PALOUSE BASIN AQUIFER committee

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April 21, 2022 Meeting Minutes

Moscow UI Facilities Services Center, Ponderosa Meeting Room

Committee business conducted by motion is indicated in **** Business Decision**
For discussion details related to other agenda items, refer to the video recording of the meeting at https://youtu.be/aNASTRxHUtc during the time period indicated within parentheses (HH:MM:SS)

Attendance
X: In-person attendance
V: Video attendance

X	UI: Tim Link, Professor of Hydrology	V	WSU: Jeff Lannigan, Facilities Services
X	UI: Rusty Vineyard, Director, Facilities Operations		WSU: Jason Sampson, Assistant Director, Environmental Services
X	UI: Brian Johnson Utilities Engineer / P3 Liaison	X	Pullman: Cara Haley (Chair), City Engineer
X	Moscow: Tyler Palmer (Vice-Chair), Deputy Director Operations	V	Pullman: Shawn Kohtz, Director of Public Works
X	Moscow: Gina Taruscio, City Council Member	X	Pullman: Eileen Macoll, City Council Member
V	Moscow: Mike Parker, Water Utility Manager	X	Whitman County: Mark Storey, Public Works Director/County Engineer
X	Latah County: Paul Kimmell, Citizen/County Representative	V	Whitman County: Tom Handy, County Commissioner
	Latah County: Tom Lamar, County Commissioner		

Visitors and Others:
See meeting video recording beginning at (00:00:45)

Call to Order: Cara Haley called the meeting to order at 2:01 PM.

1) **Introductions**
See meeting video at (00:00:45)

2) **Approval of Meeting Minutes: March 17, 2022**
See meeting video at (00:04:44)

*** * Motion passed to approve minutes**

3) **Public Comment for Items not on Agenda**
See meeting video at (00:05:22)

4) **Presentations/Discussion –**

- **Tracking Recharge through the Ambient Seismic Field – Quinn Buzzard (00:07:28)**
- **Basin Boundary Modifications (00:42:00)**

5) **Unfinished Business**
See meeting video at (00:50:02)

- **PBAC Executive Director Position Vacancy (00:50:02)**

6) **New Business *(note: agenda item considered out of order as Item 7)***
See meeting video at (00:56:50)

- **Rescission of UI Research Voting Member Status (00:57:00)**

7) **Subcommittee Reports (00:52:12) *(note: agenda item considered out of order as Item 6)***
- **Budget – (00:52:12)**
- **Communications (00:52:48)**
- **Research (00:55:30)**

8) **Other Reports and Announcements**
See meeting video at (01:09:02)

- **Good of the Order (01:09:08)**
- **Alternative Water Supply Project (01:10:24)**

**** Motion passed by 4 research funding entities to authorize the City of Moscow to extend the project through the end of August with no financial impact of the time alteration (no cost extension).**

- **NSF Civic Planning Grant Proposal Letter of Support (01:14:18)**
- **Next PBAC Meeting – Thursday, May 19, 2022, 2:00 pm, UI (01:18:14)**

9) **Adjourn**

**** Motion passed to adjourn meeting at 3:20 PM PDT (01:18:50)**

Minutes reviewed and approved at the May 19, 2022 PBAC meeting.

Tracking Aquifer Recharge:

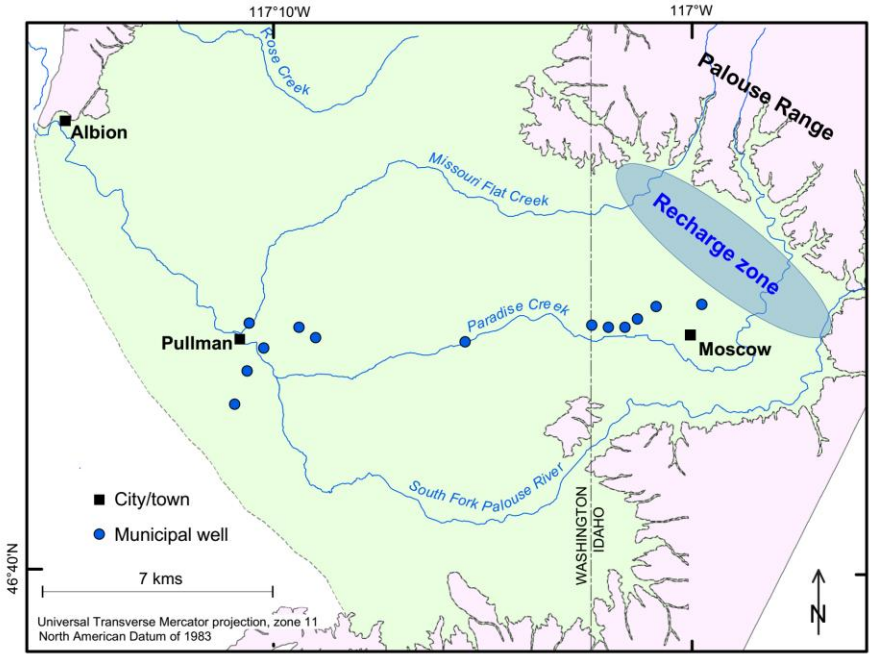
never-ending question of input to our groundwater

