months. Vegetation in the subbasin is characterized by grassland, shrubsteppe, and agricultural lands at lower elevations and evergreen forests at higher elevations."

Aquatic focal species identified in the subbasin plan include steelhead, spring Chinook salmon, and bull trout, with lamprey, mountain whitefish and freshwater mussels designated as species of interest.

The Walla Walla Basinwide Tributary Passage and Flow project is a Bi-Op non-Accord project.

Between 2007 and 2022, BPA reports on cbfish that this project is confirmed to have provided $3,435,152 in cost share.
https://www.cbfish.org/ProjectCostShare.mvc/ManageProjectCostShare/2007-396-00

More Info:

- Walla Walla Basin Watershed Council: https://wwbwc.org
- 2022 Annual Recharge Report: Annual Recharge Report (WY 2022)
- Publications
  - Modeling the impact of aquifer recharge, in-stream water savings, and canal lining on water resources in the Walla Walla Basin
- Annual Report posted on cbfish: Walla Walla Basin-wide Tributary Passage & Flow Project: https://www.cbfish.org/Document.mvc/Viewer/P177614

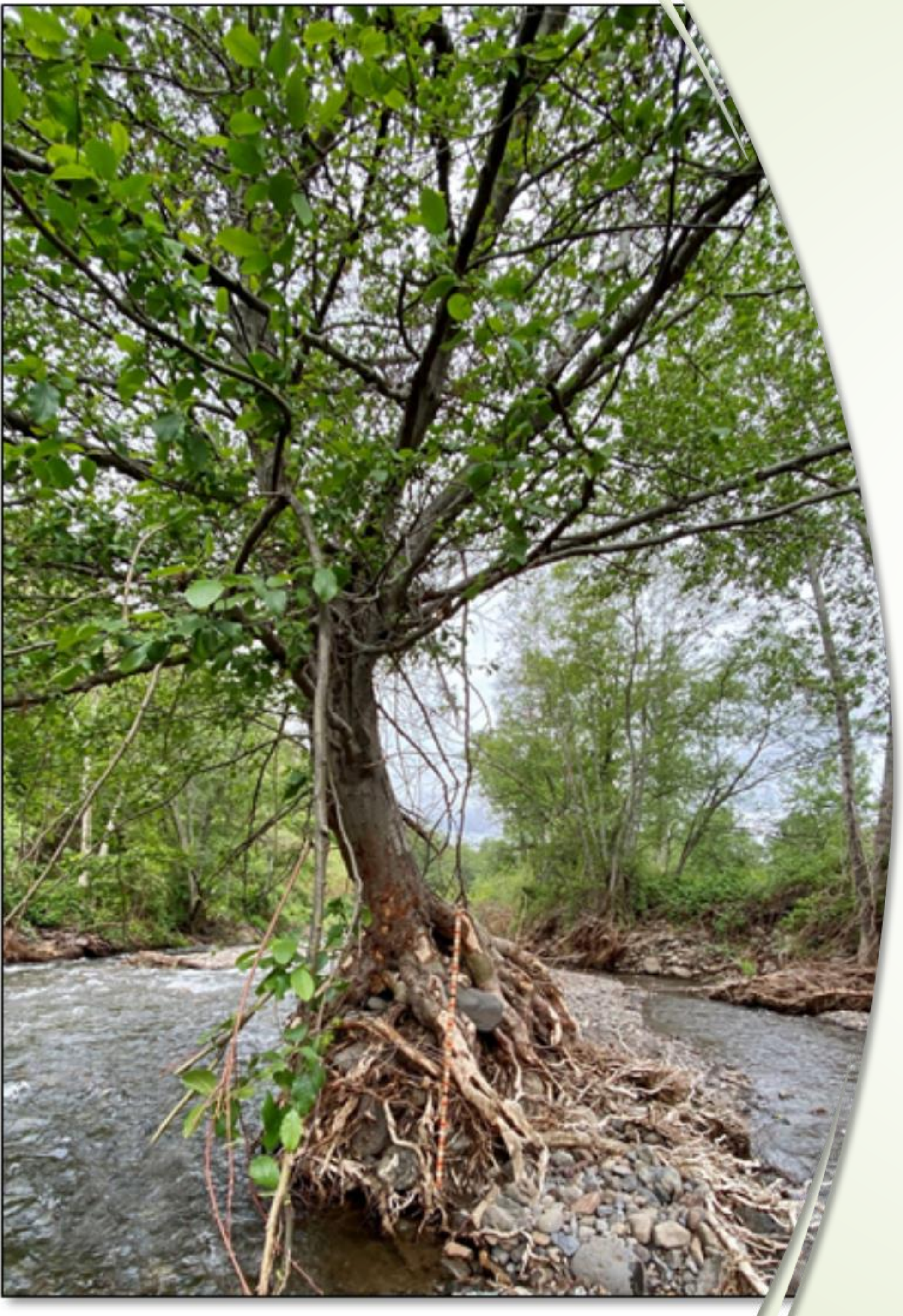
Groundwater Replenishment Approaches to Improve Water Resiliency in the Walla Walla Basin

Northwest Power and Conservation Council
November 15, 2023 Meeting

Troy Baker – Walla Walla Basin Watershed Council

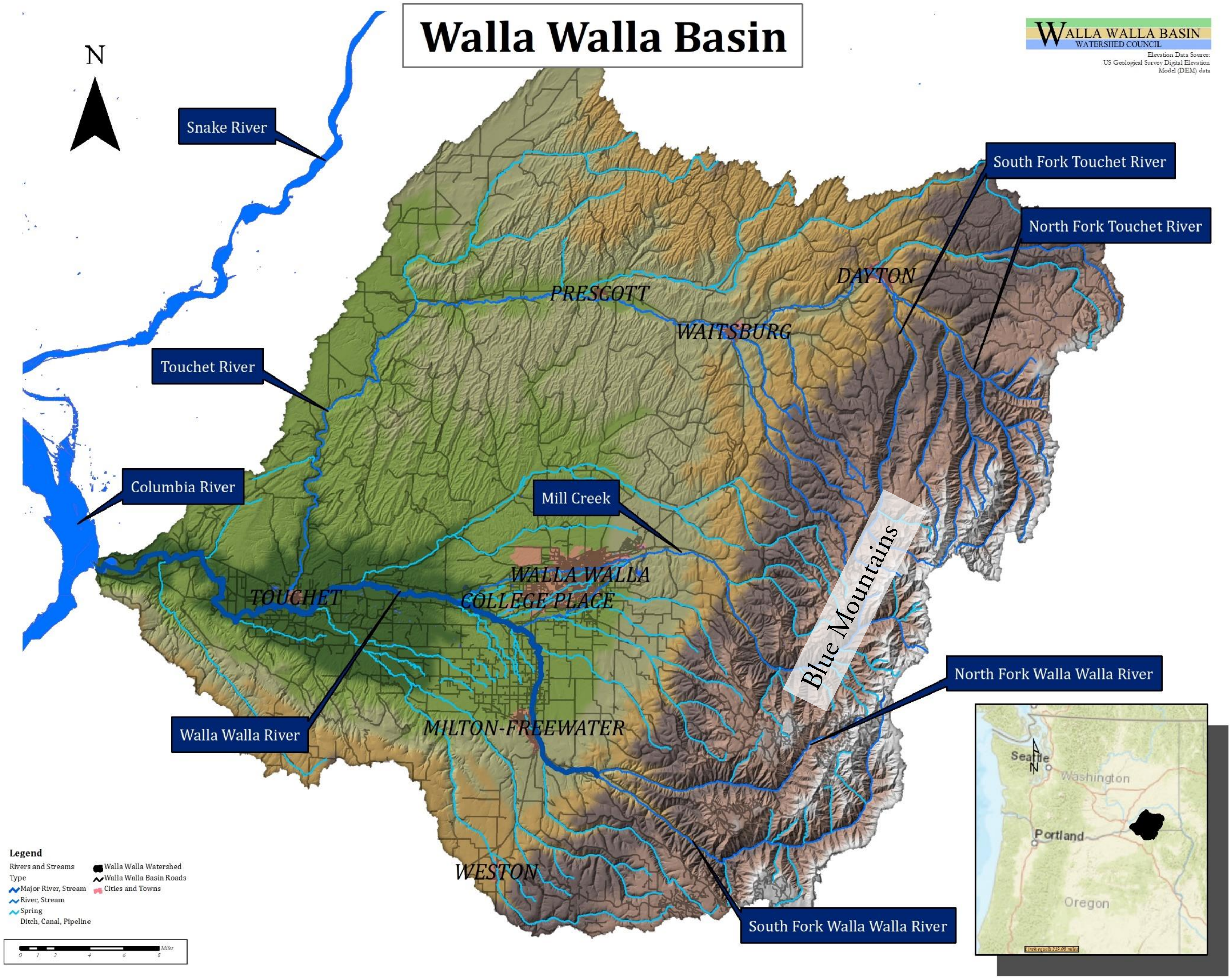
Steven Patten – City of Milton-Freewater, OR

WALLA WALLA BASIN WATERSHED COUNCIL



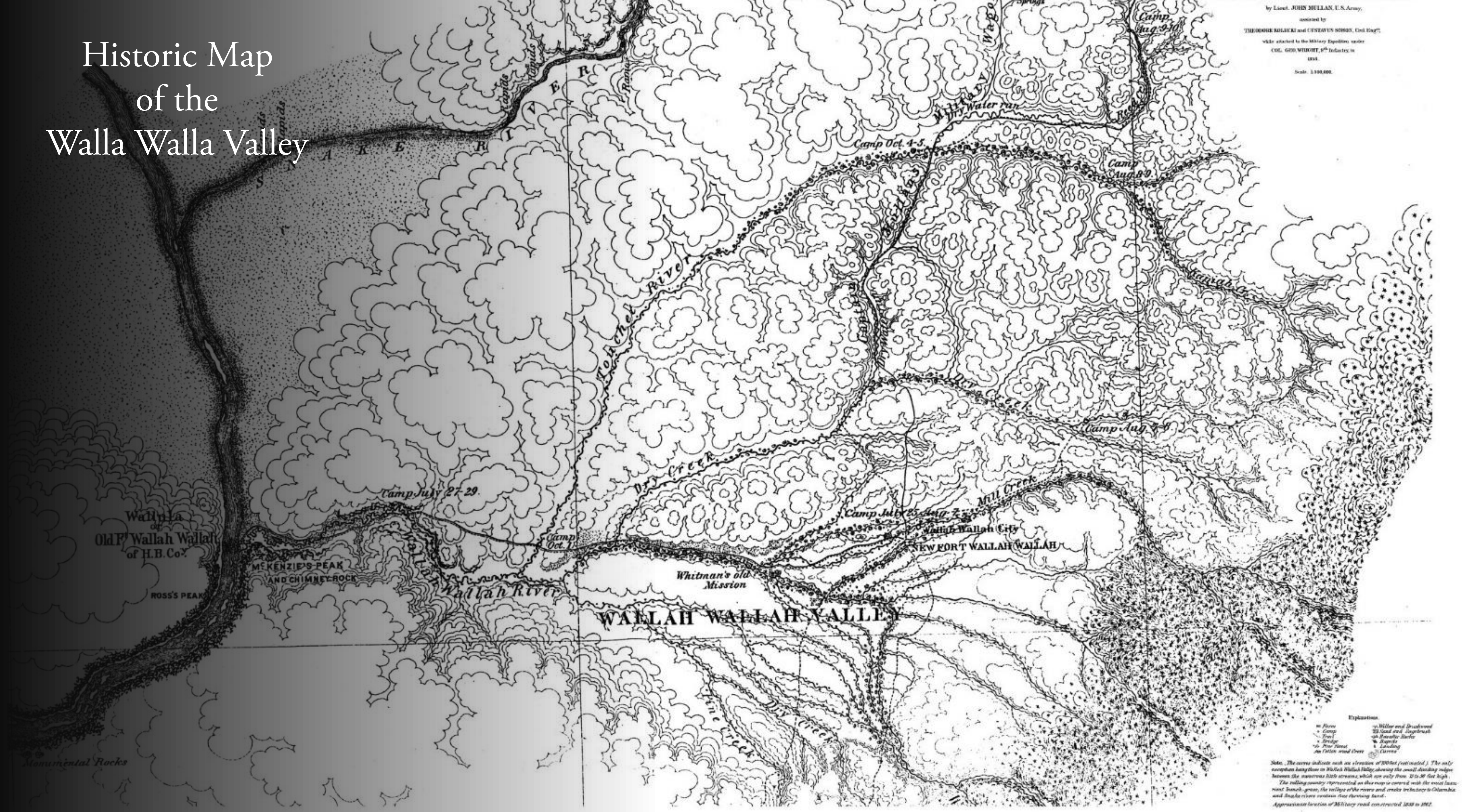
Presentation Overview

- Introduction to the Walla Walla Basin
- Groundwater replenishment approaches in the WW Basin
  - Irrigation efficiency
  - Floodplain connection
  - Spring performance
  - Groundwater recovery
  - Climate change adaptation
  - Basalt Aquifer Storage and Recovery (ASR)
  - Instream Groundwater Replenishment
    - Groundwater dependent system
    - Upriver Tributaries
    - Process-Based Restoration



