

Trends in Groundwater Levels at Ester Dome, Alaska

Youcha, Emily¹, Michael R. Lilly², and Larry D. Hinzman¹, ¹ Water and Environmental Research Center, University of Alaska Fairbanks, ² GW Scientific, Fairbanks, Alaska

Few of the many localized studies of groundwater hydrology around Fairbanks, Alaska, have compared the ground-water flow patterns and the water-level variations. There are several types of ground-water flow systems around Fairbanks that have different responses to hydrologic conditions. There are bedrock upland-dome aquifer systems and surficial alluvial aquifer systems. Characterization of the aquifer systems around Fairbanks is important for predicting flow paths and aquifer responses to climate conditions. Additionally, comparing the different types of aquifers and flow regimes will be useful for future development and planning. Ground-water levels are being collected at Ester Dome, an upland-dome aquifer system. Water levels in Ester Dome wells vary based on precipitation inputs, aquifer characteristics, complex geology, and pumping of the well. We can make several observations with the long-term historical record and the short-term data that have been collected. Wells located at the top of the dome see extreme fluctuations in water levels and show quick response to precipitation events. At the top of the dome, no known confining layers or permafrost exist to block recharge into the aquifer. Additionally, increased fractures in the bedrock allow water to infiltrate easily. Wells located at the base of the dome show less water-level variation over time, particularly from pumping of the well. Permafrost in the alluvial deposits at the base of the dome may act as a confining unit, resulting in little infiltration into the aquifer. Several of these wells show a longer response time to precipitation events. Additionally, water levels in wells located down gradient of mining pits may behave