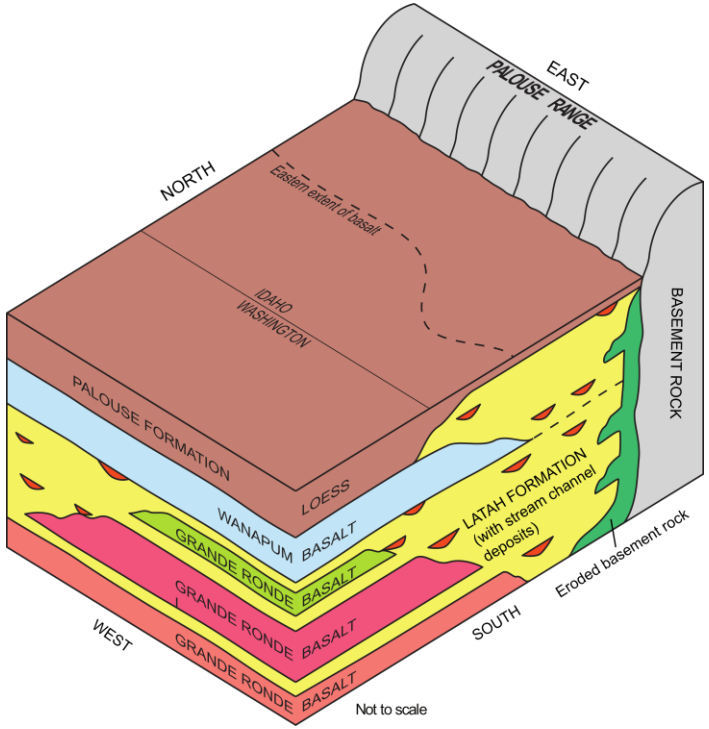
Quinn Buzzard, Water Resources

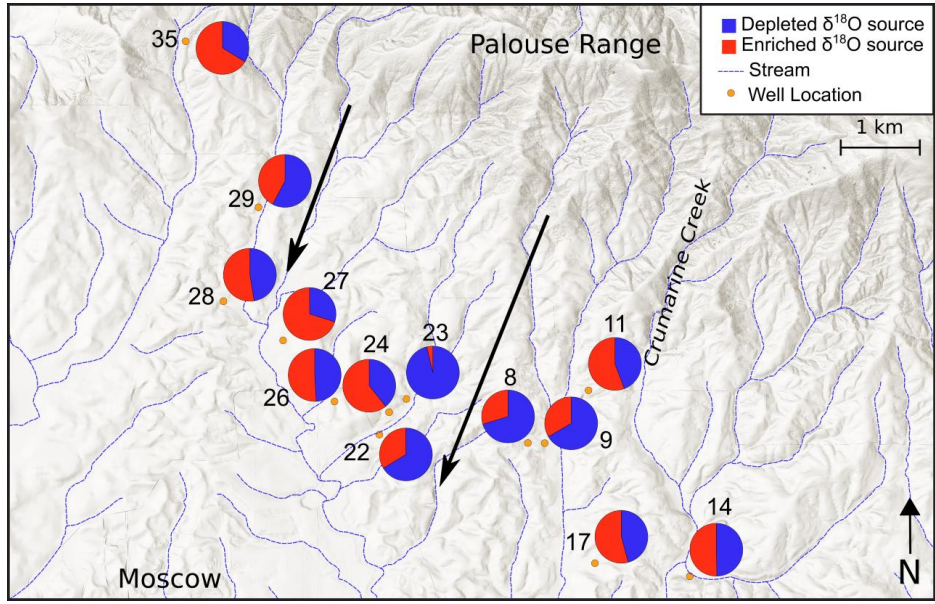
Advisor: Jeff Langman, Geology

Aquifer system recharge

- Conceptual model: recharge zone along Moscow Mountain
- Isotope study linked snowpack reservoir to recharge
- How can we estimate recharge without drilling wells?

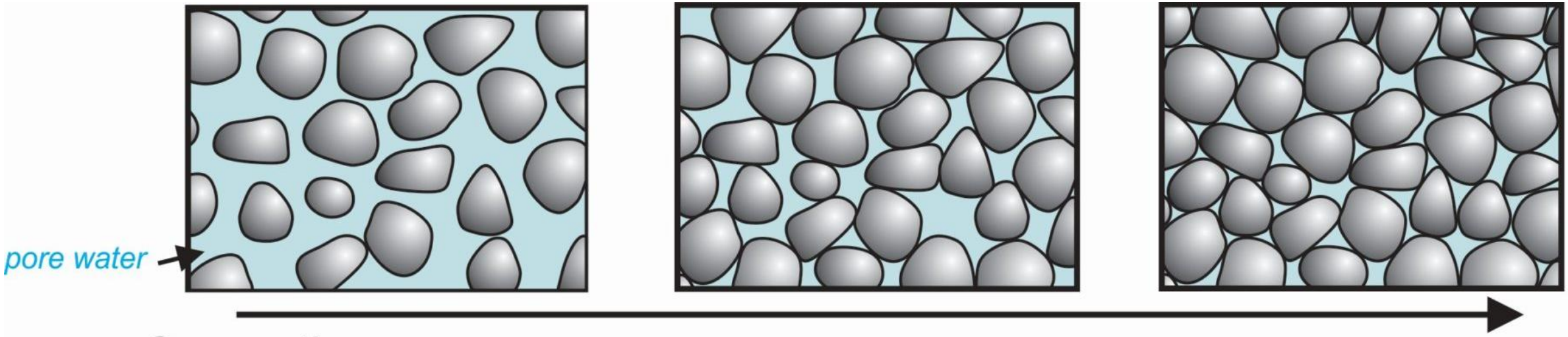






Water level and pressure

- Increased water level = increased hydraulic pressure
- Increased hydraulic pressure = decreased seismic wave velocity
- Seismic wave velocity changes = water level changes

