

## **Proposal for Skagit Basin Water Task Force Work Group**

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### **Project Title: Middle Skagit Valley Aquifer Characterization**

#### **Knowledge Gap – Expanded three-dimensional (3D) hydrogeologic framework**

**What:** We propose a three-phase research project designed to characterize the groundwater resources in the Middle Skagit Valley between Concrete and Lyman in Skagit County. The outcome will be a three-dimensional framework of shallow and deep groundwater systems and their potential to mitigate stress on water resources and planning for future mitigation (e.g., groundwater injection and deep groundwater withdrawals).

**Why:** Our ability to manage fresh-water resources and conceive of adaptation strategies as climate changes is limited by a very poor understanding of the hydrogeology of Skagit Valley. Groundwater-surface water connections are poorly understood, as is the potential of deeper aquifers serving as a water resource, and the use of shallow aquifers as reservoirs for water storage and recovery. It is also not clear to what extent alpine hydrogeologic systems recharge lowland glacial outwash and alluvial aquifers. We chose the middle Skagit Valley region because existing geomorphic mapping has revealed significant but complex groundwater resources and the projected development pressure in the valley.

**How:** The research would be completed in three-phases. Phase I would develop a three-dimensional conceptual model of the groundwater resources by using existing well-log data and an emerging large scale geomorphology data set. Phase II would characterize the various sources of groundwater recharge (e.g., using water isotope chemistry) as either fossil water from deep aquifers, modern infiltration, and or alpine; define hydraulic parameters from water well pump-test data; and develop a water-level monitoring network. Phase III would develop a groundwater model from the conceptual model and the Phase II data. Ultimately, the model will simulate groundwater flow and be used to identify areas with surface water connectivity as well as perched or deep aquifers.

**Data Uses and Impacts:** Data and models would be used in several important ways:

- Inform existing surface hydrology models that rely on limited groundwater information;
- Identify potential groundwater resources that are not being utilized;
- Develop adaptation strategies for climate adaptation that could include groundwater injection to suitable aquifers during the rainy season, or deep groundwater withdrawals to sustain river flows during droughts.