# GROUNDWATER CONDITIONS IN RINCON VALLEY

Prepared for

Pima County

by

Pima Association of Governments

August 2004

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# Groundwater Conditions in Rincon Valley

## Purpose and Scope

The purpose of this hydrologic assessment was to assemble and summarize existing information about the subsurface hydrology of Rincon Valley. This work was completed under Element 1101 of the PAG 2003-2004 Overall Work Program, which includes hydrologic data compilations in outlying areas such as Rincon Valley.

This report summarizes existing (as of June 2004) published reports and public datasets pertaining to the subsurface hydrology of Rincon Valley. It includes descriptions of the hydrogeology of the basin, recharge, well installation frequency, changes in groundwater levels though time, shallow groundwater areas, groundwater pumping, and ongoing monitoring. Data sources and limitations are also discussed. This report does not include a description of the water quality in the basin. PAG staff researched the availability of published reports on studies using water chemistry data to identify water origin, such as ongoing research conducted by the Laboratory of Isotope Geochemistry at the University of Arizona, but these reports were not available for this investigation, nor were the data available for preliminary assessment. Kalin (1994) studied geochemistry in the Tucson Basin but did not report any data for the Rincon Valley.

This report is intended to provide a broad understanding of groundwater conditions in Rincon Valley based on existing information. The findings presented within this report could be used as preliminary information for future hydrologic studies.

## Study Area

Rincon Valley is located southwest of the Rincon Mountains and east of the Tucson Basin, within the ADWR Tucson Active Management Area (AMA). The valley is bordered to the north by Tanque Verde Ridge and Mica Mountain, to the east by Rincon Peak, to the south by Pistol Hill and other foothills of the Rincon Mountains, and to the west by Pantano Wash. Rincon Creek is the main drainage feature in Rincon Valley and is a tributary to Pantano Wash.

The study area is defined on Figure 1, and includes portions of Saguaro National Park-East, the City of Tucson, unincorporated Pima County, and the Coronado National Forest.

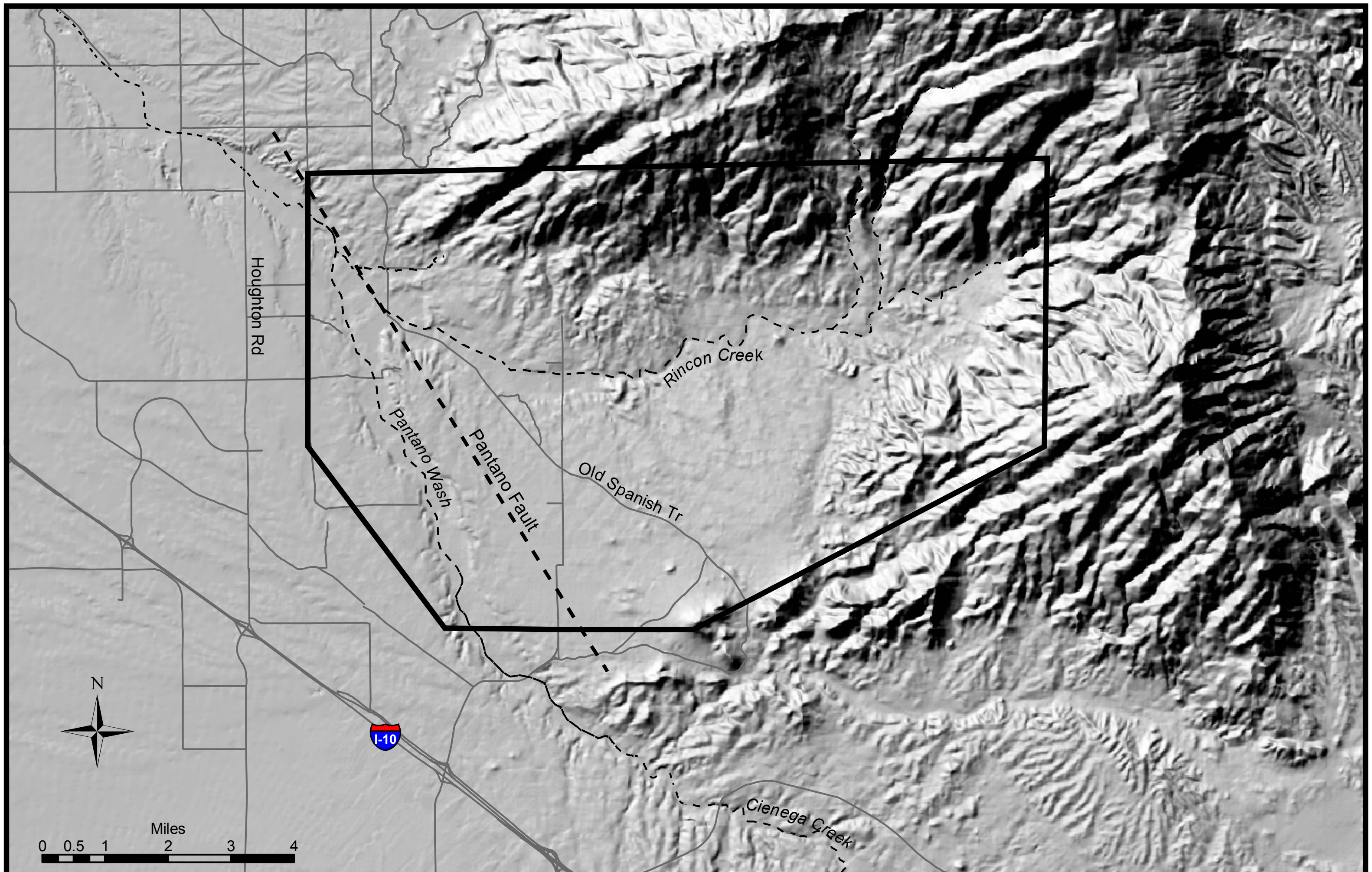


**Figure 1. Rincon Valley Study Area**

Study Area Boundary — Major Street/Highway — Major Watercourse

Note: Backdrop is USGS National Elevation Dataset (NED), shaded relief. Approximate Pantano Fault location based on Davidson (1973).

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## Hydrogeology of the Study Area

The primary geologic units in Rincon Valley include, from youngest to oldest, Holocene surficial alluvium deposits (Younger Alluvium), Pleistocene surficial alluvium deposits (Older Alluvium), Pleistocene Fort Lowell Formation, Miocene/Pliocene Tinaja beds, Oligocene Pantano Formation, Mesozoic undifferentiated sedimentary rocks, and Pre-Cambrian intrusive and metamorphic rocks (Davidson 1973, Halpenny and Halpenny 1985). Davidson (1973) and Anderson (1987) describe in detail the geologic units in the study area. The Haley & Aldrich (2003) report includes a figure showing the surficial geology of Rincon Valley, as mapped by Drewes (1977). The principal water-bearing units are the Fort Lowell Formation, the Tinaja beds, the Older Alluvium, and the Younger Alluvium. The Pantano Formation is probably water-bearing, but is considered to be less important in terms of groundwater availability in Rincon Valley. The Younger and Older Alluvium are important units when considering shallow groundwater conditions.

The degree to which the shallower, younger alluvium units and the deeper, older units are hydrologically connected has not been thoroughly investigated in Rincon Valley. Baird et al. (2001) suggest that there is little to no connection in areas surrounding the high gradient, tributary streams of Rincon Creek and substantial connection surrounding the medium to low gradient reaches.

In a discussion on groundwater elevation contours, Halpenny and Halpenny (1985) reported that groundwater movement in the area is predominantly southwestward from Rincon Creek, across the Pantano Fault, and into the Tucson Basin. Their analysis indicates that almost all streamflow from Rincon Creek sinks into the ground before reaching the confluence with Pantano Wash. That report also suggests that Pantano Wash does not recharge the groundwater supplies of Rincon Creek. Historic and recent groundwater elevation measurements compiled by PAG confirm that groundwater movement in Rincon Valley is westward to southwestward.