Walla Walla Basin
WALLA WALLA BASIN
WATERSHED COUNCIL
Elevation Data Source:
US Geological Survey Digital Elevation
Model (DEM) data
N
Snake River
South Fork Touchet River
North Fork Touchet River
DAYTON
PRESCOTT
WAITSBURG
Touchet River
Columbia River
Mill Creek
WALLA WALLA
COLLEGE PLACE
TOUCHET
Blue Mountains
North Fork Walla Walla River
Walla Walla River
MILTON-FREEWATER
WESTON
South Fork Walla Walla River
Seattle
Washington
Portland
Oregon
Legend
Rivers and Streams
Type
Major River, Stream
River, Stream
Spring
Ditch, Canal, Pipeline
Walla Walla Watershed
Walla Walla Basin Roads
Cities and Towns
0 1 2 4 6 8 Miles

Historic Map of the Walla Walla Valley

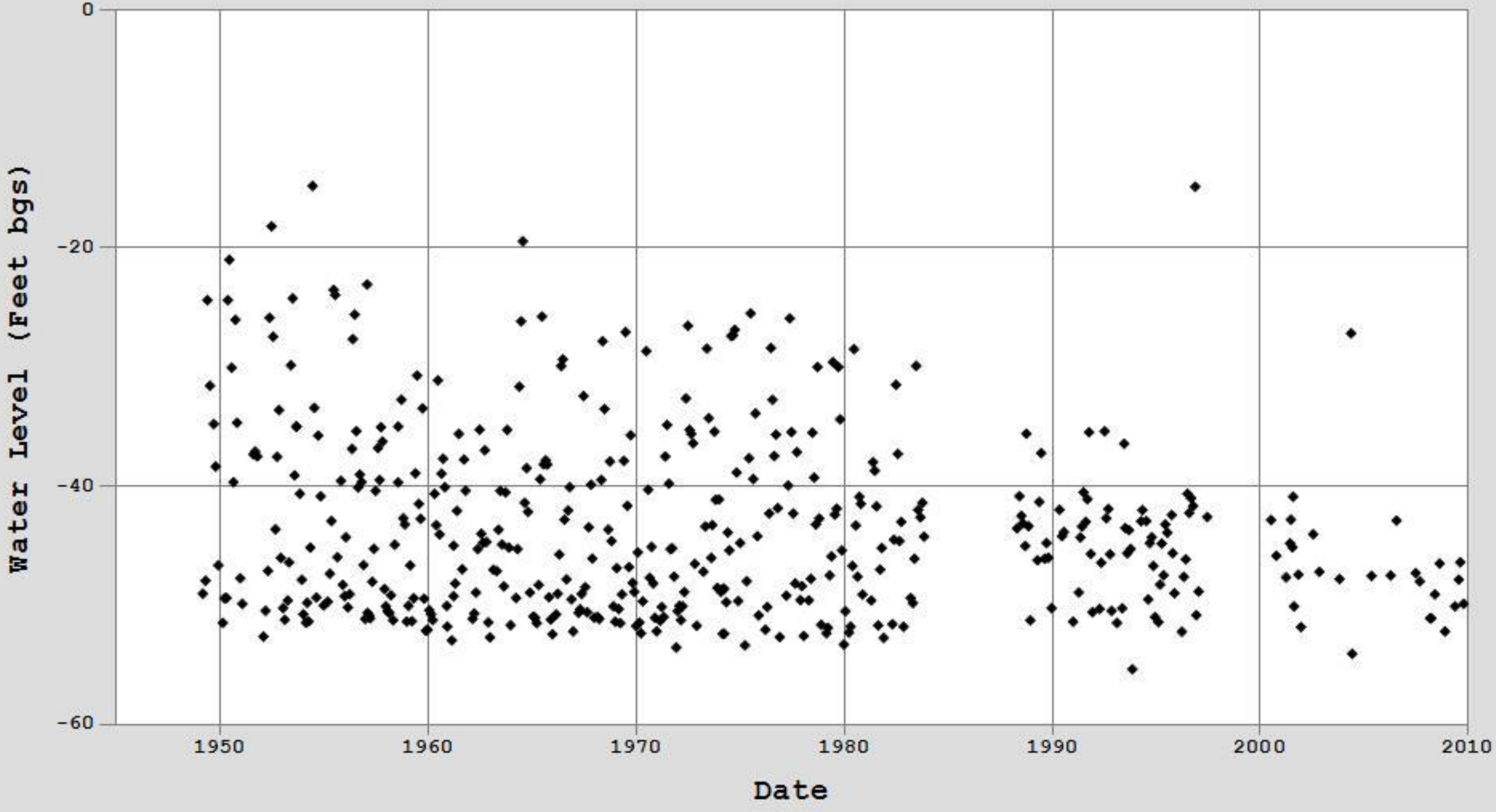


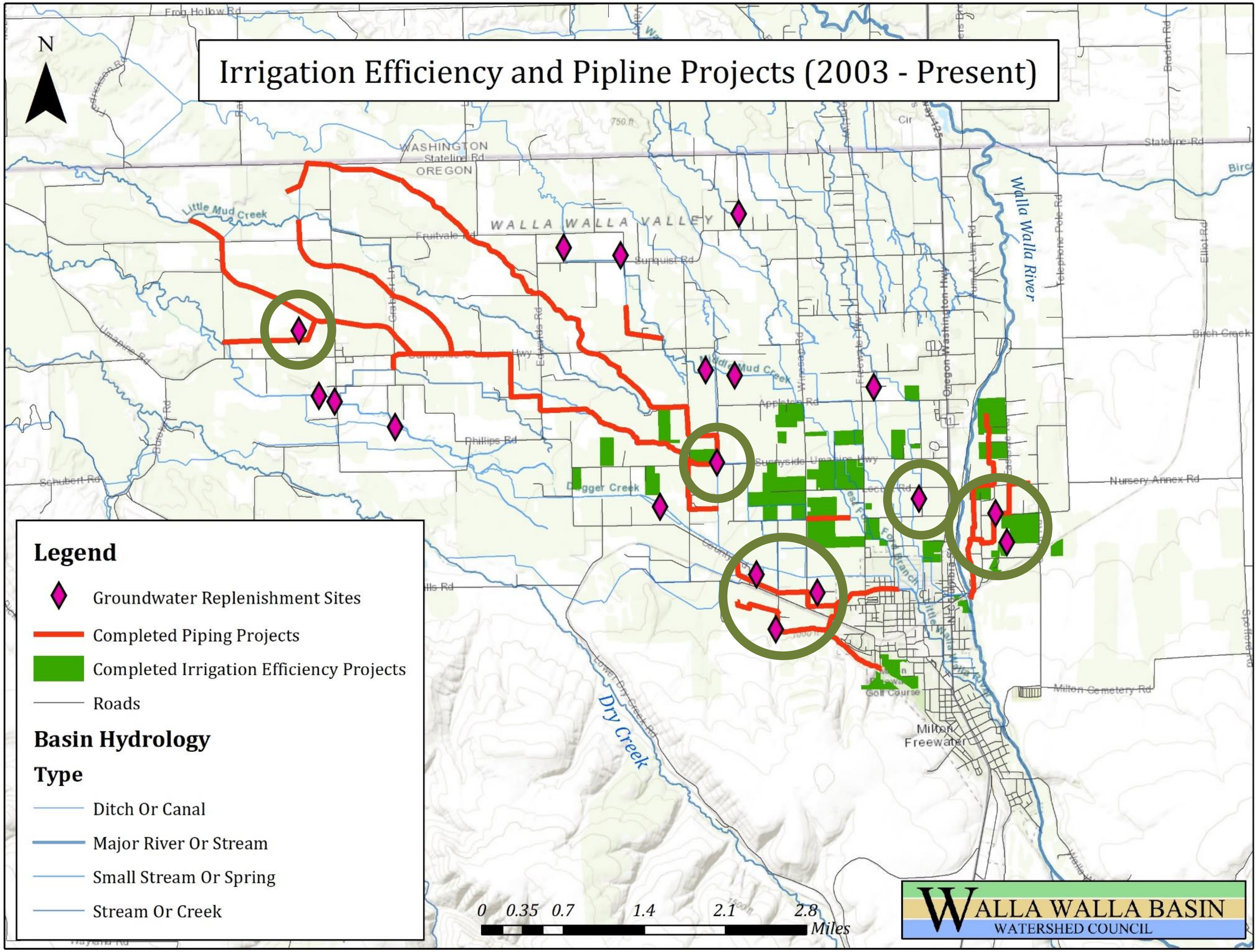
Walla Walla River at Milton-Freewater, Oregon

