Groundwater Storage Subcommittee Update

March 10, 2021

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Dave Nazy, LHg and Joel Hubble, Kittitas Reclamation District
Danielle Squeochs, PhD, LHg, PE, Yakama Nation

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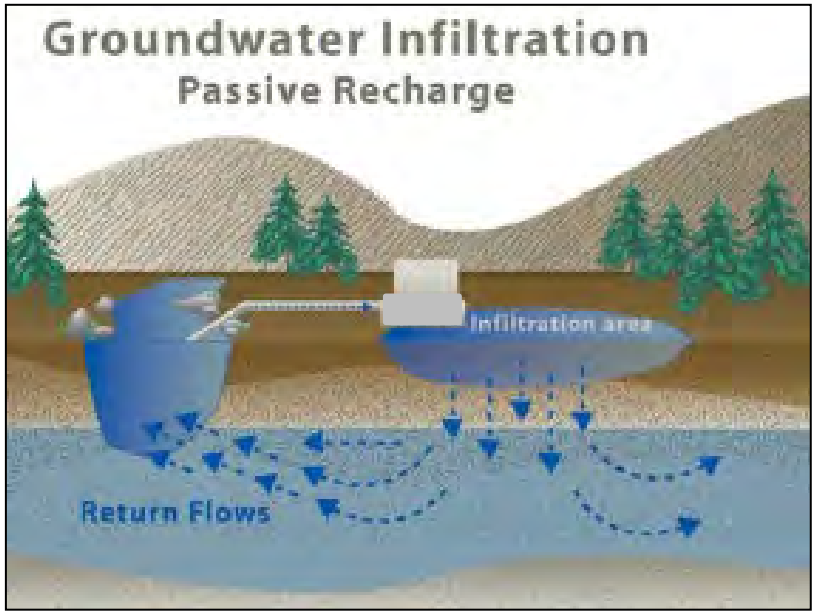
Groundwater Storage

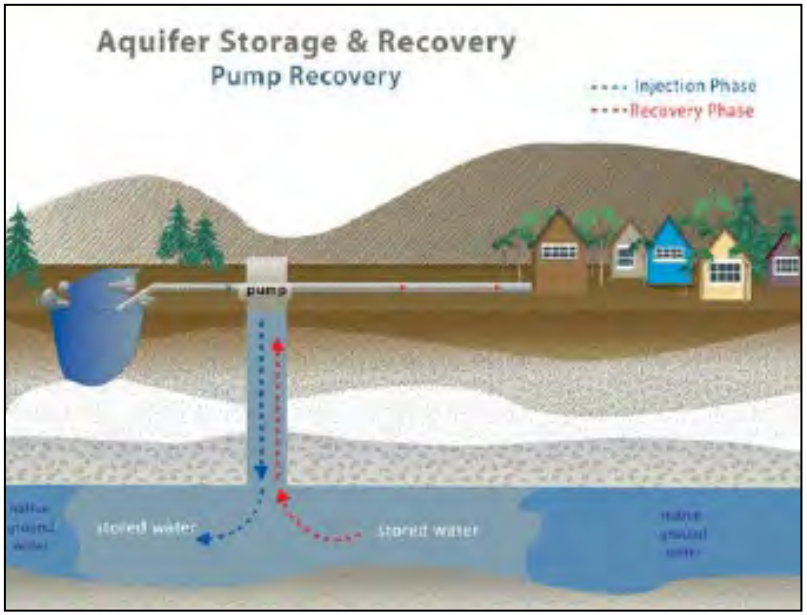
Use surface water during periods of high runoff to recharge aquifers for later withdrawal

Two distinct types of Managed Aquifer Recharge (MAR):

SAR



ASR



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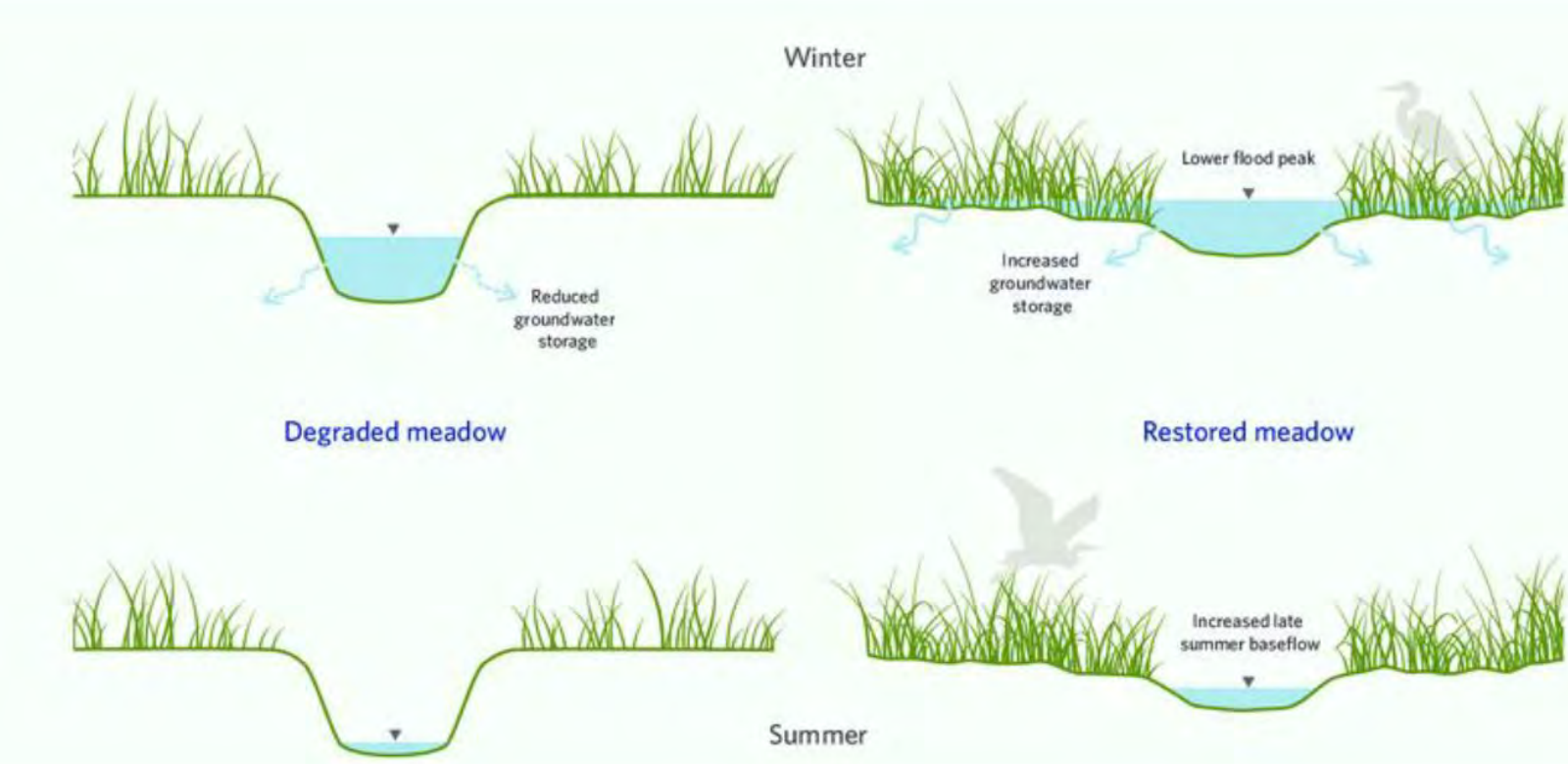
Groundwater Storage

Floodplain Storage



Podolak et al., 2105

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Groundwater Storage Subcommittee

- Make prioritized recommendations of funding and scoping groundwater storage projects under the Groundwater Storage component of the Yakima Basin Integrated Plan.

- Groundwater storage projects may include managed aquifer recharge or aquifer storage & recovery at any location in the Yakima Basin (mainstem, tributaries, etc).

- The goal of this component is augmenting post-storage control water supply consistent with the storage goals of the Integrated Plan.