Several studies have reported that the Pantano Fault (also known as the Vail Fault) running parallel and just east of Pantano Wash serves as a line of hydrogeologic separation between the Tucson Basin and Rincon Valley (Halpenny and Halpenny, 1985; Briggs et al., 1997; Baird et al., 2001; Briggs et al., 2002). However, due to the lack of documentation of evidence within these reports, the degree of separation is unclear. Although high hydraulic head gradients are associated with this fault in areas north of Rincon Valley, as described in detail by Johnson (1994), water level data that were available for this study did not show the same conditions (see the Changes in Groundwater Levels section). The data might be too limited to accurately delineate the spatial extent and hydraulic gradient of this hydrologic anomaly, if it exists in the study area. It is possible that hydrologic conditions in Rincon Valley and the adjacent portion of the Tucson Basin have not yet reached the state where water levels show influence by the fault. More data are needed to positively state that the Rincon Valley is indeed hydrogeologically separate from the Tucson Basin. A study by Johnson (1994) focused on an area near Tanque Verde Creek and determined that the aquifers on either side of the Pantano Fault in that area were not hydrologically contiguous, based on differences in aquifer transmissivities. This type of investigation for the Rincon Valley section of the fault might provide useful information on the influence the fault might have on groundwater conditions in Rincon Valley.

## Recharge

Natural recharge in Rincon Valley has two primary components: stream channel recharge and mountain-front recharge. Mountain-front recharge is from infiltration along small stream channels at the bedrock-alluvium interface and from subsurface seepage from consolidated bedrock (Osterkamp, 1973). Stream channel recharge is the amount of water that infiltrates larger stream channels and eventually reaches the aquifer. The infiltrated water is depleted during percolation through the unsaturated zone; therefore the average annual recharge to the aquifer is less than the average annual infiltration along a stream (Burkham, 1970). Much of the water that does not reach the aquifer is consumed by evapotranspiration (ET).

No site specific estimates for recharge rates in the study area were available for this investigation. Several published reports include values for natural recharge in Rincon Valley; however no single investigation that simultaneously addressed stream channel recharge and mountain-front recharge has been conducted. Early estimates of recharge rates in Rincon Valley were based on regional studies conducted by the U.S. Geological Survey (USGS) in the early-1970's. The published reports available for this study cite Osterkamp's (1973) estimate of total recharge, which was determined by adding together the rates reported in a study on streamflow losses due to channel infiltration (Burkham, 1970) and a study that created an electric-analog groundwater flow model of the Tucson Basin (Anderson, 1972). Osterkamp (1973) reported that the average annual recharge rate in Rincon Valley, near Pantano Wash, was estimated to be 4540 acre-feet per year (AF/yr).

None of the published reports available for this study included a reexamination of the Osterkamp (1973) recharge estimate for Rincon Valley. A reexamination would be warranted because Osterkamp's (1973) recharge estimate included Burkham's (1970) estimate for infiltration, which represents the upper limit for recharge that would only occur if all infiltrated water reaches the aquifer. PAG recommends that a comprehensive, site specific study using current data be conducted to estimate natural recharge in Rincon Valley. A single study addressing both recharge components simultaneously is usually preferable to separate studies of each component in order to avoid the possibility that a particular volume of water is considered mountain-front recharge in one study and stream channel recharge in another, thus resulting in a “double-count” of the water when a total is calculated.

## Well Inventory

Groundwater data for this investigation were compiled from the Arizona Department of Water Resources (ADWR) Wells55 Registry (Well Registry CD-ROM) and the ADWR Groundwater Site Inventory (GWSI) database. Annual groundwater pumping data from 1984 to 2002 were included on the ADWR Well Registry CD-ROM and were used to evaluate pumping trends for this study. ADWR provided PAG with recent updates of the Wells55 Registry and the GWSI database in June 2003 and November 2003, respectively. PAG staff then manipulated these data for subsequent calculations.

The data sources used for this hydrologic assessment have limitations that could lead to inaccurate or incomplete conclusions. The Wells55 Registry relies exclusively on information provided by the well owner and/or the well driller. However, the information is not verified by ADWR. Information might be incomplete because well registration, while required, is voluntary (ADWR, 2003). Therefore, ADWR does not guarantee the accuracy of the information contained within the Well Registry. Well locations in the Wells55 Registry are reported by township, range, and quarter-quarter-quarter section, therefore, at best, the locations of wells are accurate to within 10 acres. The GWSI database is considered to be more accurate than the Wells55 Registry because the GWSI wells have been field verified. PAG staff did not field verify the well data used in this study.

Well locations are shown on Figure 2. To determine the number of wells located within the study area, the ADWR Wells55 Registry and the GWSI database were combined and duplicate well records were removed. A total of 370 wells were located within the study area, including 41 wells that were included in the GWSI but not the Wells55 Registry. It is possible that some or all of the 41 wells are indeed registered but the registration numbers are not included in the GWSI database. It is also likely that additional unregistered and unknown wells are located within the study. A detailed well inventory was outside of the scope of this study, so PAG did not attempt to identify the number and location of wells which were not included in either of the databases.

Figure 3 shows the distribution of well types and Figure 4 shows the distribution of well water uses. Exempt wells (including exempt domestic stock) were the dominant well type in the area with 290. "Domestic" was the most prevalent water use with 296. Appendix A includes definitions for well types.

Figure 5 shows the well installation frequency in Rincon Valley. Groundwater development in the Rincon Valley area was historically associated with cattle ranching until the 1960s, when new residents began installing more groundwater wells for domestic purposes (Baird et al., 2001). Residential development continues today. Wells were first installed around the upper reaches of Rincon Creek in the early 1900s. Throughout the 1970s and 1980s, wells were installed at an average frequency of five wells per year. Between 1990 and 2000, well installations averaged 10.6 wells per year. Using the Wells55 Registry, PAG staff calculated the average well installation frequency by dividing the total number of wells installed in a given time period by the number of years in the same given time period. Currently, many domestic wells are spatially clustered in mostly medium-density residential areas, according to a brief assessment of aerial photography.