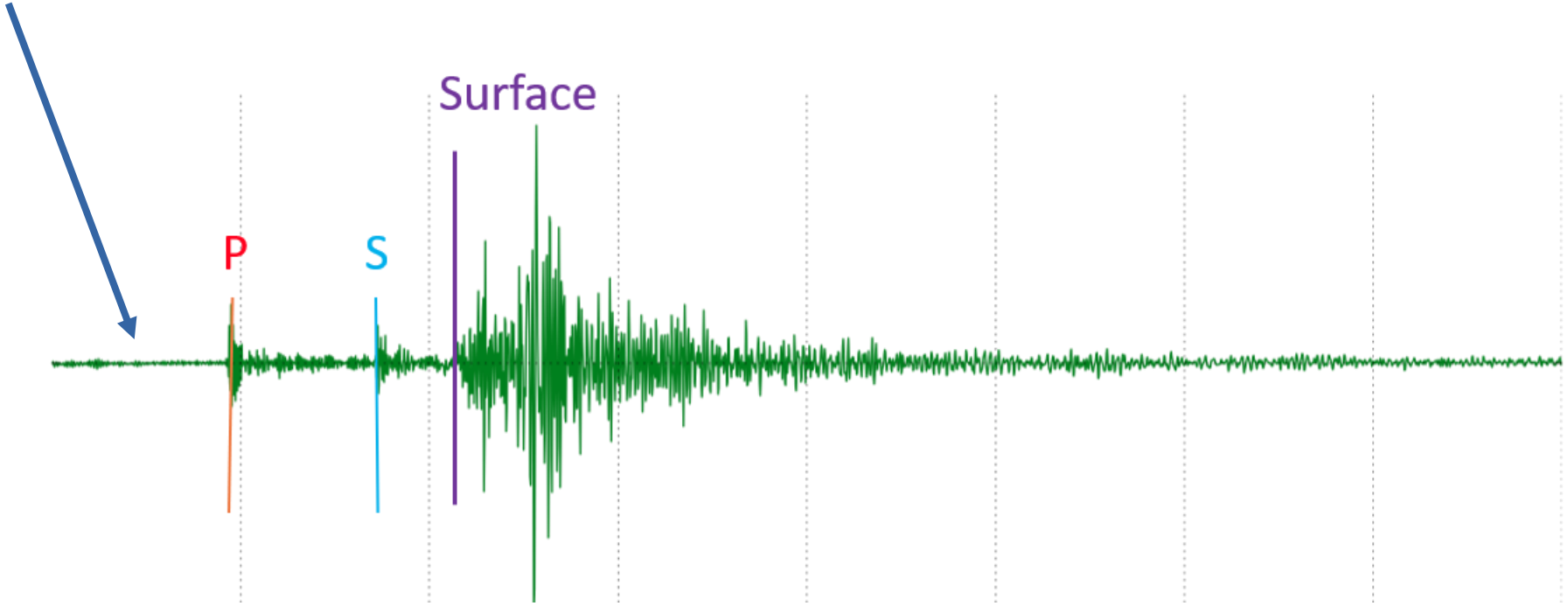


Compaction

During compaction, water is squeezed out of loose sediment and grains may eventually all be in contact.

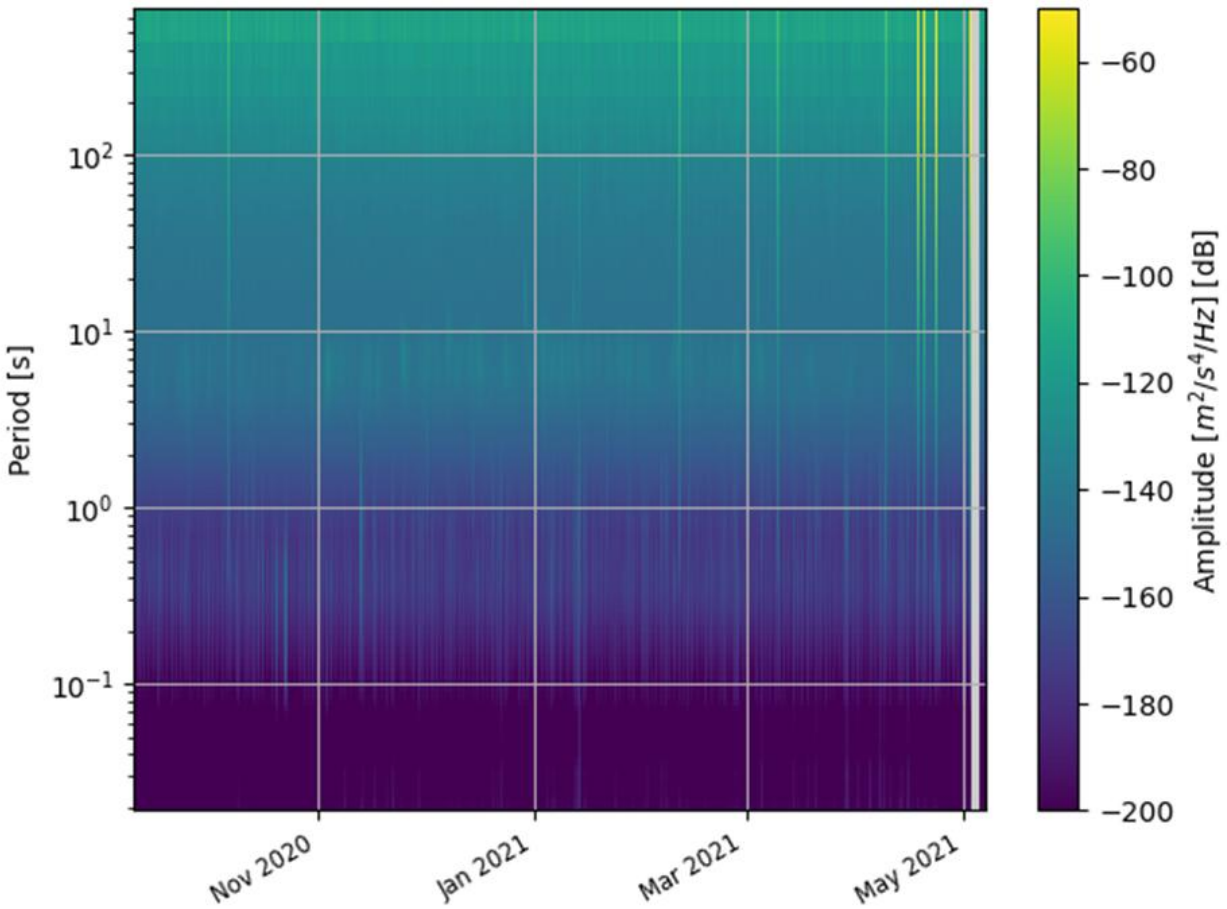
What are we recording?

- Installed 11 seismometers across the recharge zone (arc)
- Looking at low frequency waves = ambient perturbations