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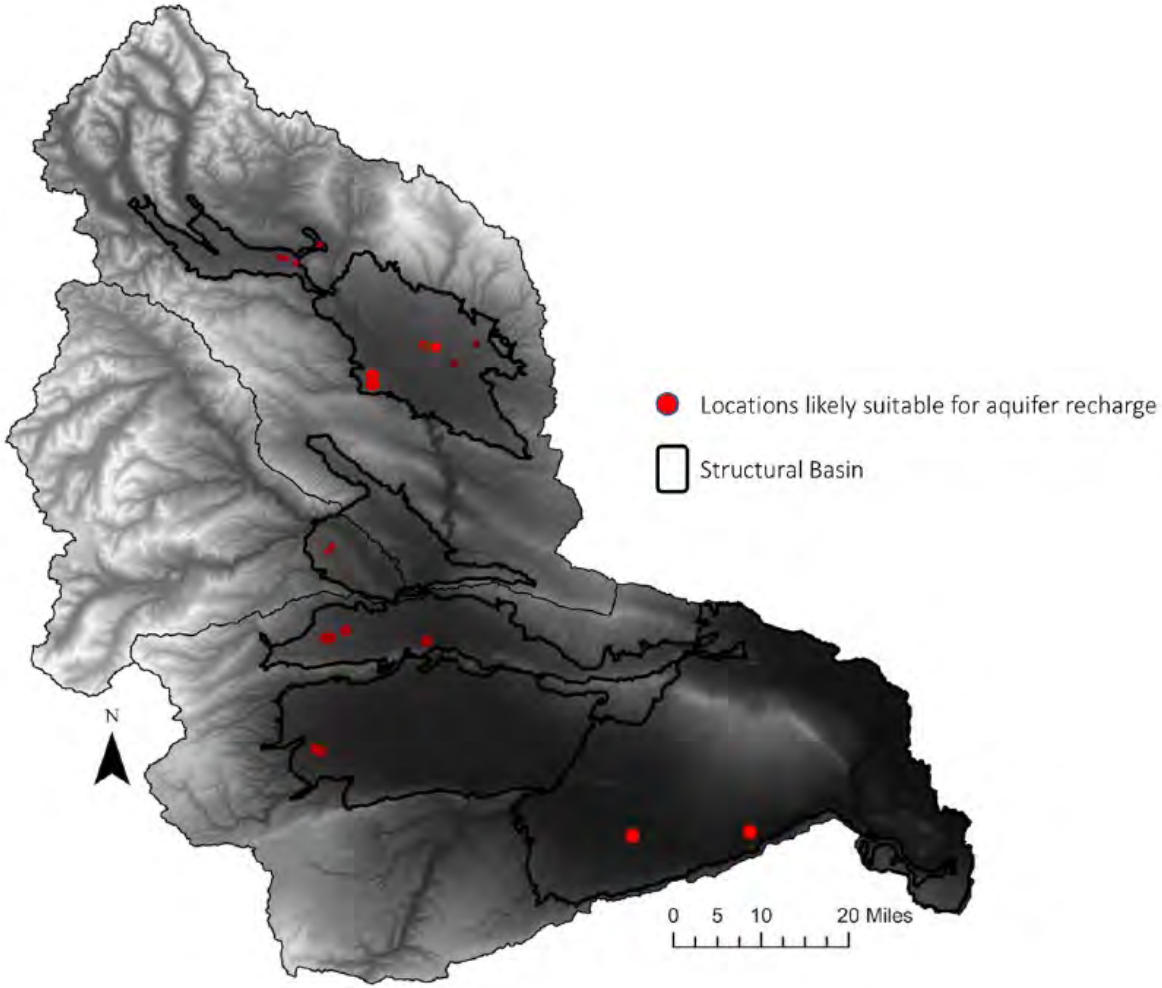
Previous Groundwater SC funded Projects

Groundwater Storage Potential in the Yakima River Basin (OSU)



Gibson M. and Campana M., 2018

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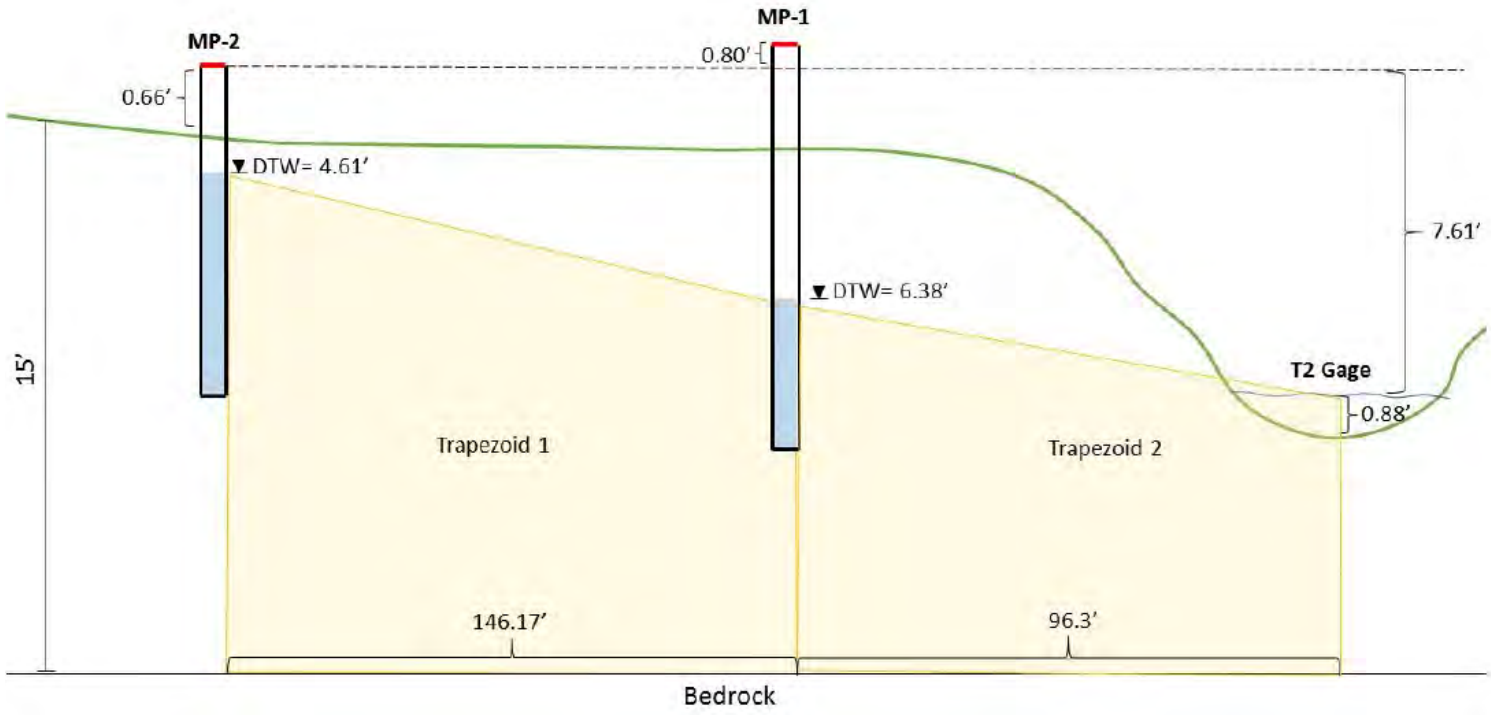
Previous Groundwater SC funded Projects

Large Wood Restoration and Groundwater Storage in Indian Creek (OSU)