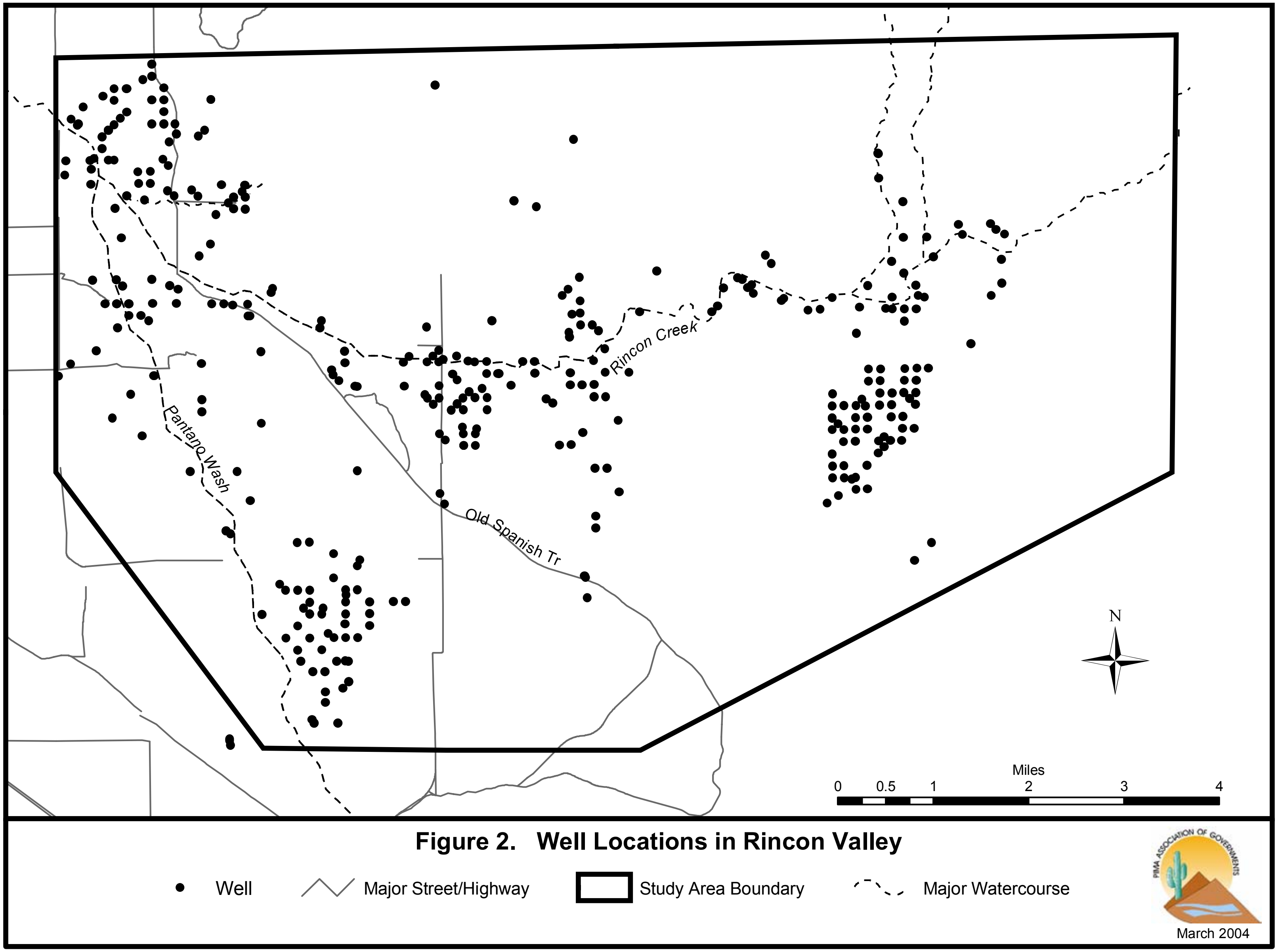


**Figure 2. Well Locations in Rincon Valley**

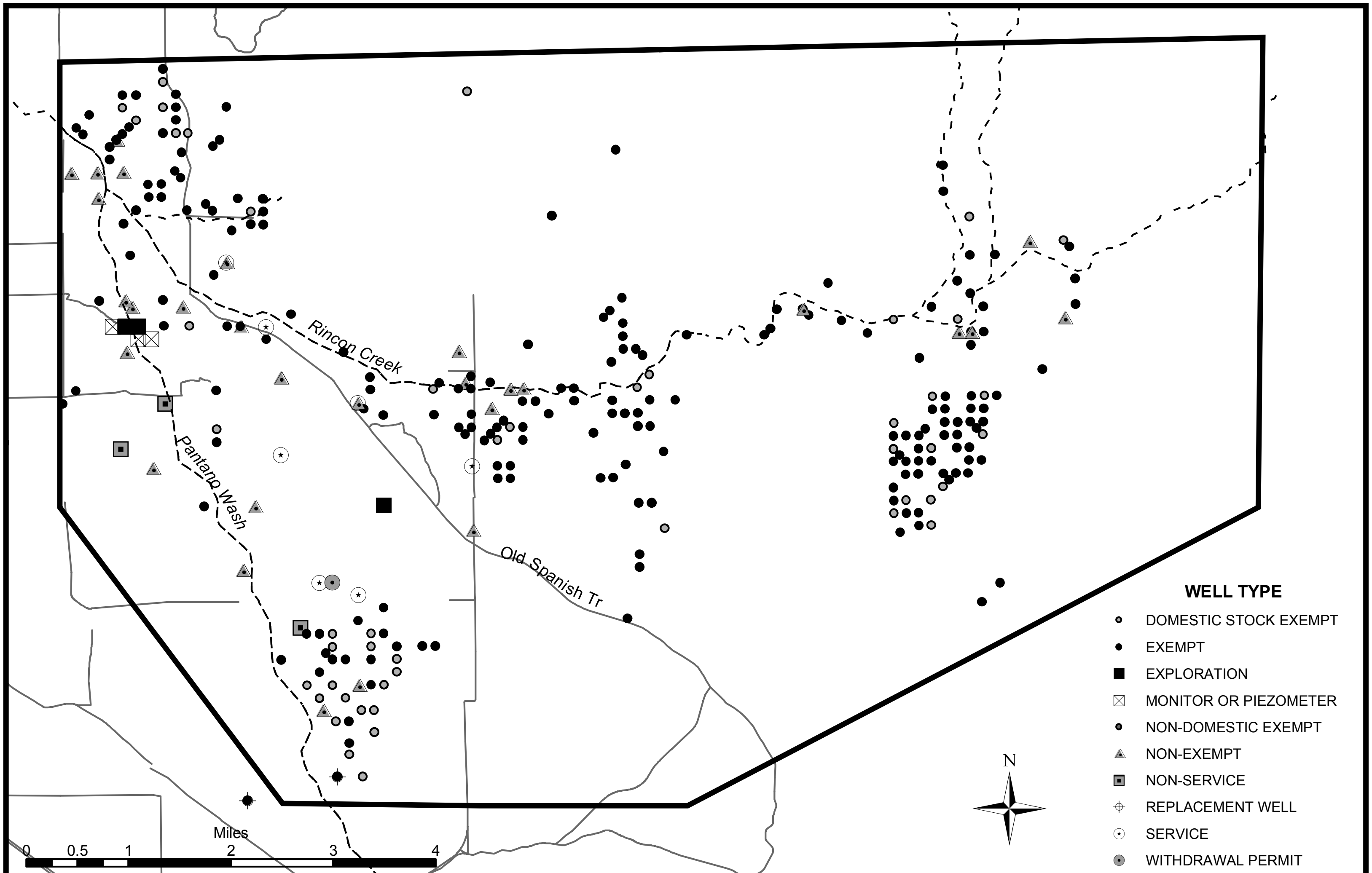


**Figure 3. Well Types in Rincon Valley**

Note: Well types based on ADWR Wells55 Registry.

