



June 30, 2017

Mr. Tim Ross
Department of Water Resources
Senior Engineering Geologist
770 Fairmont Ave, Ste 102
Glendale, CA 91203

RE: Montecito Water Groundwater Basin (Basin Number: 3-49) Prioritization

Mr. Ross,

Board of Directors

President
Richard Shaikewitz

Vice President
W. Douglas Morgan

Director
Samuel Frye

Director
Tobe Plough

Director
Floyd Wicks

**General Manager
and Board Secretary**
Nick Turner

Thank you for speaking with the Montecito Water District (District) Staff and consultants on May 10, 2017 about groundwater use in the Montecito Groundwater Basin (Basin). The District understands the Department of Water Resources (DWR) is currently refining and reevaluating groundwater basin data for the purposes of accurately prioritizing groundwater basins state-wide. The District and District's consultant, Dudek, reviewed the prioritization of the Basin DWR completed in 2014 for the California State Groundwater Elevation Monitoring (CASGEM) Program. The attachments included with this letter summarize the results of Dudek's evaluation of data relevant to DWR's basin prioritization process.

We appreciate the opportunity to provide you with this information. Please don't hesitate to contact me for additional information or if you have any questions.

Sincerely,

Nicholas Turner
Montecito Water District
General Manager

Attachments:

583 San Ysidro Road
Santa Barbara, CA
93108-2124

- 1) Dudek. Independent Analysis of the Montecito Groundwater Basin Prioritization, June 30, 2017.

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To: Nicholas Turner – General Manager, Montecito Water District
From: Dudek
Subject: Independent Analysis of the Montecito Groundwater Basin Prioritization
Date: June 30, 2017

Attachment(s): Figure 1: Groundwater Basins and Water Districts
Figure 2: Montecito Water District and Privately Owned Wells
Figure 3: Irrigated Areas

This memorandum has been prepared for the Montecito Water District (MWD) to document the results of Dudek’s review of the Montecito Groundwater Basin (Basin) prioritization conducted by the Department of Water Resources (DWR) (Figure 1). DWR assigned to the Basin a ranking of Very Low when they first conducted the ranking process in 2014. The score previously assigned by DWR was 12.75 which corresponds to a Low priority Ranking. The Basin was ranked as Very Low, apparently due to the determination that less than 2,000 acre feet per year (AFY) was extracted from the basin. Dudek’s independent analysis of the DWR prioritization indicates that based on the DWR criteria and methodology, the prioritization ranking for the Basin is within the Medium range, with an Overall Basin ranking score of 16.75. In addition, total extractions from the Basin are in excess of 2,400 AFY.

For the analysis, Dudek assessed the various data components of the DWR basin prioritization process. The data components assessed are: 1) population, 2) rate of current and projected growth of population, 3) number of public supply wells, 4) total number of wells, 5) irrigated acreage, 6) groundwater reliance, 7) documented impacts to the basin, and 8) other relevant information. Dudek has reevaluated these data components, gathered Basin specific data, and compared them to DWR’s California Statewide Groundwater Elevation Monitoring (CASGEM) Basin Prioritization Process (DWR 2014).

BACKGROUND

The Sustainable Groundwater Management Act (SGMA) was passed in September 2014. The SGMA was passed as a means of for management of groundwater throughout the State of California. Per the SGMA, all groundwater basins prioritized as Medium or High by the DWR

must designate a Groundwater Sustainability Agency (GSA) by June 30, 2017. Formation of a GSA for groundwater basins prioritized as Low and Very Low is voluntary.

The GSAs for groundwater basins designated as Medium or High must prepare a Groundwater Sustainability Plan (GSP) for each basin by January 2022. If a basin is in critical overdraft, the deadline to prepare a GSP for that basin is January 2020. If a basin is adjudicated, different requirements apply. The GSP is required to address the management needs of the basin in order to avoid undesirable results. The undesirable results as defined by DWR include: 1) chronic lowering of groundwater levels, 2) reduction of groundwater storage, 3) sea water intrusion, 4) degraded water quality, 5) land subsidence, and 6) depletions of interconnected surface water.

