



Hood River Watershed Group

*"...to sustain & improve the
Hood River Watershed through
education, cooperation, & stewardship"*

MAY 25, 2021 MEETING MINUTES

Watershed Group Members Present

Chuck Gehling	Cindy Thieman	Alix Danielsen	Heather Hendrixson	Greg Short
Rick Larson	Rick Ragan	Smita Mehta	Megan Saunders	Lauretta Burman
Mary King	Jason Keller	Richard Iverson	Sandi Rousseau	Susan Hess
Sam Doak	Mark Zanmiller	Stuart Blois	Debby Martin	Michael McElwee
John Buckley	Ryan Gerstenberger	Brian Nakamura	Kristin Alligood	Ronald Umsted
Jordyn Miller	Chuti Fiedler	Jurgen Hess	Anders Carlson	Doug Thiesies
Kaley Miller	Nancy Finch	Emily Zaretsky		

** This meeting was conducted virtually via Zoom.

Welcome and Introductions

At 6:02pm, Chuck Gehling welcomed everyone to the May meeting and stated the mission of the Watershed Group. Alix read through the list of attendees and their affiliations and provided some general logistics about the meeting. There were 33 people in attendance. Chuck introduced Jordyn B. Miller, the presenter.

Monthly Informational Presentation

Jordyn B. Miller, a hydrogeologist and PhD candidate at Purdue University, presented on *the Role of Alpine Glacial Melt in Mountain Block Recharge*.

It is widely accepted that nearly all mountain glaciers worldwide are in retreat. The World Glacier Monitoring Service mass balance is based on 41 reference glaciers with a minimum of 30 years record. They have been closely monitored and collectively they all show mass loss, beginning around 1980 and continuing through today.

Melt from alpine glaciers is significant and has an impact on sea levels. Alaskan glaciers alone are responsible for 1/3 of current global sea level rise. Eliot Glacier on Mt. Hood has retreated significantly in the last 100 years.

Glaciers advance when more snow is accumulated than ablated, and retreat when there is a shortage of snowfall. The accumulation zone is upslope, and the ablation zone is downslope, and they are separated by the equilibrium line. As the climate warms, the equilibrium line is moving upslope and causing retreat. As a hydrologist, Jordyn wonders where the melt water is going.

Glacial hydrology is becoming more complex. There is supra-glacial drainage off the surface of the glacier, englacial drainage into crevasses, and subglacial drainage underneath the glaciers. In recent years, researchers have recognized and studied shallow moraine/alluvial aquifers. This water is thought to be relatively rapid flow that travels towards a stream channel.

Snowmelt and glacial melt heavily contribute to streamflow in summer months – currently 50-70% of flow during the critical water use period is provided from glacial melt in the Hood River Watershed (Basin Study).

Important river networks begin forming high on the mountain. Some of these headwaters form from runoff and shallow infiltration of glacier melt and snowmelt. As temperatures warm, this rate of melt will increase and the size of snowpack

and glaciers will decrease. When the glaciers recede completely this natural water “storage system” will be lost. Because this presents a potential sustainability problem, Jordyn is interested in learning more about the groundwater system.

There is a longstanding debate that bedrock is incapable of allowing water to infiltrate due to polishing. But we know that there is water at the base of glaciers and that a fracture network may exist. There is a possibility of deep infiltration of glacial melt - the “Teflon Mountain” may not be impenetrable after all – but it has been widely ignored.

It is finally being accepted that groundwater and surface water systems are not separate entities, and that they influence each other. Jordyn showed two conceptual models that include the possibility of infiltration and circulation of water into the bedrock.

Many headwater streams originate as spring emergences. A spring is a water resource formed when the side of a hill, a valley bottom, or other excavation intersects a flowing body of groundwater at or below the local water table, below which the subsurface material is saturated with water. A spring is the result of an aquifer being filled to the point that the water overflows onto the land surface. They range in size from intermittent seeps which flow only after much rain, to huge pools flowing hundreds of millions of gallons daily.