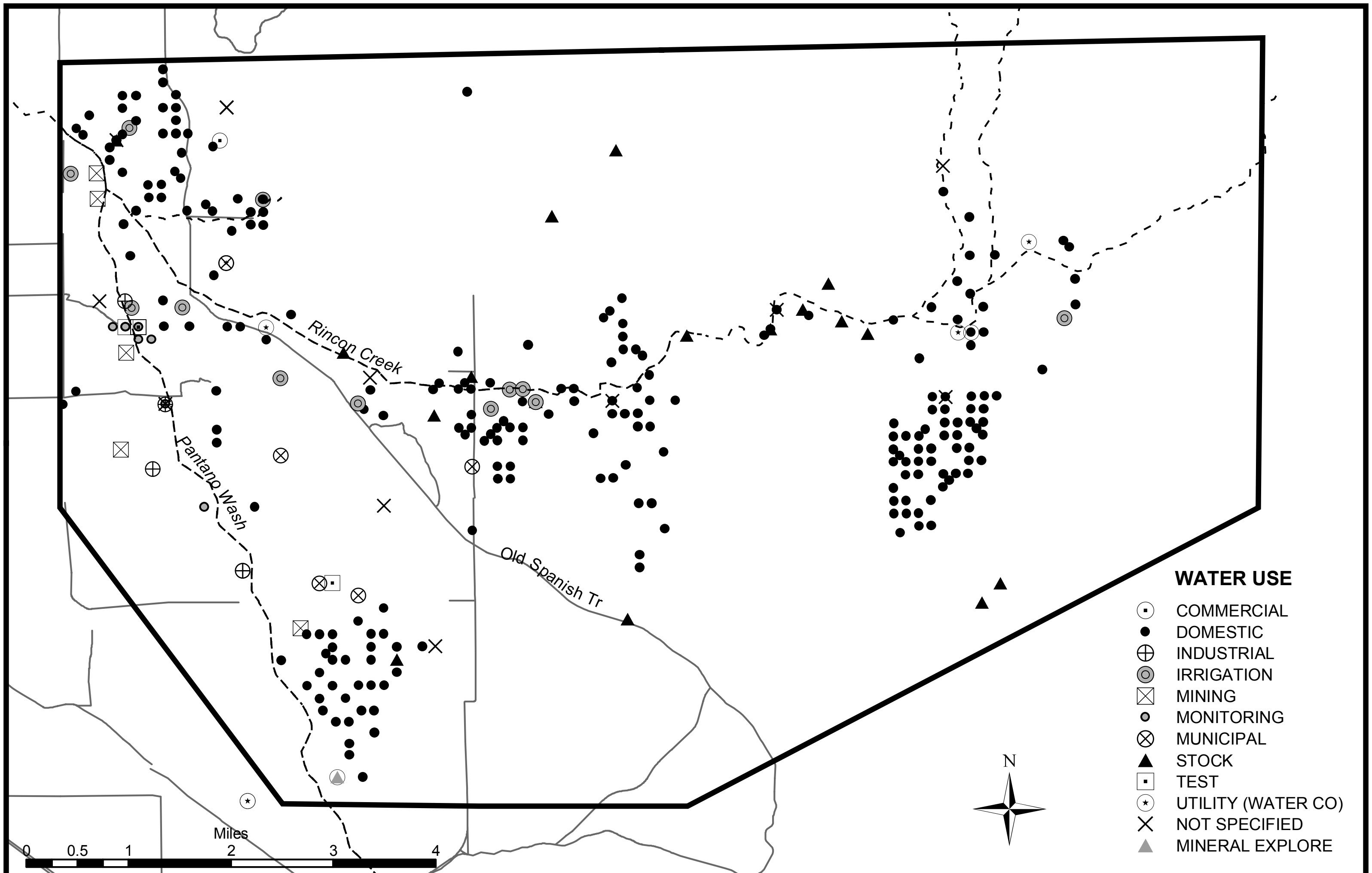


**Figure 4. Well Water Uses in Rincon Valley**

Major Street/Highway Study Area Boundary Major Watercourse

Note: Water uses based on ADWR Wells55 Registry.

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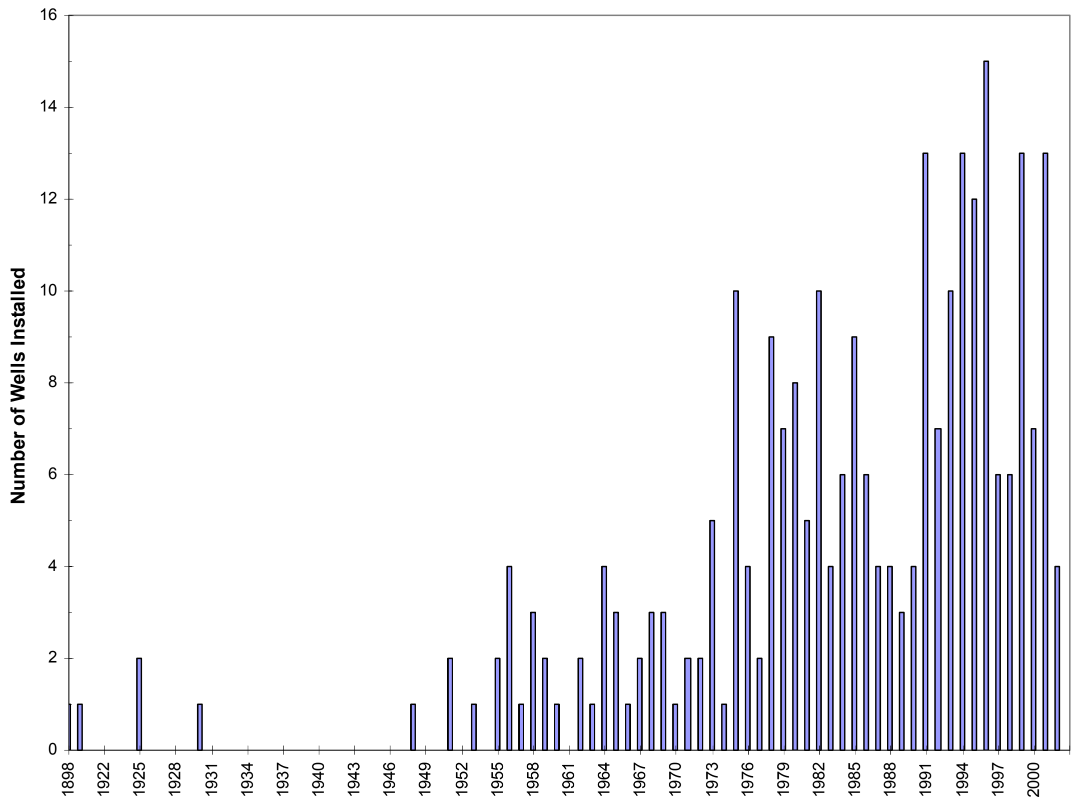
**Figure 5. Well Installation Frequency in Rincon Valley**



## Changes in Groundwater Levels

The following summary provides a broad assessment of changes in groundwater levels in Rincon Valley through time. It serves as a starting point for further investigations into both shallow and deep water-bearing units. It does not attempt to indicate how changes in water levels in one hydrogeologic unit affect the water levels in another unit. In general, water level declines could be attributed to an increase in groundwater pumping, an increase in ET, and/or a decrease in recharge. Conversely, water level rises could be attributed to a decrease in groundwater pumping, a decrease in ET, and/or an increase in recharge. Due to the limits of the scope of this study and limited data, this report does not include a discussion on the actual causes for the changes in water levels described in this section.

*1950s to mid-1990s*

Historic water level data indicate that Rincon Valley experienced a rise in groundwater levels between the 1950's and the 1990's. Halpenny and Halpenny (1985) found that water levels in wells located in the western part of the study area in 1980 were, on average, five feet higher than when first measured in the 1940s, 1950s, and 1960s. The same study reported that between 1969 and 1985, groundwater elevations rose in all of the measured wells. PAG staff created individual well hydrographs using GWSI data from across the study area. These hydrographs indicate a rise of approximately 25 feet in groundwater levels in both the younger, shallow alluvial units and in the older, deeper alluvial units between the early 1980s and 1995. In addition, Briggs et al. (1997) did not detect any significant change in groundwater elevations between 1994 and 1997 in the wells they were monitoring for a riparian assessment.

*Mid-1990s to Present*

Figure 6 shows depths to groundwater in wells measured between 1990 and 2003, based on data from both the ADWR Wells55 Registry and GWSI databases. Hydrographs for specific wells within the study area are also included in Figure 6. GWSI and Wells55 data collected since 1995 indicate a declining water table. Using GWSI groundwater level data, PAG staff calculated that between 1995 and 2000 groundwater elevations fell an average of almost 4 feet per year in the 10 wells that were measured by ADWR. Both the 1995 and the 2000 measurements were taken in the winter season.

Since 1980, much of the riparian vegetation in the middle and lower reaches of Rincon Creek has evidenced water stress or a shift to less water-demanding plants, indicating a declining alluvial water table (Baird et al., 2001). In addition, Haley & Aldrich (2003) monitored ten shallow wells near the bed of Rincon Creek, and observed a gradual decline in groundwater elevations in most of the wells between Fall 2002 and Fall 2003. Rapid increases in groundwater elevations were observed in Spring 2003, in response to seasonal streamflow in Rincon Creek. However, groundwater table elevations declined to their pre-streamflow levels by Fall 2003.

Two wells have been deepened in the study area, according to the ADWR Tucson AMA office (ADWR, personal comm.). They were both located in the cluster of wells in the southeastern portion of the study area (see Figure 6). One well (55-532143) was deepened from 500 feet to 700 feet in 1993, and the other (55-520304) was deepened from 154 feet to 600 feet in 2003.

After reviewing the available data, PAG staff chose not to create contour maps for groundwater elevations or depths to water because the data represented different time periods and possibly different hydrogeologic units. A more comprehensive array of wells with water levels measured during the same time period would be necessary for reliable and accurate contour analysis. However, the limited data that were available for this study did indicate that groundwater flows to the west-southwest into the Tucson Basin, and that groundwater levels are relatively shallow near the creek and deeper away from the creek, especially in the southern portions of the study area.

