

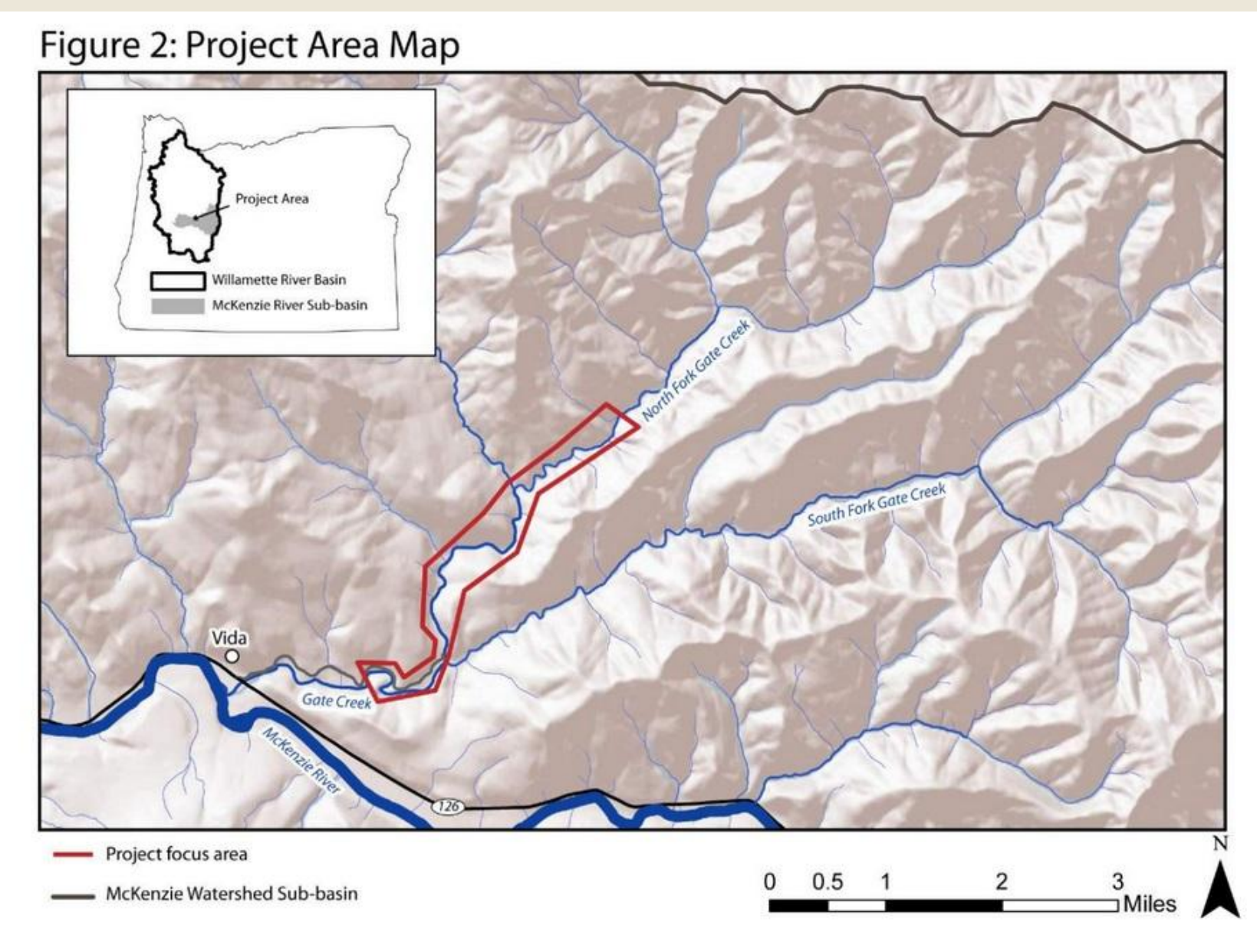
# Habitat Restoration & GIS Analysis of a Salmon Stream: North Fork Gate Creek and Minney Creek, McKenzie Sub-Basin, Lane County, OR



