SAN PASQUAL

2010 Groundwater Management State of the Basin Report

June 2011

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Final Report

San Pasqual Basin
2010 Groundwater Management State of the Basin Report

June 2011

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Abbreviations and Acronyms

AB .....Assembly Bill
basin .....San Pasqual Valley groundwater basin
bgs .....below ground surface
BMO .....basin management objective
City.....City of San Diego
CWC .....California Water Code
DWR .....California Department of Water Resources
GMP.....Groundwater Management Plan
MCL.....maximum contaminant levels
mg/L.....milligrams per liter
mgd .....million gallons per day
msl.....mean sea level
NO_3 .....nitrate
RO.....Reverse Osmosis
RWQCB.....Regional Water Quality Control Board
SANDAG.....San Diego Association of Governments
SB.....Senate Bill
SDCWA .....San Diego County Water Authority
TDS .....total dissolved solid
UC IPM.....University of California's Statewide Integrated Pest Management Program
USGS .....U.S. Geological Survey
Valley.....San Pasqual Valley

Section 1 – Introduction

This Basin Management Report documents groundwater management activities performed by the City of San Diego (City) between January 2008 and June 2010. This biennial report is designed to document hydrologic conditions as well as management activities undertaken to help ensure long-term sustainability of the San Pasqual Basin's groundwater resources. This report also documents the ongoing implementation of the San Pasqual Groundwater Management Plan (GMP) and recommends future implementation activities (City of San Diego, 2007).

1.1 CITY OF SAN DIEGO BACKGROUND

The City is located on the southern coast of California near the Mexico border (**Figure 1-1**). The City population in 2010 is 1,376,170 (California Department of Finance, Demographic Research Unit, 2010). The population is expected to grow by approximately 700,000 people by the Year 2030, according to the 2050 San Diego Association of Governments (SANDAG) Regional Growth Forecast (SANDAG, 2010).

The City of San Diego's Public Utilities Department provides municipal water supply to its service customers. The current source of water is imported supplies via the San Diego County Water Authority (SDCWA) aqueducts, as well as from nine reservoirs fed from local runoff.

The City's Long-Range Water Resources Plan (City of San Diego, 2002) outlines ways to meet future water demands. This plan outlines the use of imported water supplies and ways to improve reliability by diversifying their water supply. This diversification of water supply includes development of potential groundwater resources and storage capacity, combined with surface water management to meet overall water supply and resource management objectives.

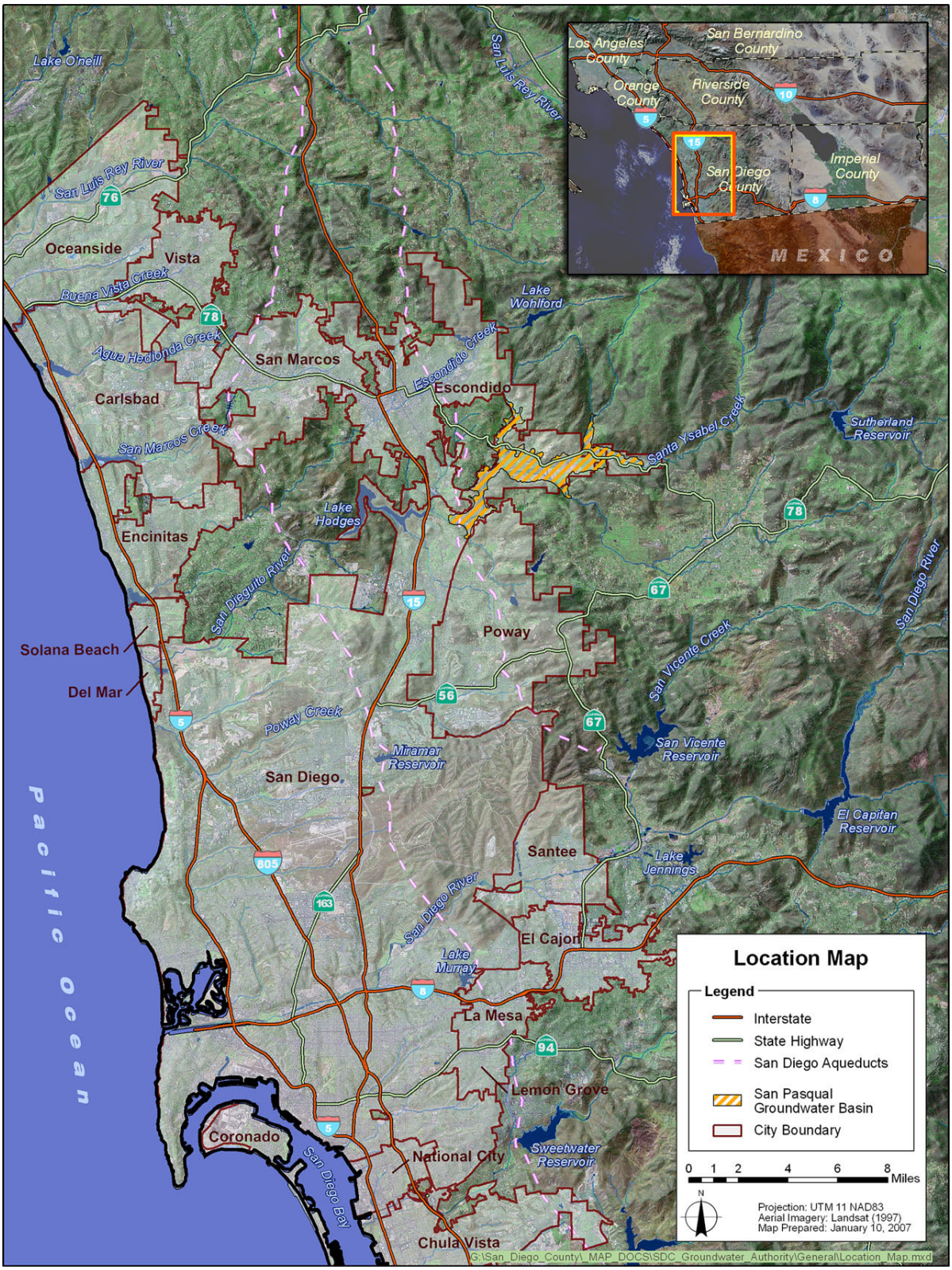

Figure 1-1. San Pasqual GMP Area and Regional Setting

In 1995, San Diego adopted the San Pasqual Valley Plan that includes specific goals aimed at the long-term protection and management of the San Pasqual Valley (Valley). The San Pasqual Valley Plan is now included within the City's General Plan. The Valley was also identified as a region for development of potential groundwater resources. The City is responsible for following through with directives written in the San Pasqual Valley Plan.

In 2004, the San Pasqual Vision Plan was presented to the San Diego City Council. In 2005, the San Diego City Council adopted Council Policy 600-45, which reinforces the goal of the Vision Plan, and also requires development of a GMP.

1.2 SAN PASQUAL GROUNDWATER MANAGEMENT PLAN

In 2007, San Diego developed and adopted the GMP for the San Pasqual Valley Groundwater Basin (basin), referred to hereafter as the San Pasqual GMP. This document represents a "beginning" point for understanding how to best manage the basin. This is an "adaptive management" plan and future actions will result from careful evaluation of basin response to past actions.

The San Pasqual GMP area, illustrated on **Figure 1-1**, is located within the San Dieguito Drainage Basin, which is the fourth largest drainage basin in San Diego County. The San Pasqual GMP area boundary coincides with the California Department of Water Resources (DWR) groundwater basin boundary, as defined in Bulletin 118 and illustrated on **Figure 1-2**.[1]

[1] The basin boundary shown on this figure and presented in this GMP has been slightly modified from Bulletin 118 to better represent the physical conditions within the basin.