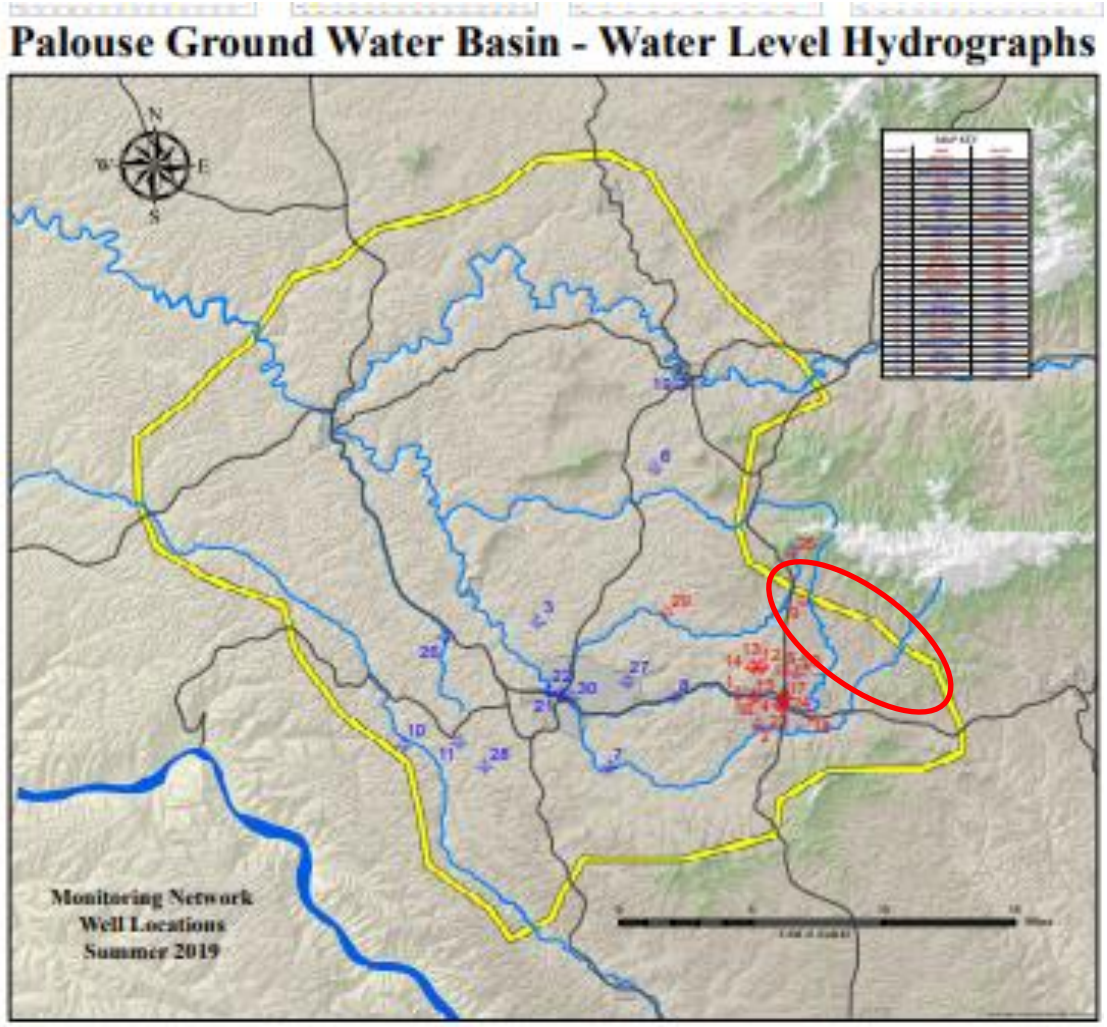
Seismometer output

- Raw spectra reduced to target range
- Convert to a change in velocity
- Correlate to relative change in water level