## Shallow Groundwater Areas

For the purposes of this study and previous PAG studies, shallow groundwater areas were defined as areas where water levels are less than or equal to 50 feet below ground surface. This criterion was determined during the PAG (2000) investigation and coincides with the depth of water where deep-rooted riparian trees (i.e., mesquite) often show evidence of stress. Shallow groundwater areas were also delineated based on the extent of riparian trees that were seen on aerial photographs. PAG (2000) delineated three shallow groundwater areas in the Rincon Valley study area. While limited water level data confirmed the designations, thick riparian vegetation seen on aerial photographs taken in the mid-1990's was the primary indicator of the shallow groundwater areas in Rincon Valley (PAG, 2000). PAG staff extended the polygon associated with Rincon Creek in an easterly direction to include two shallow groundwater wells that were reported in the Haley & Aldrich (2003) assessment of shallow groundwater areas along Rincon Creek. No recent data were found that would warrant changes to the other two shallow groundwater areas (Pantano Wash and Box Canyon). Figure 7 shows the shallow groundwater areas in the study area and recent groundwater levels. Water levels deeper than 50 feet are shown to be located within the Rincon Creek shallow groundwater area. This occurrence might be explained by well locations being plotted incorrectly or by riparian vegetation utilizing a perched aquifer. This study did not investigate the presence of perched aquifers or field verify the well locations.

Recent DTW measurements indicate that most shallow groundwater areas occur near the main stem of Rincon Creek, although several wells farther away from the creek to the south also exhibited shallow groundwater levels. Deeper water levels (200-550 feet) were observed in the southwest and southeast portions of the study area.

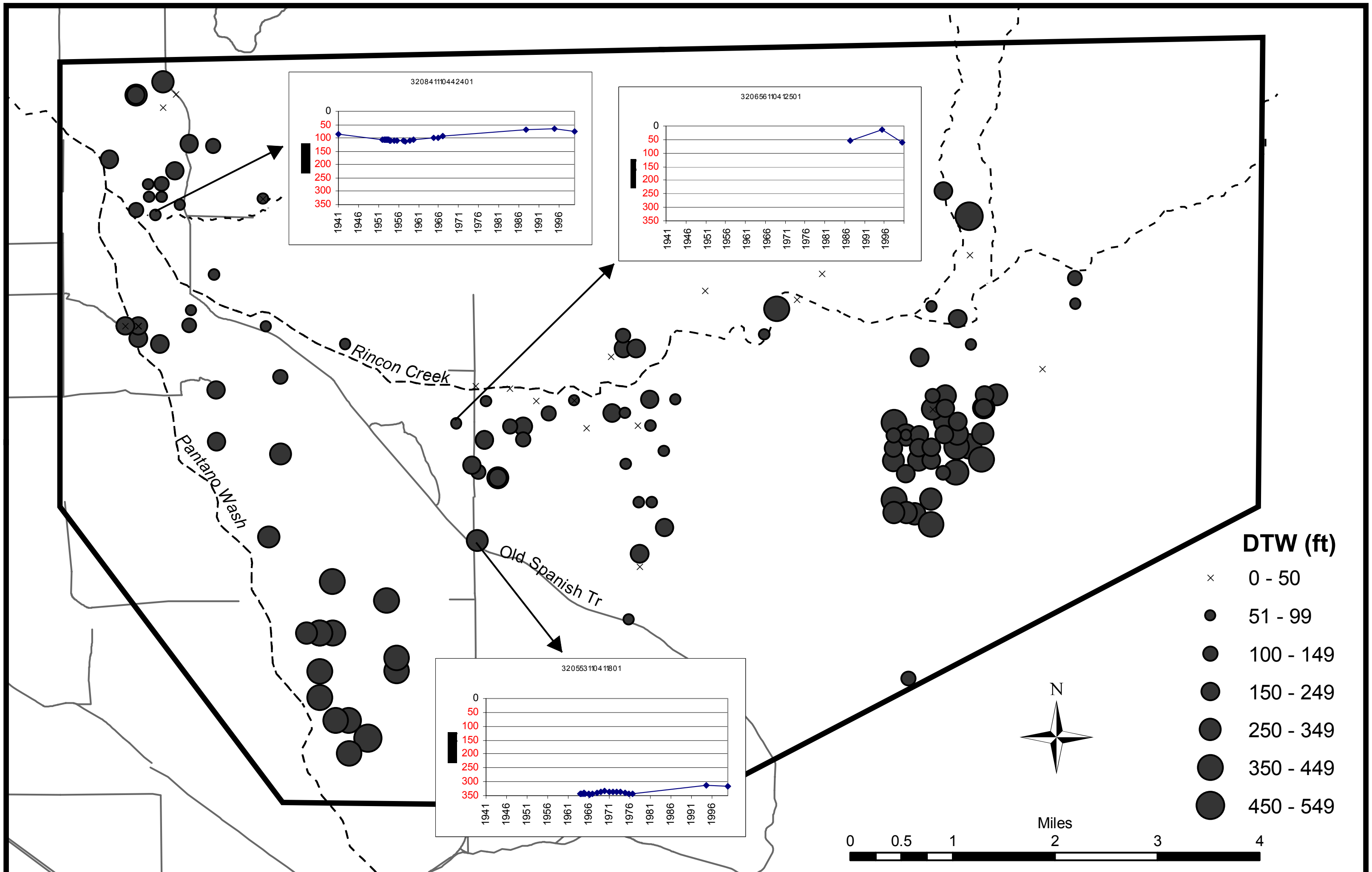



**Figure 6. Recent Depths to Water in Rincon Valley**

Major Street/Highway — Study Area Boundary — Major Watercourse

Date Sources: ADWR Wells55 Registry and GWSI databases. DTW measurements collected after 1990. Hydrographs based on GWSI data.

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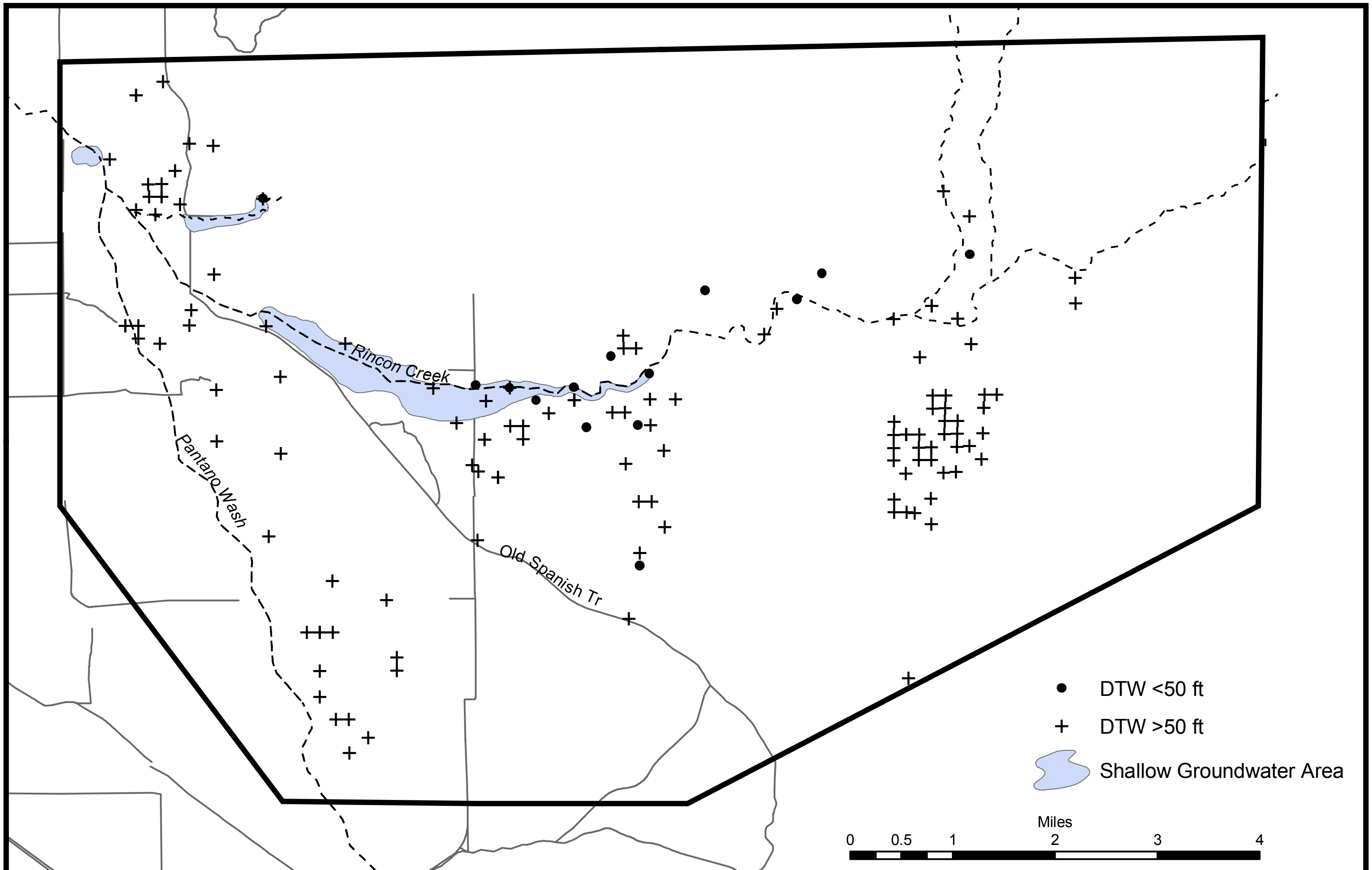