Groundwater basin prioritization was completed for the CASGEM Program. The CASGEM Program was established under the 2009 Groundwater Monitoring legislation (SBX7-6) in order to provide groundwater elevation information for all of California's groundwater basins (CWC §10933).

DATA COMPONENTS

The data components used in the basin prioritization are summarized as follows (DWR 2014):

1. Population overlying the basin;
2. Rate of current and projected growth of the population overlying the basin;
3. Total number of public supply wells (PSW) that extract water from the basin;
4. Total number of wells that extract from the basin;
5. Irrigated acreage overlying the basin;
6. Degree to which persons overlying the basin rely on groundwater as their primary source of water;
7. Documented impacts on the groundwater within the basin, including overdraft, subsidence, saline intrusion, and other water quality degradation;
8. Any other information determined to be relevant by DWR.

Several of these components are expressed in designations per square mile. The Montecito Groundwater Basin is 9.8 square miles.

All 515 California groundwater basins were assessed as part of the CASGEM program. A ranking system was developed using the above data components 1-6. The statistical distribution was broken down by the CASGEM Program staff into six ranking values, 0 to 5 as shown in Table 1. Data component number six is comprised of the two factors shown under Groundwater Reliance in Table 1. Data component number seven was applied by DWR staff based on a review of DWR Bulletin 118 Update 2003, local groundwater management plans, public

comments, and other published information. The overall Basin ranking score is calculated by summing the ranking value of the data components. The groundwater reliance adjusted ranking value shown in Table 2 is determined by averaging the ranking values of groundwater use and percent of the total supply (DWR 2014).

Table 1
Data Components and Ranking Ranges

Ranking	Ranking Value	Data Components and Ranking Ranges						
		Population		PSW Density	Total Well Density	Irrigated Acreage	Groundwater Reliance	
		Density per sq.-mi	Projected Growth %	per sq.-mi	per sq.-mi	ac/sq.-mi	GW Use ac-ft/acre	% of Total Supply ¹ %
Very Low	0	$x < 7$	$x < 0$	$x = 0$	$x = 0$	$x < 1$	$x < 0.03$	$x < 0.1$
Low	1	$7 \geq x < 250$	$0 \geq x < 6$	$0 > x < 0.1$	$0 > x < 2$	$1 \geq x < 25$	$0.03 \geq x < 0.1$	$0.1 \geq x < 20$
Moderately Low	2	$250 \geq x < 1000$	$6 \geq x < 15$	$0.1 \geq x < 0.25$	$2 \geq x < 5$	$25 \geq x < 100$	$0.1 \geq x < 0.25$	$20 \geq x < 40$
Medium	3	$1000 \geq x < 2500$	$15 \geq x < 25$	$0.25 \geq x < 0.5$	$5 \geq x < 10$	$100 \geq x < 200$	$0.25 \geq x < 0.5$	$40 \geq x < 60$
Moderately High	4	$2500 \geq x < 4000$	$25 \geq x < 40$	$0.5 \geq x < 1.0$	$10 \geq x < 20$	$200 \geq x < 350$	$0.5 \geq x < 0.75$	$60 \geq x < 80$
High	5	$5 \geq x < 4000$	$x \geq 40$	$x \geq 1.0$	$x \geq 20$	$x \geq 350$	$x \geq 0.75$	$x \geq 80$

Note:

Population growth is percent growth from 2010 to 2030.

¹ Percent of total water supply (groundwater and surface water) that is provided by groundwater.

x = component data value

Source: DWR 2014

Population

The population within the Basin is not directly available through census data. Dudek used Census data from 2010 (US Census 2010) to quantify the population in all Census tracts that completely or partially intersect the Basin. Using this technique, the population overlying the Basin was approximately 1,447 people per square mile. However, this method likely overestimates the population by including people within the census tracts but outside of the Basin.

Montecito Water District also estimated population within the MWD service area using the DWR online Population Tool (Baker 2017). The service area excludes relatively small portions of the Basin but also extends significantly beyond it in less populated areas. The calculation

yields approximately 1,187 people per square mile and it is noted in the UWMP that, for various reasons, it may underestimate the actual population. Population calculation by either method results in a ranking of 3, which is consistent with the previous CASGEM ranking.