Nursery Bridge - July, 1998

Nursery Bridge - July, 2019

Monitoring Well GW_16

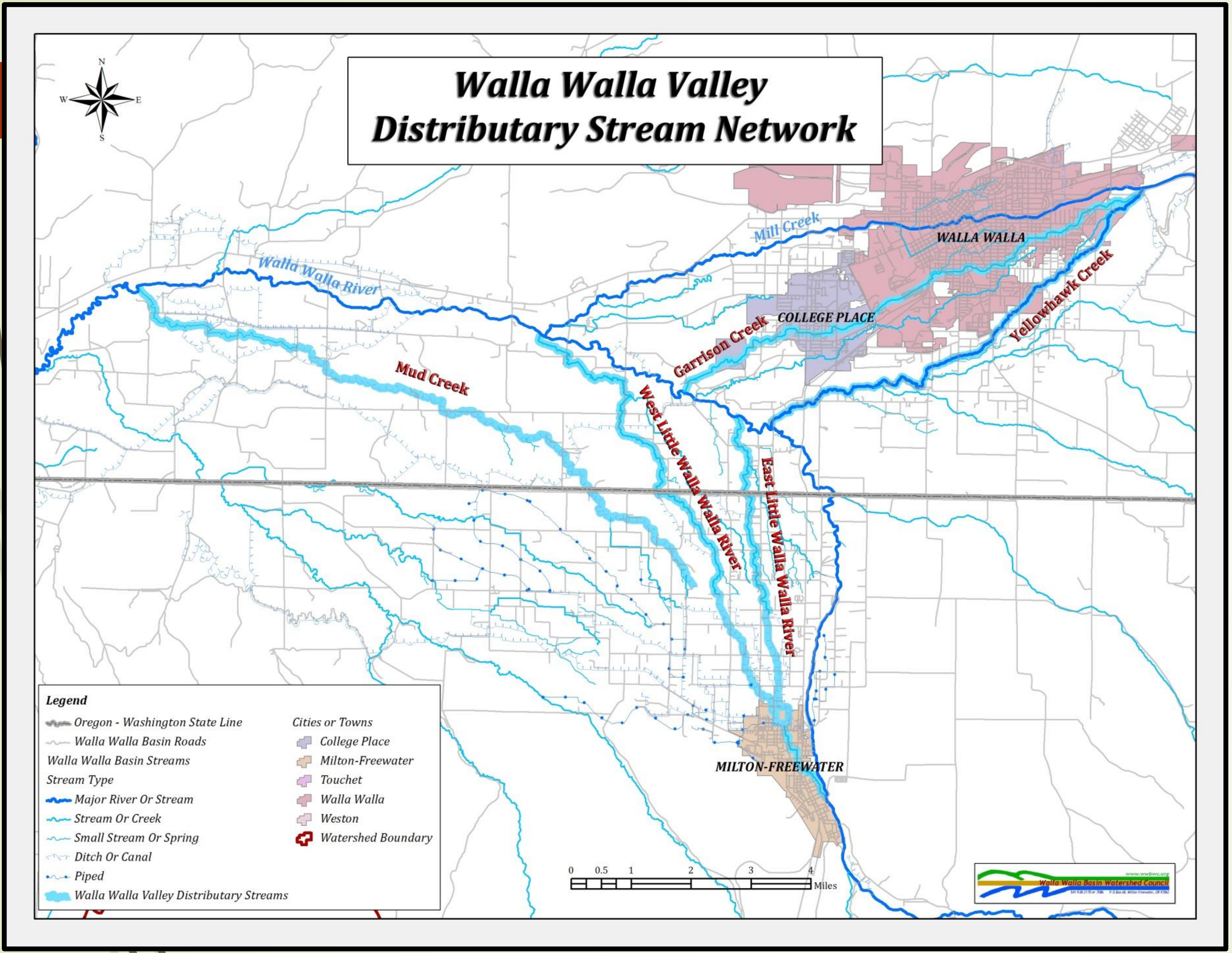




Approach 1

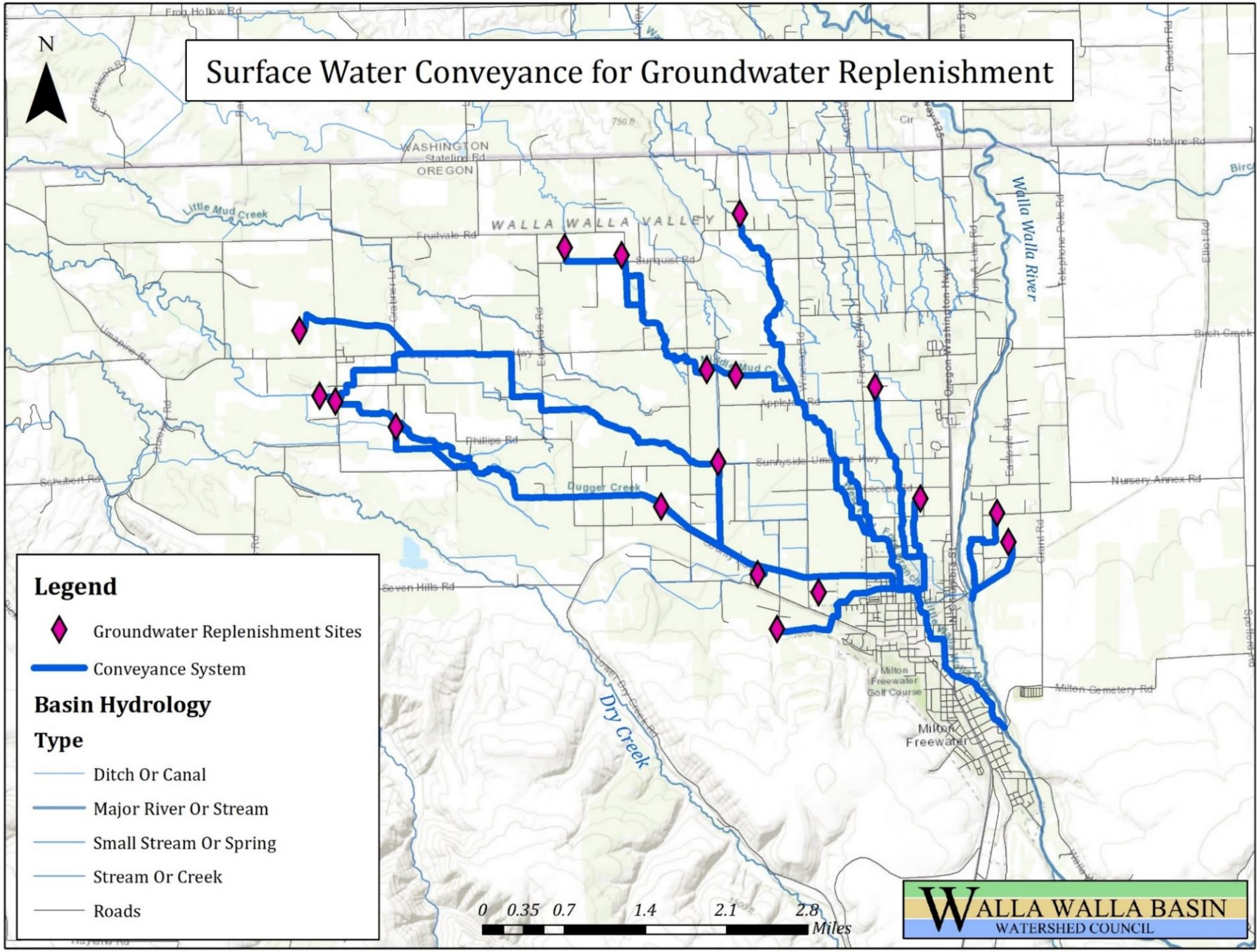
Irrigation Efficiency

- Water for instream flows voluntary at first
- Irrigation efficiency projects were used to "back-fill"
- Ditch piping
- On-farm efficiency



Approach 2
Floodplain connection

- Historic distributary system (alluvial fans)
- Levees constructed in the 1930s & 1940s
- Head gates installed on distributaries

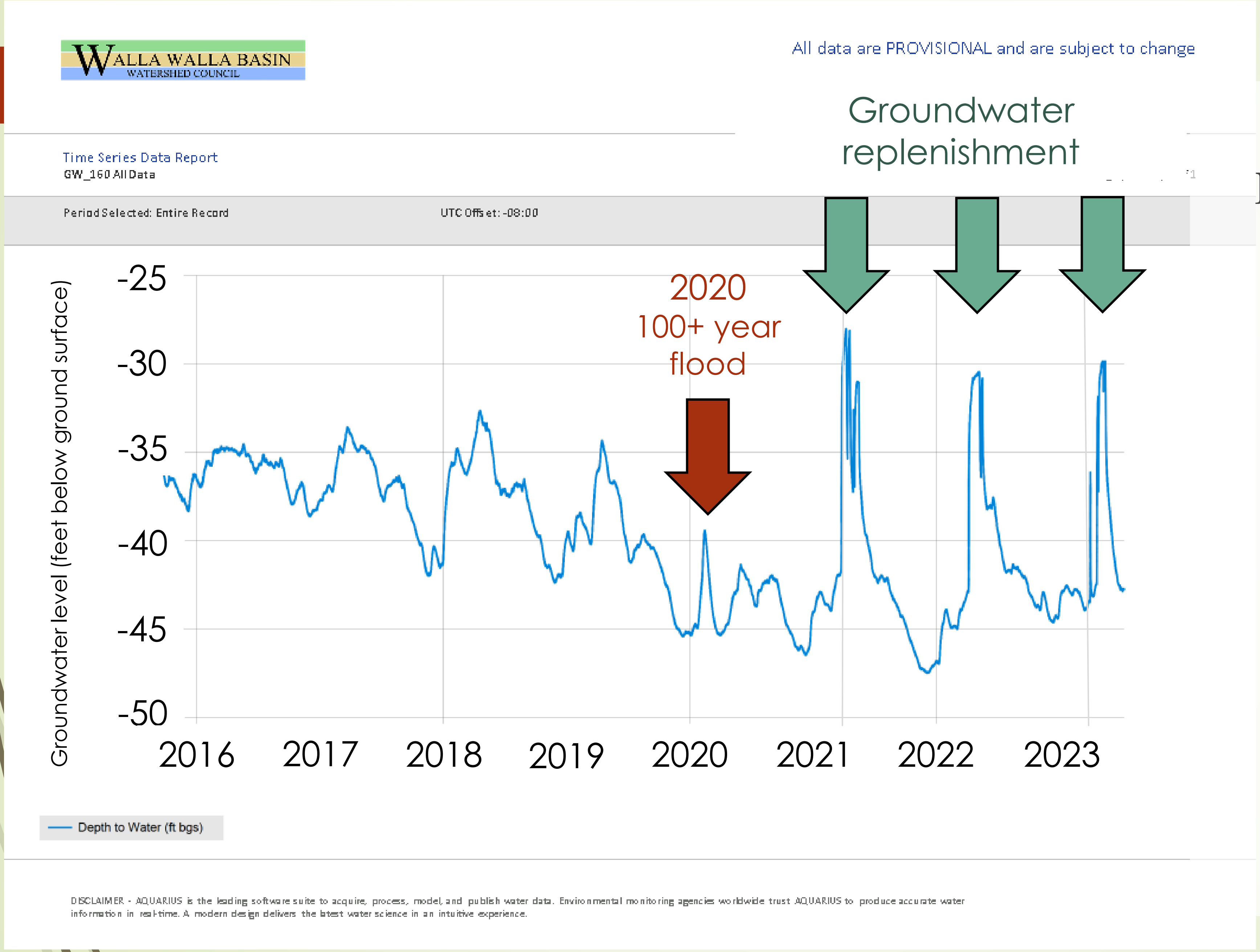


Approach 2
Floodplain connection

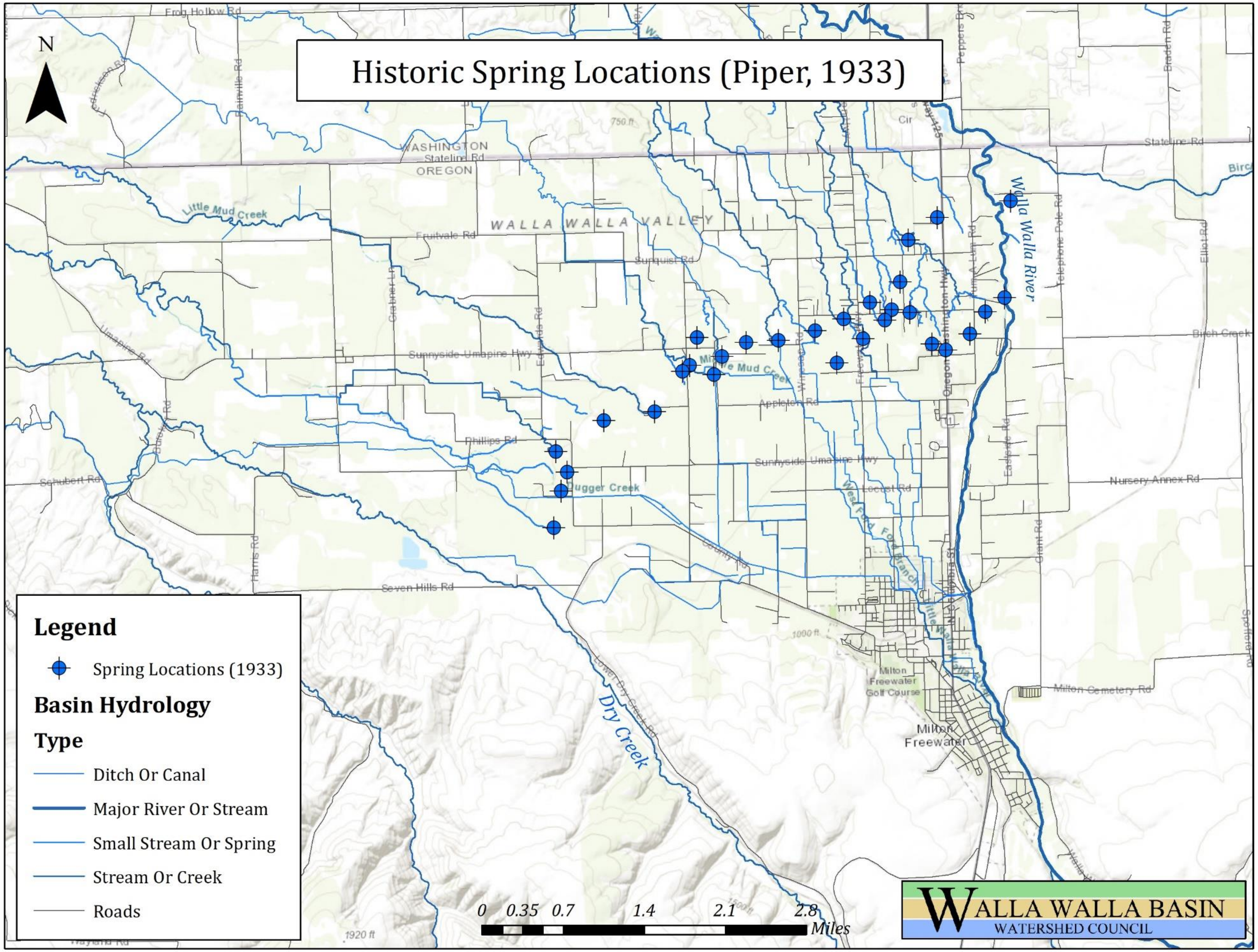
- Re-activating distributaries
- Strategically place replenishment sites to increase water conveyance length

Approach 2

Floodplain connection



- Replenishment activities are creating similar responses to natural high flows
- Replenishment mechanisms simulate floodplain functions