Boylan N., 2020

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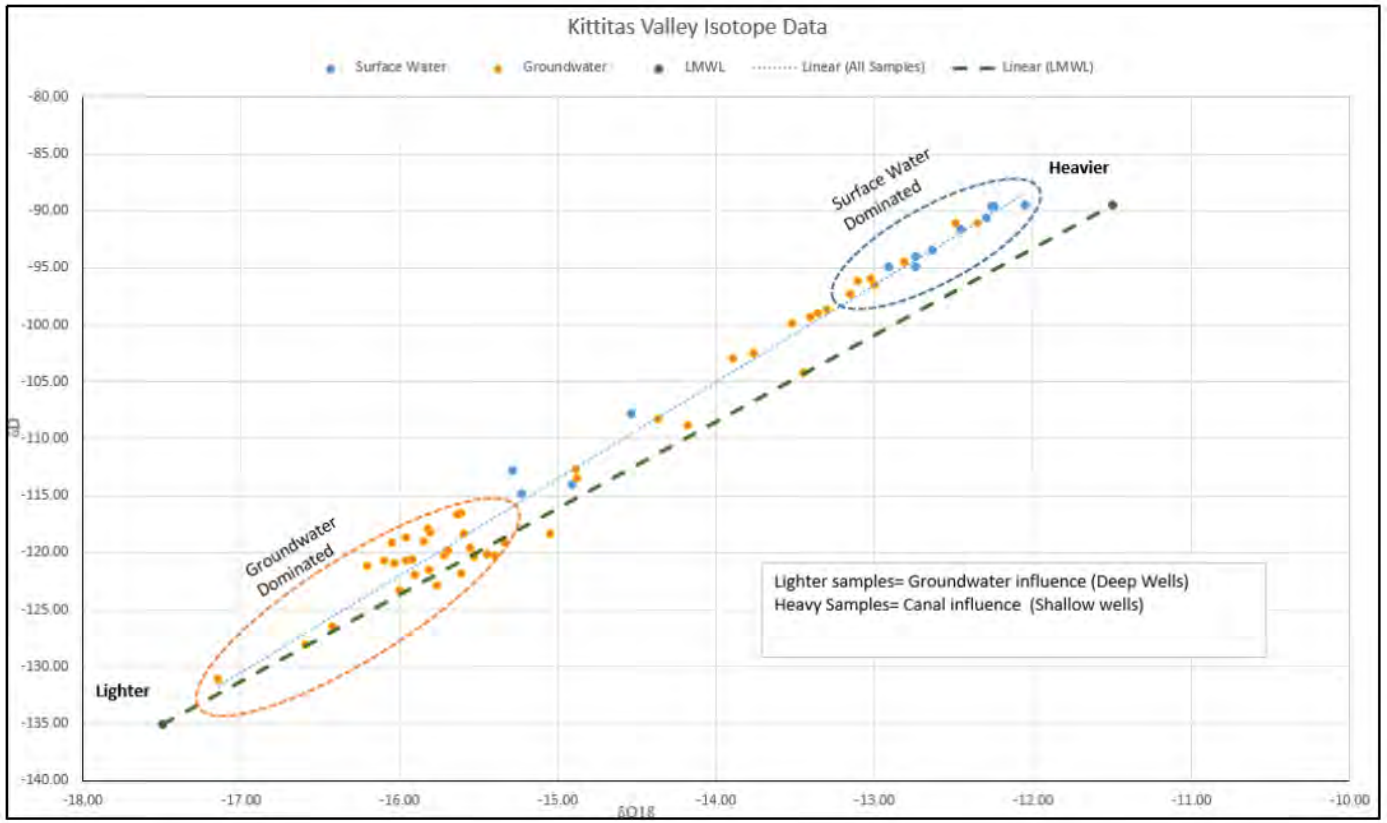
Previous Groundwater SC funded Projects

Geochemical Assessment of GW Storage Locations within the Yakima River Basin (CWU)



Sleeper S., 2020

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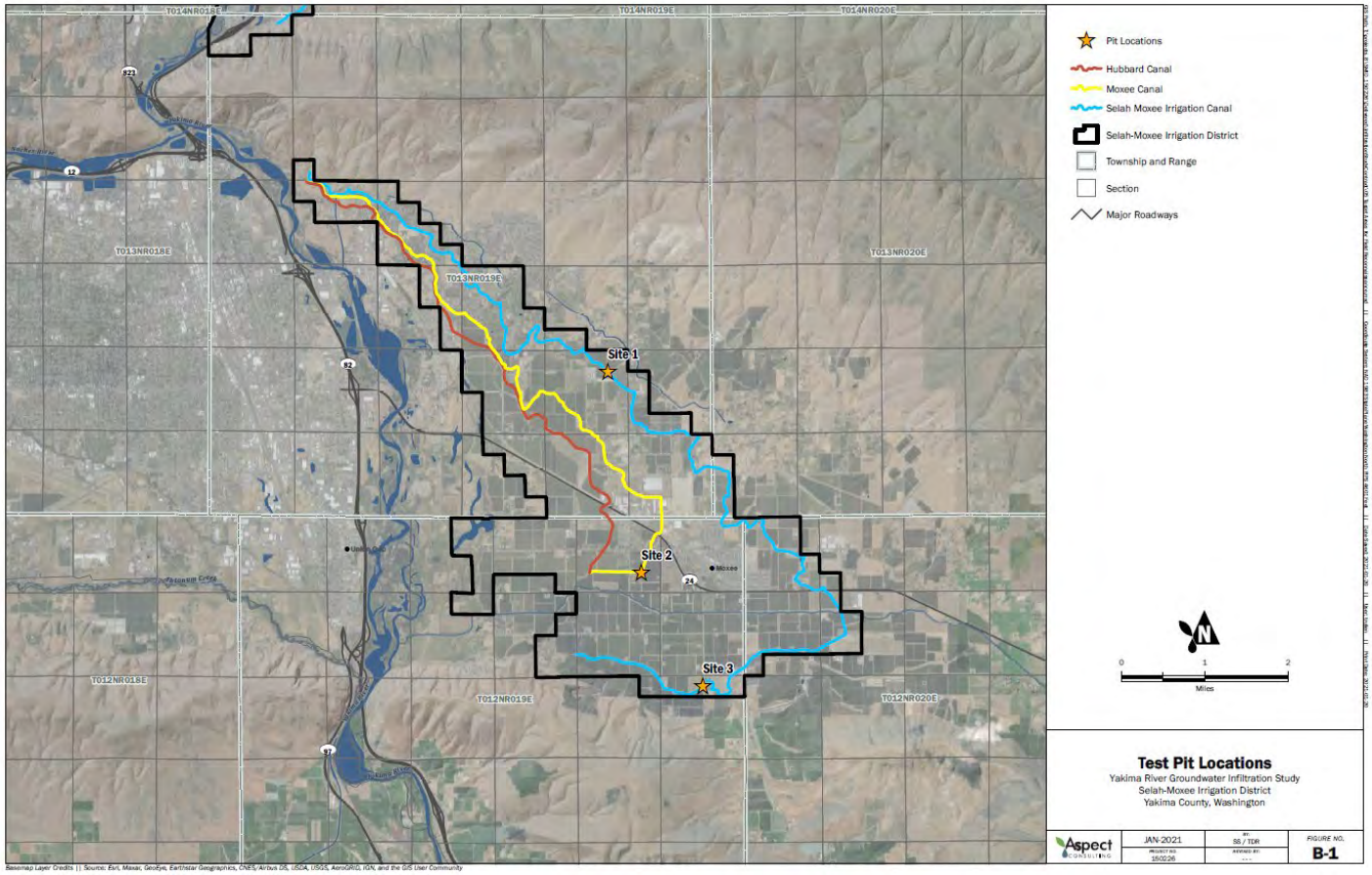
Previous Groundwater SC funded Projects

Yakima River Groundwater Infiltration Study (SMID)



SMID, 2021

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Previous Groundwater SC funded Projects

Yakima Basin MAR Assessment (KRD)

Rank	Site	Infrastructure Available	Infrastructure not Available	Infrastructure can Provide Water Now	Retrofit Required
1	Taneum Creek	X		X	X
2	Big Creek	X		X	X
3	Tieton River	X			X
4	Little Creek	X		X	X
5	Naneum Creek		X		
6	Rattlesnake	X			X
7	Cottonwood Creek	X			X
8	Roslyn - Cle Elum District		X		
9	Smithson Road	X		X	X
10	Cle Elum	X			X
11	Naches River	X			X
12	Wenas Creek	X			X
13	NB 16 South		X		
14	Schnebly Canyon Public Land		X		
15	Teanaway Gravel Pit	X			X
16	NB 15.2 East	X		X	X
17	NB 15.2-1.9 East	X			X
18	NB 15.2-1.9 West	X		X	X
19	South Branch Area	X		X	X
20	Kittitas Reclamation District	X		X	X