The population change in the unincorporated area of Montecito from 2000 to 2010 was a reduction of 1,035 people resulting in a total population decrease of 10% (SBCAG 2012). Per the Montecito Growth Management Ordinance, the growth of Montecito is to be limited to 19 dwelling units per year (Santa Barbara County 2010). Therefore, the population growth rate is consistent with the CASGEM Program ranking range of $R < 0$ percent resulting in a ranking value of 0.

Basin Wells

There are eight active public supply wells operated by the MWD, as shown in Figure 2 (MWD 2005). The normalized value of the public supply wells is 0.8 wells per square mile, which falls within the assigned ranking range of $0.5 \leq R < 1.0$ wells per square mile resulting in a ranking value of 4.

Dudek has identified 535 wells as being in or around the Basin. (Note that only the wells that could be located precisely are shown on Figure 2). This does not include wells operated by MWD, drilled prior to 1955, or constructed with a cable tool as indicated on the DWR Well Completion Report. The cable tool well construction method utilizes a hammer style bit to break up the soil material. This method of well construction has been obsolete for the last few decades. Therefore, these wells may not still be in operation and were excluded from the analysis. Wells were identified using the DWR Well Completion Report online database and sorted by Township, Range, Section and City.

Previously, DWR identified the total number of wells within the Basin using the DWR Well Master database (WellMa). The WellMa database contains well locations by township, range, and section as recorded on the Well Completion Reports. DWR did not remove wells based upon construction type, owner or use (DWR 2014).

The normalized total number of wells is 55 wells per square mile. This value is equivalent to the ranking range of $R \geq 20$ wells per square mile and matches the initial DWR Ranking Value assigned of 5. Due to uncertainty regarding the number of active wells in comparison to the number of identified wells based on the DWR Well Completion Reports, the DWR reduced the ranking value by 25%, resulting in an adjusted ranking value of 3.75. To date, Dudek was unable to verify the total number of active wells within the Basin and has therefore maintained the adjusted ranking value of 3.75.

Irrigated Acreage

Dudek used aerial imagery to identify and calculate the size of large irrigated areas within the Basin using Geographic Information System (GIS) tools. The analysis did not consider small irrigated or turf areas (such as those attached to single family residences).

Irrigated areas were digitized using the World Imagery aerial base map (USDA 2014) at a scale of 1:3,000 and 1:2,400. These scales are the equivalent of 1-inch equals 350 feet and 1-inch equals 200 feet respectively. At these scales and with the resolution of the aerial photography, it is possible to distinguish features such as single family homes, agricultural areas including orchards and row crops, and landscape features such as swimming pools and lawn areas. Note that the imagery used was from 2014, a dry year following several dry years. It is assumed that only irrigated areas show as green in this imagery as areas un-supplemented by irrigation had browned.

Irrigated areas were adjusted to include those shown on the Santa Barbara County Agricultural Commissioner Pesticide Permit applications (Santa Barbara County 2015). Such areas may include golf courses, cemeteries, and farms. Only bushes, turf grass (lawns), crops, and orchard areas were included due to the difficulty of identifying other types of irrigated landscaping. In addition, parcels and irrigated areas were constrained to only those areas located within the Basin (see Figure 3: Irrigated Areas). Note that only the parts of parcels that were identified as irrigated were counted for water use calculations. For example, paved areas and buildings were not included in the water use calculations so as not to over-estimate water use.

This method resulted in the identification of 706 irrigated acres. (For land and water use type, see Groundwater Reliance Below). The normalized value for irrigated acreage is 72 acres per square mile. This value is within the ranking range of $25 \leq R < 100$ acres per square mile and a ranking value of 2. This is greater than the previously assigned CASGEM Program ranking range of $1 \leq R < 25$ acres per square mile (Ranking value of 1). It is likely that the discrepancy is due to the CASGEM Program use of the DWR land use data and/or the Department of Conservation Farmland Mapping Program. The most recent DWR land use data for Santa Barbara County is from 1996 and the Department of Conservation Farmland Mapping Program only categorizes areas based upon the potential for farming activity. The estimates prepared by the CASGEM Program likely did not account for the irrigated acreage of golf courses and cemeteries and therefore may have underestimated the actual irrigated acreage.