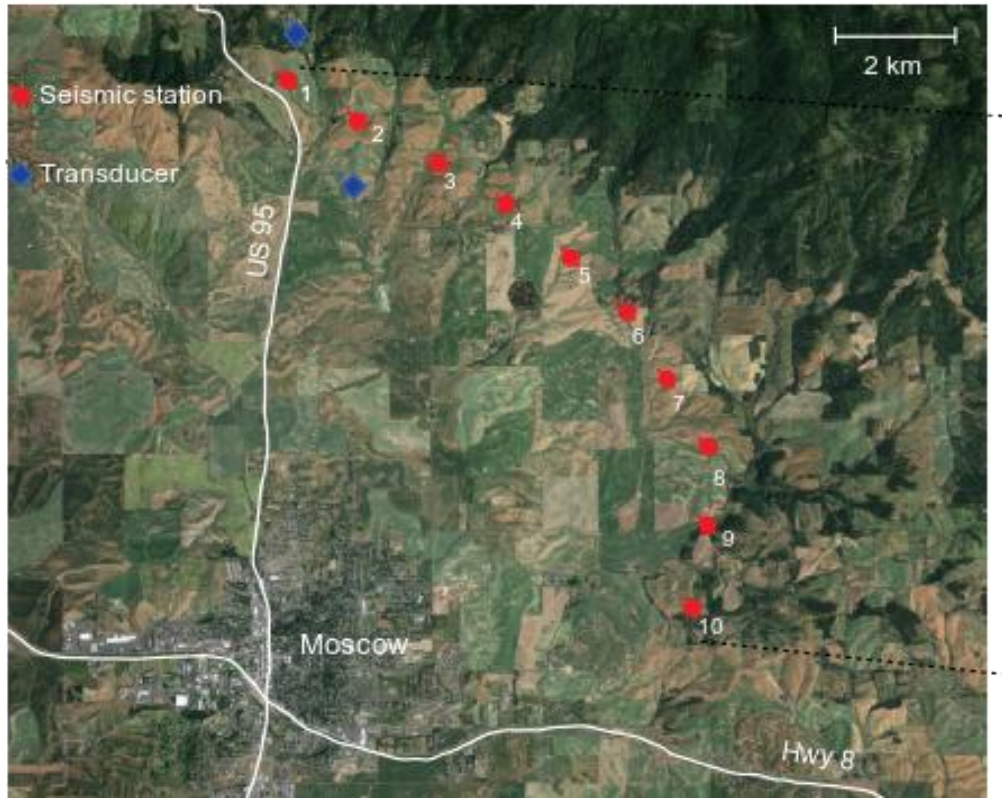
Seismic wave to water level

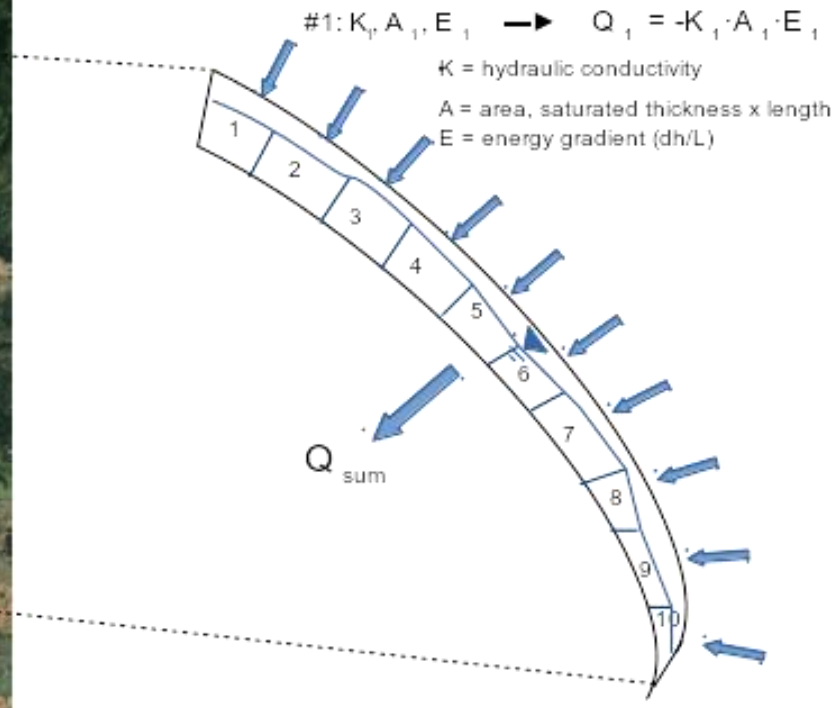
- Lots of transducers, only one in the recharge zone
- All seismometer results will be correlated to changes in Elliot well



Applying the results

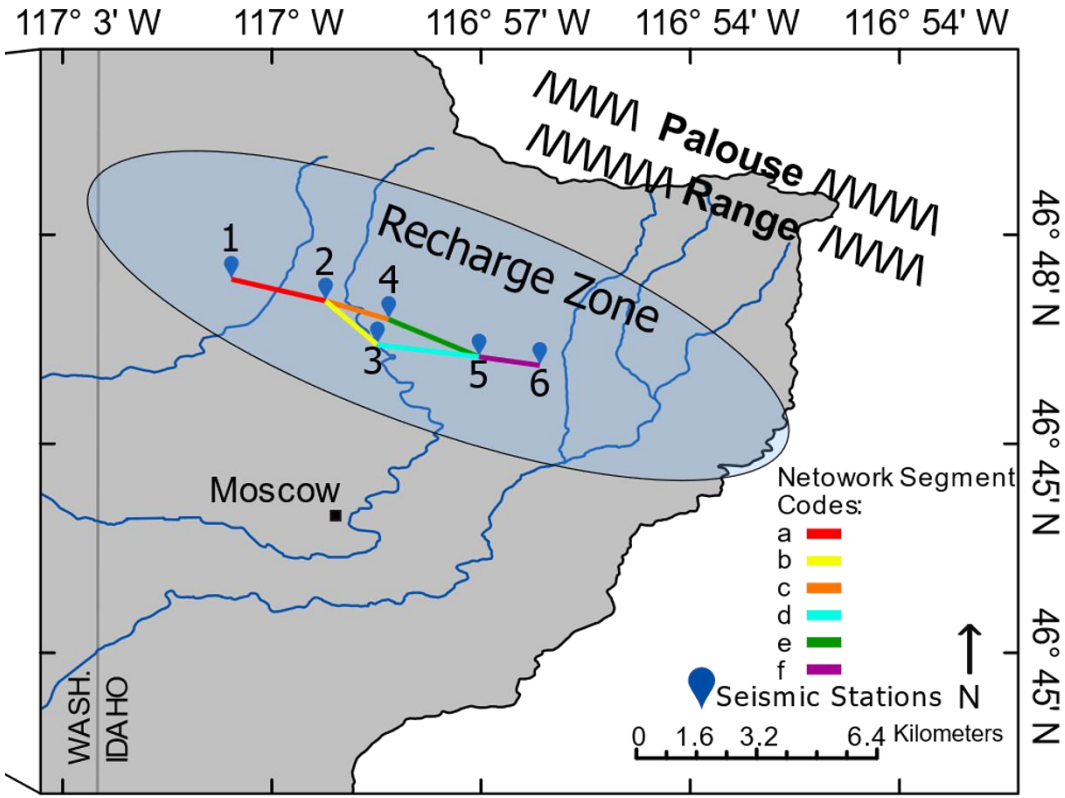
- Water level, saturated thickness, hydraulic gradient:
  - Recharge volume calculation by season





