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**INVENTORY OF SPRINGS ON ZUNI TRIBAL LANDS IN WEST-CENTRAL NEW MEXICO: IMPLICATIONS FOR AQUIFER RECHARGE IN THE ZUNI MOUNTAINS AND NORTH PLAINS**

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**ABSTRACT:** An inventory of 29 springs on the Zuni Reservation conducted between 2007 and 2009 focused on four areas: Nutria, Pescado, Dowa Yalanne-Black Rock, and Ojo Caliente (northeast, east-central, central, and southwest regions of the reservation, respectively). Springs discharge from the Permian San Andres-Glorieta (Psg), Triassic Chinle, Triassic-Jurassic Wingate-Zuni, and interconnected Quaternary alluvium/fractured basalt (Qal/Qb) aquifers. Spring assessments included geologic mapping, measurement of discharge and field water quality parameters, spring classification, and geochemical analyses. Relatively high-volume springs (100-300 gpm) discharge from the Psg and Qal/Qb aquifers. Psg springs in the Nutria area, near the recharge source in the Zuni Mountains, exhibit a mixture of modern (<5-10 year old) and pre-1952 recharge, indicating spring discharge from shallow and deep circulation systems near the mountain front. Ojo Caliente Psg springs are fenn-type springs that represent predominantly or entirely pre-1952 recharge. Stable isotope ( $\delta^{18}\text{O}$  and  $\delta^2\text{H}$ ) data are consistent with high elevation, winter precipitation recharge for Nutria area Psg springs and a lower elevation North Plains/Continental Divide recharge source southeast of the reservation for the Ojo Caliente springs. Alluvial springs in the Black Rock area exhibit modern recharge, whereas discharge from Pescado area alluvial springs represents predominantly pre-1952 recharge. These data indicate that Pescado area springs discharge from a deeper (possibly leaky-confined) alluvial/fractured basalt flow system, whereas Black Rock alluvial springs discharge from a shallow, unconfined alluvial flow system. Springs discharging from the Chinle and Zuni/Wingate aquifers exhibit variable recharge, with some receiving rapid recharge from winter precipitation and others showing older recharge from summer monsoons. Spring discharge measurements conducted during this investigation, when compared to earlier studies conducted by Orr (1987) and Summers (1972), suggest a generally declining trend in spring flows between 1972 and 2009. This apparent trend is supported by Zuni research which identified several historically productive, although low-discharge, springs that were dry during 2007-2009 site visits. The increase in groundwater development in the Zuni Mountains over this time period is a potential contributing cause of these declining spring flows.

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