Table 18 - Accessibility of Water via the Presence or Absence of Infrastructure

KRD, 2021

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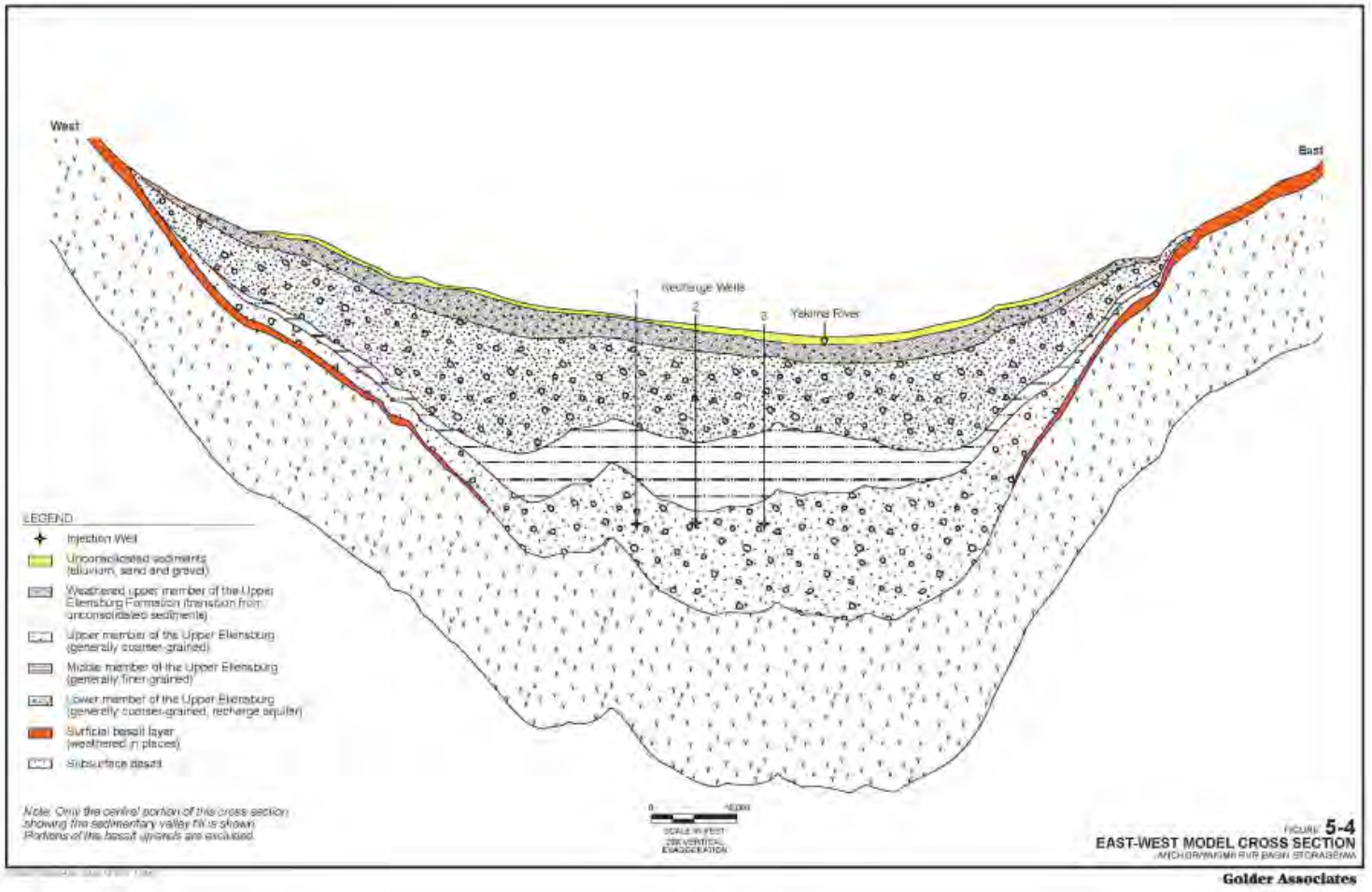
Previous Groundwater SC funded Projects

City of Yakima Aquifer Storage and Recovery*



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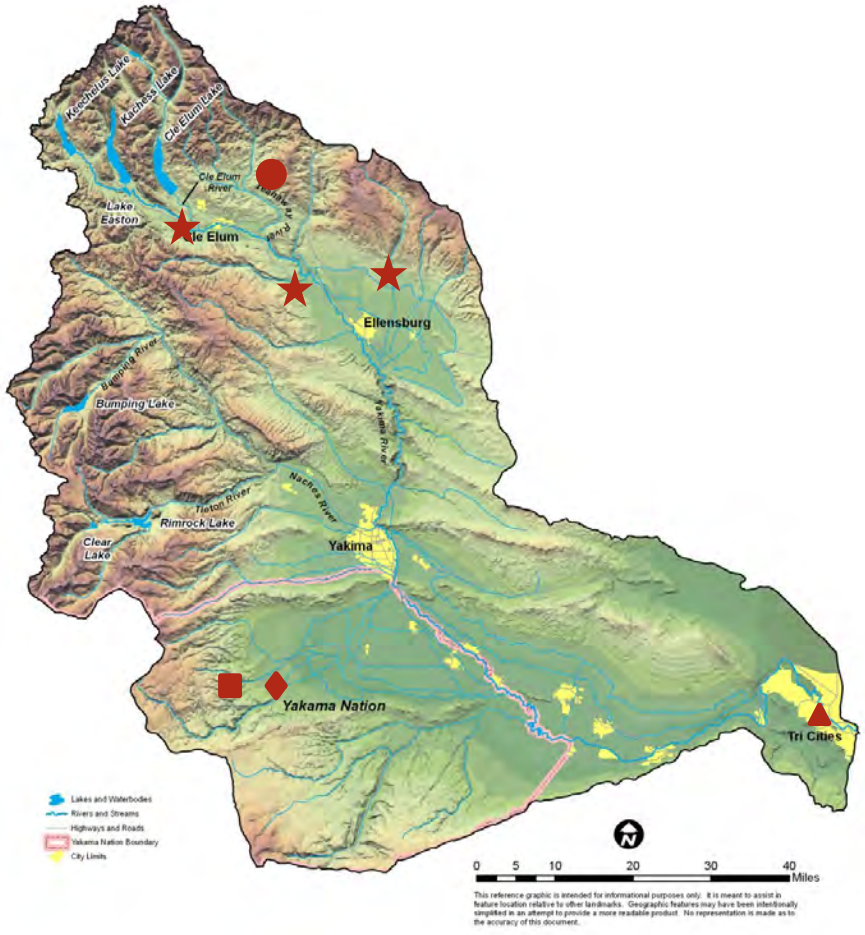
Current Groundwater SC funded Projects

- Large Wood and Alluvial Aquifer Storage (CWU)
- Taneum Creek and other priority sites (KRD)
- Toppenish Fan Shallow Aquifer Recharge (YN)*
- Hunt Creek Head Check Structures (YN)
- Groundwater Storage Potential in Badger Coulee (CWU)



*Project funded by BOR

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KRD MAR Report Highlights

- Water for recharge is generally available November – March
- 89 Potential MAR Sites were identified, scored & ranked
- 12 Criteria were used to score and rank MAR Sites
- Opportunities for surface infiltration , ASR, & conjunctive use
- Recommendations for data collection & site characterization

KITTITAS RECLAMATION DISTRICT KRD

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KRD MAR Report Highlights

- **High priority sites 2021-22 monitoring: Taneum, Big, Little & Naneum**
  - **Monitor streamflow at 5 locations (+ YBIP partner's data)**
  - **4 Monitoring wells at Taneum Creek Site**
  - **Site characterization/modeling at other priority sites**
  - **Pilot tests and construction**

Well Coordinates NAD 27		
Well	Lat	Long
MW A	47.08617	120.74993
MW B	47.08267	120.75009
MW C	47.08334	120.74031
MW D	47.08118	120.74197