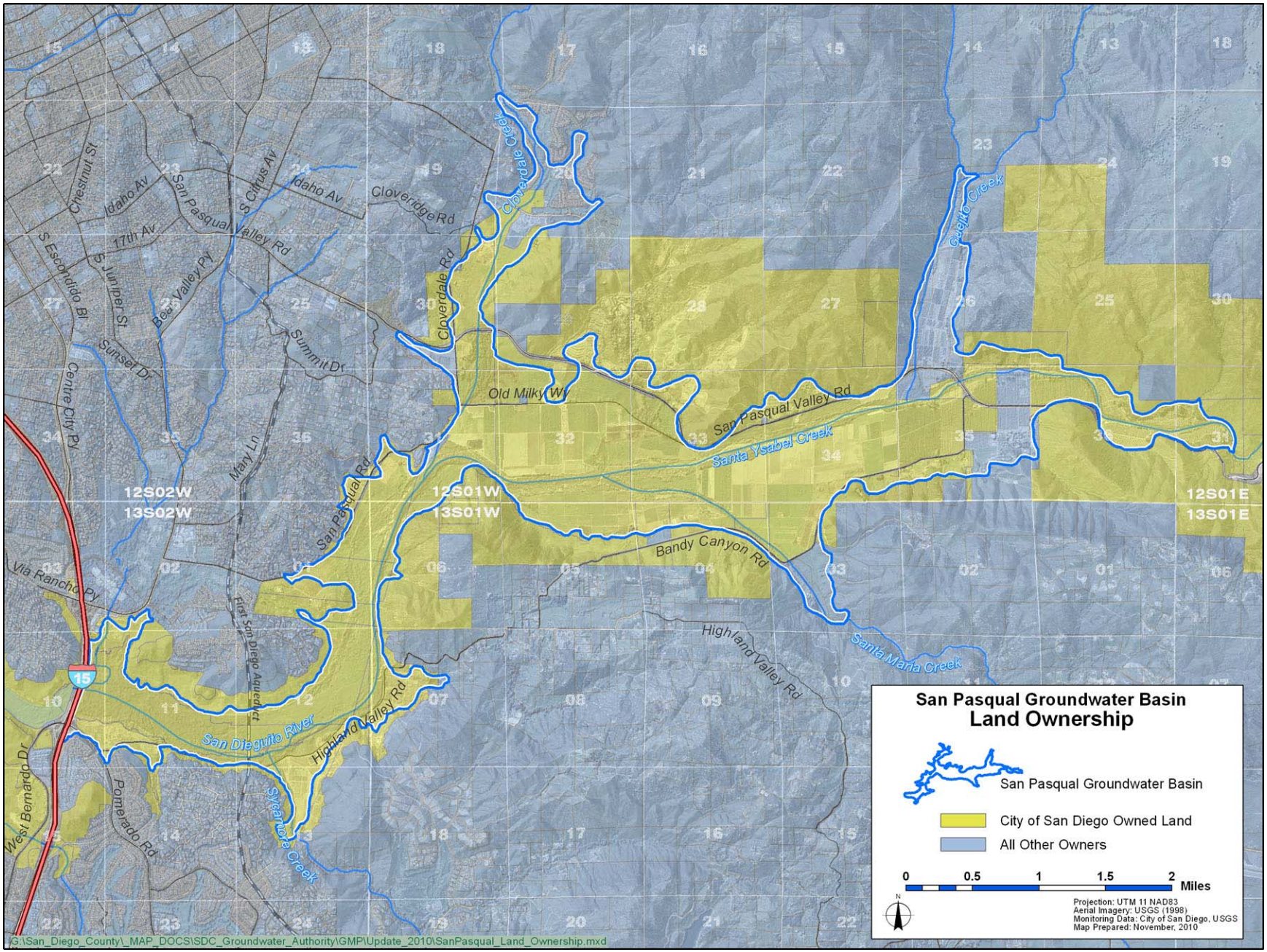

Figure 1-2. San Pasqual Groundwater Basin Boundary and City Land Ownership Within the San Pasqual Valley

The authority of the City to manage the San Pasqual GMP is based on City Council Policy. The City chose the San Pasqual GMP as one of the tools to effectively protect and manage the basin, consistent with the City's San Pasqual Vision Plan and California Water Code (CWC) Section 10755.2. On June 27, 2005, the San Diego City Council adopted the San Pasqual Vision Plan Council Policy 600-45 (included in **Appendix A**) to comprehensively protect the water, agricultural, biological, and cultural resources within the Valley. The San Pasqual GMP is a required element of the policy.

In 1992, the California Legislature passed Assembly Bill (AB) 3030, which was designed to provide local public agencies with increased management authority over their groundwater resources. In September 2002, new legislation, Senate Bill (SB) 1938, expanded AB 3030 by requiring GMPs to include certain specific components to be eligible for grant funding for various types of groundwater related projects.

1.3 REPORT ORGANIZATION

This section briefly describes the report organization.

Section 1. Introduction. This section provides information on the geographic setting, general background of the City's role as a water supplier and the development of a GMP for the Valley.

Section 2. Basin Conditions. This section describes the hydrologic conditions in the basin for the period from January 2008 to June 2010. The following information is summarized in this section: precipitation, groundwater elevations, groundwater quality, surface water quality, and land use.

Section 3. Basin Management Activities. This section describes the status of implementing San Pasqual GMP management actions taken by San Diego during the period from January 2008 to June 2010.

Section 4. Conclusions and Recommendations. This section evaluates whether current basin management objectives (BMO) are being met and makes recommendations for future management actions in the basin.

Section 5. References. This section provides the references used in developing this document.

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Section 2– Basin Conditions

This section describes the hydrologic conditions in the Valley for the period from January 2008 to June 2010 (reporting period). The basin resource elements presented and summarized below include precipitation, depth to groundwater and groundwater elevation, groundwater quality, surface water quality, and land use. The City monitors hydrologic conditions in the basin at fixed locations and on a regular schedule, as summarized in **Table 2-1**. These monitoring locations are also shown on **Figure 2-1**.

Table 2-1. Groundwater and Surface Monitoring in the San Pasqual Basin

Monitored Media	Number of Sites	Notes on Number of Sites	Frequency	Notes on Frequency[1]	Constituents
Groundwater Quality	11	9 production, 2 inactive	2-4 times/yr	Quarterly is goal	See data, Appendix B
Groundwater Levels	12	10 abandoned, 1 active, 1 inactive	Monthly		Depth to groundwater below reference point
Surface Water Quality	6	Santa Ysabel Creek and tributary flow into San Pasqual	Monthly	Twice per month is goal	See data, Appendix B

1. At a minimum sampling occurs as listed in the frequency column, when availability of Public Utilities staff allows, sampling at a higher frequency is completed.

2.1 TOTAL PRECIPITATION

Weather data for the Valley was obtained on-line and is made available by the University of California's Statewide Integrated Pest Management Program (UC IPM). Precipitation data are collected at the weather station shown on **Figure 2-1,** identified as ESCONDIDO_SPV, located on the Valley floor at an elevation of 390 feet above mean sea level (msl).

Figure 2-2 shows and **Table 2-2** lists the annual precipitation totals from 1999 to the present (the complete record of the gage). Data were not available for 2000. During this period, the highest rainfall total was measured at 24.29 inches (2005). The driest year during this 11-year reporting period was 2002 when only 3.86 inches of precipitation fell at this weather station in the Valley.

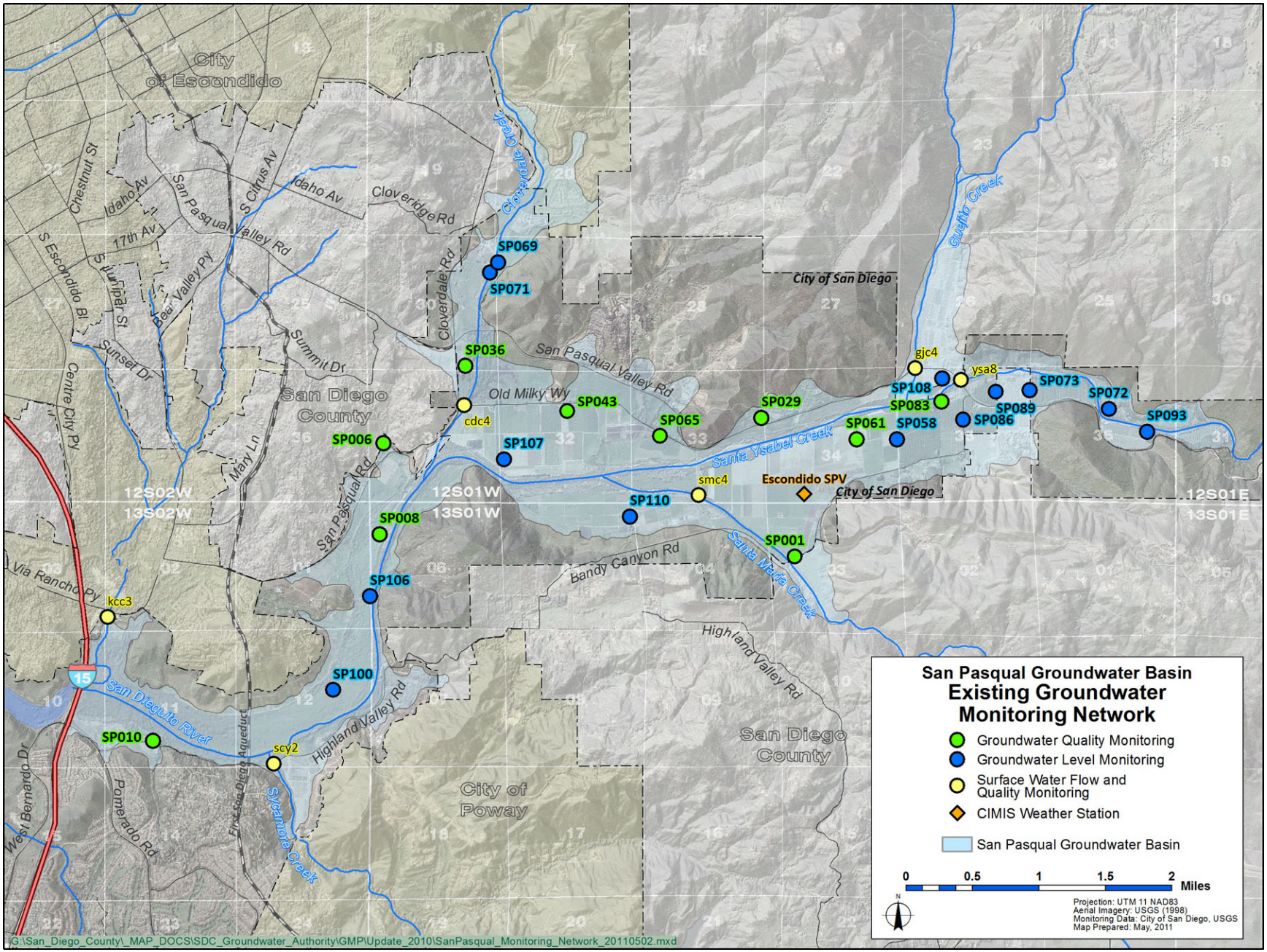

Figure 2-1. San Pasqual Basin Groundwater and Surface Water Monitoring Locations

Table 2-2. Summary of Annual Precipitation in San Pasqual Basin, San Diego (Measured at ESCONDIDIO_SPV.A*)