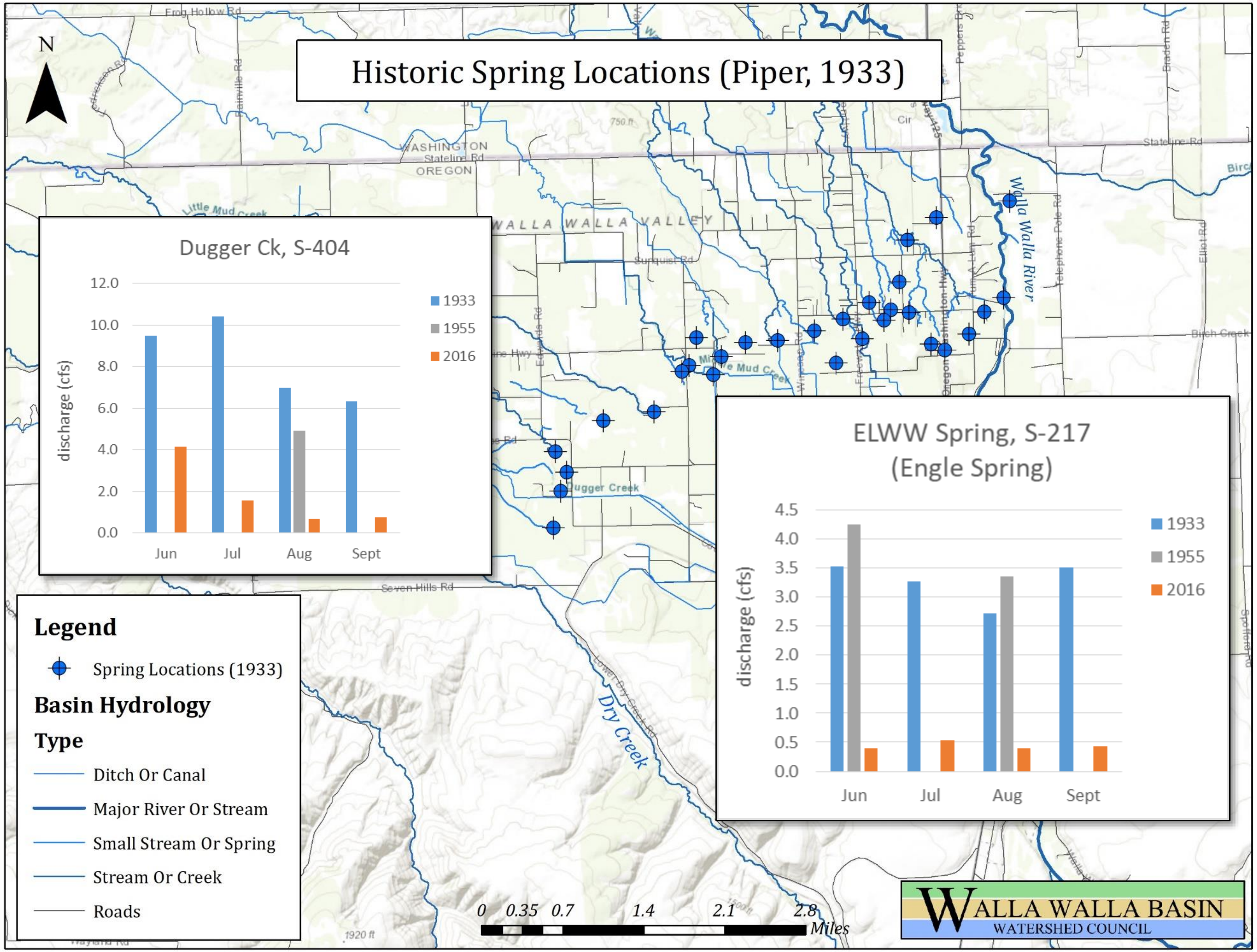


Approach 3

Spring Performance

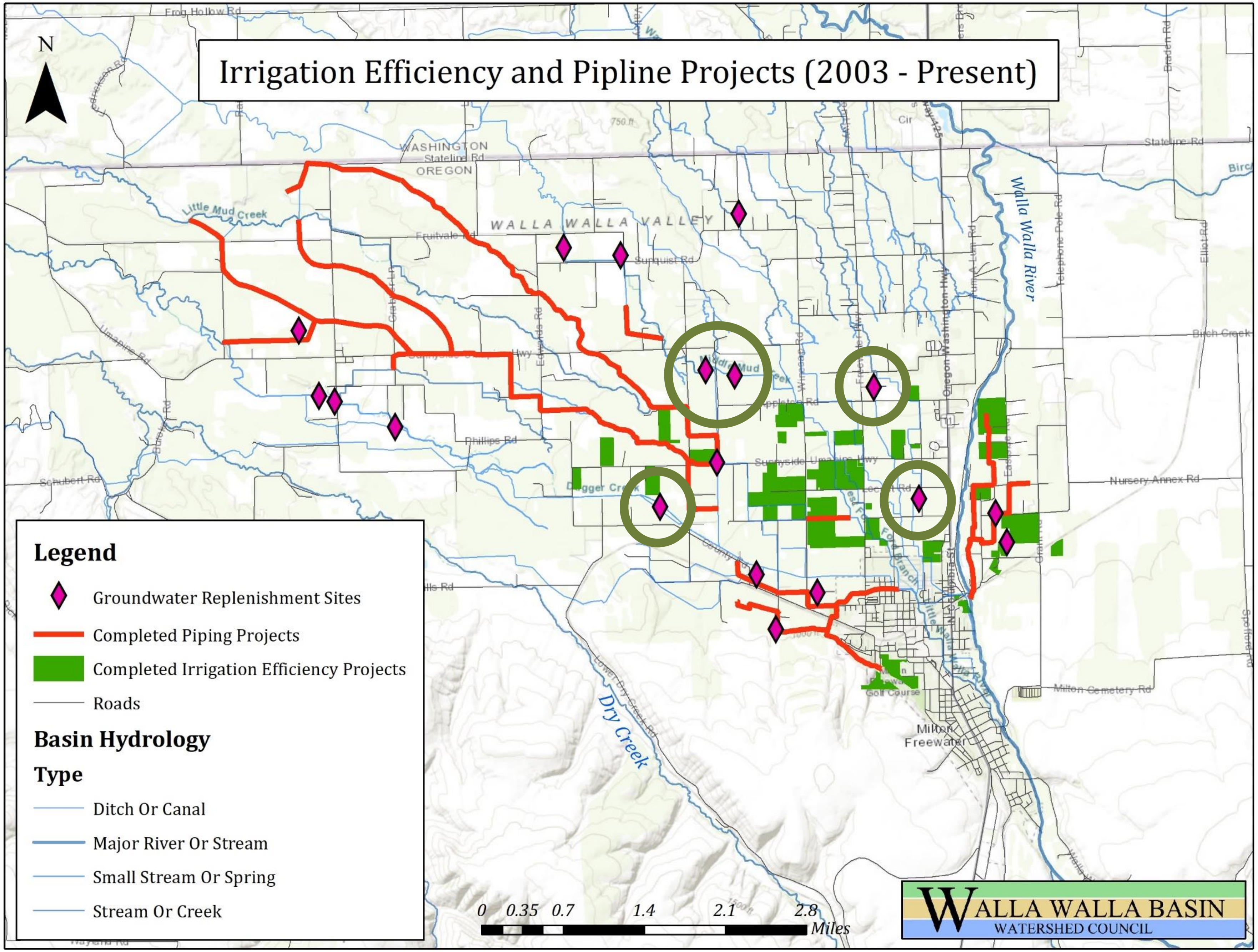
- Spring volume estimates from the 1930s & 1970s range from 50,000 to 56,000+ acre-feet per year
- Springs provide cold water inputs to the middle reaches of the Walla Walla River