Groundwater Reliance

DWR has focused prioritization efforts on high-use basins, ranking lower use basins (2,000 AFY to 9,500 AFY) only if there are other issues or impacts (DWR 2014). The CASGEM ranking provides a value of 1 for “Impacts”, apparently based on water quality concerns of high TDS and iron and manganese concentrations. In its original ranking of the Basin, DWR calculated a score of 12.5 but replaced it with a zero indicating that they determined the basin to produce less than 2,000 AFY. It is assumed that the DWR analysis did not include extractions from private entities which are largely unmonitored.

To estimate total groundwater reliance, Dudek evaluated both District and private extractions. District records indicate that the supplies from groundwater between 2011 and 2015 have ranged from 124 AFY to 636 AFY. Averaging all of the values yields 421 AFY, the value used for this analysis.

Water use within the irrigated areas was estimated by identifying irrigated parcels and assigning a water use factor to each land use within them. Because other types of irrigated landscape are less water intensive and more difficult to identify by this method, the analysis focused on turf, trees, crops, and orchard areas.

Water Source Analysis:

The water sources for the parcels identified as having irrigated landscapes were determined from the District parcel supply list, “Heal the Ocean” well list, District supply well location list, and DWR well completion logs (see Figure 2: Well location map). Parcels with irrigated areas were designated as having one of the following:

1. Only wells
2. Both wells and District supplied water
3. Unknown sources
4. District supplied water (only for parcels with irrigated areas over 0.5 acres)

The following assumptions were made about each source category:

1. Only wells – All irrigation water is obtained from the well(s) existing on the property.
2. Both wells and District supplied water – When both sources exist, well water is used for irrigation of large areas and District water for domestic uses.
3. Unknown sources – Well water is the source for irrigation in these areas.

4. District supplied water parcels (Only with irrigated areas over 0.5 acres) – Such parcels have groundwater to supplement water supplied by the District.

Water Use Factors:

The Water Use Factor is the amount of water required by a particular landscape type. There are many elements that can affect the magnitude of the factor such as location and soil type. For example, grasses existing in hotter climates may require more applied water than those in cooler climates due to higher evapotranspiration rates. Highly permeable soils such as sand and gravel may not hold moisture near the plant root as well as more clayey soils and therefore require more frequent watering. There are various methods to determine the Water Use Factor. Those used in this analysis are described below. The Factor units are Acre Feet per Year per Acre (AFY/A).

Turf and Lawn – A range of values were examined for turf and lawn. The one selected (3.38 AFY/A) was provided by the District as the amount supplied to residential turf areas after subtracting out estimated domestic use. The value chosen was for the year 2013, prior to the institution of allocation restrictions and during drought conditions.

The California Irrigation Management Information System (CIMIS) reference evapotranspiration zone information was consulted as a check on the reasonableness of the turf and lawn value determined above. CIMIS data is used to produce a map of California that is divided into 18 evapotranspiration zones having uniform characteristics. An evapotranspiration reference value (ET₀) is assigned to each zone. This value is the inches per year of irrigation required to keep turf in a “healthy” condition. The Montecito Basin is located in Zone Number 4 with a corresponding ET₀ of 46.6 inches per year or 3.8 AFY/A.

Crops - The water use factor for crops was taken from the Santa Ynez River Water Conservation District information table used for water use reporting. Water use factors for common crops range from about 1.2 to about 2.0 AFY/A. A value of 1.7 AFY/A was used as a reasonable average of the crop factors listed.

Orchards - The water use factor for Orchards was taken from the Santa Ynez River Water Conservation District information table used for water use reporting. Tree crop water use factors for avocados, citrus, olives, deciduous fruits, and walnuts range from 1.5 to 2.6 AFY/A. A water use factor of 2.0 AFY/A was selected as the average of the tree crops listed.