Year	Annual Precipitation (inches)
1999	6.9
2000	N/A
2001	9.9
2002	3.9
2003	11.3
2004	7.4
2005	24.3
2006	8.3
2007	5.4
2008	12.7
2009	4.0
2010	11.2

Note:
* UC IPM, 2010 – Water Year October 1 to September 30

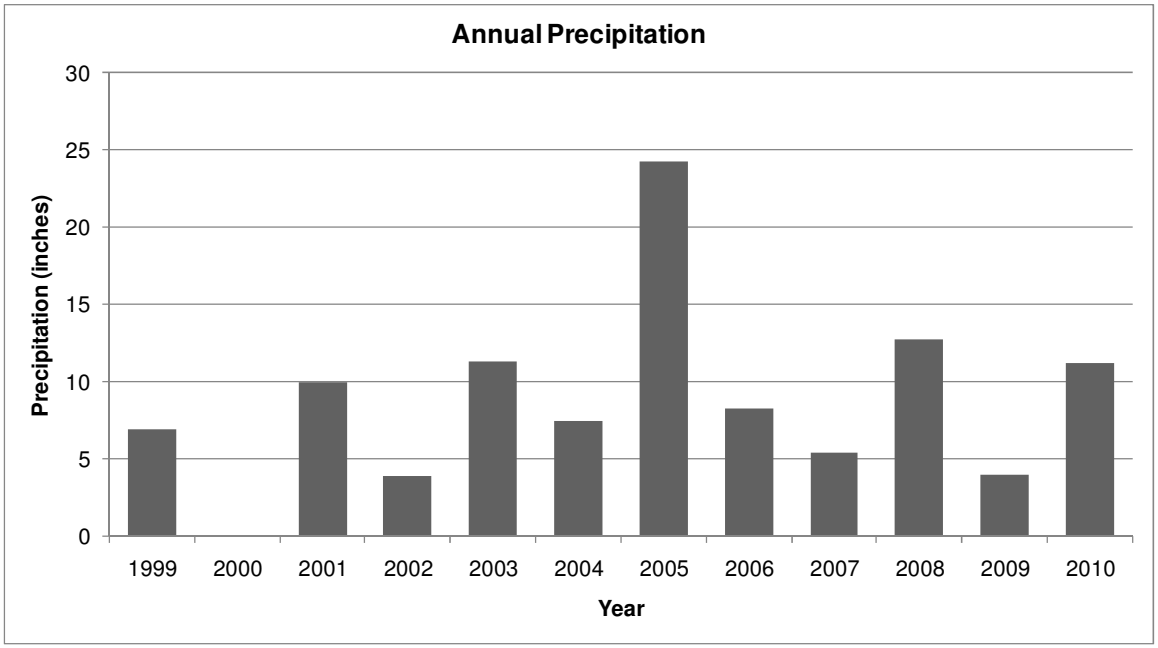

Figure 2-2. Total Annual Precipitation in San Pasqual Basin, San Diego (Measured at ESCONDIDIO_SPV.A[2])

[2] UC IPM, 2010 – Water Year October 1 to September 30

Figure 2-3 shows the average monthly rainfall totals during this reporting period. The wettest month is February when, on average, more than 2.5 inches of rainfall are typically measured in the basin. The driest month on average in the basin is typically August.

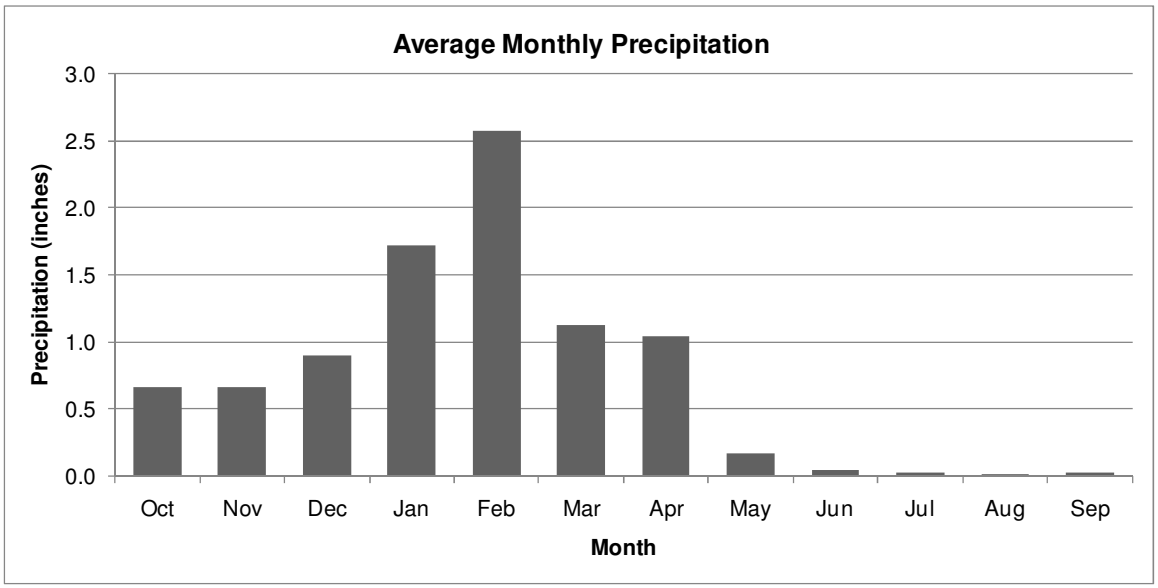

Figure 2-3. Average Monthly Precipitation in San Pasqual Basin, San Diego

2.2 GROUNDWATER LEVELS IN SAN PASQUAL

The City measures groundwater levels from a network of 12 monitoring wells in the basin each month. Data for the period from 2008 to 2010 has been processed and is presented in this section. Groundwater depth data are useful for well design and pump selection. Groundwater elevation data are useful in evaluating groundwater flow direction and velocity.

2.2.1 Depth to Groundwater

Figure 2-4 shows the depth-to-water measurements taken by City staff on May 18, 2010 and the estimated depth-to-water throughout the rest of the Valley. This figure represents spring conditions in the basin, before typically higher season period of pumping begins to meet agricultural and domestic water demands in the summer months. The greatest measured depth-to-water is in the eastern area of the basin near the confluence of Guejito Creek and Santa Ysabel Creek. Groundwater in this area is as deep as 52 feet below ground surface (bgs) (SP089). The shallowest measured depth-to-water was measured adjacent to Cloverdale Creek at SP069 at 6 feet bgs.