Approach 3
Spring Performance



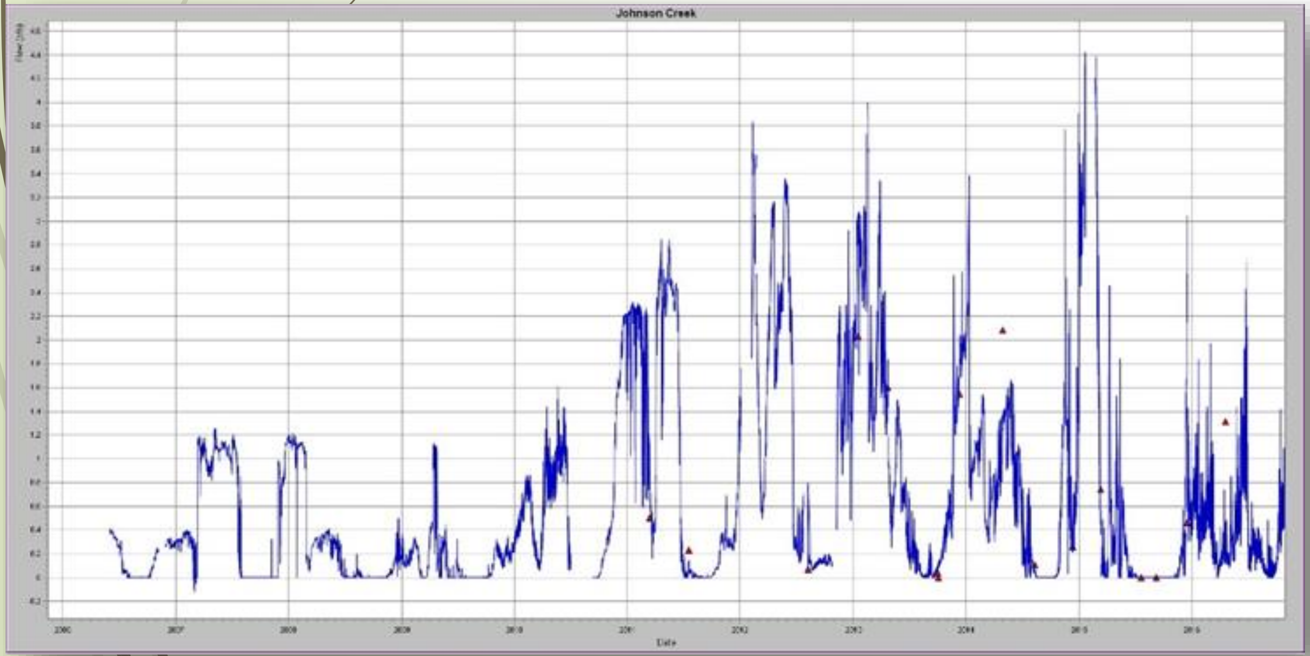
Approach 3
Spring Performance

- Groundwater replenishment sites located up-gradient from springs arc

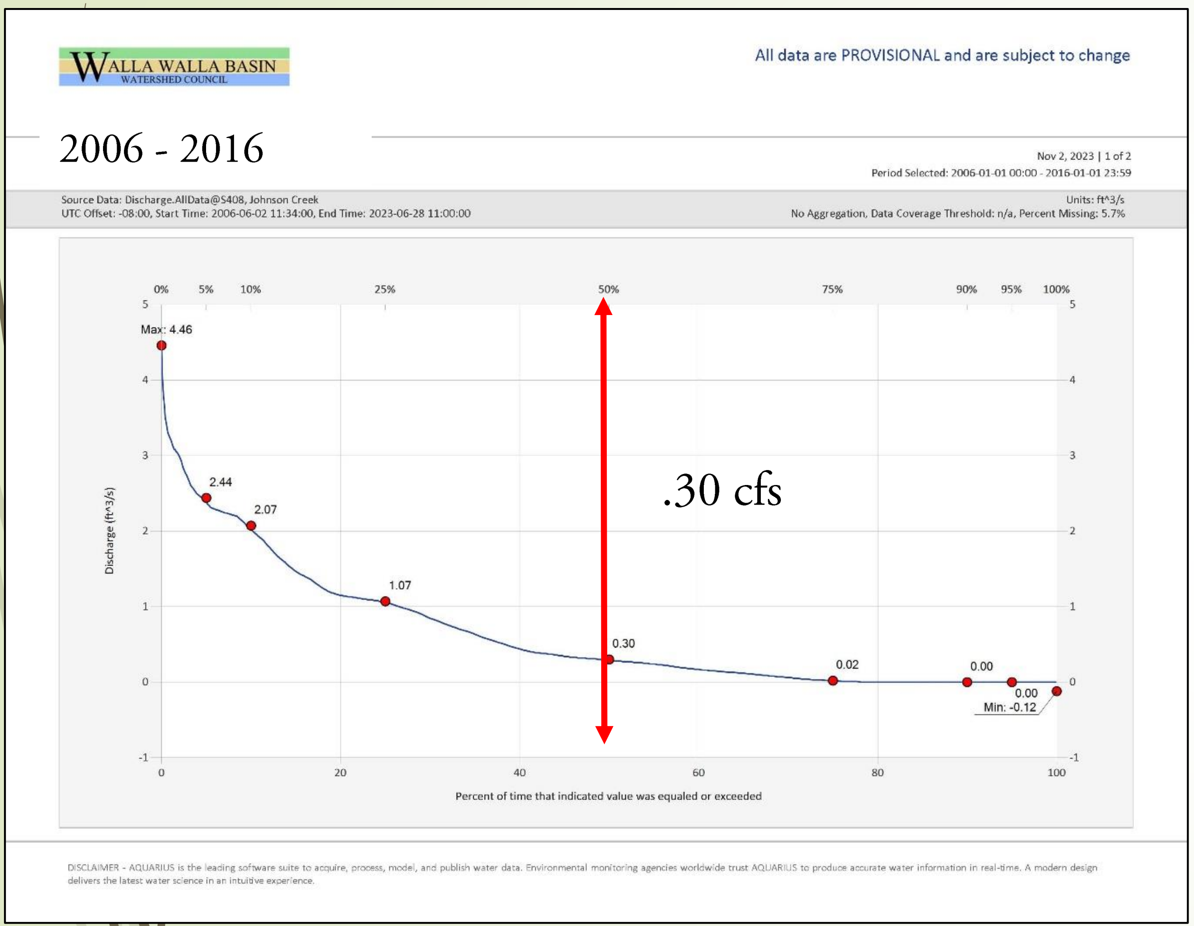


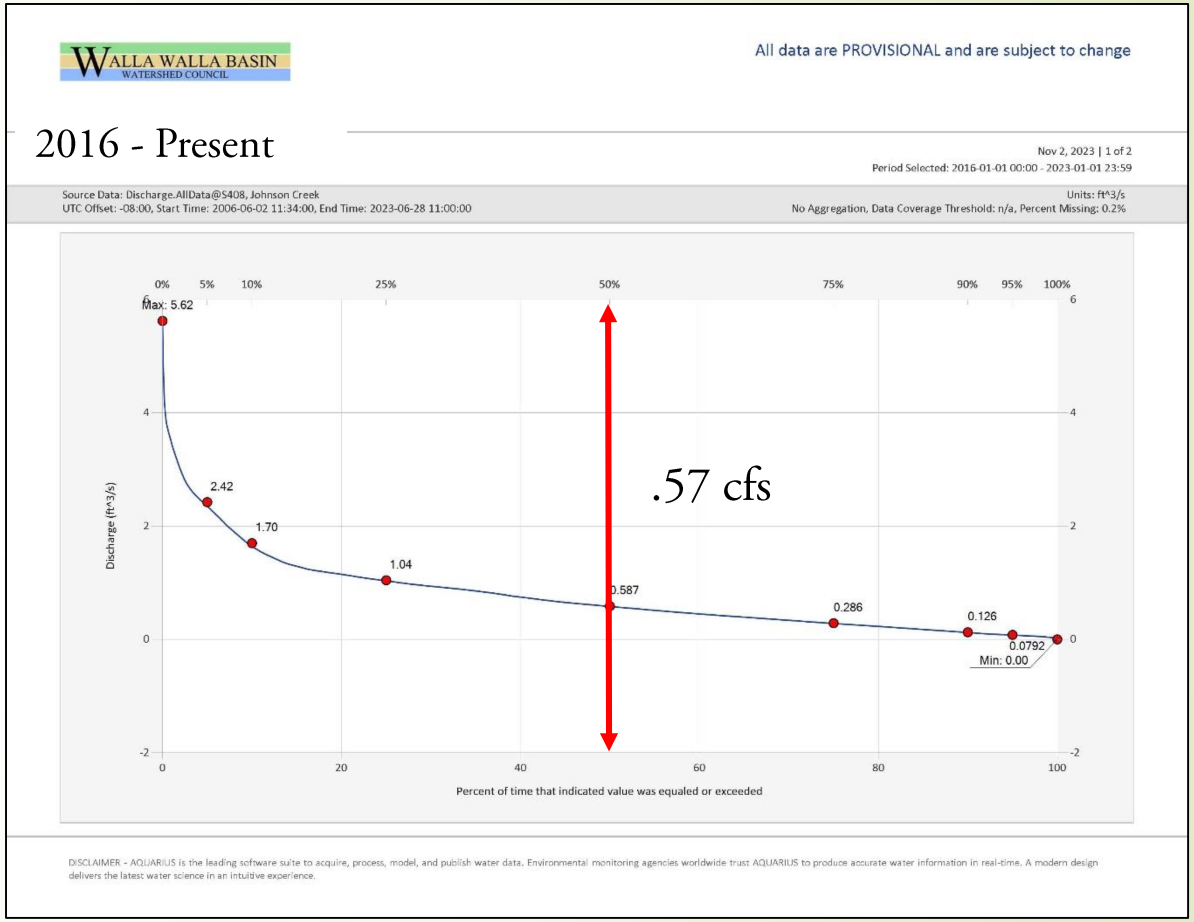
Johnson Creek

- Rebirth of a stream
- Flowing again after 25+ years of being dry



Approach 3 Spring Performance

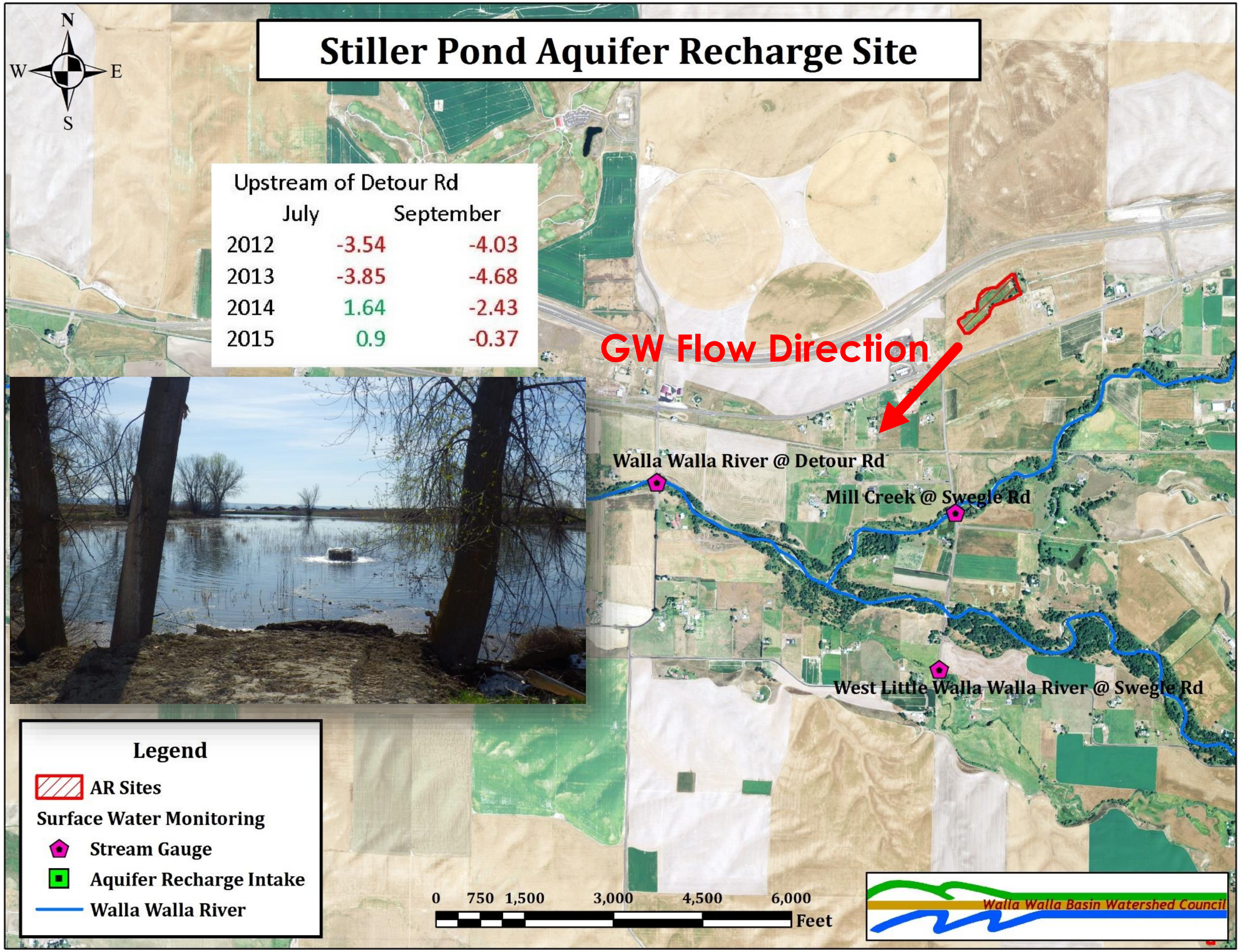




Approach 3

Spring Performance

- Groundwater replenishment activities may be reducing river seepage
- Year-to-year changes in seepage rates, however positive correlation