Jadzia Engle, Lauren Barr, Gwynneth Slater, Kiara Teel, Sonora Rueda, Ian Kerr, Zion Tran, Gavin Hubbard, Logan Auxier, Saleena Tumpach, Aquatic Habitat Assessment Water Team, Springfield High School; Jared Weybright, Justin Demeter, Jennifer Weber - McKenzie Watershed Council; Stephanie Lawless - The WELL Project

## Background

- The Endangered Species Act (ESA) is aiding in the preservation of the threatened Chinook Salmon
- Majority of the geomorphic zone is undifferentiated tuffaceous rock, in the upper areas of the North Fork Gate Creek and Minney Creek.
- The loss of large wood from the streams has altered the floodplain, reducing the quality and quantity of the habitats for native fish.
- Lack of alluvial substrate has decreased the spawning ability, negatively affecting the salmon.



## Project Development

- In 2017 the Springfield WELL Project partnered with the Eugene BLM District and the McKenzie Watershed Council, to focus on surveying Gate Creek.
- With the collaboration of all teams, the stream has been surveyed seven times.
- Work sites are on a mix of private and public land.
- The intent of the project is to improve habitat for salmon and other native fish species



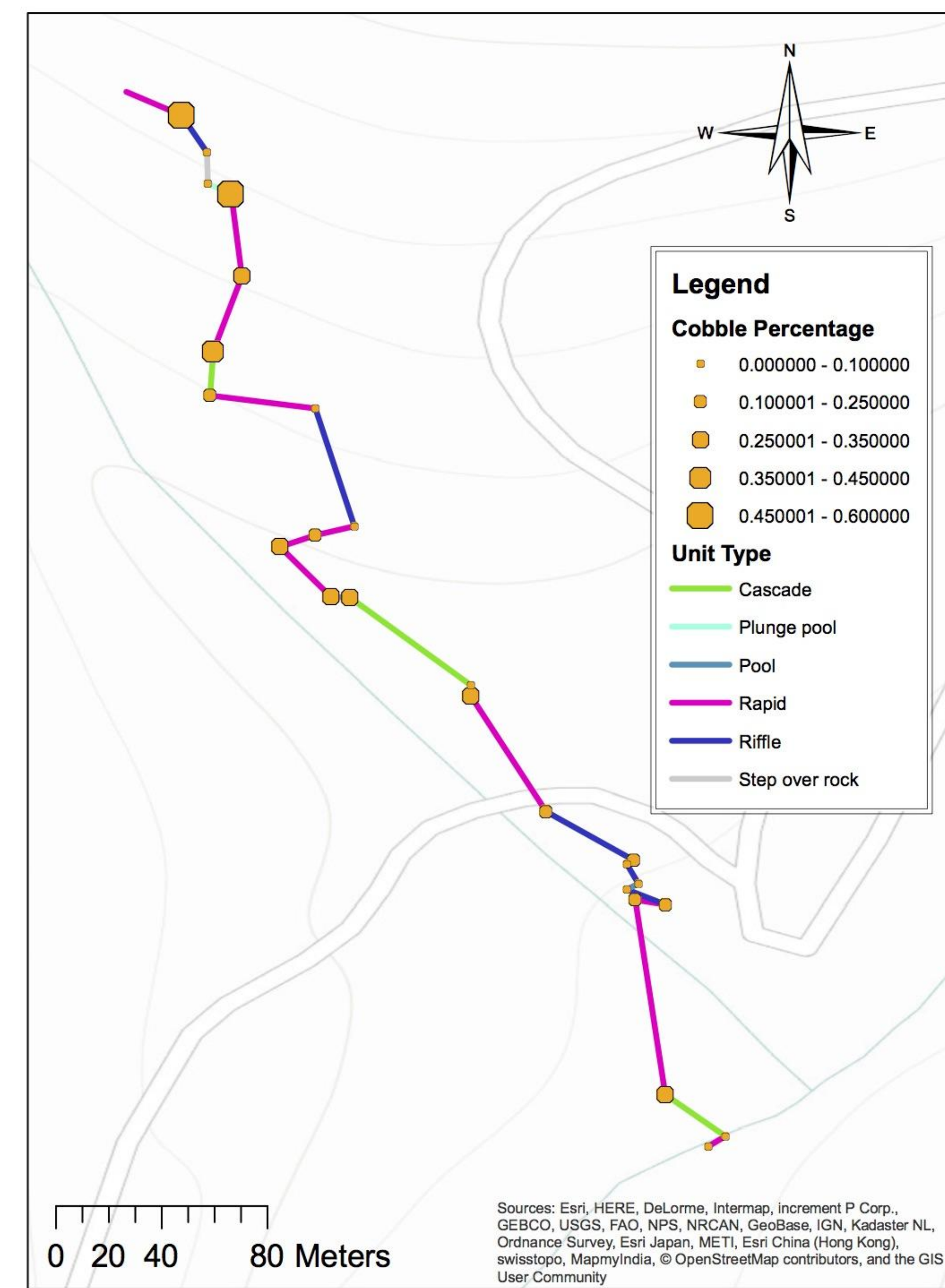
## The Water and Energy Learning Lab (WELL) Project