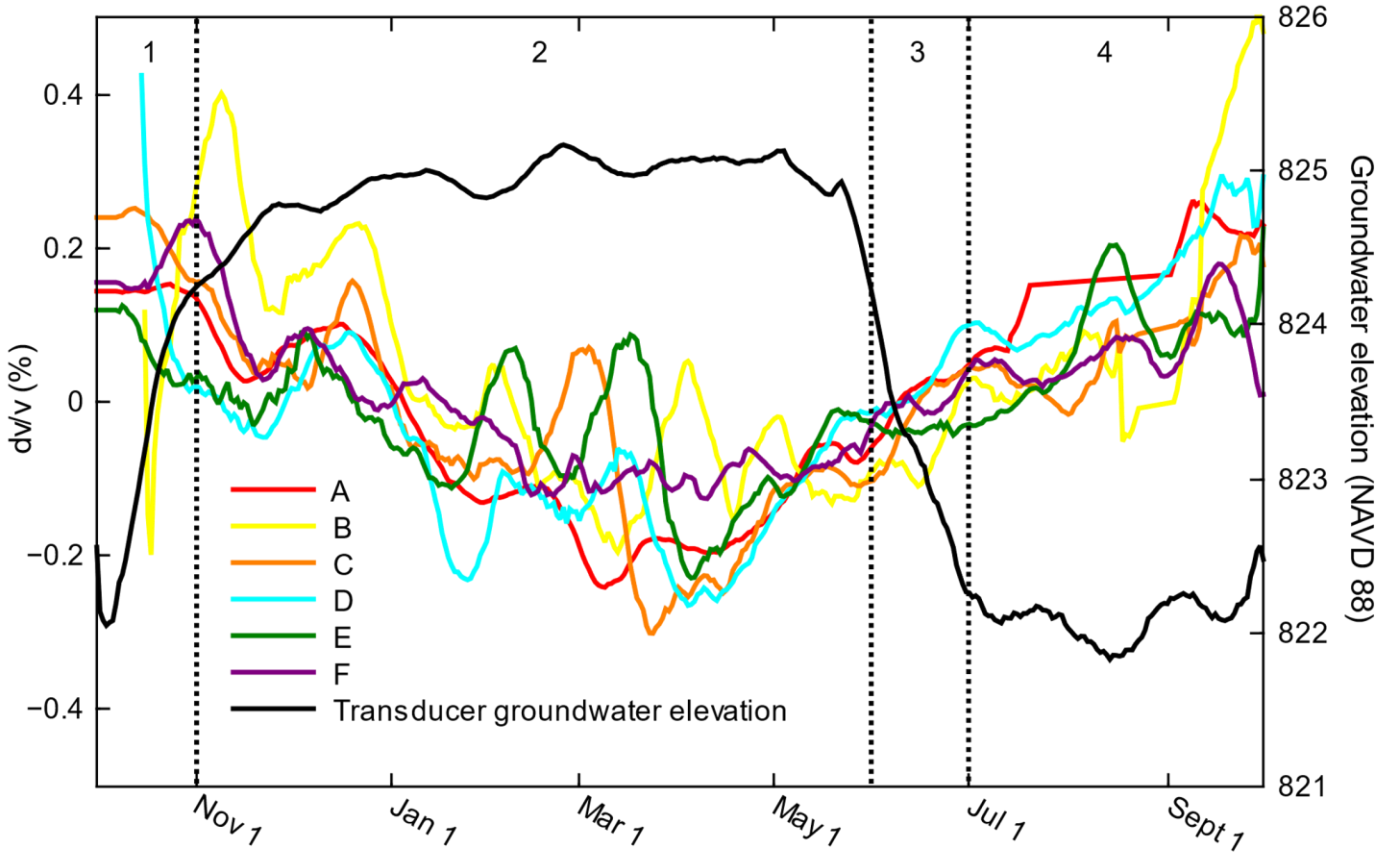
Final Stations

- Seismic data was refined to “usable data”
  - Usable data is low frequency waves recorded within a specific range (2-4hz)
- 11 stations reduced to usable 6 stations.



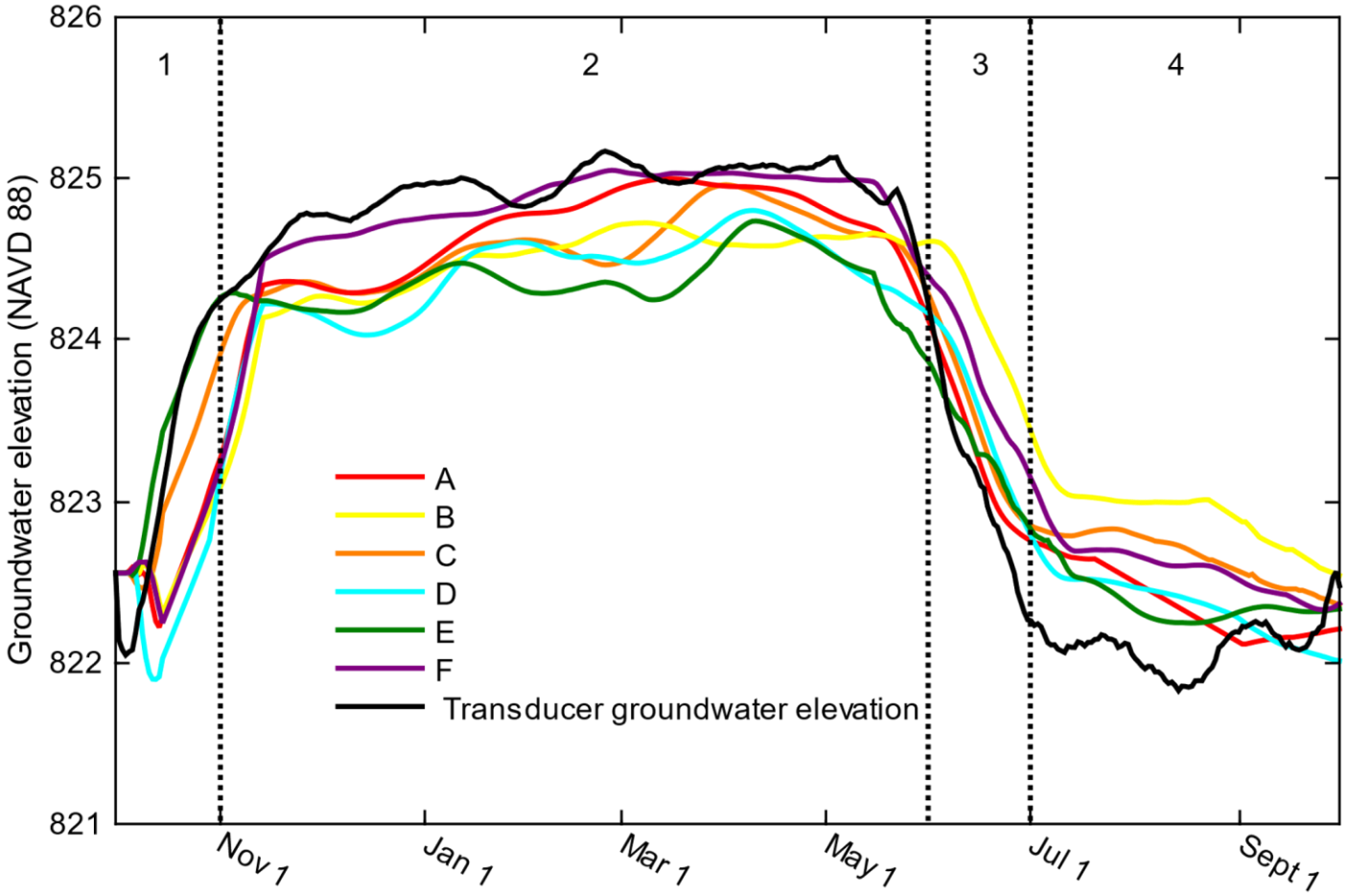
Seismic Velocity and Groundwater

- Seasonal relationship between water level and seismic velocity



Estimating Groundwater Level

- Accurate up to .5m (1.5ft) of transducer measurement
- Underpredicts high water levels and over predicts low water levels
- Has potential to expand groundwater monitoring networks