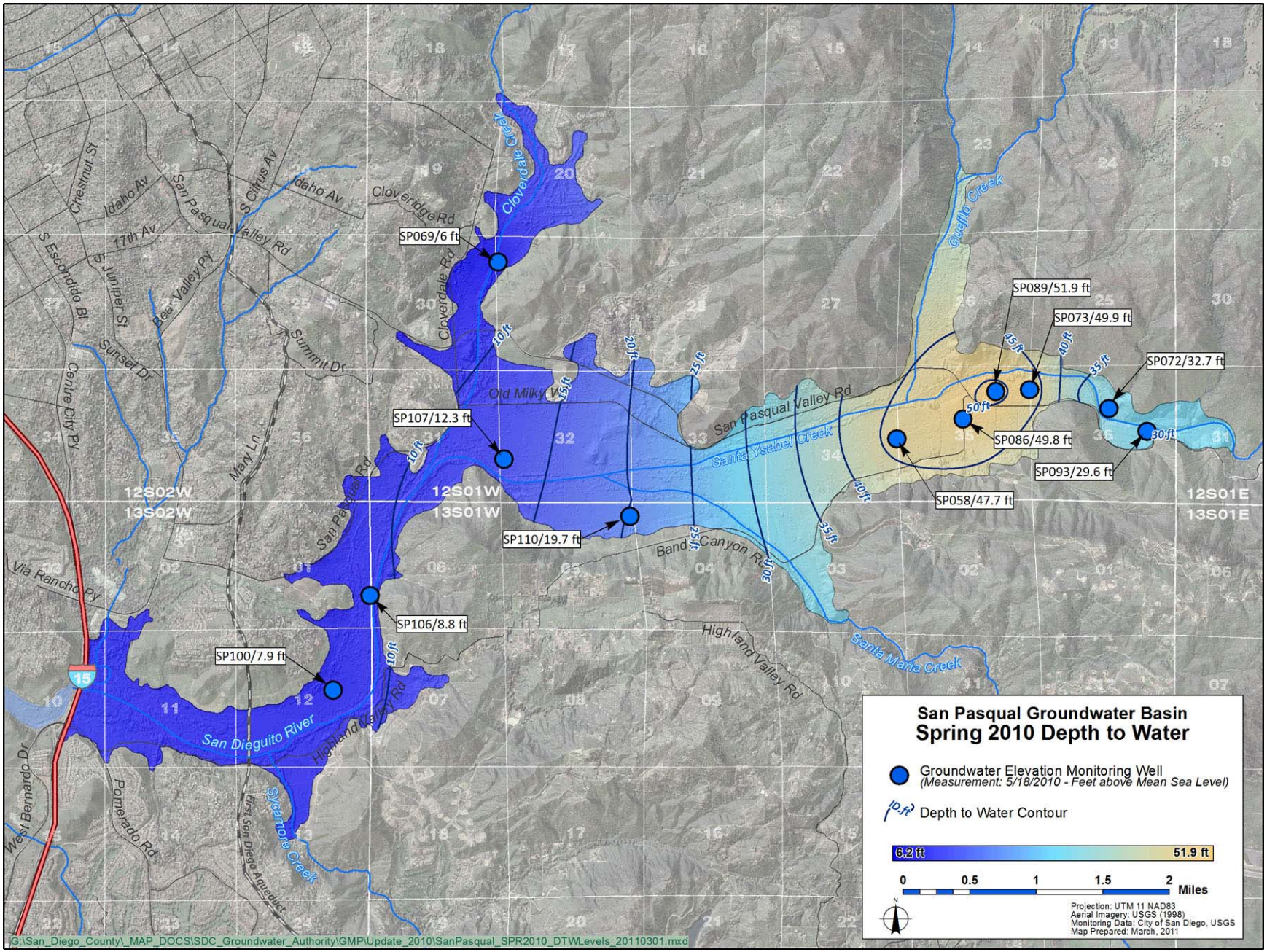

Figure 2-4. Depth to Groundwater on May 18, 2010, in San Pasqual Basin

2.2.2 Groundwater Elevation

Figure 2-5 shows groundwater elevations based on the same measurements taken on May 18, 2010 and estimated groundwater elevation contours. As mentioned above, this groundwater elevation map represents spring conditions in the basin, before increased pumping begins to meet agricultural and domestic water demands in the summer months. Groundwater flows from east to west through the basin. The highest groundwater elevation measured was 437 feet above msl at SP093. The lowest groundwater elevation was calculated at 329 feet above msl at SP100. The groundwater gradient is steepest in the eastern portion of the basin, indicated by the relatively close spacing of groundwater elevation contours in this area on **Figure 2-5**. The spacing between contours increases in the middle and western areas of the basin indicating a lower gradient and slower moving groundwater through these areas.

2.2.3 Historic Trends

Figure 2-6 combines the reporting period groundwater level measurements with a longer record of groundwater level data extending back to about 1970 for eight key wells in the basin. The well hydrographs show the groundwater elevation on the left vertical axis and the depth to groundwater on the right vertical axis. The wells on the eastern side of the basin have the greatest variability in groundwater levels over time in response to hydrologic patterns. Groundwater levels in these records are lowest during the drought periods of 1976 and the early 1990s. Recent data shows that changes in groundwater levels in response to seasonal pumping are also greatest in the eastern area. Wells in the western area generally show steady groundwater levels over time and, aside from Lake Hodges, do not appear to be as sensitive to surface water hydrologic conditions (i.e., smaller groundwater level drops in 1976 and the early 1990s, but well SP110 is the exception) like the wells in the mid- and eastern areas of the basin. Seasonal fluctuations in response to pumping are evident in recent data collected from wells in the western area also. The gap in these data records, from approximately 1995 to 2005, resulted because DWR had stopped collecting groundwater levels at these locations and the City had not yet assumed responsibility for groundwater level data collection.