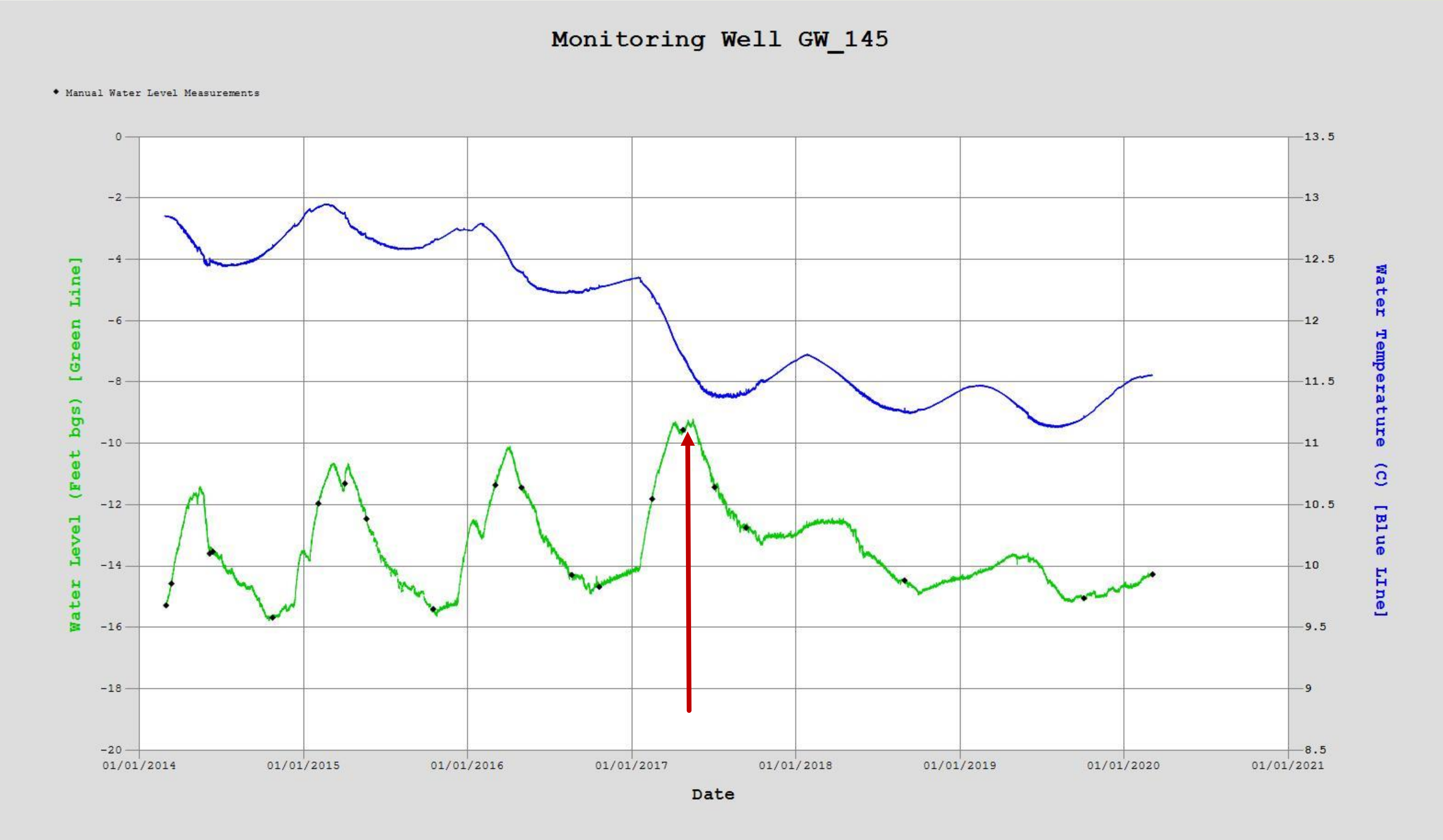
Upstream of Detour Rd

	July	September
2012	-3.54	-4.03
2013	-3.85	-4.68
2014	1.64	-2.43
2015	0.9	-0.37

Approach 3

Spring Performance

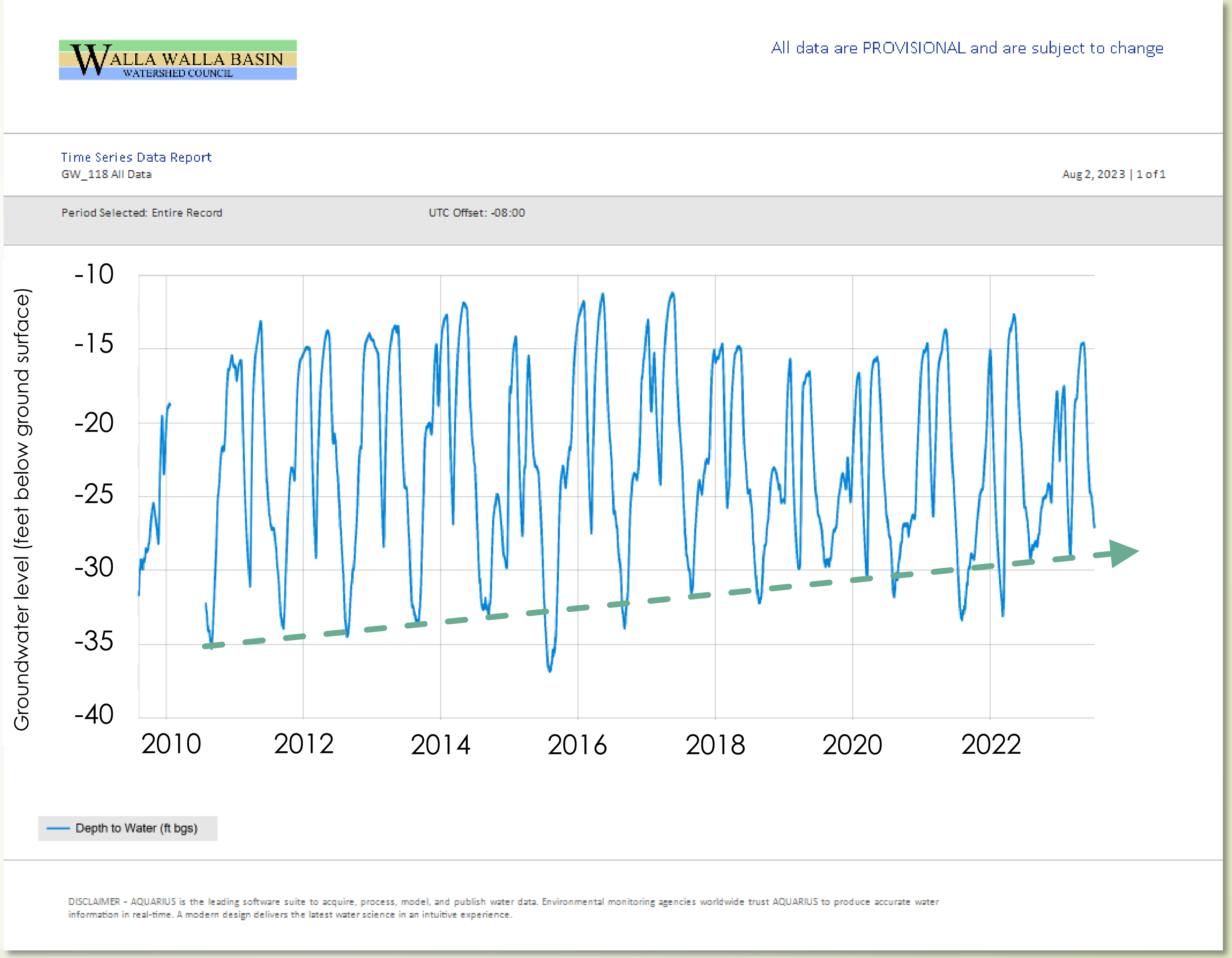
- Groundwater replenishment activities may be reducing river seepage
- Groundwater data also support correlation between groundwater replenishment and reduced seepage rates for the Walla Walla River



Approach 4

Groundwater Recovery

- Groundwater has been used to help meet instream flow requirements for the last 20 years
- This is on top of long-term groundwater declines

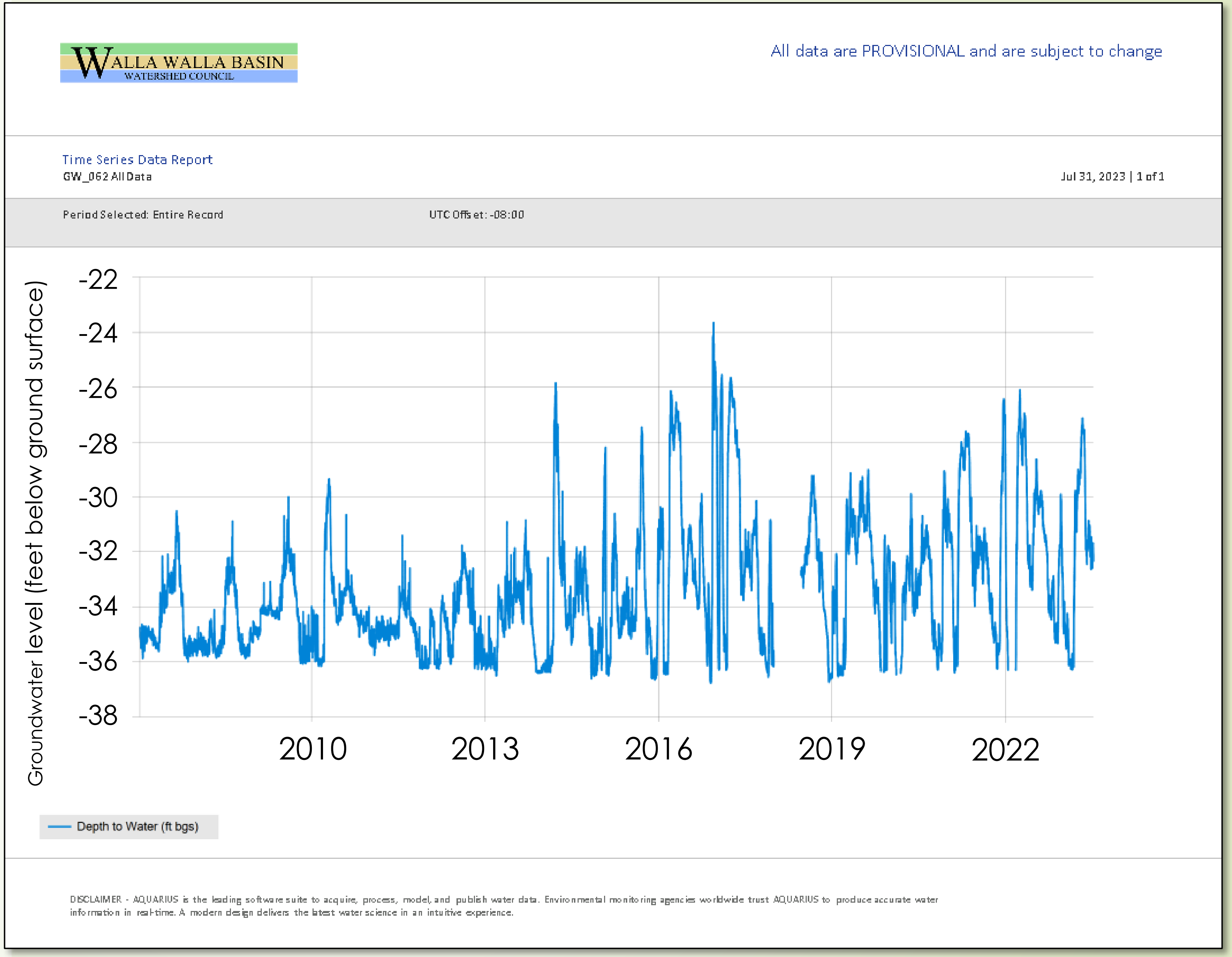


Approach 4

Groundwater Recovery

- Groundwater replenishment creates valley-wide benefits

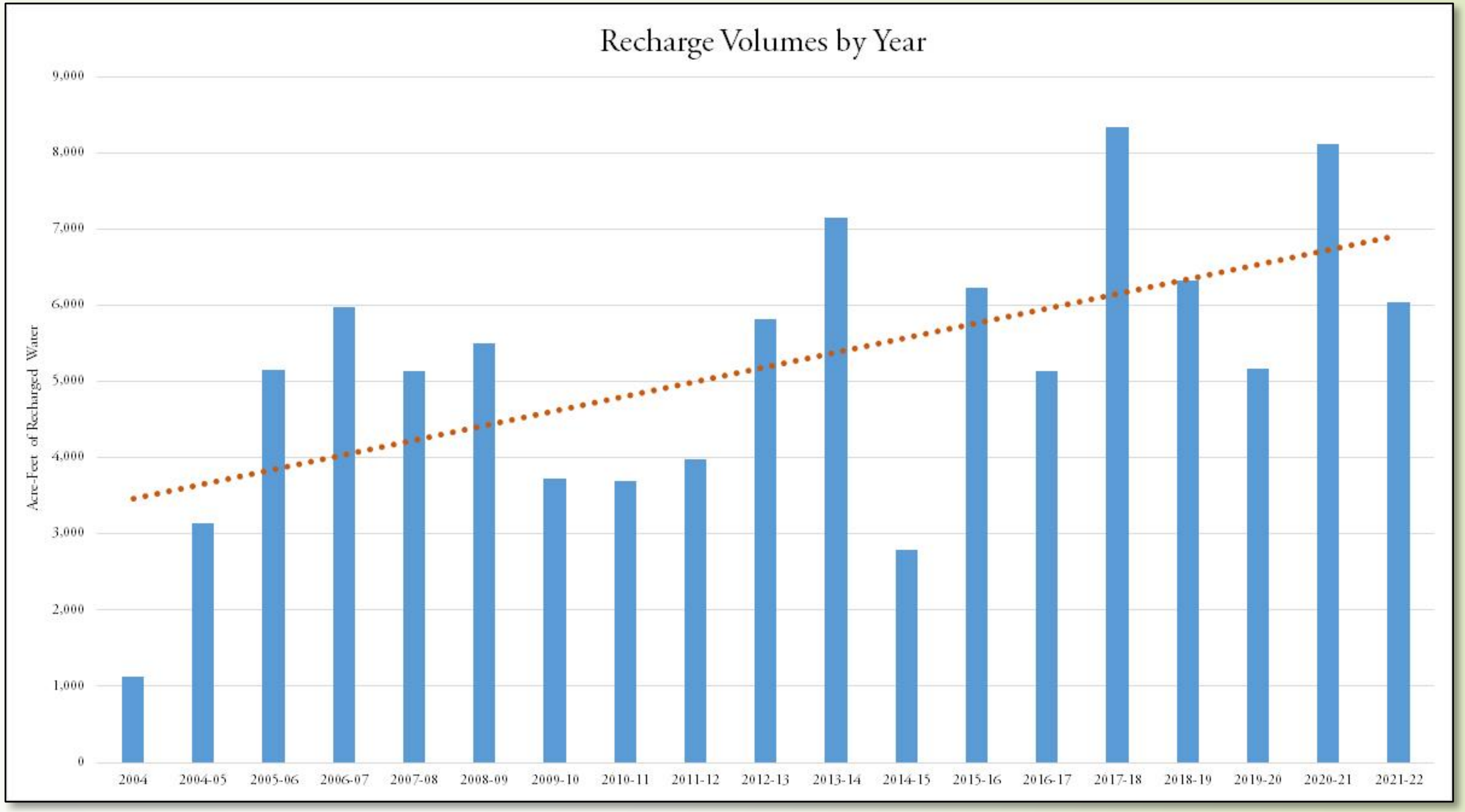
- Groundwater management also creates the potential for conjunctive management of groundwater and surface water