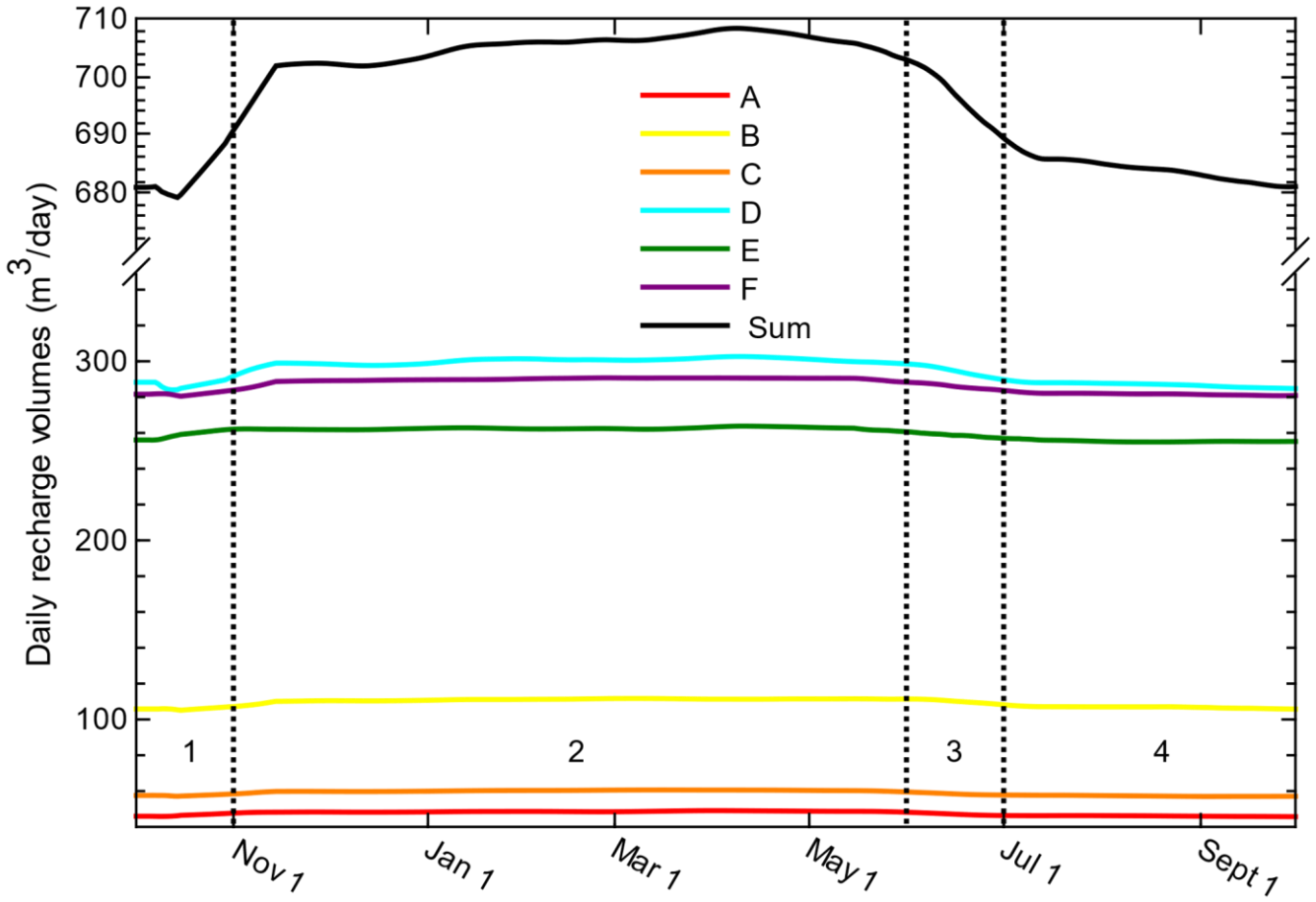


Results

- Recharge estimate of 255,085 cubic meters per year (67.4 MGY) across network
- Much higher then PBAC groundwater model estimate of 26,250 cubic meters per year (6.9 MGY) over same area
- Higher recharge rate indicates fast recharge pathways along the mountain front interface.
- Recharge is spatially variable across the interface.

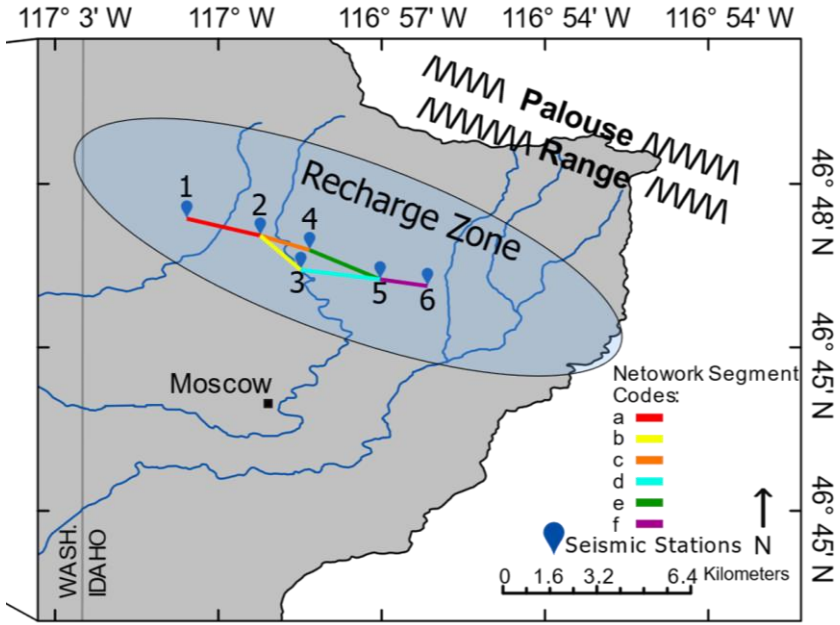
Spatially Variable Recharge

- Western segments (A,B,C) much smaller volume than eastern segments (D,E,F).
- Attributed to higher conductivity, thicker saturated interval, higher hydraulic gradient.
- Eastern half of network constituted 78% of total recharge across network



