UPP 2020 Seed Grant Program Grantees

Willamette Water Quality Past and Present

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Portland has invested billions of dollars over the last decade to manage its combined wastewater treatment system. As a result of this success, very minimal combined sewer overflow has occurred to the downtown reaches of the Willamette River in recent years. Levels of *E. coli* have remained well within recreational use standards. This has led to a resurgence in public use of the river. At the same time, stormwater input from the separated system, numerous priority industrial cleanup sites, a major urban tributary, and a lagoon feature representing algal bloom potential may still present some safety risk to swimmers. In this proposal we detail our plan to 1) utilize historical data to document and evaluate changes in the Willamette over the past ten years, 2) in collaboration with local managers as well as local algae experts, initiate a sampling plan that addresses new contamination concerns at six local beaches, and 3) initiate a social survey to understand how beach users determine swimming risk for themselves. Goals of this work are to inform future monitoring and management plans as swimming and restoration efforts continue, and to contribute to the academic discourse on recreational water use standards and large river ecology.

Tree-ring reconstruction of historical groundwater-streamflow dynamics

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The McKenzie River is a key snow-fed source of water for water-use intensive regions of Oregon, particularly during summer months. As such, assessing the long-term variation in snowpack and drought in its headwaters at Clear Lake in the Cascade Range are critically important for regional water resources. The overall goal of this project is to better quantify the residence time of groundwater supplying Clear Lake, and, by extension, the lag-time between climate variability (or landscape/ecosystem change) and ecological and downstream water resources impacts. To accomplish this goal, this project will expand on a novel groundwater-supply reconstruction based on tree rings. We will compare radial growth in trees near lake level at the outlet to that of adjacent more water-limited trees on the slopes above the lake. Groundwater-dependent differences could be quantified from their respective tree ring growth patterns. By quantifying the relationship between the discharge of Clear Lake and climate (and groundwater residence time), climate forecasts could be used to help predict water availability and quality (less water = higher temps) for the McKenzie River. This proposed research project is a new collaboration between Portland State University and the U.S. Geological Survey.