Water Reliance Calculations:

The following table shows the analysis results.

Table 2:
Irrigated Acreage Water Use

Landscape Type	Water Use Factor (AFY/A)	Irrigated Areas per Water Source (acres)					Total Water Use (AFY)
		MWD (Large Parcel)	MWD, Well(s)	Unknown	Wells	Total Acres	
Crops	1.7	18	0	0	0	18	31
Lawn/Turf	3.38	173	47	186	78	484	1,636
Orchards	2	53	6	46	62	167	334
District Pumping							421
Total		249	61	255	141	706	2,422

The total annual water use by this method was estimated to be 2,422 AF. The normalized value for groundwater use equals 0.38 acre-feet per acre. This value is within the range of $0.25 \leq R < 0.5$ acre-feet per acre with a ranking value of 3, greater than the CASGEM Program ranking range of $0.03 \leq R < 0.1$ acre-feet per acre and a ranking value of 1.

According to SBX7-7, MWD annual supply is limited to 4,800 AFY (Baker 2017). Combining this with 2,001 AFY of estimated private groundwater use yields a total supply of 6,801 AFY of which 2,422 AFY is from groundwater resources. Therefore, the groundwater percentage of total supply is 36%. The majority of the District water supply is from local surface water reservoirs and imported State water. This results in a modified ranking value from a CASGEM ranking of 1 to a ranking of 2 ($20 < R < 40$).

Impacts

In the CASGEM evaluation of impacts to the Basin, DWR determined water quality to be high in total dissolved solids (TDS), iron, and manganese concentrations (DWR 2003; Santa Barbara County 2011). As part of this re-evaluation, these impacts have been reviewed and determined to be consistent with the Ranking Value of 1. It should be noted that there has been evidence of seawater intrusion in coastal portions of the basin but further information is needed to evaluate its impacts.

CONCLUSIONS

As discussed in Groundwater Reliance above, MWD groundwater use averages about 421 AFY, significantly below the DWR threshold of 2,000 AFY. However, this quantity includes none of the extraction from private and agricultural wells throughout the Basin. To estimate this component, Dudek performed an indirect analysis of irrigated acreage and related groundwater use.

In evaluating the current ranking of the Montecito Groundwater Basin, Dudek found the population overlying the Basin to be commensurate with the previous CASGEM ranking of 3, and the population growth was confirmed to be within the ranking value of 0. The eight MWD wells within the Basin confirm that the public supply wells are within the ranking value of 4. A review of the DWR Well Completion Reports has also confirmed that the total wells within the Basin are within the ranking value of 5. Dudek has maintained the DWR applied confidence reduction of 25% due to the uncertainty that the wells are active and within the Basin.