Geology

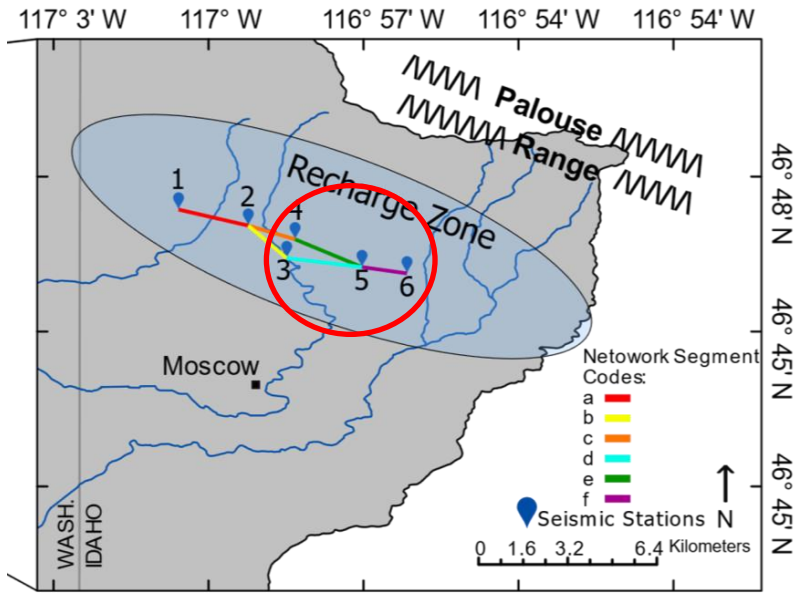
- Western half has higher clay content
- Bedrock was shallower in the west and deeper in the east
- Hydraulic gradient was higher in east

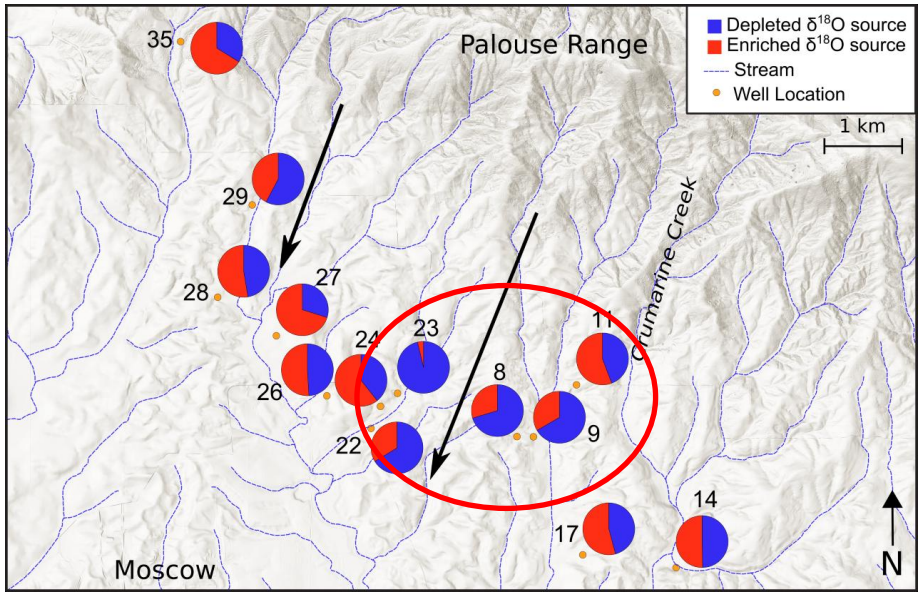


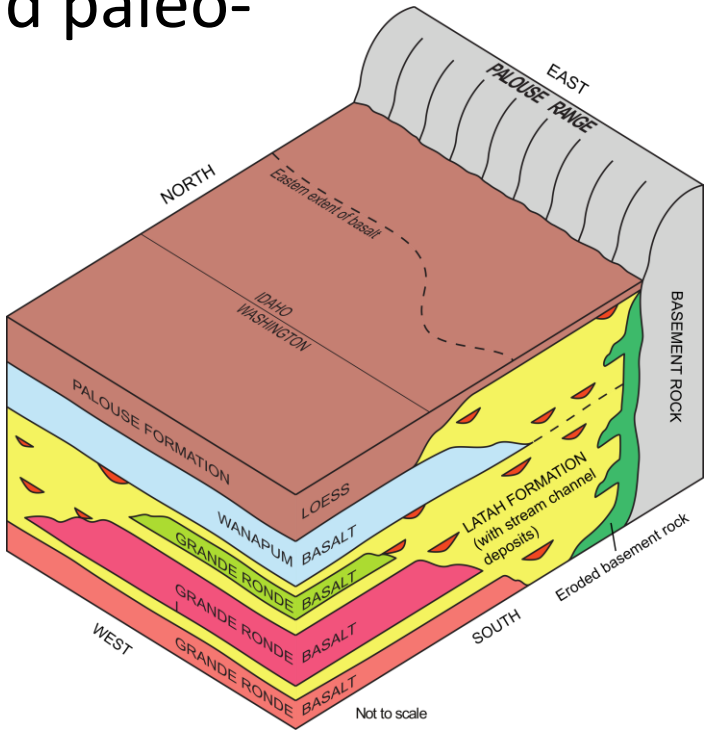
Network segment	Hydraulic conductivity (m/d)	Saturated thickness (m)	Station distance (m)	Hydraulic gradient	Potential recharge (m^3/d)	Adjusted recharge[1] (m^3/d)
A	0.0235	35.7	1,812	0.0303	46	46
B[1]	0.0329	45.8	1,253	0.0305	57	81.5
C[1]	0.0329	39.1	1,500	0.0549	106	
D[1]	0.0423	45.0	1,883	0.0804	288	273
E[1]	0.0423	72.0	1,927	0.0436	258	
F	0.0517	76.8	1,130	0.0627	281	281
					Network sum (m^3/d):	681.5

Fast Pathway

- Comparison to previous study (Behrens et al 2021)
- Fast pathways located along the eastern/central portion of the mountain front interface.
- Fast pathways composed of eroded bedrock (granite) and paleo-channel stream deposits







Next Steps

- Incorporate fast recharge pathways into groundwater model
- Re-evaluate geology to include paleo-channel deposits and decomposed granite.
- Calibrate groundwater model to new recharge estimate (in appropriate area).
- To account for spatially variable recharge, break recharge zones into more segments.

Summary

- Annual recharge across study area is 255,085 cubic meters per year (67.4 MGY).
- Much higher then PBAC groundwater model estimate of 26,250 cubic meters per year (6.9 MGY) over the same area.
- Recharge is spatially variable, more recharge (fast pathway) in eastern portion of network.