Conceptual groundwater flow diagrams highlight the varying paths water can take in mountain systems. You can have shallow, intermediate, local, and regional flow paths, and if they infiltrate deep enough, this can influence flow happening far away. This is called “mountain block recharge”.

Mountains act as “water towers” – they hold water and slowly release it downslope over time. Mountains comprise 25% of Earth’s land area but provide water for 50% of the population. As water vapor moves inland and higher, its stable isotopic values become lighter (more negative). This can be used to track where the water is coming from. Stable isotopes have traditionally been used to estimate the fractional contribution of glacial melt in streams draining alpine glaciers – pulling apart a streamflow to show the distribution of summer precipitation, snowmelt, and icemelt.

Jordyn applied this to springs (instead of streams) around Mt. Hood. Various types of recharge were sampled in Mt. Hood National Forest from 2016-2019. Jordyn explained her process for collection, the tools she used (including a 3D printed drill pump), and the modeling that was used (a Bayesian end-member mixing model). The results showed that approximately 30% of the spring samples, or 18 different springs, are glacially influenced. Springs that receive a large portion of their recharge from glacial melt can be far away from glacier ice.

A secondary question asked in the study was how the microbial communities of glacially influencing springs compare to those receiving most recharge from modern day snow and rain. We are learning that glaciated landscapes have far more biodiversity than originally thought (ice worms, snow algae, etc.). The DNA of the spring samples were collected and extracted and separated into two groups (glacier versus snow contribution). Taxa are present in glacially influenced and snow melt stream systems, and some are unique to either.

Jordyn’s Conclusions:

- Pairing traditional end-member isotopic mixing models with microbial community populations is a novel tool for assessing recharge from glacial meltwater.
- Approximately 30% of the spring samples are significantly influenced by glacial melt.
- Microbial communities in glacially influenced springs are taxonomically distinct from springs receiving most recharge from snow/rain.
- The role of alpine glacier meltwater in mountain block recharge and structure of microbial communities is more important than previously thought.

Future work includes a more detailed microbiology study, geochemistry evolution, age-dating and residence time, a timeseries baseflow study.

See Jordyn’s website at <https://glacierrecharge.webflow.io/>. She can be contacted at jorbmillier@purdue.edu.

Questions:

Brian Nakamura asked how different the microbiota is between the Cascades and Glacier National Park. Jordyn showed the data from each region, showing the differences and similarities in the communities. Snow algae is pretty much

everywhere. A follow up paper will look at biogeology. Cindy asked about the difference in snow versus glacial melt proportions between the two locations as well. There was more glacial melt influence on Mt. Hood. In Glacier NP, the mountains are very steep and not very porous which cuts off the flow paths and minimizes glacial infiltration.

Mark Zanmiller asked which springs on Mt. Hood are more glacial influenced. Jordyn noted that all this data is in her paper. She showed a map with the data, showing that on the north side of the mountain there are more glaciers and therefore springs are more glacially influenced.

Stuart Blois asked how far away you can see glacier influence. Jordyn thinks it depends on geography – if there are large valleys in between, they are likely not connected. But generally the connection stays within the mountain scale.

Greg Short asked whether the elevation of the stream correlates with the contribution of glacier versus snowmelt. Jordyn thinks both elevation and aspect (north side of the mountain) are important, as well as gradient (shallow flow paths on steeper slopes).

Cindy asked whether the future work of aging the residence time would happen in the near future. Jordyn said she is working on that now, and she is finding that the warm springs Mt. Hood are quite old, as well as Crystal Spring. She doesn't have exact ages yet, but her thesis will be done by the end of the year.

There was discussion about how long streams and springs will last after glaciers melt, which is a question that Jordyn is particularly focused on.

Dick Iverson asked about how much deep recharge there is – recharge that isn't showing up in the springs but is important for water balance. Jordyn thinks the isotopic data can be used to assess this, particularly if sampling was done in the summer or other parts of the year that could reflect changes. Dick agreed that the seasonal snowpack changes are a really important component.

Jurgen Hess asked about the microbe sampling and what the downstream significance is. Jordyn thinks that microbes can change water chemistry, and changes in microbe communities can therefore have a downstream effect. There was no stream transect sampling so there is no data, but it is definitely possible.