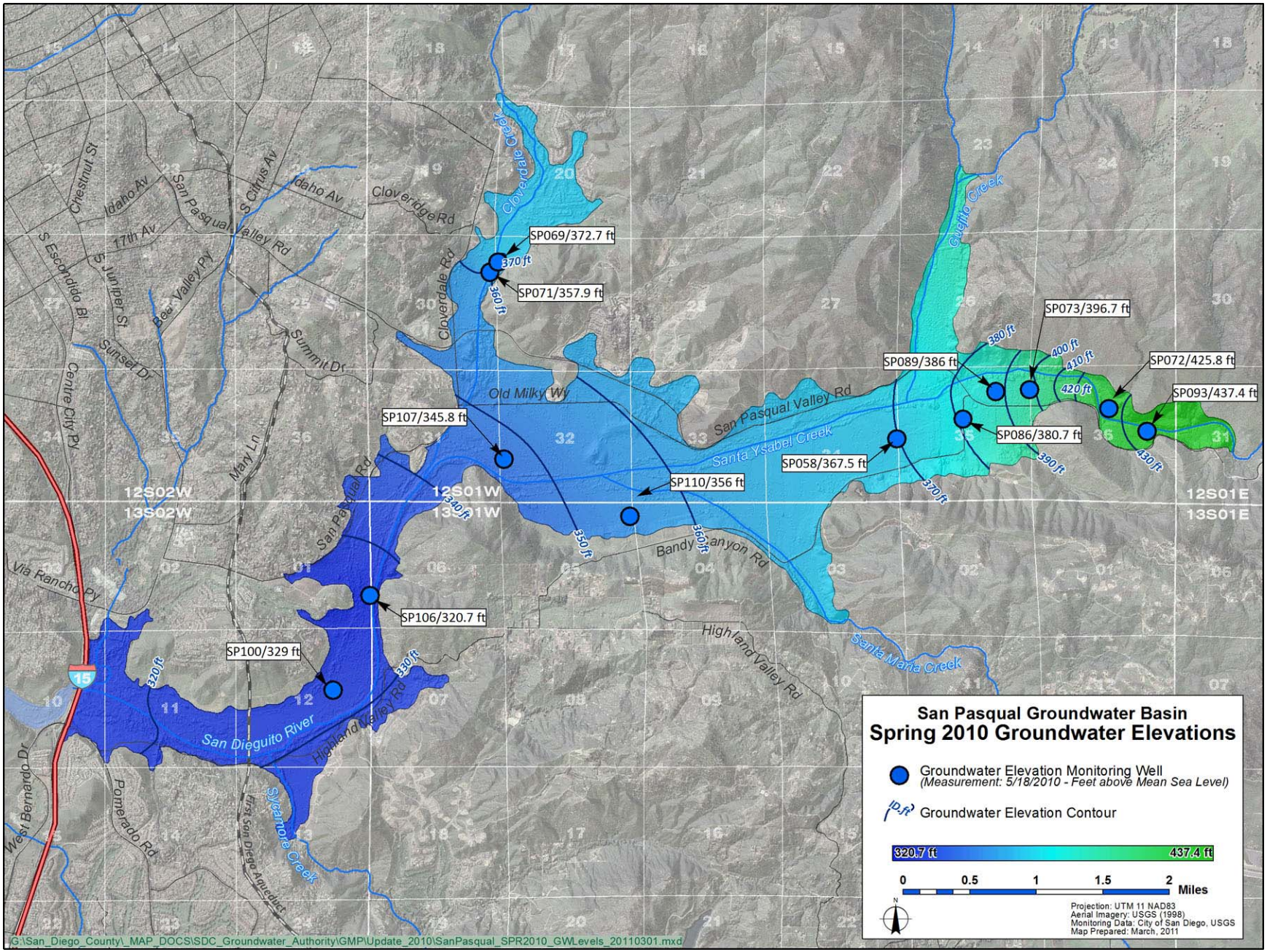

Figure 2-5. Groundwater Elevation on May 18, 2010, in San Pasqual Basin

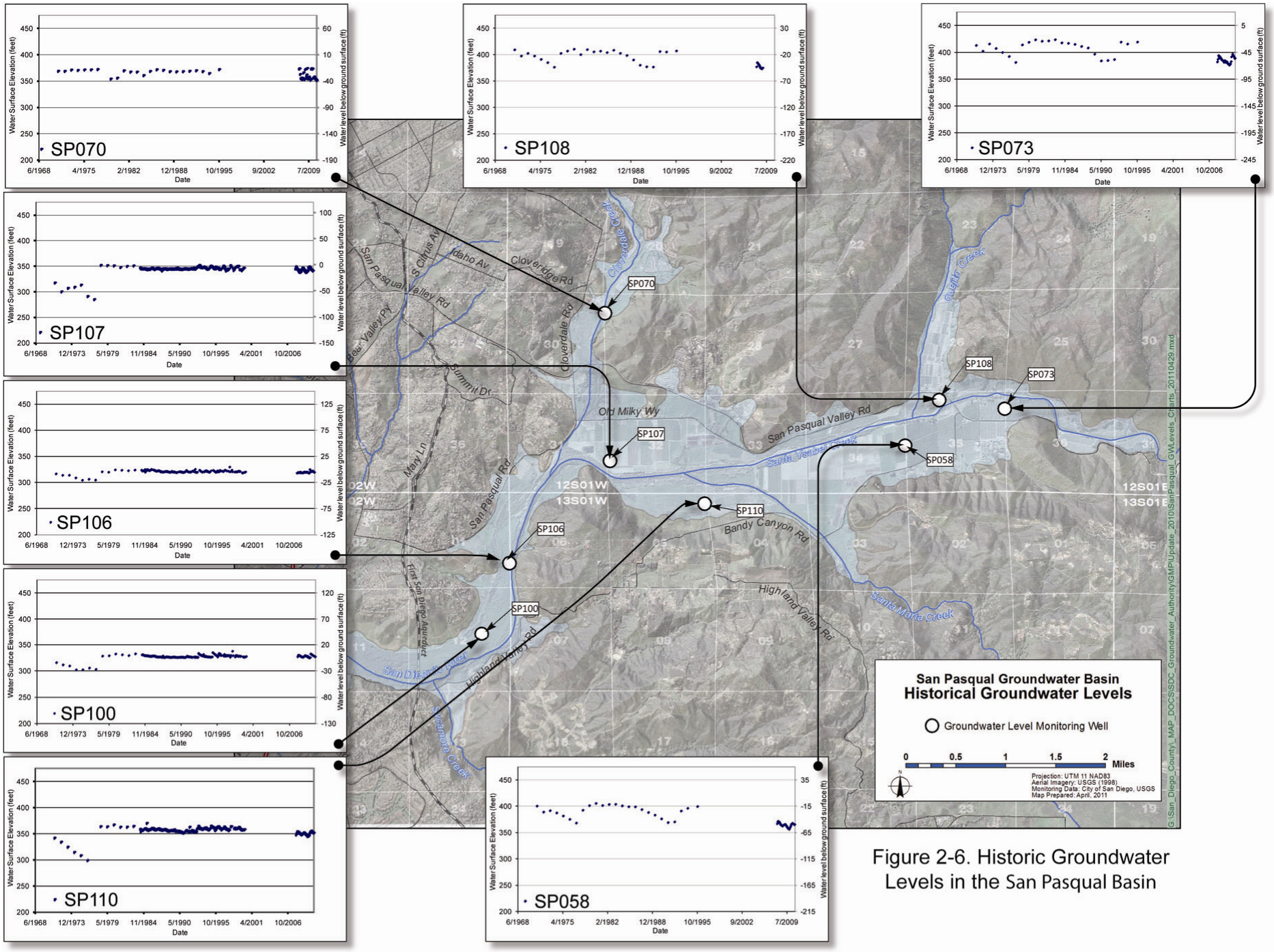

Figure 2-6. Historic Groundwater Levels in the San Pasqual Basin

2.3 WATER QUALITY IN SAN PASQUAL

The San Pasqual GMP summarized a broad array of groundwater quality constituents for the basin and found total dissolved solids (TDS) and nitrate (NO_3) concentrations to be of particular concern. This section provides updates on groundwater quality monitoring being conducted by City staff, the groundwater quality statistics provided in the San Pasqual GMP, and the concentration and distribution of TDS and NO_3 in the basin. This section also provides information on surface water quality from tributary flows into the basin. Surface water quality data was not available during development of the San Pasqual GMP.

2.3.1 Groundwater Quality Monitoring

Table 2-1 indicates that the City attempts to collect and analyze groundwater samples quarterly. However, the actual frequency fluctuates and in some years only two samples were collected. The locations of the groundwater wells sampled are shown on **Figure 2-1**. The City analyzes samples for a broad suite of organic and inorganic compounds. The full list of analytes is provided in **Appendix B** of this report.

As described in the San Pasqual GMP, groundwater quality data within the San Pasqual GMP area have been collected and reported periodically since 1950. The San Pasqual GMP provided maximum, minimum, and average values for wells in the basin. These data are presented in **Table 2-3**.

Table 2-3 compares groundwater quality data with applicable California drinking water quality standards (both primary and secondary maximum contaminant levels (MCL)). Primary MCLs are derived from health-based criteria that include technologic and economic considerations. Primary MCLs are legally enforceable standards that apply to public water systems designed to protect the public health by limiting the levels of contaminants in drinking water. Secondary MCLs are designed to regulate contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water. In California, public water systems are required to comply with the secondary MCLs.

Table 2-3 also presents the groundwater quality objectives of the Regional Water Quality Control Board (RWQCB) for the San Pasqual Region within the San Dieguito Hydrologic Unit.

Both MCLs and RWQCB objectives are used as points of reference because groundwater must be treated to meet MCLs before it can be used as a public drinking water supply. RWQCB objectives are of interest because groundwater in the basin cannot be degraded beyond these objectives by any activity at the surface, be it agriculture, urbanization, groundwater recharge, etc.

Based on a review of these data, it appears that TDS and NO_3 continue to be the two primary constituents of concern within the basin. The most recent (collected 2008 to 2010) TDS concentrations in the southwestern-most well (SP010) range from 605 to 1,050 milligrams per liter (mg/L), which indicates that groundwater is leaving the basin with TDS exceeding the recommended secondary MCL of 500 mg/L. Although the most recent NO_3 concentration in the same well is relatively low, average NO_3 concentrations in the western San Pasqual GMP area are 40 mg/L with a maximum concentration reported at 174 mg/L. This indicates that the NO_3 concentrations exceed the MCL of 45 mg/L in some areas.

Table 2-3. Water Quality Summary for Period (1950 to 2006)

Constituent	Primary MCL[8]	Secondary MCL[8]	RWQCB Groundwater Quality Objectives[3]	Units	Groundwater Results						Exceeds Primary or Secondary MCL[1]	Exceeds RWQCB Groundwater Quality Objective[1]
					Western Portion of Basin			Eastern Portion of Basin				
					Maximum	Minimum	Average[7]	Maximum	Minimum	Average[7]		
General Mineral												
Calcium	--	--	--	mg/L	352	11	140	274	21	85	NA[2]	NA[2]
Chloride	--	250/500/600 [6]	400 [4]	mg/L	1,618	72	270	324	0.3	100	Yes	Yes
Fluoride	2	--	1.0 [4]	mg/L	2	< 0.03	0.5	62.1	< 0.03	0.6	Yes	Yes
Hardness (as CaCo3)	--	--	--	mg/L	1,390	50	500	997	127	347	NA[2]	NA[2]
Magnesium	--	--	--	mg/L	170	< 3	60	121	4.6	35	NA[2]	NA[2]
Nitrate (as NO_3)	45	--	10 [4]	mg/L	174	<0.2	40	141.5	<0.2	20	Yes	Yes
Potassium	--	--	--	mg/L	28	0.604	3.5	12	<0.5	3	NA[2]	NA[2]
Sodium	--	--	--	mg/L	540	3.11	185	204	34	83	NA[2]	NA[2]
Sodium Percent	--	--	60 [5]	%	42%	19%	40%	27%	51%	33%	NA[2]	No
Sulfate	250	250/500/600 [6]	500 [4]	mg/L	1,063	3.9	310	519	10	100	Yes	Yes
Alkalinity (total)	--	--	--	mg/L	408	89.2	270	384	20	200	NA[2]	NA[2]
General Physical												
Total Dissolved Solids	500	500/1000/1500 [6]	1000 [4]	mg/L	3060	58	1300	4400	262	722	Yes	Yes
Inorganics												
Aluminum	1	0.2	--	mg/L	0.387	0.00205	0.0179	0.27	0.00136	0.0184	Yes	NA[2]
Antimony	0.006	--	--	mg/L	0.00587	0.00145	0.0039	<0.0005	<0.0005	<0.0005	No	NA[2]
Arsenic	0.01	--	--	mg/L	0.009	0.00102	0.0030	0.007	0.00075	0.0024	No	NA[2]
Barium	2	--	--	mg/L	0.135	0.00131	0.0576	0.294	0.00239	0.1280	No	NA[2]
Beryllium	0.004	--	--	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	No	NA[2]
Boron	--	--	0.75 [4]	mg/L	0.194	<0.0005	0.060	0.148	<0.0005	0.0400	NA[2]	No
Cadmium	0.005	--	--	mg/L	0.02	0.00115	0.004	0.003	0.00108	0.0030	Yes	NA[2]
Chromium	0.05	--	--	mg/L	0.0114	0.00101	0.004	0.0105	0.00101	0.0034	No	NA[2]
Copper	--	1	--	mg/L	0.05	0.00133	0.007	0.351	0.00101	0.0101	No	NA[2]