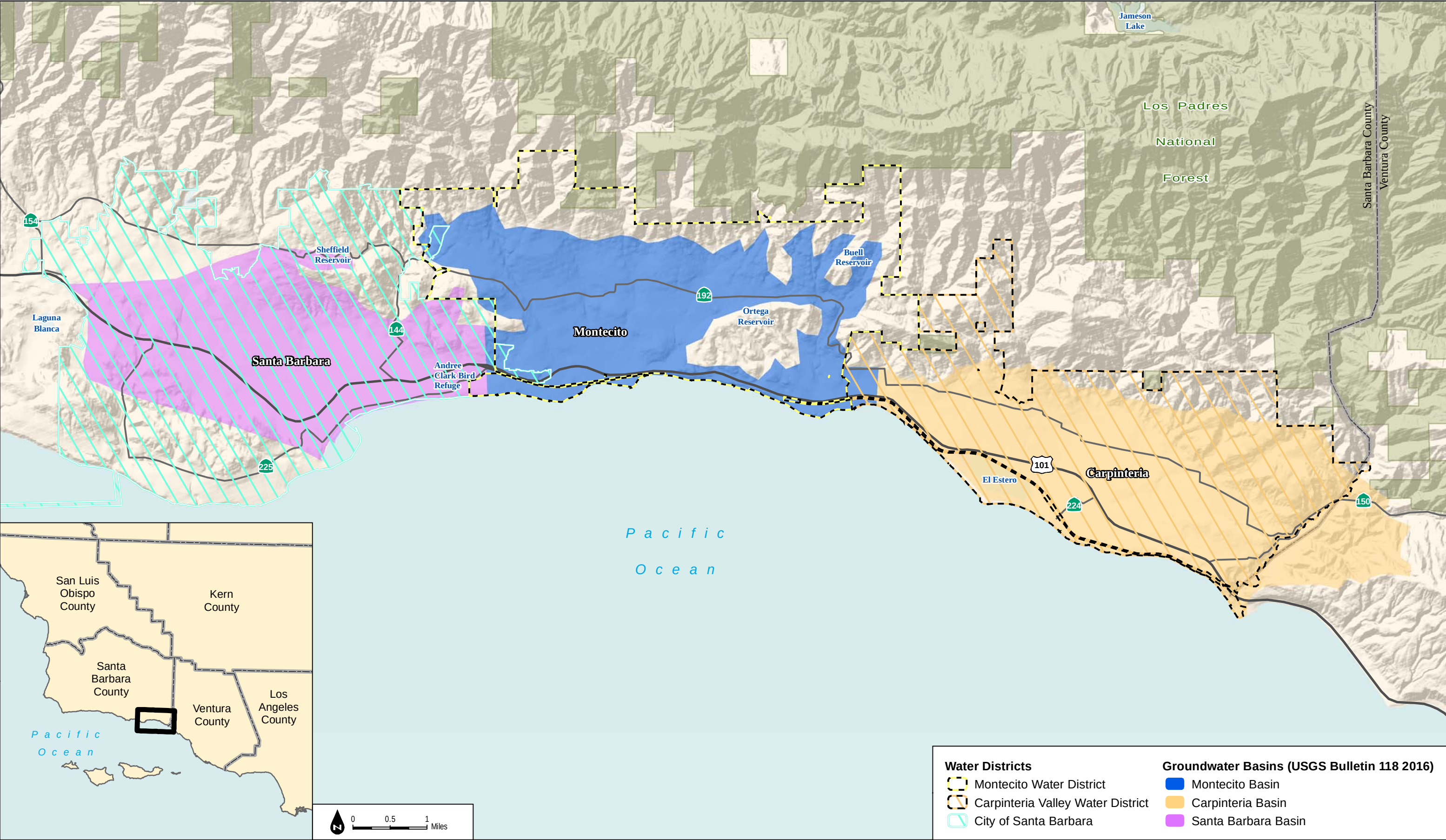
Because private and agricultural groundwater within the Basin is largely unmonitored, Dudek performed an indirect analysis of irrigated acreage and related groundwater reliance. Based upon these methods, the irrigated acreage ranking value has increased from 1 to 2. The groundwater use value has increased from 2 to 3, and the Percent of Total Supply has increased from 1 to 2. The resulting adjusted ranking value is 2.5. Documented impacts to the Basin confirm that the ranking value of 1 for the impact data component is appropriate. The Basin re-prioritization has been determined to have an overall Basin ranking score of 16.25, placing the Basin within the Medium ranking range of $13.43 \leq R < 21.08$ (Table 2).

Table 2
Basin Re-Prioritization Ranking Summary

Data Component		Ranking Range (R)	Units	Ranking Value	Confidence Adjustment	Average of Component	Adjusted Ranking Value
Population		$1,000 \leq R < 2,500$	persons/sq-mi	3			3
Population Growth		$R < 0$	percent	0			0
Public Supply Wells		$0.5 \leq R < 1.0$	wells/sq-mi	4			4
Total Wells		$R \geq 20$	wells/sq-mi	5	3.75		3.75
Irrigated Acreage		$25 \leq R < 100$	acres/sq-mi	2			2
Groundwater Reliance	Groundwater Use	$0.1 \leq R < 0.25$	acre-feet/acre	3		2.5	2.5
	% of Total Supply	$0.1 \leq R < 20$	percent	2			
Impacts				1			1
Overall Basin Ranking Score		Medium Ranking Range $13.43 \leq \text{Range} < 21.08$					16.25