- In 2017, the Springfield WELL Project began a partnership with the Eugene BLM District and the McKenzie Watershed Council focused on Gate Creek including the mainstem Gate Creek, North Fork Gate Creek and Minney Creek.
- The stream channel was broken into habitat units (pools, riffles) and a series of metrics collected within each unit.
- The ODFW Aquatic Inventory protocol was modified to accommodate a large amount of surveys (up to 14) and attempts to have students take quantitative measurements.
- Student surveys are accomplished by breaking the team of 10-14 students into 3 sub-teams, with each team responsible for a sub-set of metrics.

## In-Stream Habitat Assessment Team Survey Methodology

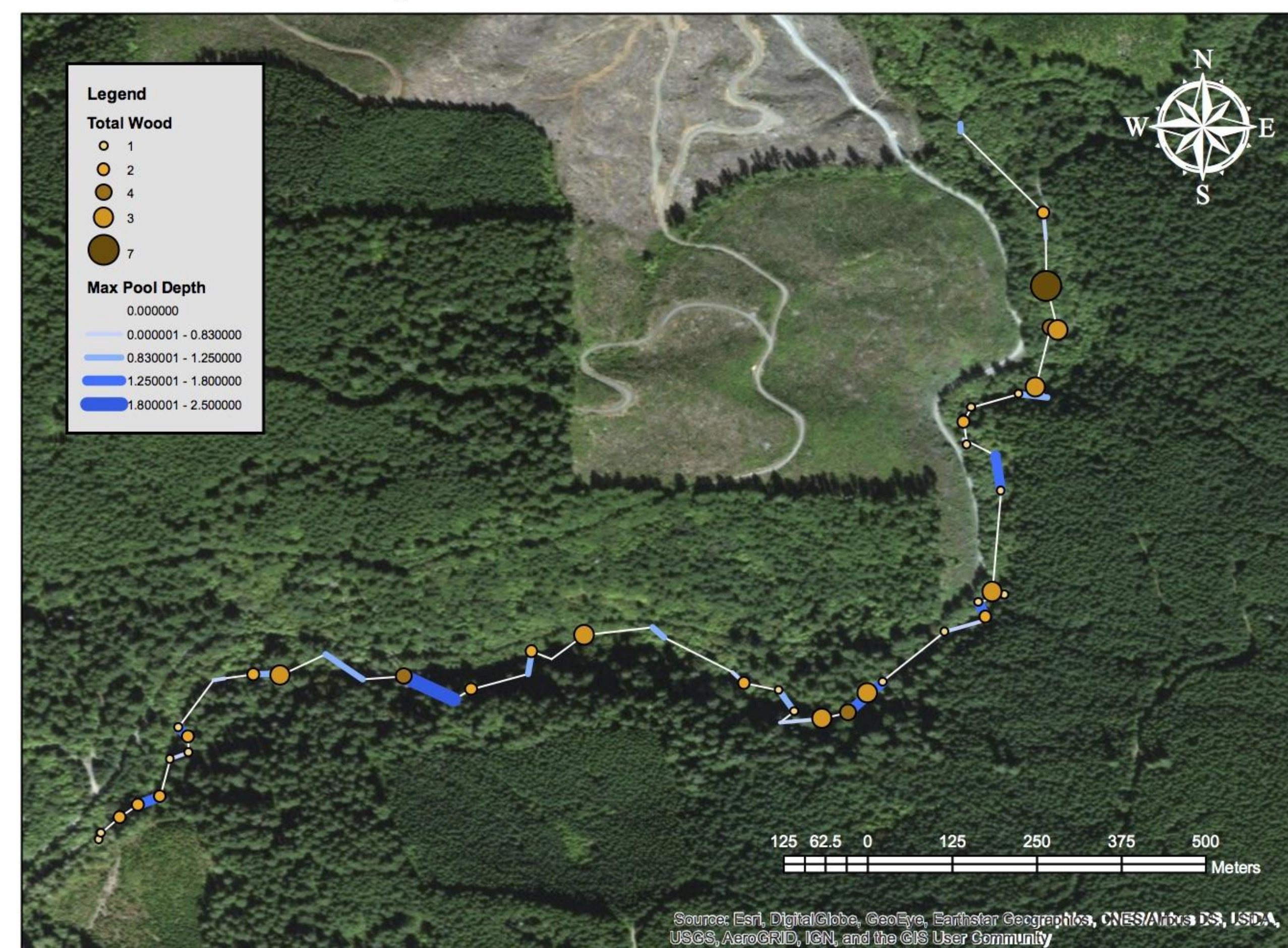
- Two In-Stream Habitat Assessment Teams worked with the McKenzie Watershed Council to survey Gate Creek a total of seven times. Students follow modified protocols adapted from the Oregon Department of Fish and Wildlife Aquatic Inventory Methodology to take quantitative measurements as opposed to qualitative assessments or estimates whenever possible.
- Student surveys are accomplished by breaking the team of 10 to 14 students into 3 sub-teams, with each team responsible for a subset of metrics including:
  - Unit-Type-riffle, pool, glide, etc.; Unit Length, Photo Records,
  - In-Stream Wood Size & Count, Structure of placed wood structures, % Shade, % Bank Active Erosion, Substrate Composition, Slope
  - Average Wetted Width/Depth, Pool Depth/ Tailout Crest, Active Channel Width/Height, FloodPlain Width/Height
- Students worked with the WELL Project instructor, and the McKenzie Watershed Council to assess data and prepare maps utilizing GIS Software.