Table 2-3. Water Quality Summary for Period (1950 to 2010) (continued)

Constituent	Primary MCL[8]	Secondary MCL[8]	RWQCB Groundwater Quality Objectives[3]	Units	Groundwater Results						Exceeds Primary or Secondary MCL[1]	Exceeds RWQCB Groundwater Quality Objective[1]
					Western Portion of Basin			Eastern Portion of Basin				
					Maximum	Minimum	Average[7]	Maximum	Minimum	Average[7]		
Iron	--	0.3	0.3 [4]	mg/L	35.6	0.0266	2.060	4	0.01	0.3000	Yes	Yes
Lead	0.015	--	--	mg/L	0.05	0.000561	0.021	0.05	0.000844	0.0180	No	NA[2]
Manganese	--	0.05	0.05 [4]	mg/L	2.7	0.0002	0.300	5.67	0.0002	0.2000	Yes	Yes
Mercury	0.002	--	--	mg/L	0.00037	0.0002	0.0	0.0004	0.0002	0.0002	No	NA[2]
Nickel	0.1	--	--	mg/L	0.0687	0.00056	0.005	0.0858	0.0005	0.0040	No	NA[2]
Perchlorate	--	--	--	mg/L	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	NA[2]	NA[2]
Selenium	0.05	--	--	mg/L	0.012	0.001	0.0060	0.057	0.00137	0.0120	Yes	NA[2]
Silver	--	0.1	--	mg/L	0.01	0.00075	0.0092	0.01	0.01	0.0100	No	NA[2]
Thallium	0.002	--	--	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	No	NA[2]
Vanadium	--	--	--	mg/L	0.0253	0.00506	0.0126	0.0709	0.00301	0.0115	NA[2]	NA[2]
Zinc	--	5.0	--	mg/L	0.303	0.00201	0.0452	5.02	0.0023	0.0960	Yes	NA[2]
Organics												
Volatile Organic Compounds (Drinking Water)	-- [9]	-- [9]	-- [9]	mg/L	0.00284	<0.00001	-- [9]	0.00456	<0.00001	-- [9]	-- [9]	NA[2]

Notes:
[1] Indicates that at least one or more reported concentration exceeds the primary or secondary MCL or RWQCB groundwater quality objective.
[2] To date MCLs and groundwater quality objectives have not been identified for this respective constituent.
[3] RWQCB is an acronym for the Regional Water Quality Control Board. These values represent the RWQCB groundwater quality objectives for the San Pasqual Groundwater Basin.
[4] Detailed salt balance studies are recommended for this area to determine limiting mineral concentration levels for discharge. On the basis on existing data, the tabulated objectives would probably be maintained in most areas. Upon completion of the salt balance studies, significant water quality objective revisions may be necessary. In the interim period of time, projects of ground water recharge with water quality inferior to the tabulated numerical values may be permitted following individual review and approval by the Regional Board if such projects do not degrade existing ground water quality to the aquifers affected by the recharge.
[5] Na is measured as the % Na = (Na / (Na + Ca + Mg + K)) * 100%, where Na, Ca, Mg, and K are expressed in milliequivalent per liter (meq/L)
[6] Secondary MCLs limits presented in order of Recommended/Upper/Short Term.
[7] Average was calculated only using detections recorded above the reporting limit. Therefore, non detect or less than the detection limit values were not factored into the average calculation.
[8] The lowest respective U.S. Environmental Protection Agency or California Department of Health Services constituent MCL value is presented.
[9] As multiple constituents are represented as VOCs, MCLs and average concentrations are not provided.

Key:
-- = (Not Applicable)
MCL = maximum contaminant level
mg/L = Milligrams per Liter
NA = not available
RWQCB = Regional Water Quality Control Board
VOC = Volatile Organic Compound

2.3.1.1 Total Dissolved Solids Distribution

The recommended secondary MCL for TDS is 500 mg/L. TDS concentrations often exceed the recommended MCL throughout the basin and on average are highest in the western and central portions of the basin. As shown in **Table 2-3**, the RWQCB objective for TDS in the Valley is 1,000 mg/L because the predominant use of groundwater in the basin is for agricultural irrigation and not for public water supply. As listed in **Table 2-3**, TDS concentrations average 1,300 mg/L and 722 mg/L in the western and eastern portions of the basin, respectively. TDS concentrations range between approximately 58 mg/L and 4,400 mg/L within the entire basin. TDS average values exceed the secondary MCL and therefore may be a limiting factor for various water uses. **Figure 2-7** shows the results of recent sampling during the 2008 to 2010 time period at the wells monitored for water quality. **Figure 2-7** shows that the lowest TDS values during these recent sampling events are at wells SP089 and SP061. TDS concentrations generally increase in the central and western areas of the basin.

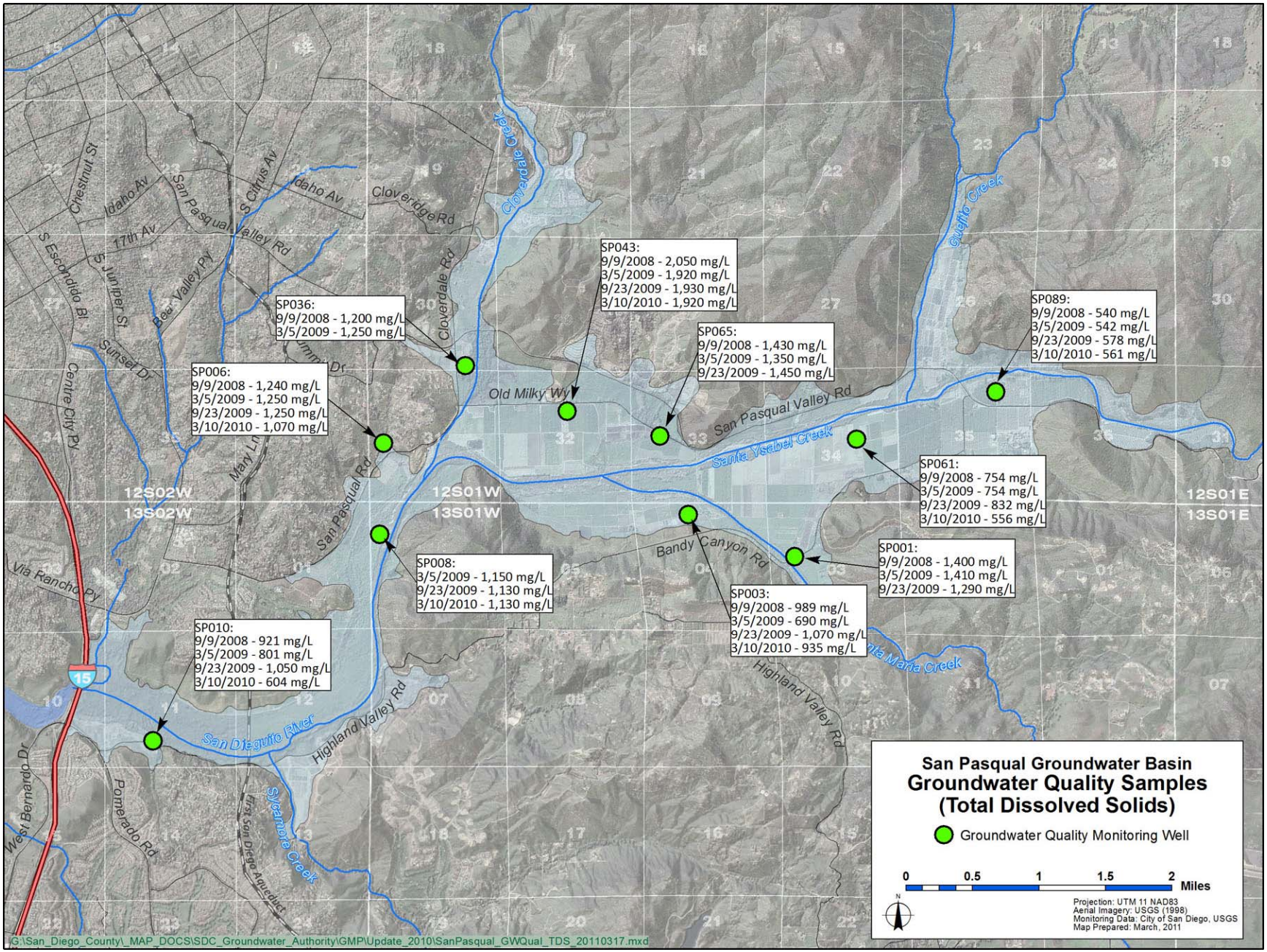

Figure 2-7. Total Dissolved Solids Concentrations in Groundwater in San Pasqual Basin (2008-2010)

Figure 2-8 illustrates the TDS concentrations over time for wells within the western and eastern portions of the basin. The results from the time series data presented indicates that the TDS concentrations in the western portion of the basin have generally increased since 1950, and the TDS concentrations in the eastern portion of the basin have shown little significant changes overall. Although the TDS concentration at SP043 is higher than the other wells in the basin, recent samples show a downward trend in the TDS concentration at this well from more than 2,500 mg/L to at or slightly below 2,000 mg/L.