**Figure 7. Shallow Groundwater Areas in Rincon Valley**

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Major Street/Highway | Study Area Boundary | Major Watercourse

Date Sources: ADWR Wells55 Registry, GWSI database, and Haley & Aldrich (2003). DTW measurements collected after 1990.

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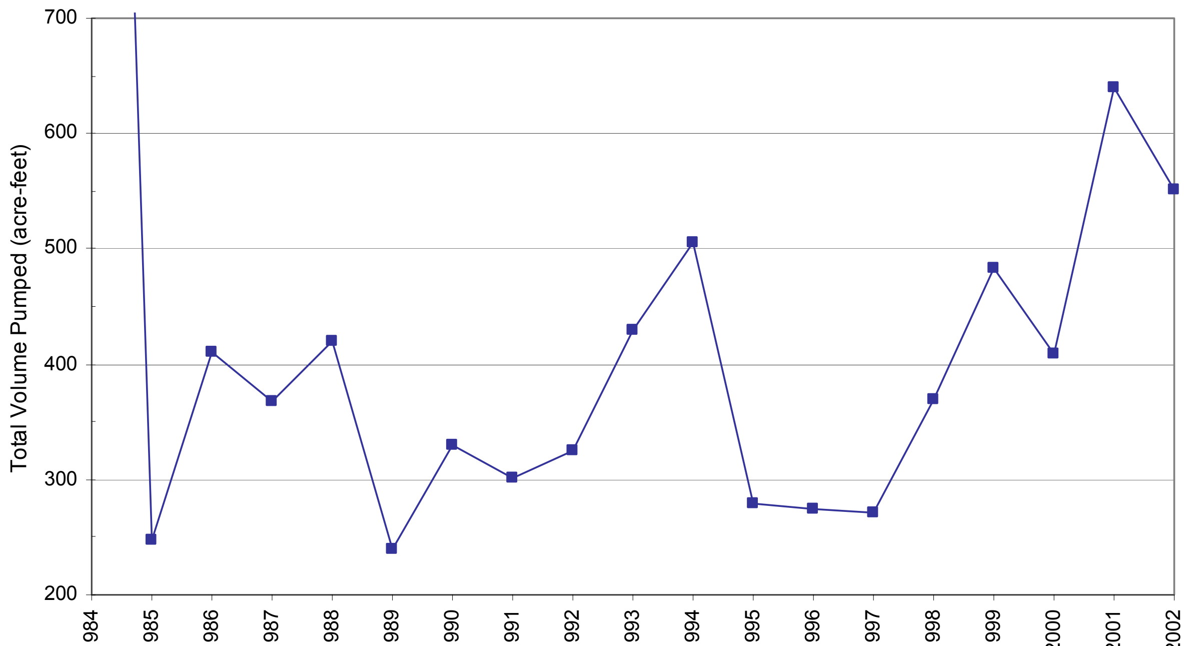
## Groundwater Pumping

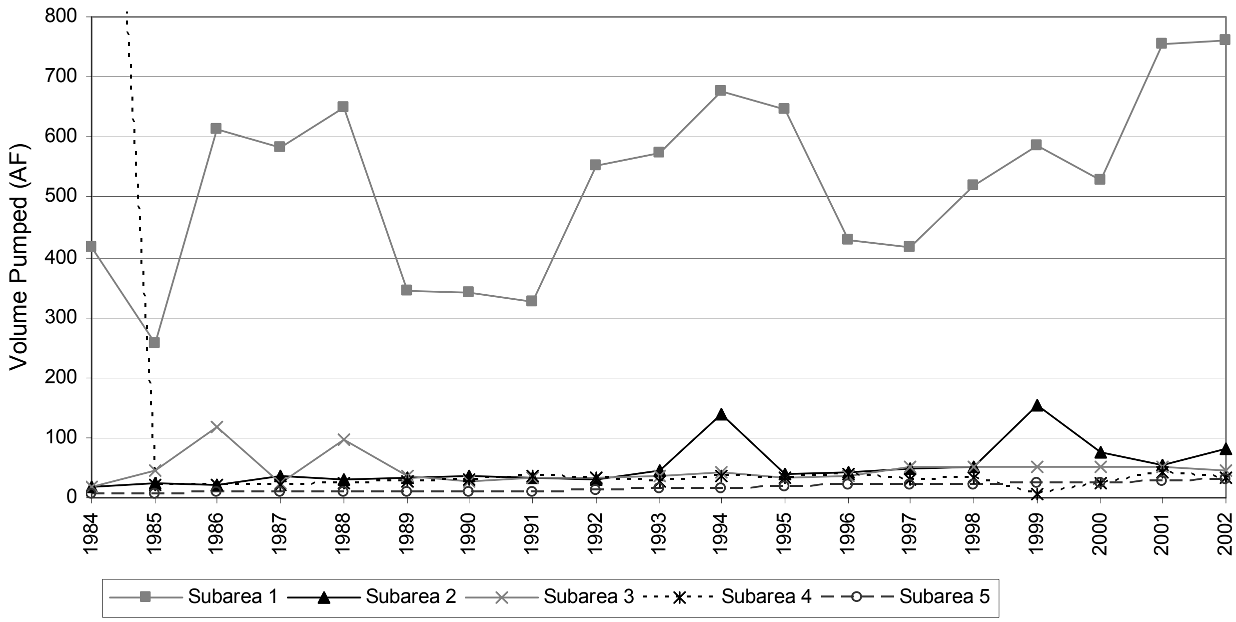
Besides groundwater flow into the Tucson Basin, groundwater pumping is the primary component of groundwater discharge from the study area (Baird et al., 2001). Wells designated with the well types 'non-exempt' or 'service' are required to report their annual pumping data to ADWR, while other types (i.e., 'exempt') are not. Reported pumping data were included in the ADWR Well Registry CD-ROM. Twenty-seven wells had pumping data for at least one year between 1984 and 2002. The total reported volume of groundwater pumped from the study area was skewed due to abnormally high values reported for two water company utility wells in 1984. Neither 1984 value was consistent with later values, and no data were available to explain these 1984 values. Reported annual non-exempt groundwater pumping in the study area in 1984 was 1,861 acre-feet (AF) if these values were included and 148 AF if the values were not included. Total annual non-exempt pumping reported in 2002 (the most recent data available) was 551 AF, as shown on Figure 8. Note that the values shown on Figure 8 do not include exempt pumping estimates.

**Figure 8. Reported Annual Groundwater Pumping in Rincon Valley**
**(not including pumping from exempt wells)**




Clusters of wells were grouped into subareas (shown on Figure 10) to gain an understanding of pumping trends in specific areas within the valley. Figure 9 shows pumping hydrographs for these subareas. Exempt wells were assumed to pump 0.5 AF of groundwater each year. Ten of the 33 non-exempt wells located within a subarea did not report annual pumping volumes to ADWR and, therefore, were assumed to be inactive. Annual pumping is substantially greater in Subarea 1, which is located near the confluence of Rincon Creek and Pantano Wash, than in all other subareas. More water company utility wells and large industrial wells are located in Subarea 1 than in other subareas. The assumptions that were made for pumping rates and temporal distribution of pumping are described below. Figure 10 displays the locations of registered pumping wells within Rincon Valley.