There was a question about the temperature of the warm springs. Jordyn noted that they were about 25 degrees Celsius.

Stuart Blois asked why Alaska glaciers make up so much of the sea rise. Alaska has a lot more ice available to melt, and climate change is having a disproportionate affect on the poles.

Jurgen Hess asked if Jordyn had any sense of how long the springs might last. Jordyn noted that her lab is focused on spring permanence. We don't know about the transition period – when glaciers are gone, will the snowpack fill in the gap?

A link to Jordyn's paper can be found here: <https://iopscience.iop.org/article/10.1088/1748-9326/abf06b>.

** This presentation was recorded and can be found on the Hood River Watershed Group website under the 'Resources' tab.

Review and Approval of Last Meeting Minutes

Chuck asked if there were any corrections to the April minutes. The group approved the minutes.

New Business

Facilitated meetings to discuss 501c3 development

The SWCD approved a facilitator RFP that Cindy and Heather sent to three local facilitators. They have until June 7th to respond.

Schedule biennial self-evaluation for June

This is the annual self-evaluation required by OWEB to determine whether the Watershed Group is meeting organizational goals and objectives. Cindy usually sends out a survey with questions developed by OWEB and the results

are reviewed at the evaluation by about 12 people. That would have been done last December but was delayed due to Covid. Cindy asked the group if they would like to find an outside venue for the evaluation on a weeknight in June. The group was in favor. Cindy, Chuck, and Alix will work on a location (Sawtooth was suggested) and distribute the survey.

Alternative to a July picnic

The increase in instream habitat projects, which begin in July, makes convening the picnic challenging, and perhaps it is time for a new type of annual gathering. Cindy asked the group to start thinking about alternative times and options.

Ryan thought September might be a good month, but October might be risky with weather, etc.

Megan thought a change would be fine as long as there was still a gathering.

Reports

Watershed Coordinator updates – Cindy sent out the draft Action Plan earlier in the day, which was a relief! Cindy reported that preliminary work is beginning for the big restoration projects this summer. There will be some weed work done at Red Hill prior to implementation.

Heather asked how to provide feedback on the Action Plan. Cindy asked for reviewers to use track changes and send back a copy with their initials in the file name. Feedback can also be given verbally or on a paper copy if that is preferable.

Restoration & Outreach Project Manager updates – Alix noted the Master Naturalist field day that recently took place, updated the group on the status of the Neal Creek projects, explained that the MFID temperature monitoring season has begun, and that planning is underway for work that will take place this year for the CIG pollinator pipeline project.

Announcements

John Buckley noted that Farmers Conservation Alliance had a ribbon cutting ceremony for the Eastside Lateral completion. There were about 20-25 people there and it was a great ceremony. John received a plaque for his retirement. The Whiskey Creek sublateral is being surveyed and will be implemented later this year.

Brian Nakamura added that it was a nice ceremony and a good chance to honor John's work. Steve Pappas, the new District Manager, was also introduced at the ceremony.

Megan Saunders noted that Hood River is looking better than the rest of the state but is still listed as moderate drought and early season water use is about double than last year at this time. FID is beginning to put out messaging about water conservation. Kingsley work will begin in the next few weeks.

Ryan Gerstenberger noted that the Sping Chinook runs are looking bad. The whole basin is looking bad but especially the Hood. The tribal fishery has been shut down but not the sport fishery. The hatchery probably won't collect their brood target (i.e., fish collected to provide eggs/milt) this year. The steelhead run is also looking weak. Summer Chinook may be stronger than the spring run.

Cindy noted that next month we will hear from East Cascades Oak Partnership about their strategic action plan.

Summary of Consensus Items and Establishment of Next Meeting

Items that Received First Consensus:

None.

Items that Received Second Consensus:

None.

The next meeting will be on September 28th from 6-8pm. There will be no meeting in July or August.

Adjournment

Chuck thanked the group for attending and adjourned the meeting at 7:57 pm.

Reported by Alix Danielsen.