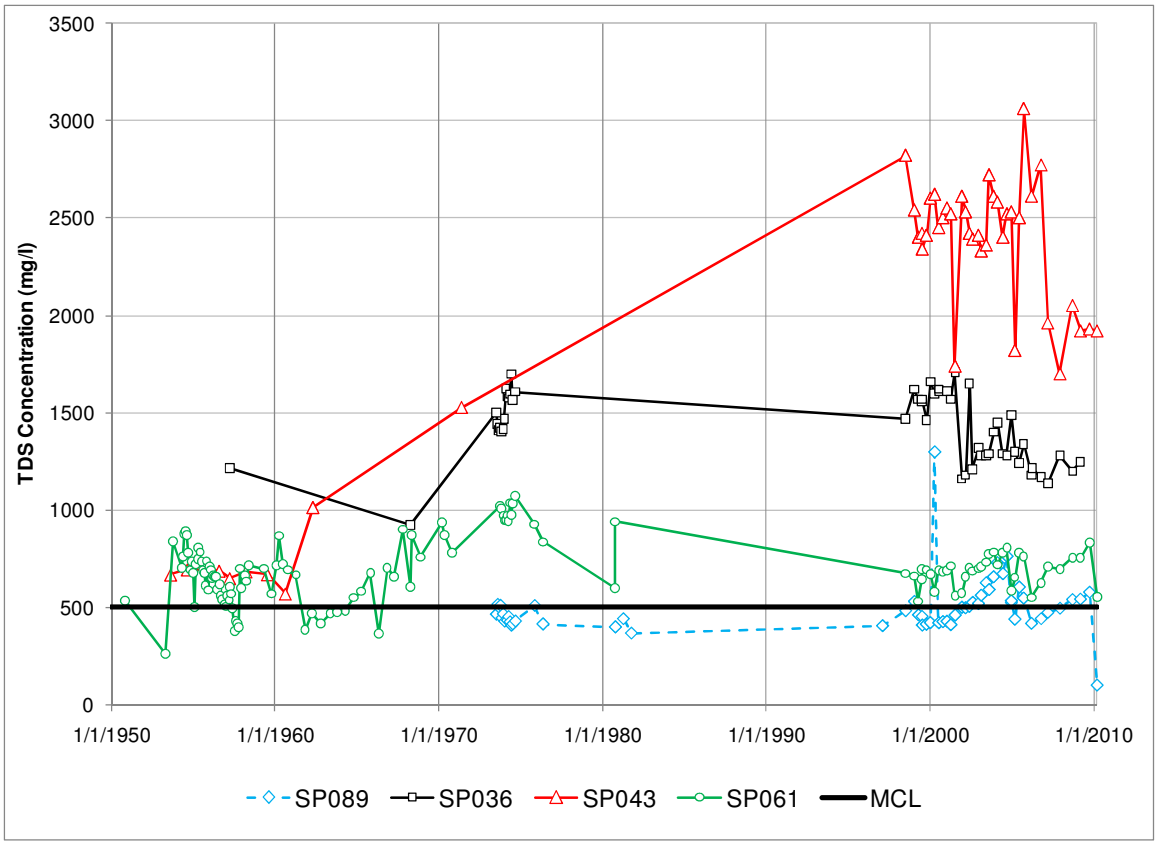

Figure 2-8. Trends in Total Dissolved Solids Concentrations over Time in San Pasqual Basin

2.3.1.2 Nitrate Distribution

The primary MCL for NO_3 is 45 mg/L. **Figure 2-9** shows the results of NO_3 concentrations in groundwater in the basin based on samples collected during the period from January 2008 to June 2010. **Figure 2-9** shows the most recent NO_3 concentrations measured from wells with water quality measurements in the last 2 years, which indicates that the highest NO_3 levels have been reported in the central and western portions of the basin. The potential sources of NO_3 contamination are from agricultural use of fertilizers, urban and industrial runoff, wastewater discharges, septic systems, and sewer

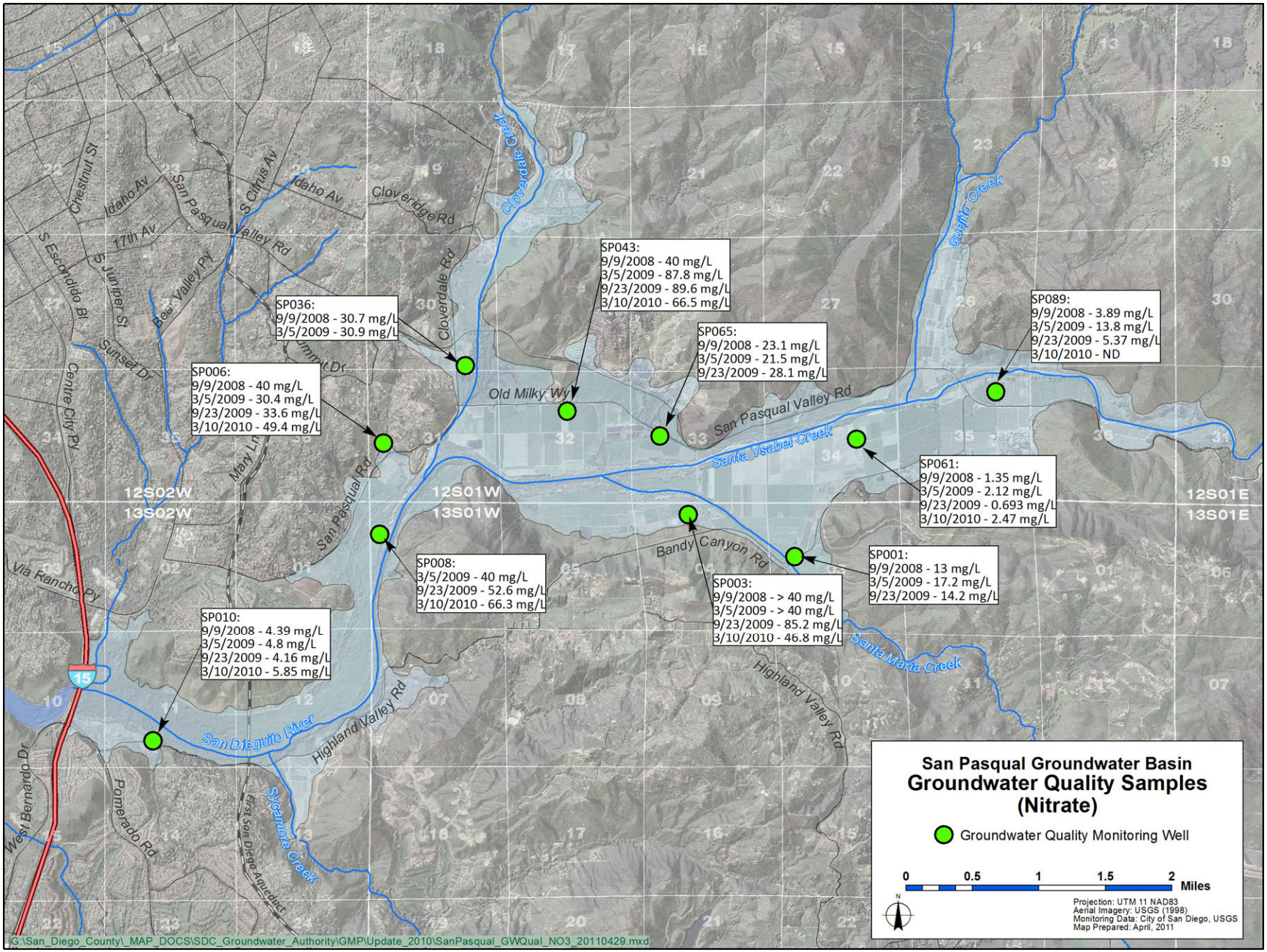

Figure 2-9. Nitrate Concentrations in Groundwater in San Pasqual Basin (2008-2010)

overflows (Weston Solutions, 2006). **Table 2-3** shows that NO_3 concentrations average 40 mg/L in the western and central portions of the basin and 20 mg/L in the eastern portion of the basin. NO_3 concentrations have been reported as high as 174 mg/L from one well located in the west-central region of the basin. Before 1995, there were too few wells being monitored to assess the basin-wide water quality for NO_3. However, a better collection of records in 1968 and in 1970 indicate that the highest levels of NO_3 within the basin were located within the central-western portion of the basin. The results from the time series data presented on **Figure 2-10** indicate that the NO_3 concentrations in the western portion of the basin have generally increased over the period of record and the NO_3 concentrations in the eastern portion of the basin have shown significant fluctuations. However, in recent years more frequent measurements have shown that NO_3 has varied significantly in well SP043, located in the west-central portion of the basin. Recent measurements showed a significant decrease in concentrations over the past 5 years.