KITTITAS RECLAMATION DISTRICT KRD

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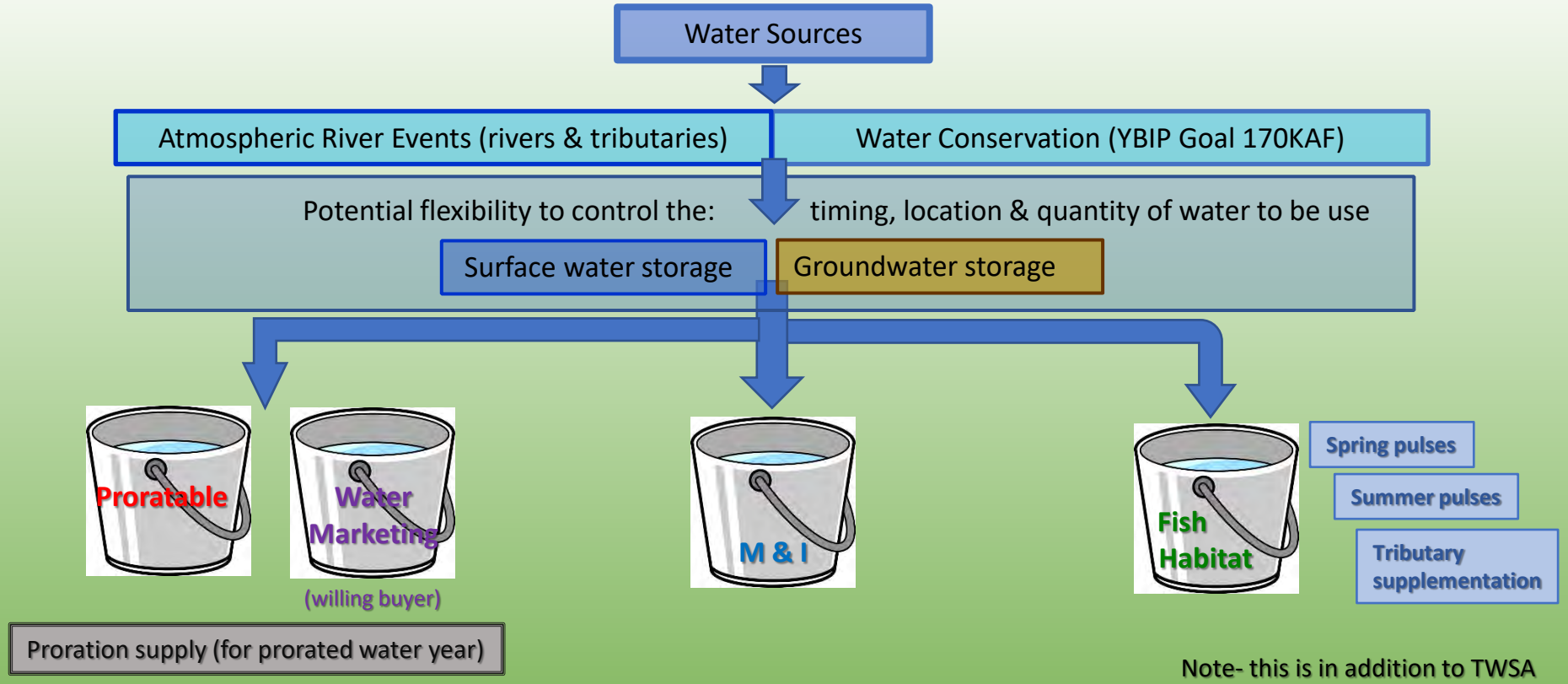
THERE IS NO "NEW" WATER

It's all about OPTIMIZING Yakima Basin's existing water supply by integration of the YBIP water related elements: conservation, storage, water marketing and infrastructure



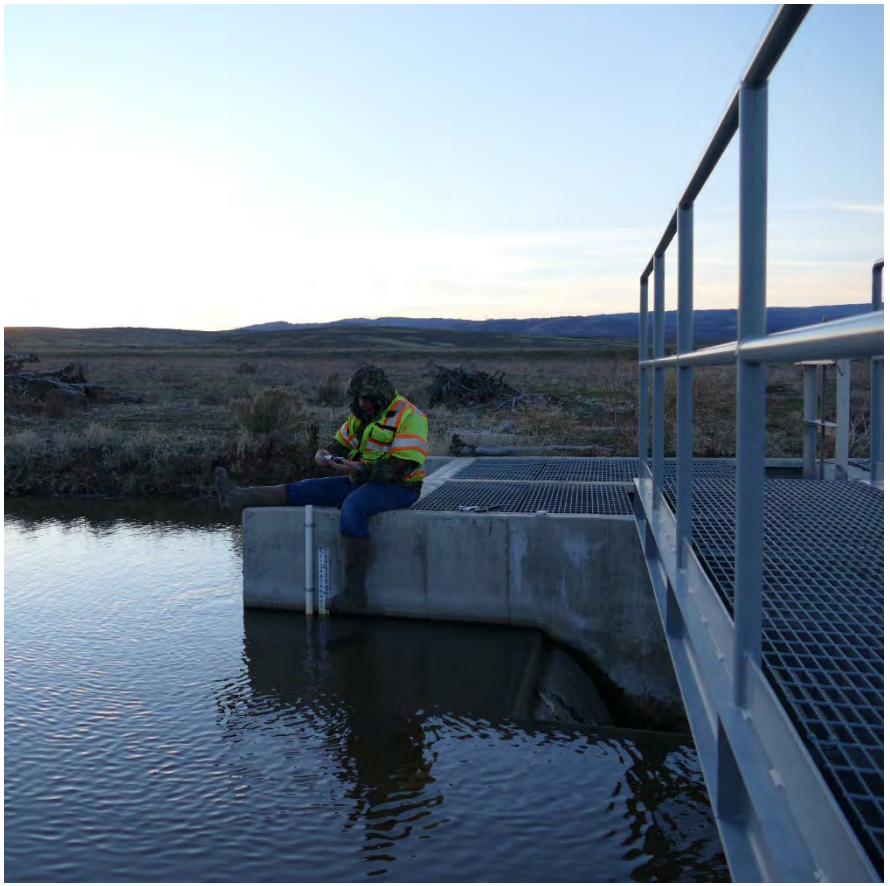
Note- this is in addition to TWSA

Yakama Nation Reservation Managed Aquifer Recharge Program

Program Objectives

- Create climate change resiliency
- Reduce flood risk
- Address over-extraction of deep basalt aquifers
- Restore recharge processes which have been disrupted by development, channelization, grazing and agriculture
- Restore and support establishment of traditional foods and plants
- Conjunctive use of groundwater and surface water to address water resource needs for fish, wildlife, domestic water use irrigation
- Respond to reduced summertime recharge due to water conservation on WIP

Report to be completed **Spring 2021**



Yakama Nation Engineering Staff downloading water measurement data on the Toppenish Fan SAR Project (January 2021)

Yakama Nation Reservation Managed Aquifer Recharge Program

Funded Projects

- Toppenish Fan Shallow Aquifer Recharge Project [1, 2]
- Hunt Creek Flood Risk Reduction and Recharge [1]
- Marion Drain Check Structures [1]
- Optimization of Existing Irrigation Induced Recharge Recapture Facilities [1, 2, 3]

Potential Future Projects

- Wanity Slough Channel Reactivation and Wetland Recharge[1, 2, 3]
- Agency Creek Flood Risk Reduction and Recharge [1]
- South Ahtanum Aquifer Recharge [2, 3]
- South Drain Wetland Restoration and Recharge Project