REFERENCES

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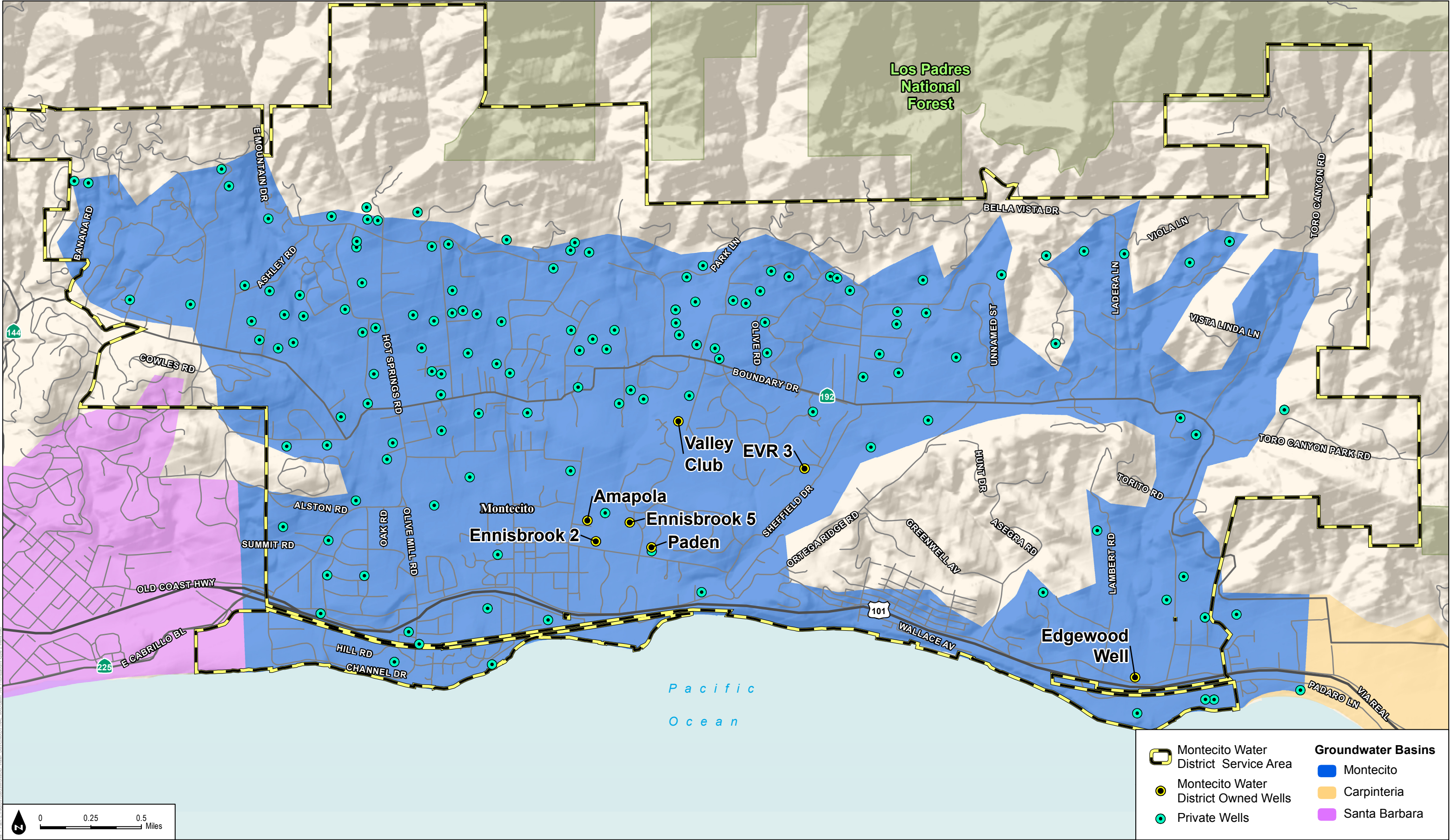


FIGURE 2

Montecito Water District and Privately Owned Wells