**Figure 9. Subarea Groundwater Pumping in Rincon Valley, 1984-2002**



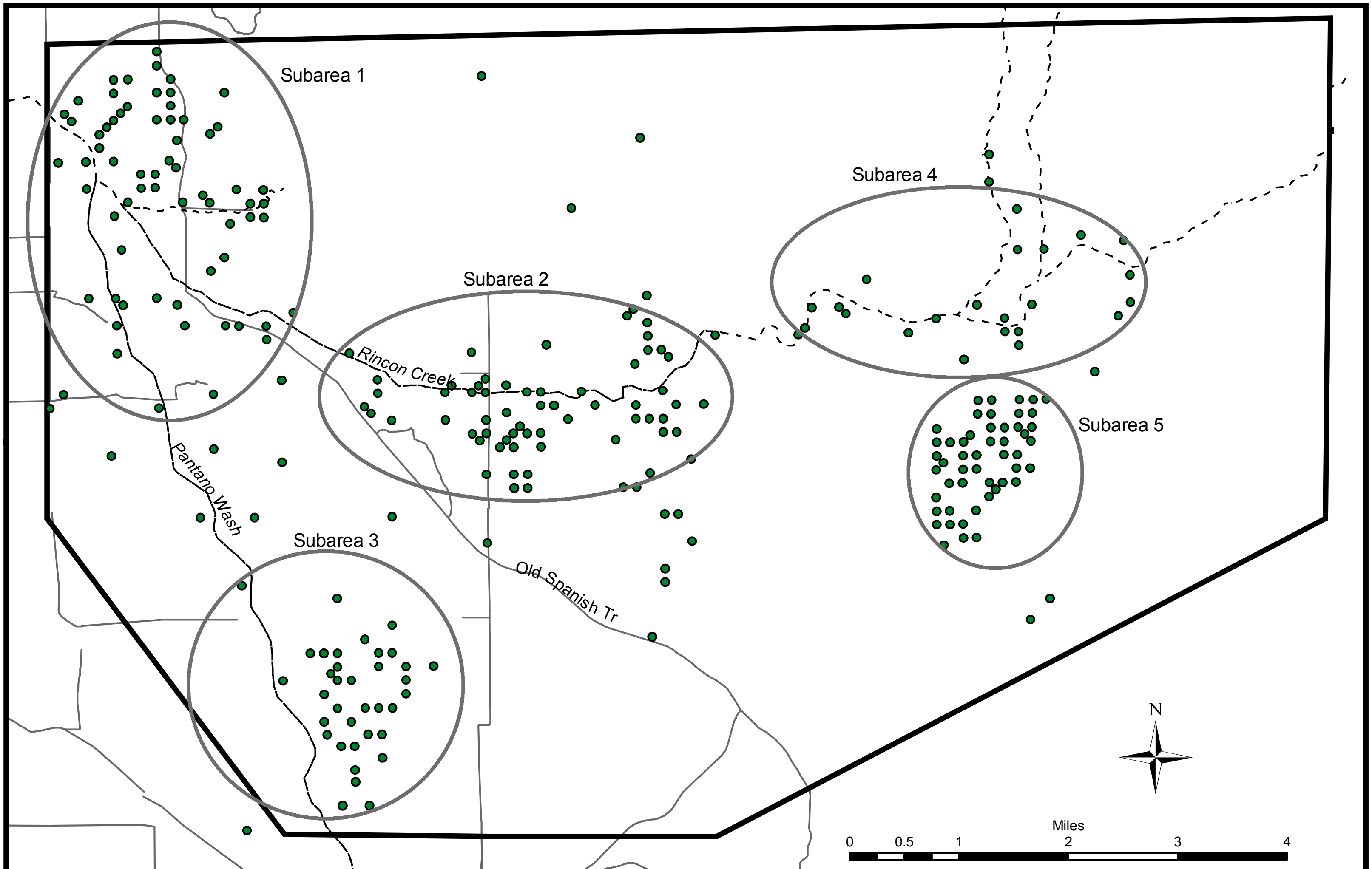



**Figure 10. Groundwater Pumping Wells in Rincon Valley**

Registered Well | Major Street/Highway | Study Area Boundary | Major Watercourse

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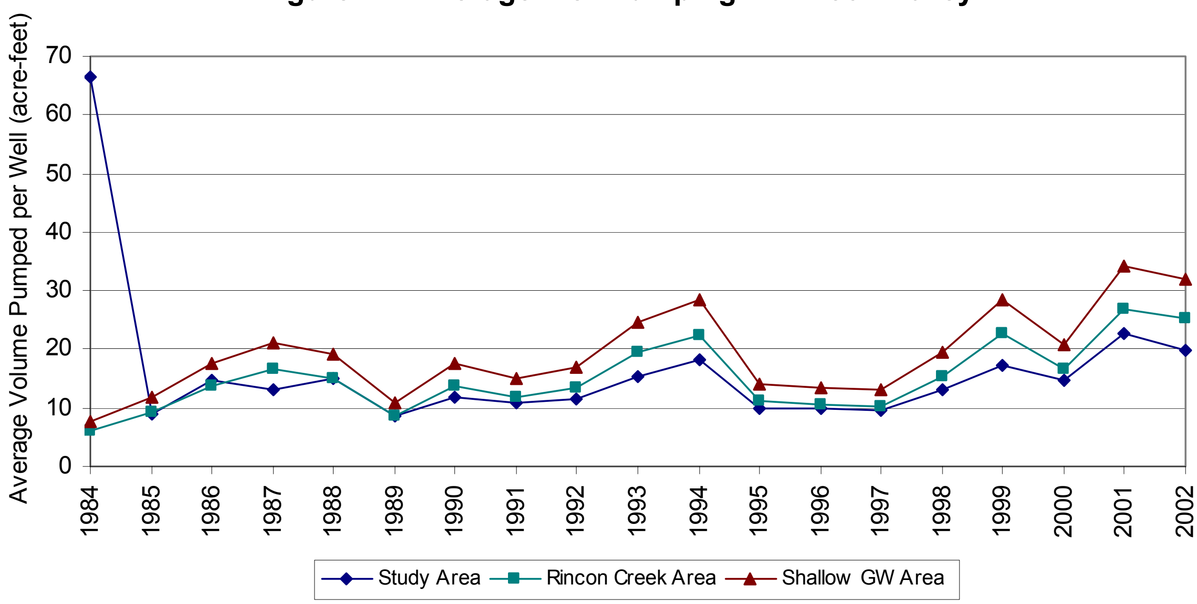
Figure 11 shows the average annual volume of groundwater pumped per non-exempt well located within one mile of either the delineated shallow groundwater areas or Rincon Creek. Average annual groundwater pumping per non-exempt well is higher near riparian areas (i.e., shallow groundwater areas and the creek) than in the basin as a whole.