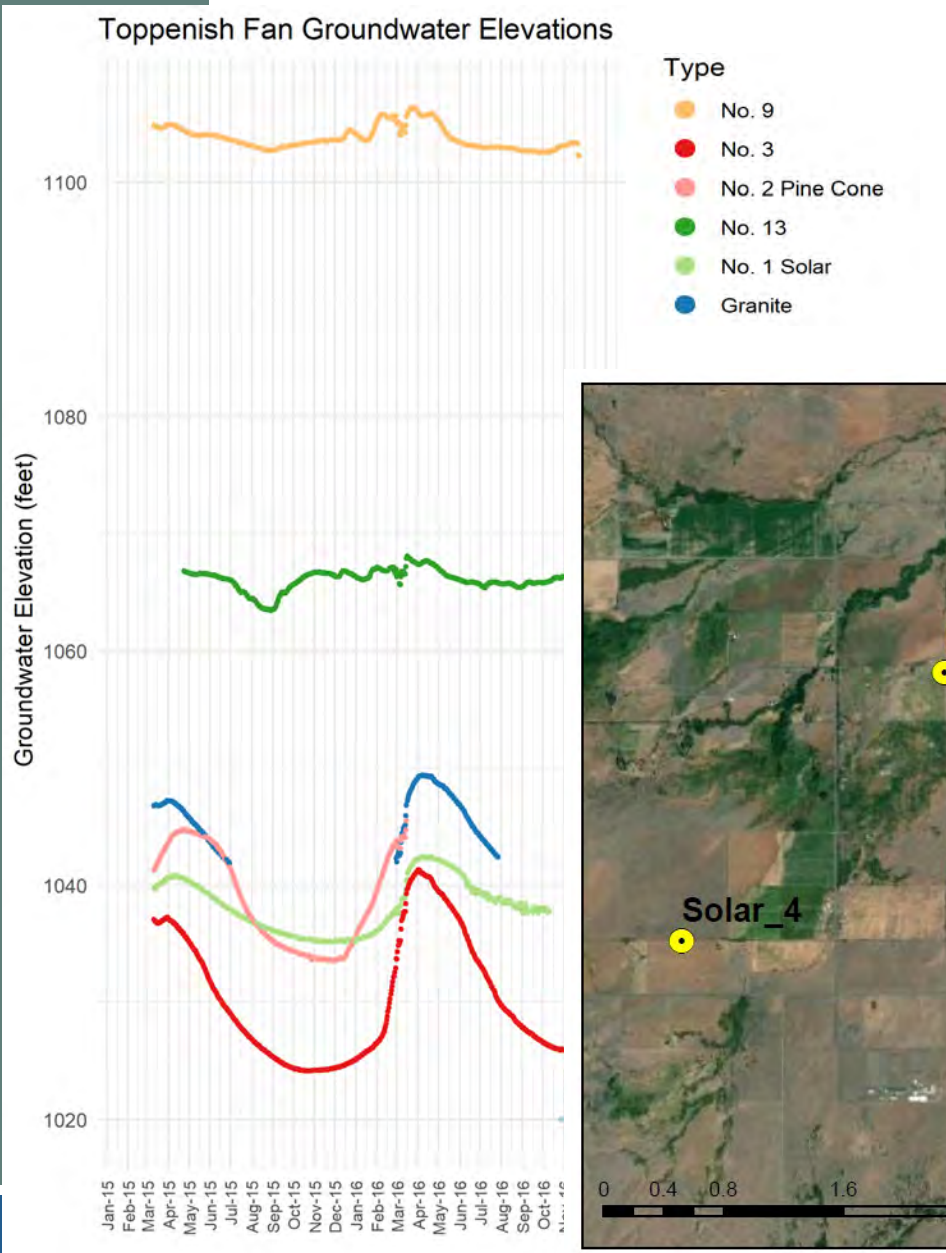
Previous Planning Documents:

[1]Toppenish Creek Corridor Enhancement Plan

[2]WIP Conservation Plan

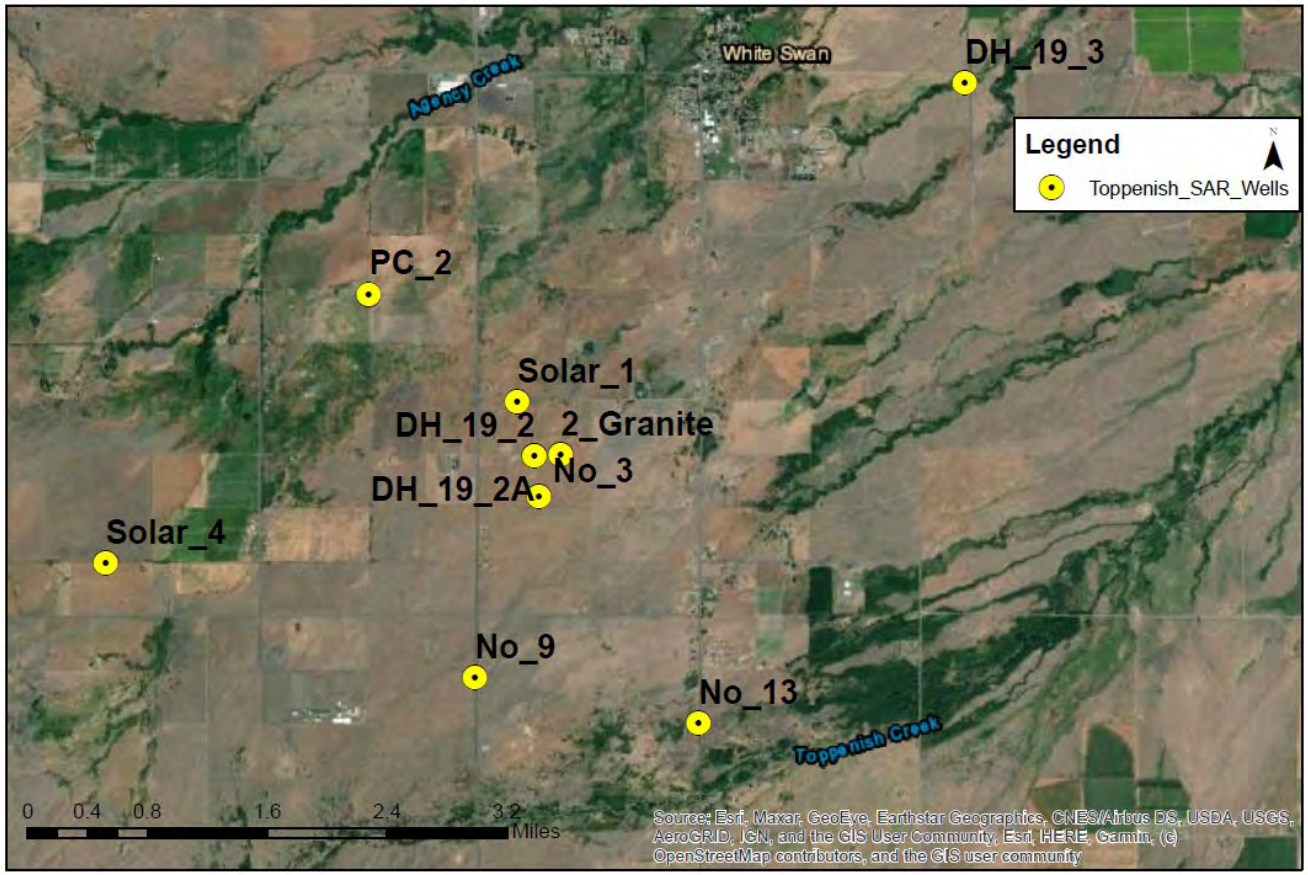
[3]WIP Modernization Plan

Toppenish Fan Shallow Aquifer Recharge

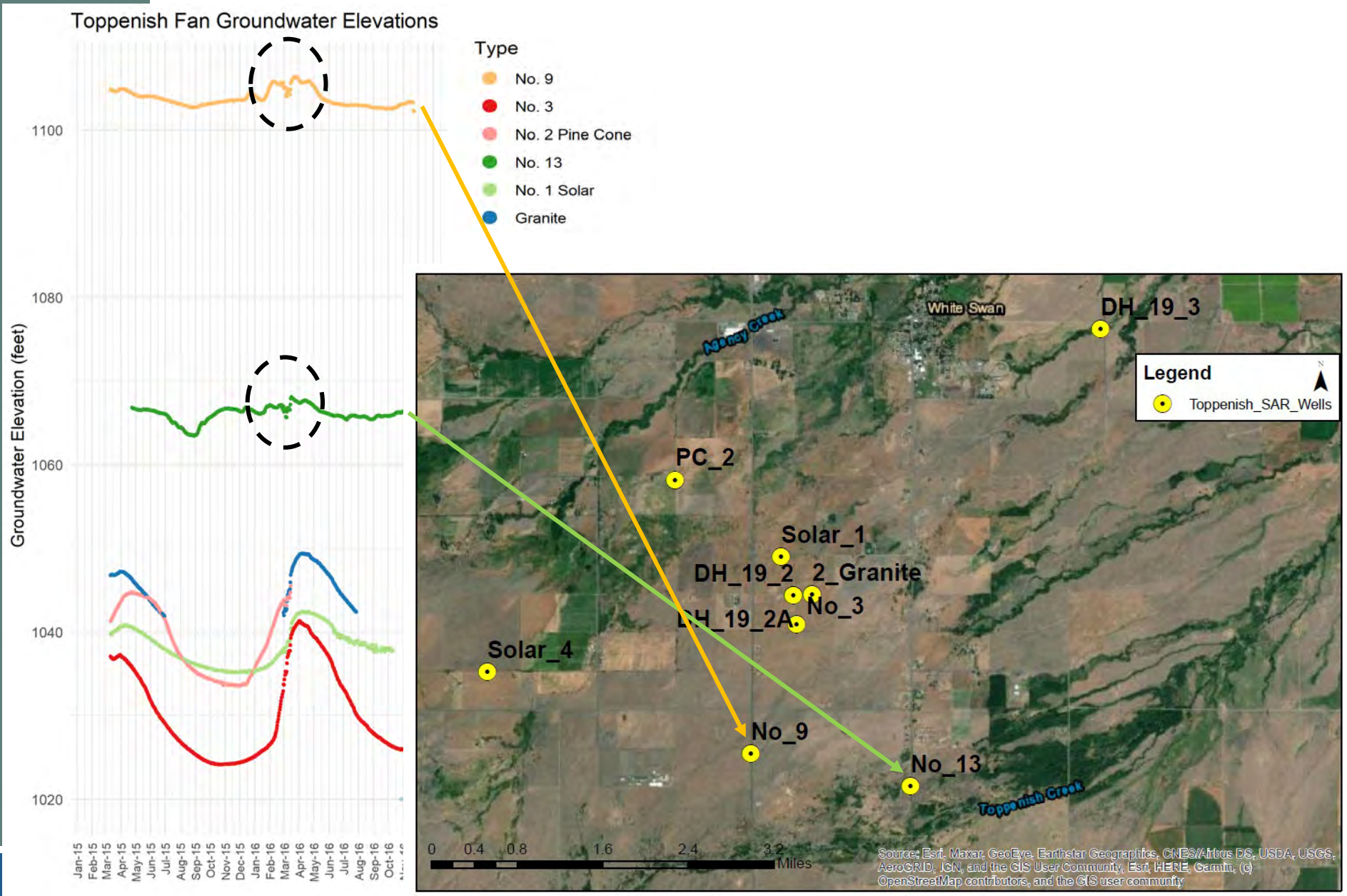


Status: Operating (2015)

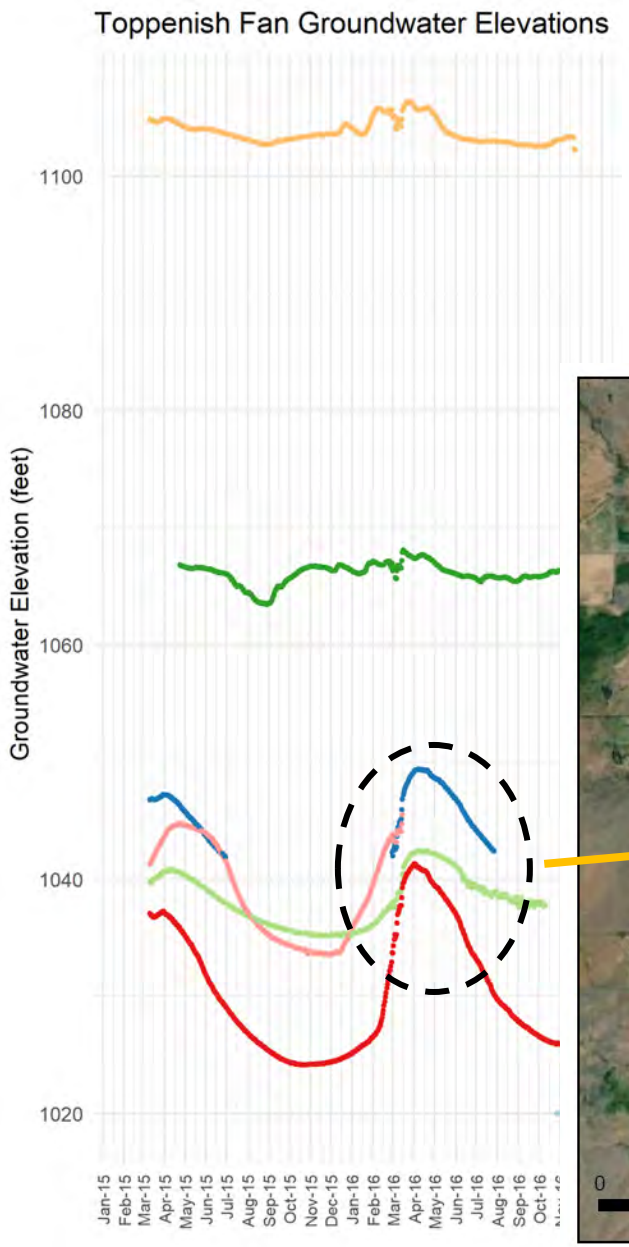
Recharge: ~2000 ac-ft/yr



Toppenish Fan Shallow Aquifer Recharge

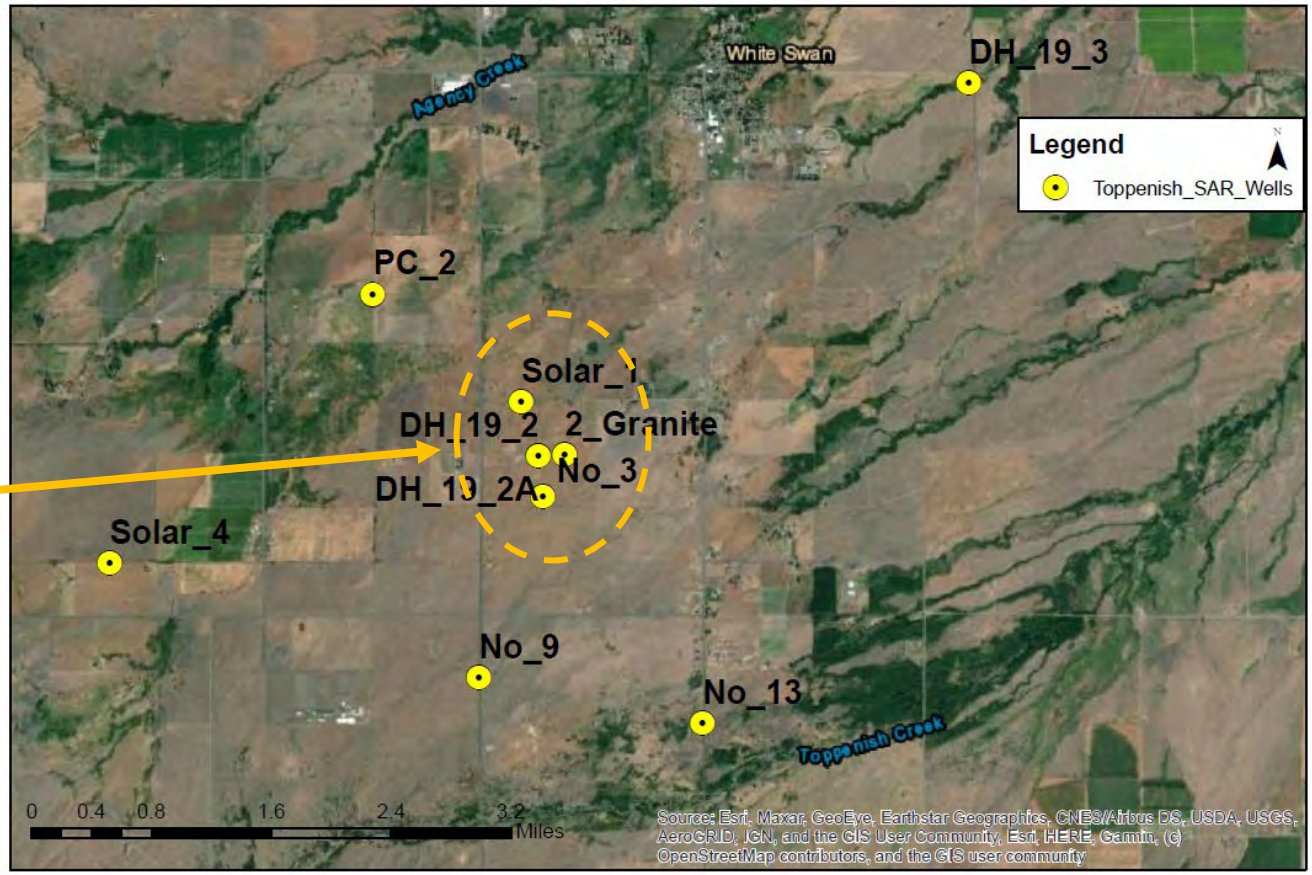


Toppenish Fan Shallow Aquifer Recharge



Resource needs addressed

- Restore recharge processes
- Restore and support establishment of traditional foods and plants
- Conjunctive use of groundwater and surface water to address water resource needs



