

## Isotopic studies of groundwater in Tucson Basin

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Usefulness of the various isotopic systems

H, O: Indicators of altitude of precipitation, and evaporation. In Tucson, we distinguish precipitation at altitudes greater than 2000 m from precipitation at or near the basin floor (700-800 m). We can also distinguish Colorado River Water supplied by the Central Arizona Project canal.

<sup>3</sup>H: Water containing finite tritium includes bomb-pulse precipitation, and precipitation (average 5TU) since the end of the bomb pulse in 1992. Pre-bomb water, also probably averaging 5 TU, is now below our detection limit of 0.7 to 0.9 TU. Tritium is therefore useful for delineating parts of the aquifer that have been partly or wholly recharged in the last 40 years.

<sup>14</sup>C: Indicates recent recharge (>80 percent modern C, pMC); particularly useful in combination with tritium. Can also indicate parts of the aquifer containing water thousands of years old.

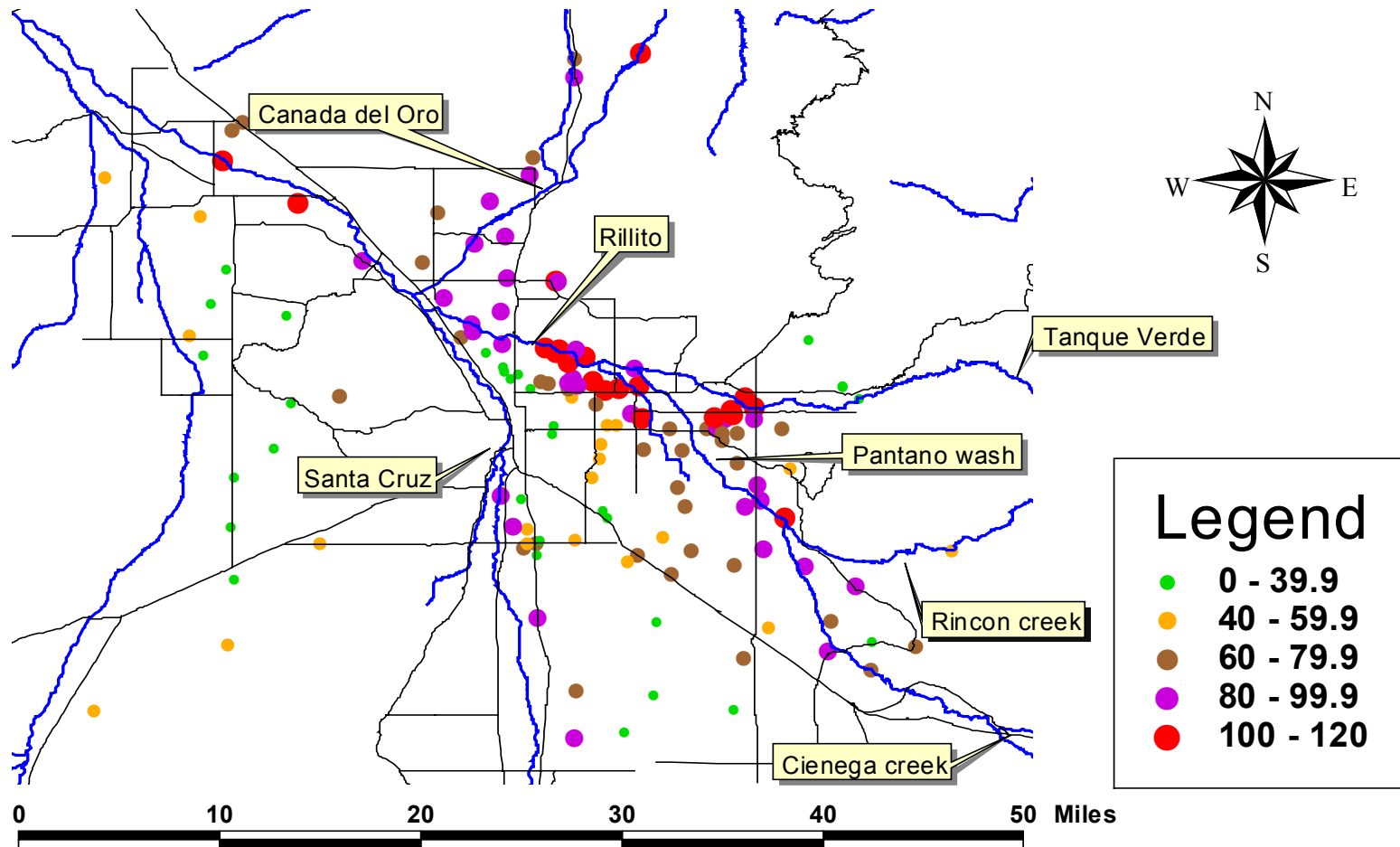
S: Depends on local geology, e.g. lacustrine evaporites in the basin, weathering of sulfide-bearing rock or marine evaporites in the ranges. Useful in combination with O isotopes for determining which surface drainage has contributed water to a given section of the aquifer.

Cl: Small variations; one anomaly may be associated with diffusion at depth in the basin.

TOGETHER the different techniques yield a map of Tucson Basin showing sources of recharge and relative ages of recharge.

Two examples of isotopic maps are given: tritium and <sup>14</sup>C. There is much detail to be discussed in another place; for the present, note the area of recent recharge south of the Rillito and Tanque Verde Creek, in contrast to the lack of lateral recharge adjacent to the Santa Cruz, Cañada del Oro and Pantano washes. On the <sup>14</sup>C map, also note the linear low-pMC feature near the confluence of the Santa Cruz and Rillito washes. This may correspond to mountain-block recharge beneath the basin sediments.

# pMC values in Tucson Basin wells



# Tritium values in Tucson Basin wells (TU)