Approach 5

Climate Change Adaptation

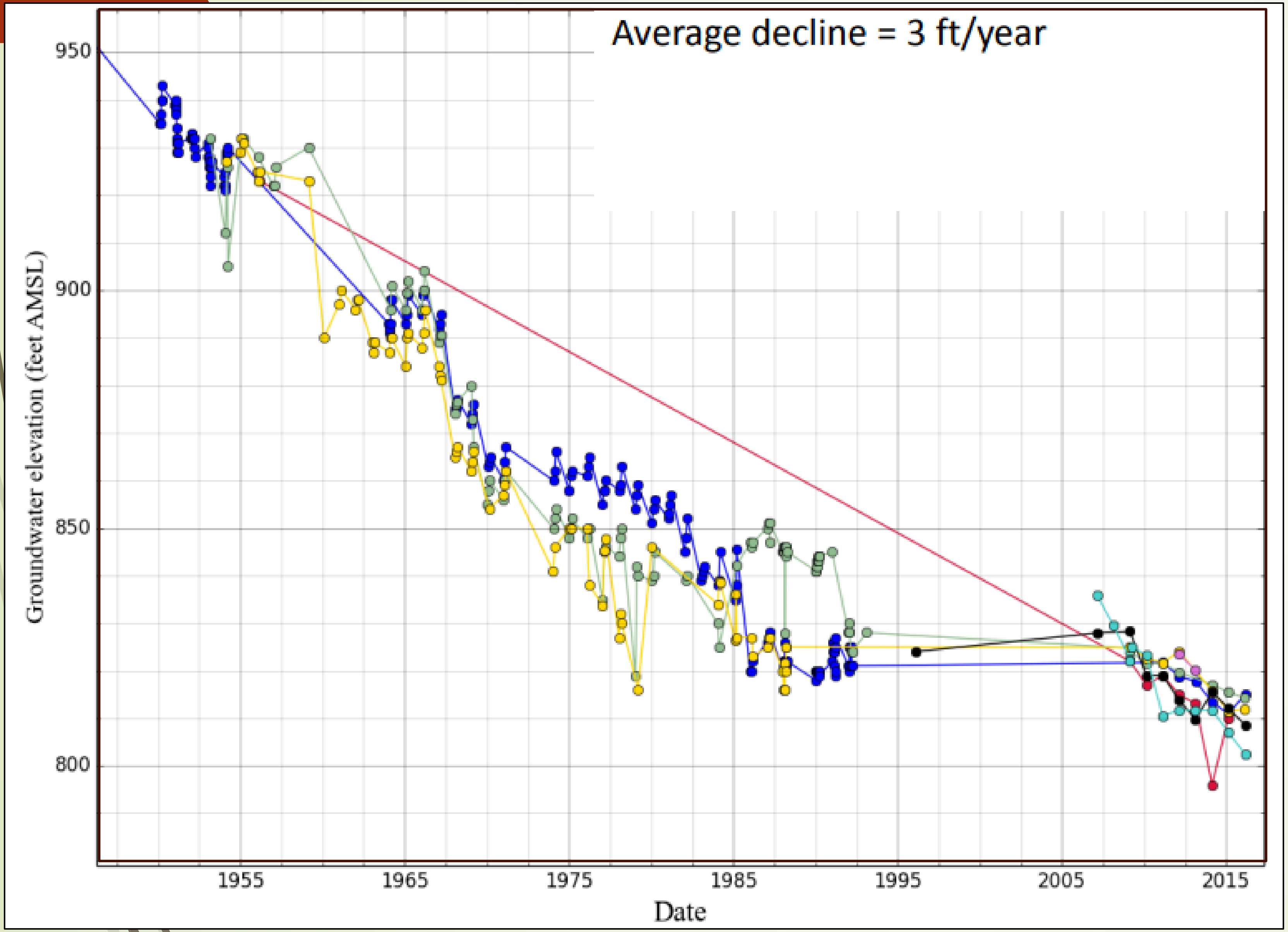
- Model impacts to the Blue Mountains include:
  - Decreased snowpack
  - Earlier snowmelt
  - Higher peak flows
  - Lower summer flows
  - Parts of the WW Basin snow-free



Groundwater replenishment can be an inexpensive method for intermittent storage - Less than $1.50/acre-foot

Approach 6

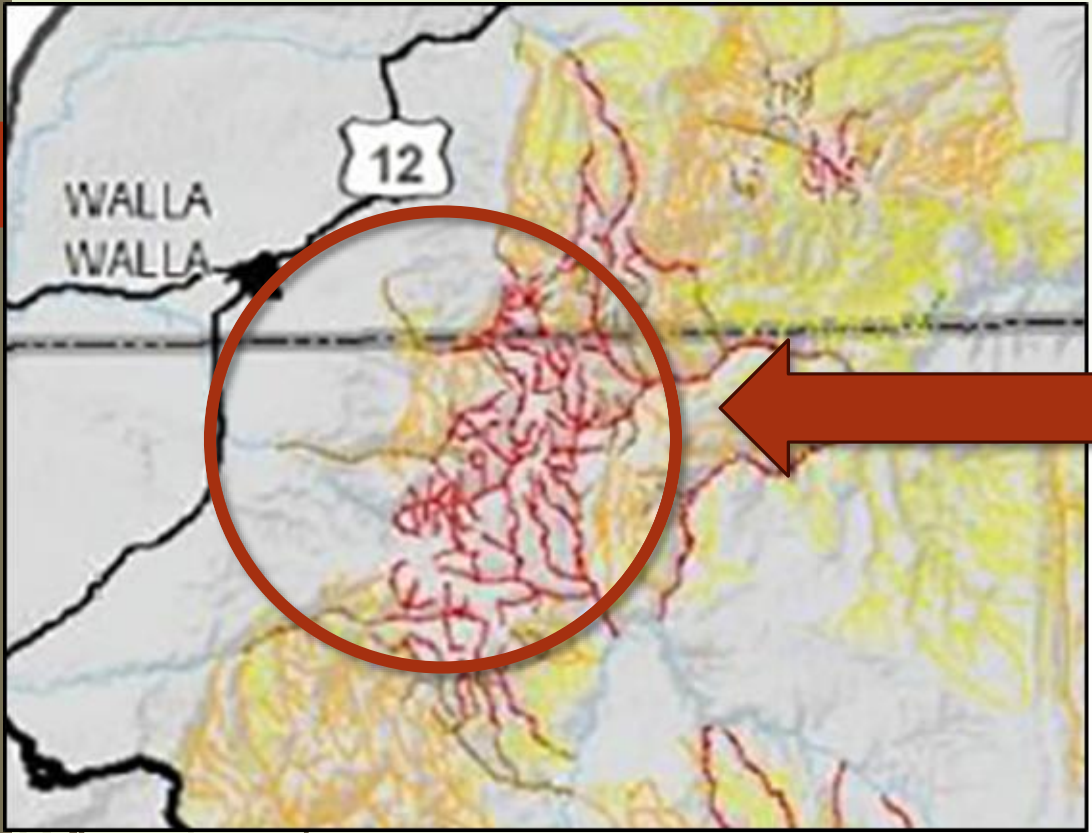
Basalt Aquifer Storage & Recovery

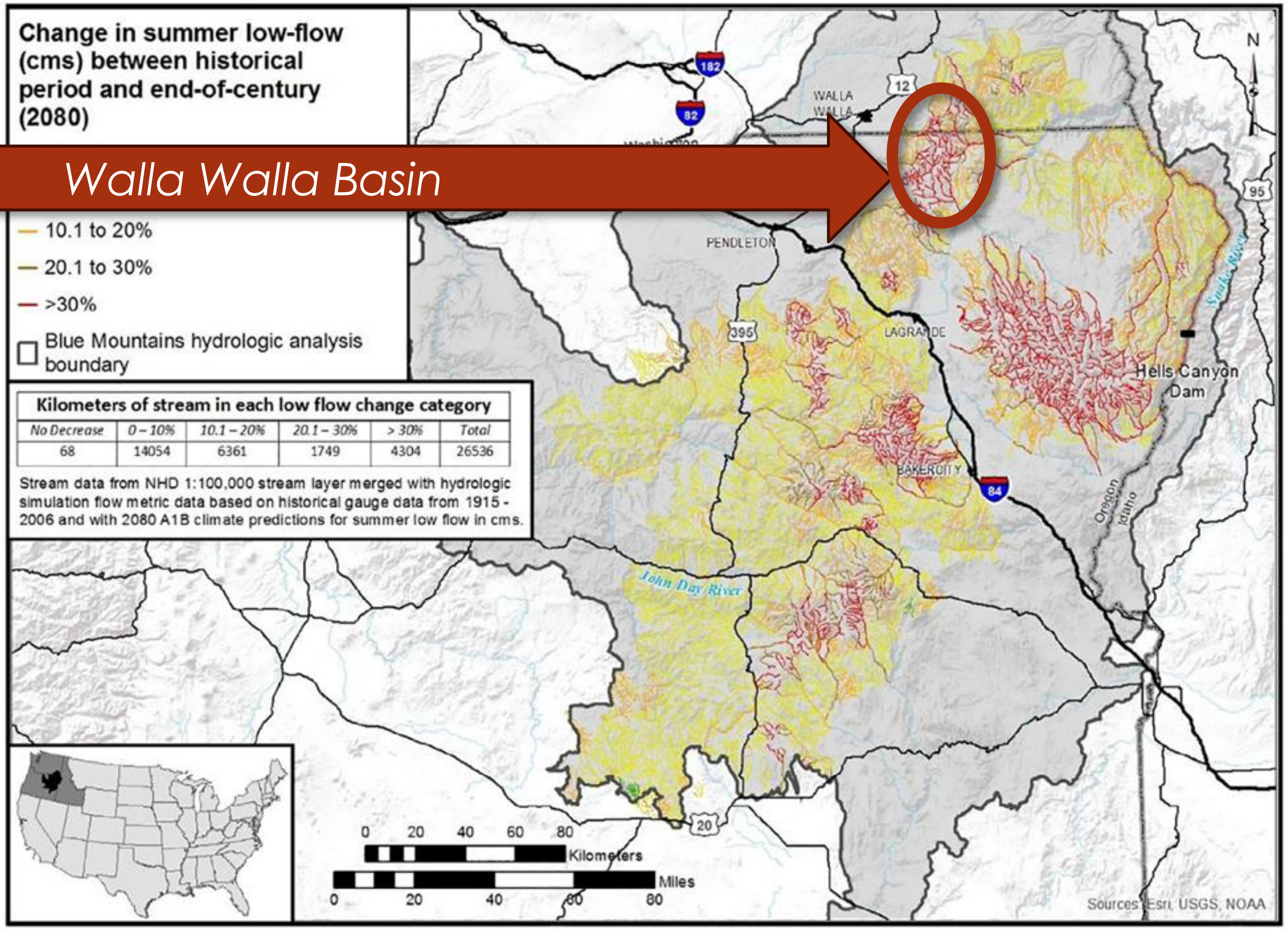


- Working with City of Milton-Freewater on possible ASR projects
- Regional ASR potential for basalt aquifer storage
- Pumping has created a lot of storage capacity
- Successful in Walla Walla and Pendleton

Upriver Groundwater Replenishment & Aquatic Habitat Enhancement

- Water supply in the Walla Walla basin is a priority concern for a wide range of stakeholders.
- Summertime flow is dependent on basalt groundwater springs in the upper watershed.
- Nearly all summer base flow in the Walla Walla River at Milton-Freewater emerges in the South Fork WWR drainage area.

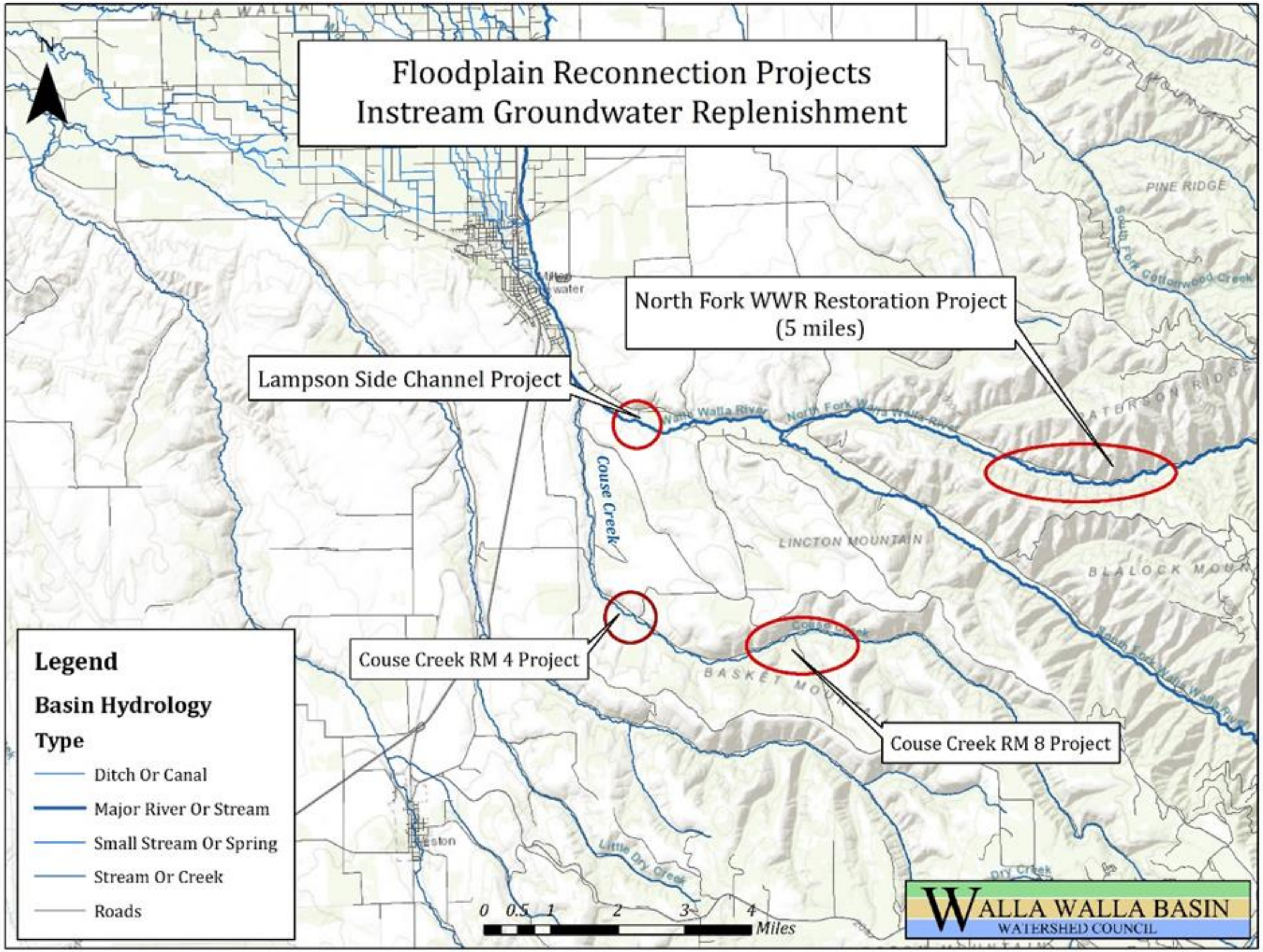




No Decrease	0 – 10%	10.1 – 20%	20.1 – 30%	> 30%	Total
68	14054	6361	1749	4304	26536

