ABSTRACT

TITLE:	Determining Structures That Control Groundwater Flow in San Juan Mountain Karst Aquifers Using Fluorescent Dye Tracer
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ABSTRACT: Communities of the San Juan Mountains in Southwest Colorado continue to grow. With this growth, demand for water is increasing. Many of these communities are located on top of karst aquifers. Karst aquifers are unique because they can develop caverns and underground streams, which affect the direction of ground water flow. In addition, contaminated surface waters can quickly enter and move through karst aquifers, jeopardizing the quality of drinking water for mountain communities. Therefore, it is important to understand the structural features which dictate the direction of groundwater flow in the area. The study area is located 41 miles north of Durango, CO on Highway 550, south of Andrews Lake. Above Andrews Lake is a stream which disappears underground (insurgent cave stream) into a small cave (swallow hole). Insurgent cave streams present a unique opportunity to research karst groundwater flow. The purpose of my study is to determine the structural controls of groundwater flow by observing springs for changes in water discharge and by injecting 15 grams of sodium fluoroscene, fluorescent dye, into the insurgent cave streams and then analyzing spring water samples for the fluorescent dye with a spectrofluorimeter. The results from the study were then compared to the orientation of regional folds, faults, and bedding planes to determine which structures promote the flow of groundwater in local mountain karst aquifers. The study found that bedding planes were the regional control for the formation of conduits. This was ascertained by observations of a highly karstified spring system wherein water discharge rates varied with the water recharge rates going into the insurgent cave stream. The spring and the insurgent cave steam flows into the same limestone unit in which the spring flows out of. Unfortunately, fluorescent dye was not detected in the spring samples. It is believed that more dye was needed and therefore the result of the dye tracer study was inconclusive. Yet, the qualitative evidence suggests that conduits form within limestone units in the Lower Hermosa Group, which are confined to the bedding plane.