Minney Creek Cobble Percentage/Unit Type Springfield High School, OR Jadzia Engle, Kiara Teel, Sonora Rueda-Sullivan



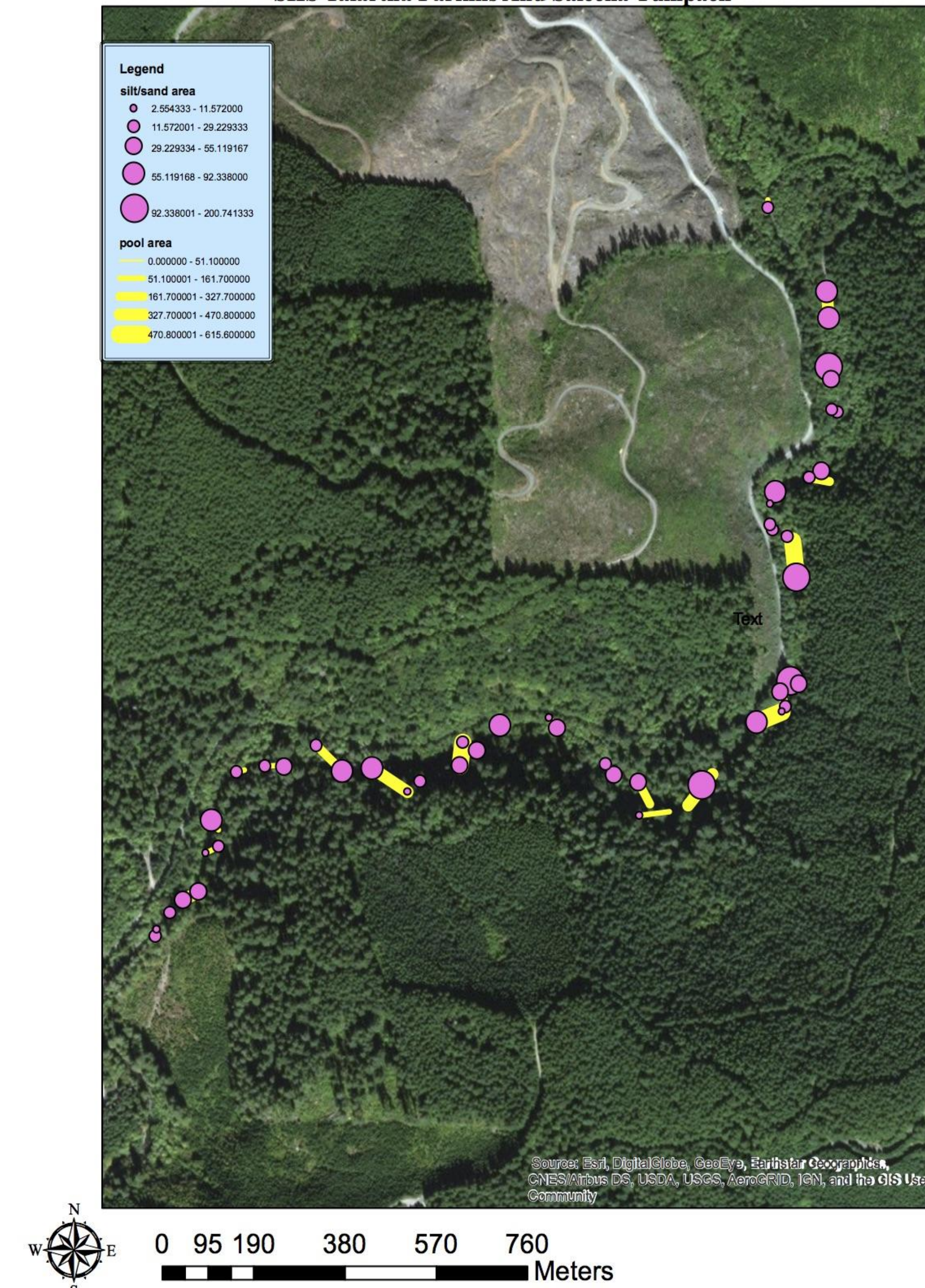
This map shows the correlation between cobble, substrate, and unit type in Minney Creek, a tributary of NF Gate Creek. This map illustrates how the largest percentages of cobble are in areas of faster moving water (rapids, riffles, and cascades).

North Fork Gate Creek Max Pool Depth & Total Wood By Kiara Teel & Sonora Rueda-Sullivan



This map attempts to show a correlation between residual pool depth and the amount of wood found in each stream unit. There is a small correlation between larger amounts of wood and higher residual pool depth in NF Gate Creek.

North Fork Gate Creek Silt/Sand Area and Pool Area SHS Talartha Parkins And Saleena Tumpach



This map illustrates how the larger percentages of silt and sand are found in areas with larger pool areas.

## Results

Metric	Summer 2017	ODFW Standards
Survey Length	1228.3 M	
ACW (meters) average	20.48	
Width to Depth Ratio	.24	desirable
Entrenchment ratio	2.37	desirable
Percent Shade	65%	undesirable (desirable: >70)
Percentage Substrate Silt and Sand	17%	undesirable (desirable: <12)
Percentage Substrate Gravel	24%	undesirable (desirable: >35)
Percentage Substrate Cobble	33%	
Percentage Substrate Boulder	9.3%	
Percentage Substrate Bedrock	16.7%	
Percentage Total Pool Area	53.1%	desirable
Residual Depth of Pools	.56	desirable
Total Wood Count	52	
Total Wood per 100 meters	5.34	undesirable (desirable: >20)



## Conclusion

To address the undesirable metrics that do not meet the ODFW benchmarks we propose to

- Increase large wood placement along the channel
- Instill restoration teams to plant trees near or on the banks of the channel
- Implement gravel augmentation where the cobble percent is abundant

These changes will decrease cobble and silt & sand percent to the desirable range that are currently unsuitable for the aquatic environment. Additionally these improvements will foster a habitat for fish, including their spawning, and will provide a suitable habitat for organisms in the aquatic food chain to thrive.



## Acknowledgments

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- US EPA, and Oregon Watershed Enhancement Board
- Springfield Utility Board & Eugene Water and Electric Board
- Springfield High School and the Springfield Public School District