Hunt Creek Flood Risk Reduction and Recharge

Objectives

- Reduce flooding associated with peak discharge events
- Promote upland infiltration and groundwater storage

Resource needs addressed

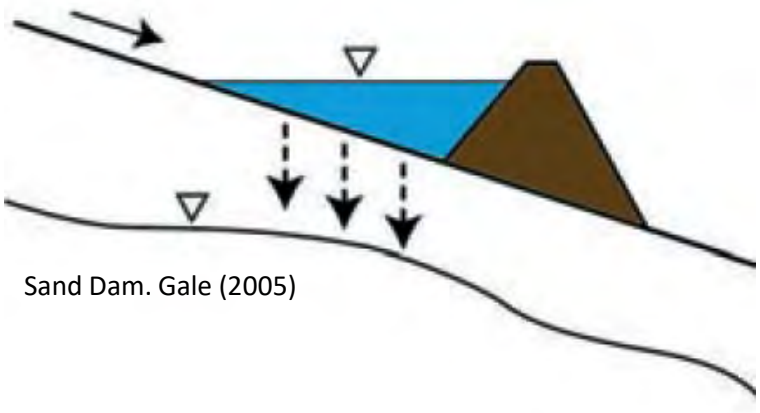
- ✓ Create climate change resiliency
- ✓ Flood risk reduction
- ✓ Address over-extraction of deep basalt aquifers
- ✓ Restore recharge processes
- ✓ Restore and support establishment of traditional foods and plants
- ✓ Conjunctive use of groundwater and surface water to address water resource needs

Hunt Creek During Peak Flow Event (January 2021)

Status: In Design

Phase 1: Estimated recharge ~ 500 ac-ft/yr

Phase 2: Estimated to recharge ~ 2000 ac-ft/yr



Sand Dam. Gale (2005)

Marion Drain Check Structures

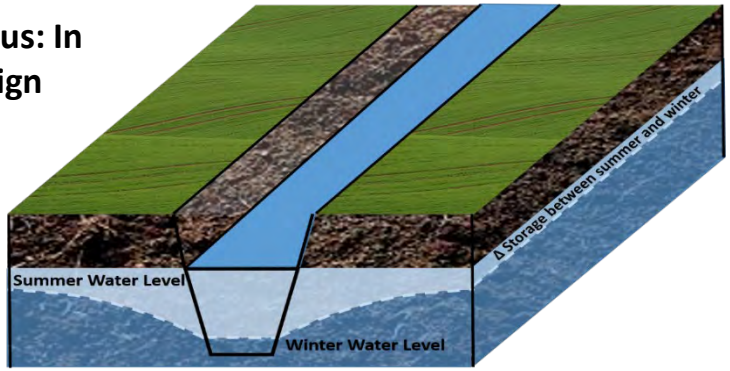
Objectives

- Reduce the amount of groundwater discharged during winter months by temporarily checking the water levels in Marion Drain
- Restore seasonal flow gradients between Marion Drain and Toppenish Creek

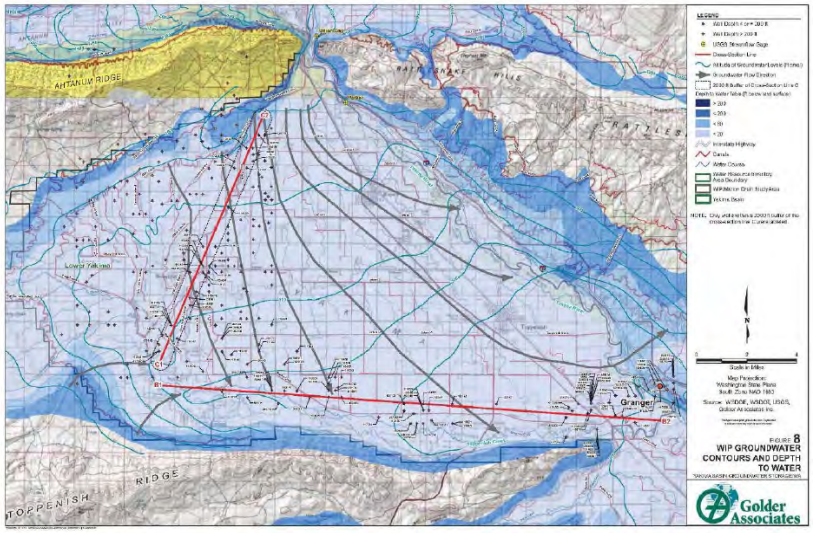
Resource needs addressed

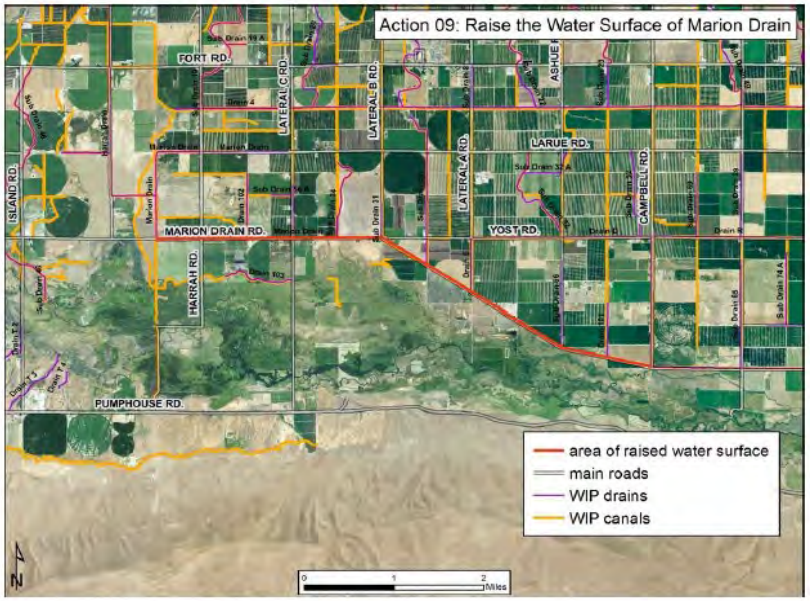
- ✓ Create climate change resiliency
- ✓ Restore recharge processes which have been disrupted by development, channelization, grazing and agriculture
- ✓ Restore and support establishment of traditional foods and plants
- ✓ Conjunctive use of groundwater and surface water to address water resource needs

Status: In Design



Conceptualized diagram of changes in seasonal groundwater elevations near Marion Drain





Top: Golder (2011) groundwater flow direction in the Toppenish Basin
Bottom: Initial target reach for check structures. TCCP (2019)

Knowledge Gap Assessment

- **Task:** Develop synthesis of knowledge gaps basin-wide related to the Groundwater Storage element
- **Purpose:** Common platform to enable prioritizing future work at a basin-wide and project level
- **Knowledge gaps team:** Danielle Squeochs, Jen Johnson, Michael Poulos, Sophie Wilderotter, Bob Lounsbury, Urban Eberhart, Joel Hubble, Walt Larrick, Joel Freudenthal, Tom Ring, Michael Callahan, Chris Duncan

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Knowledge Gap Assessment

- Big picture (basin-wide)
- Site specific
  - Shallow Aquifer Recharge (SAR)
  - Aquifer Storage and Recovery (ASR)
  - Stream channel and floodplain storage improvement

Water source / Delivery mechanism
Availability of water[1]? 1. Physically (without harming aquatic habitat/life histories)? 2. Operationally (possible to convey in winter?)
Estimated size of available groundwater storage and level of certainty
What is intended use of water (streamflow, irrigation, other)?
What is recovery method (natural discharge to stream, pump, etc.) and level of confidence (think about competing uses). What is residence time?
What are potential constraints and limitations (contamination, slope stability, impacts to infrastructure and vegetation, etc.)
What would be logical next step(s) to increase knowledge?
Budget (if known, think order of magnitude)
References

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Knowledge Gap Assessment

- Key basin wide knowledge gaps exist that currently inhibit ability to integrate groundwater storage into YBIP water management
- Site-specific investigations suggest that conditions vary significantly.
- Advancing both basin wide and site-specific work is best approach to advancing groundwater element of YBIP.

Questions ??

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