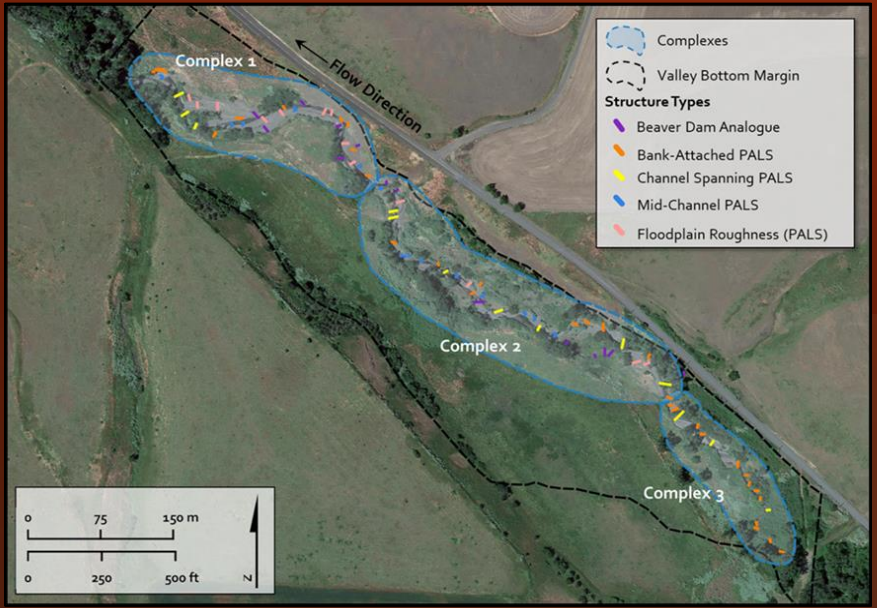
Summer flow in many of the upgradient spring-fed springs in the Walla Walla watershed are predicted to drop by over 30% by 2080.

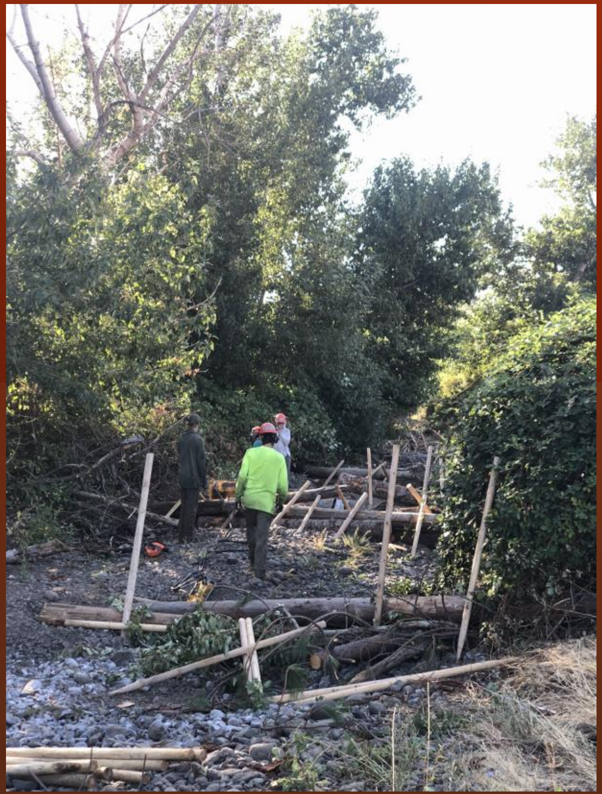
Source: Clifton et al, 2018. Effects of climate change on hydrology and water resources in the Blue Mountains, Oregon, USA. Published in Climate Services. [*https://doi.org/10.1016/j.cliser.2018.03.001*](https://doi.org/10.1016/j.cliser.2018.03.001)



- Adapting to Diminished Snowpack
- Prolonging Surface Flow Retention
- Enhancing Upriver Infiltration
- Expanding Accessible Habitat
- Cooling the Waters
- Integrated Approach

Couse Creek RM 4 Project



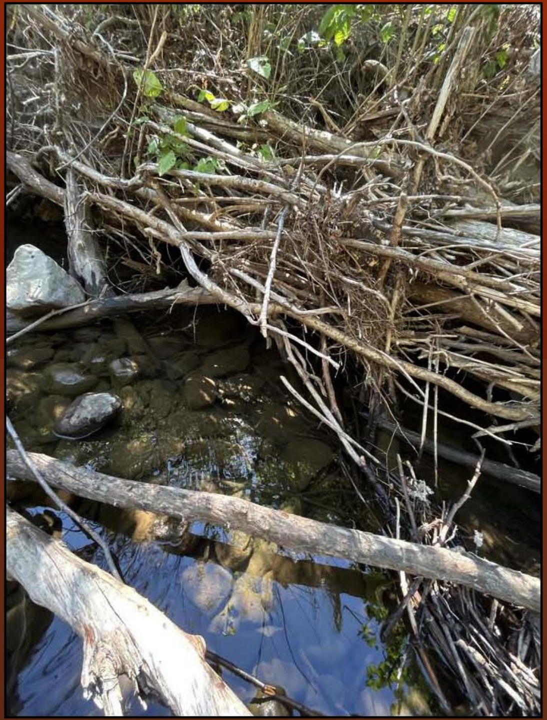


PALs Installation in 2023

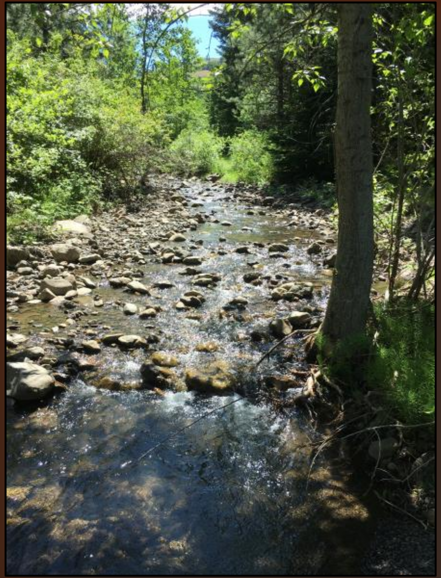
Upper Couse Creek

Connecting perennial reaches through groundwater replenishment while enhancing the complexity of Couse Creek

Couse Creek RM 8 Project



Perennial pools contain juvenile steelhead and redband trout



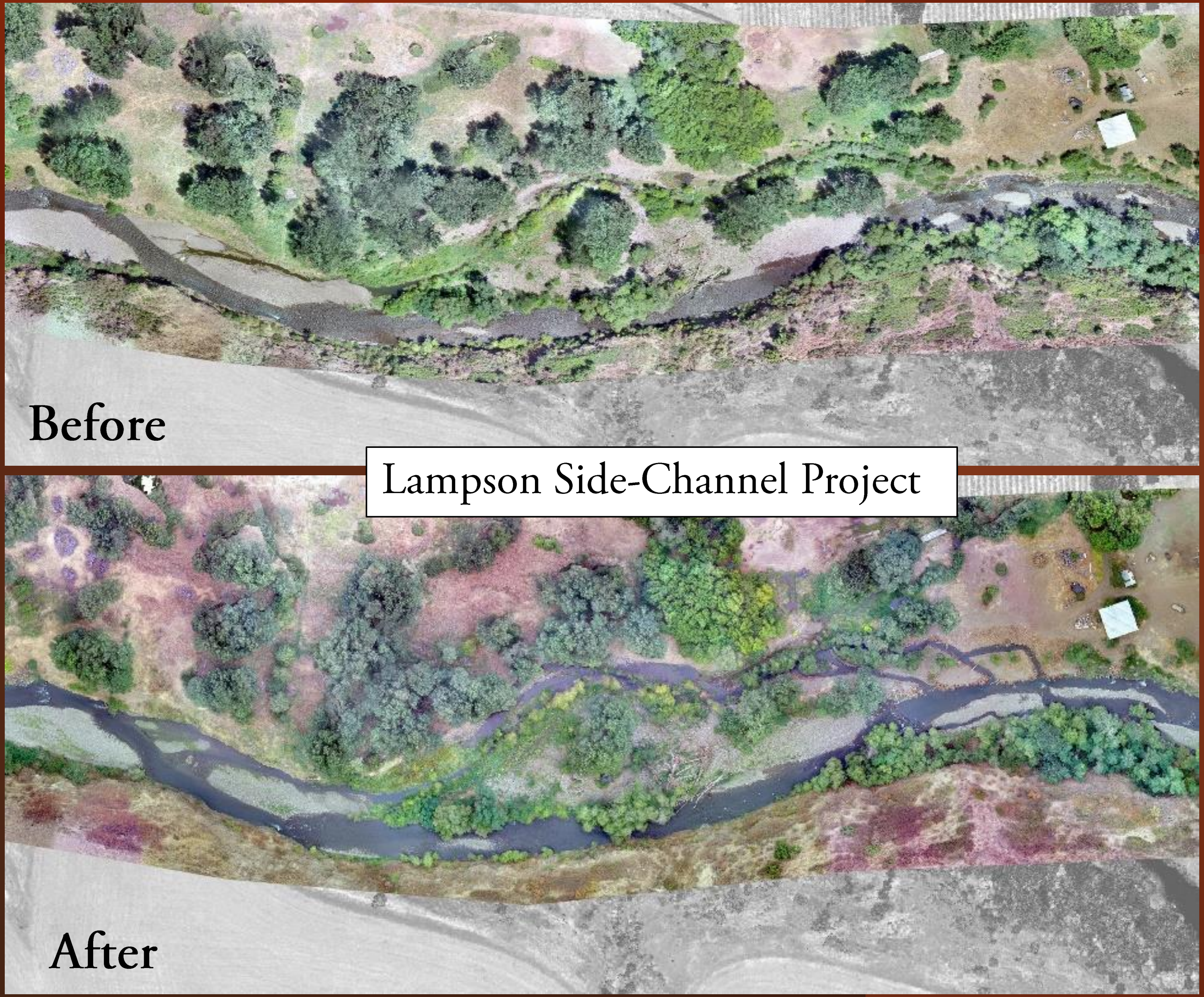
Combining groundwater replenishment and river restoration tool for multiple benefits in the basin

North Fork Walla Walla River
Sams – Rea Project

Current Conditions

Upriver Habitat

- Hyporheic Connectivity
- Restoring Functional Fluvial Processes
- Achieving Active Groundwater Recharge





Success

Through Collaboration

Bonneville Power Administration

Confederated Tribes of the Umatilla Indian Reservation

Walla Walla Basin Watershed Council

Oregon Watershed Enhancement Board
OWEB

State of Oregon Water Resources Department
WRD

Washington Department of Fish and Wildlife

Oregon Fish & Wildlife

US Army Corps of Engineers ®
Walla Walla District

Washington State Department of Ecology

Umatilla County

DEQ
State of Oregon Department of Environmental Quality

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Troy Baker

Executive Director, Walla Walla Basin Watershed Council

troy.baker@wwbwc.org

(541)938-2170

wwbwc.org

Steven Patten

Public Works Engineering Technician, City of Milton-Freewater, OR

stevenbpatten@gmail.com

(509) 730-9368

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