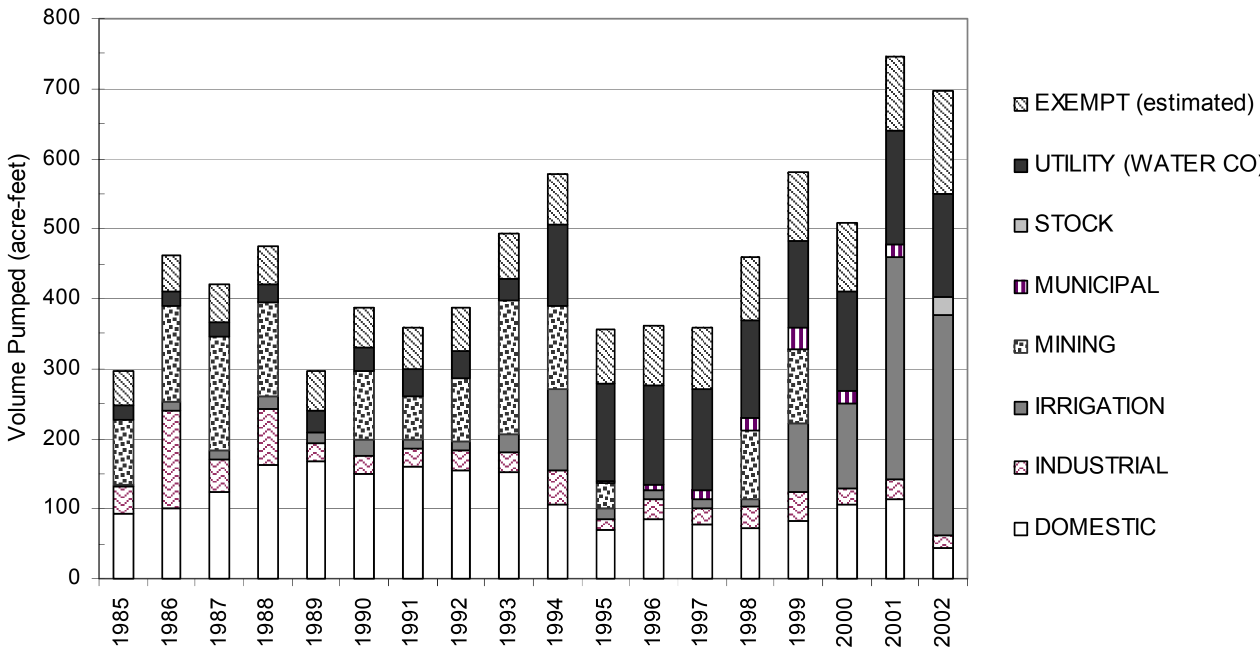
**Figure 11. Average Well Pumping in Rincon Valley**




The reported amount of groundwater pumped annually by each water use sector is shown on Figure 12. The dominant water uses in the study area have shifted through time. Prior to 1995, the mining and domestic sectors pumped the largest amounts of groundwater in the study area, though mining use fluctuated from year to year. By the mid-1990's, mining water use decreased substantially and utility wells emerged as the dominant pumpers, which correlated with a decline in the domestic water use sector. Irrigation wells and water utility wells are currently the leading groundwater pumpers in the study area. The annual volume pumped by utility wells has remained fairly consistent since the mid-1990's.

Collectively, exempt wells potentially account for a significant amount of current pumping as well, as shown on Figure 12. ADWR conservatively estimates exempt well pumpage in the Tucson Active Management Area to be 0.5 AF per year per well, with a range from 0.5 AF to 1.0 AF per year (Seasholes, 2003). Approximately 290 exempt wells were identified as being located within the study area, as of the end of 2002. Therefore, using the conservative estimate of 0.5 AF per year, exempt wells within Rincon Valley accounted for approximately 145 AF of groundwater pumpage in 2002. Many exempt well records did not include installation dates and, therefore, could not be assigned to a specific year prior to 2002. These records were added to the 2002 total as a way to provide an estimate of total annual pumpage by exempt wells in the study area for the year 2002. These undated wells account for a relatively small number of records and don't affect the overall trend shown in Figure 12.

**Figure 12 - Annual Groundwater Pumping by Water Use in Rincon Valley**
**(including estimated pumping from exempt wells)**




Using the Osterkamp (1973) recharge rate, the volume of groundwater pumped each year from Rincon Valley is much lower than the volume of water recharged: 4540 AF/yr recharged and roughly 700 AF/yr pumped in 2002. However, the Osterkamp (1973) value might be overestimated. Although the groundwater pumping rate in the study area as a whole might not exceed the overall recharge rate, specific areas where pumping is concentrated may be experiencing overdraft.

## Ongoing Monitoring

Several organizations and agencies are currently monitoring natural resources in Rincon Valley. Much of the current monitoring work focuses on riparian corridors, with the intention of conserving existing riparian vegetation. The following is a brief list of organizations who are currently involved in monitoring efforts in Rincon Valley.

Riparian Inventories/Monitoring
- Rincon Institute
- University of Arizona, School of Renewable Natural Resources

Wildlife Habitat
- Rincon Institute
- Saguaro National Park East

Streamflow
- USGS
- Rincon Institute

Groundwater
- Rincon Institute
- ADWR - GWSI

## Recommendations

Existing monitoring programs are primarily focused on areas near Rincon Creek and its associated riparian area, within the Younger Alluvium. While monitoring water levels in this alluvium unit is very important, a more spatially comprehensive monitoring program that includes wells throughout the entire Rincon Valley might provide a more complete understanding of changing groundwater conditions in the Valley. Wells further away from the creek should also be monitored. Monthly water level measurements from wells throughout the valley might provide information on recharge mechanisms and timing, as well as identify changes in water levels that could impact the riparian area and/or existing water users. Establishing a comprehensive baseline monitoring program prior to more extensive development is essential for determining water level changes due to increased water use. Where possible, the monitoring program should utilize existing wells. However, drilling new piezometer wells should be considered for areas where no wells are currently located.

Water level contours could not be drawn during this investigation because the available data were limited in both space and time. If a comprehensive array of monitoring wells is established within Rincon Valley, water levels should be measured during the same time period in order to delineate reliable depth to water and water level elevation contour maps. These maps would be useful to illustrate water level changes through time and would help identify areas most impacted by groundwater pumping.

A review of drillers logs and well construction data might help characterize components of the groundwater system, such as perched aquifers, shallow bedrock, and hydrogeologic controls. This type of information, coupled with water level data, could also be used to construct cross-sections of the basin to help visualize the hydrogeologic system of the basin.

An investigation on aquifer transmissivities might provide useful information on how and to what degree the Pantano Fault might serve as a line of hydrogeologic separation between the Tucson Basin and Rincon Valley. Although there is evidence outside of the study area suggesting that the aquifers on either side of the fault are not hydrologically contiguous, an investigation on the Rincon Valley portion of the fault has not been conducted. This is a very important question to answer, especially if there are concerns about how urbanization in the region might impact the existing riparian habitat in Rincon Valley. A transmissivity investigation could be conducted along with the review of well construction data.

Recharge is a very important component of a water budget, yet it is often the least understood. A comprehensive, site specific study should be conducted to represent an understanding of natural recharge in Rincon Valley based on currently available information. Researchers from the

USGS and the University of Arizona are currently studying recharge processes in areas within the Tucson Basin. The results of these studies and their methodologies might be useful for future recharge studies in Rincon Valley.

Groundwater pumping is another important component of the water budget that is often not fully understood. Well locations and groundwater pumping rates are needed for a groundwater pumping assessment. As mentioned previously, the ADWR Wells55 database has limitations. Some reported well locations are inaccurate. Pumping data are available for a certain class of wells, but are not available for the vast majority of wells. Better estimates are also needed for exempt well pumping rates. While well registration is required by the State, it is essentially voluntary. Future hydrologic investigations should address unregistered wells in Rincon Valley.

A groundwater flow model for Rincon Valley would be a useful tool for land use planning based on the water resources of the area. The model could be used to help characterize the hydrologic system and identify how the system might respond to various stresses (ie, dry/wet years, increased groundwater pumping, changing land uses, and changing vegetation). The model could also be used to estimate recharge.

A water budget for Rincon Valley was not included in this report, but would be very useful for planning land uses that are consistent with the water resources of the area. Groundwater inputs are recharge (mountain front and stream channel) and possibly underflow across the south/southwestern limit of the study area (Pantano Wash). Groundwater outputs are well pumping, evapotranspiration, and underflow into the Tucson Basin to the west. A detailed hydrologic assessment, including the creation and use of a groundwater flow model, would provide insight on the water budget of Rincon Valley.

Future water budget analyses should consider evapotranspiration (ET) rates. No information was found on the total volume of water consumed by ET within Rincon Valley. ET in areas with substantial riparian vegetation is often a considerable component of the water budget.

Lastly, water chemistry data should be used to determine the composition, source, and age of the groundwater in Rincon Valley. Researchers from the University of Arizona, Department of Geosciences, Laboratory of Isotopic Geochemistry are currently collecting and analyzing groundwater samples throughout the Tucson Basin and the surrounding region, including Rincon Valley, for these purposes. Unfortunately, these data were not available at the time of this investigation. Future assessments on groundwater conditions in Rincon Valley should include a review of these geochemistry data, if available. A review of water system well logs might also provide information about the water quality of the groundwater in Rincon Valley.

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