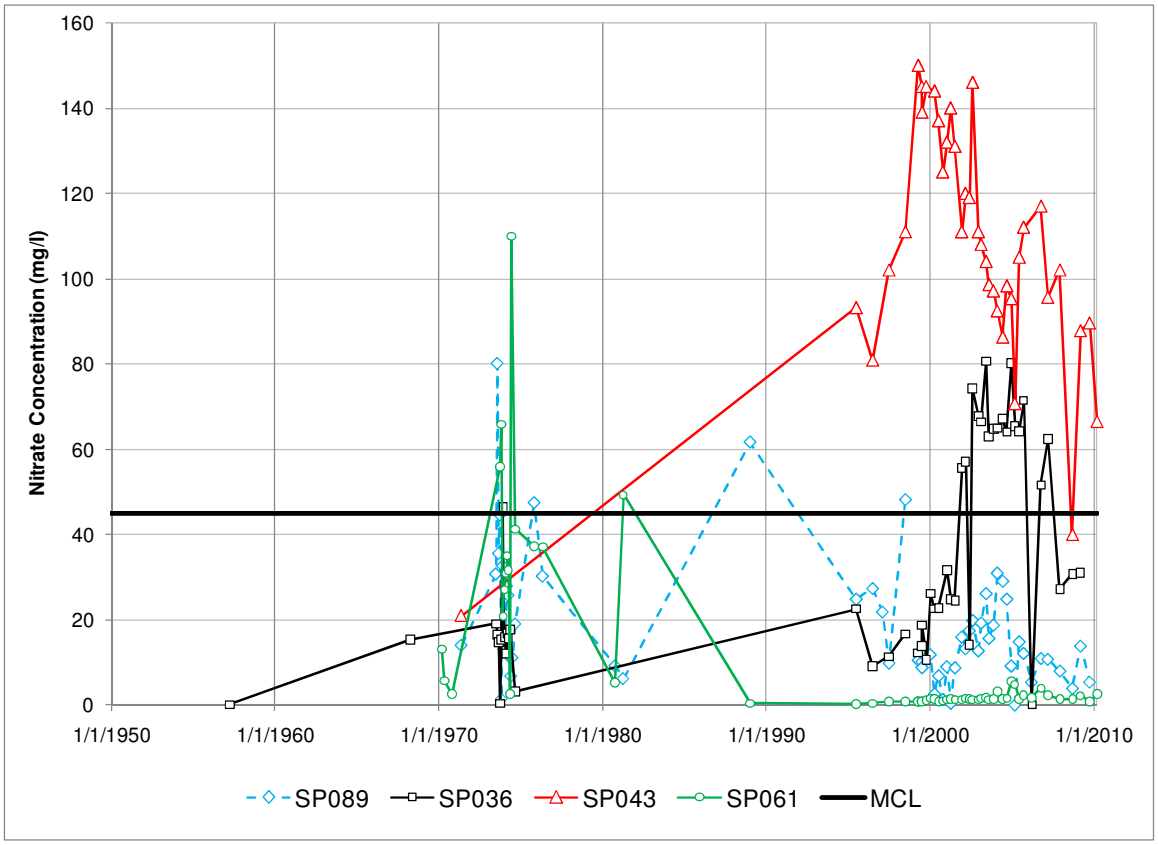

Figure 2-10. Trends in Nitrate Concentrations over Time in San Pasqual Basin

2.3.2 Surface Water Quality

Table 2-1 indicates that surface water monitoring is performed by the City monthly. The list of constituents analyzed in surface water samples is included in Appendix B. Surface water flows into the basin are not monitored at this time; however, the City does take a flow measurement at the time surface water samples are collected. Because TDS and NO_3 are of the greatest concern in the San Pasqual Basin, this section presents information on these constituents in surface water flowing into the basin.

2.3.2.1 Total Dissolved Solids in Surface Water

Figures 2-1 and **2-11** show the six surface water sampling locations in the basin. TDS information for this reporting period (January 2008 through June 2010) is available for five of the six sampling locations. TDS concentrations are lowest in samples collected in the eastern area of the basin on Santa Ysabel Creek and Guejito Creek. TDS concentrations in these locations varied from 241 to 400 mg/L during this reporting period. It should be noted that these are not urban watersheds. Flow from the urban watersheds, Cloverdale, Sycamore, and Kit Carson Creeks, tend to have more highly concentrated TDS levels. TDS measurements at these locations varied from 619 mg/L to 2,160 mg/L. The highest TDS concentrations from these tributaries occur in the summer months when flow rates are at their lowest.

2.3.2.2 Nitrate in Surface Water

Figure 2-12 shows NO_3 data at all of the six surface water sampling locations in the basin for the period from January 2008 through June 2010. The NO_3 concentration is low or not detected in samples collected in the eastern area on Santa Ysabel, Guejito, and Santa Maria Creeks. NO_3 concentrations in these locations varied from a non-detected concentration to 2.13 mg/L during this reporting period. It should be noted that these are not urban watersheds. Flows from the urban watersheds, Cloverdale, Sycamore and Kit Carson Creeks, tend to have more highly concentrated NO_3 values. NO_3 concentrations from these flows varied from a non-detected concentration up to as high as 36.1 mg/L on Cloverdale Creek on May 19, 2010. Like TDS, the highest NO_3 concentrations from these tributaries generally occur in the summer months when flow rates are at their lowest.

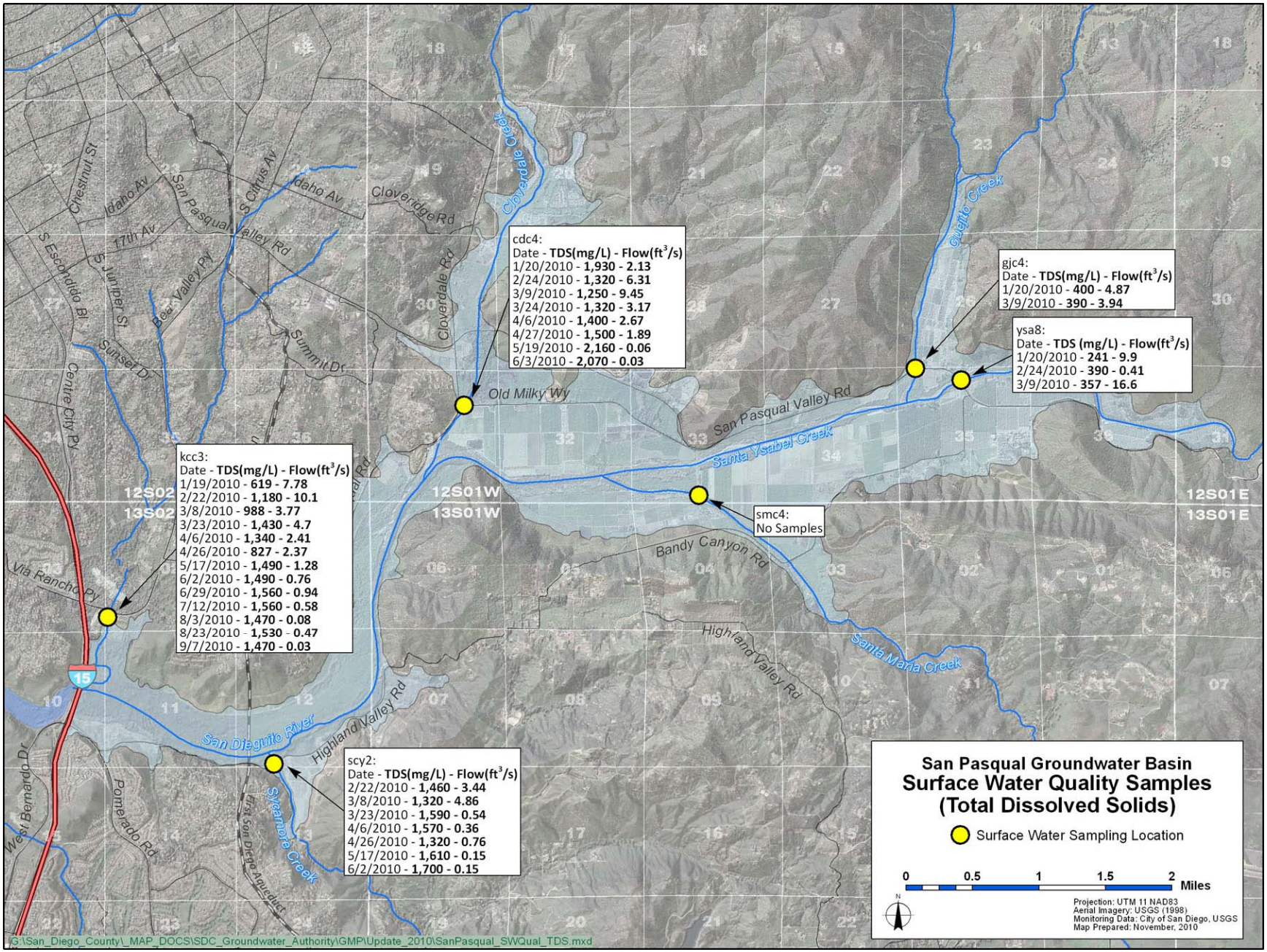

Figure 2-11. Total Dissolved Solids Concentrations in Surface Water Flowing into San Pasqual Basin (2008-2010)

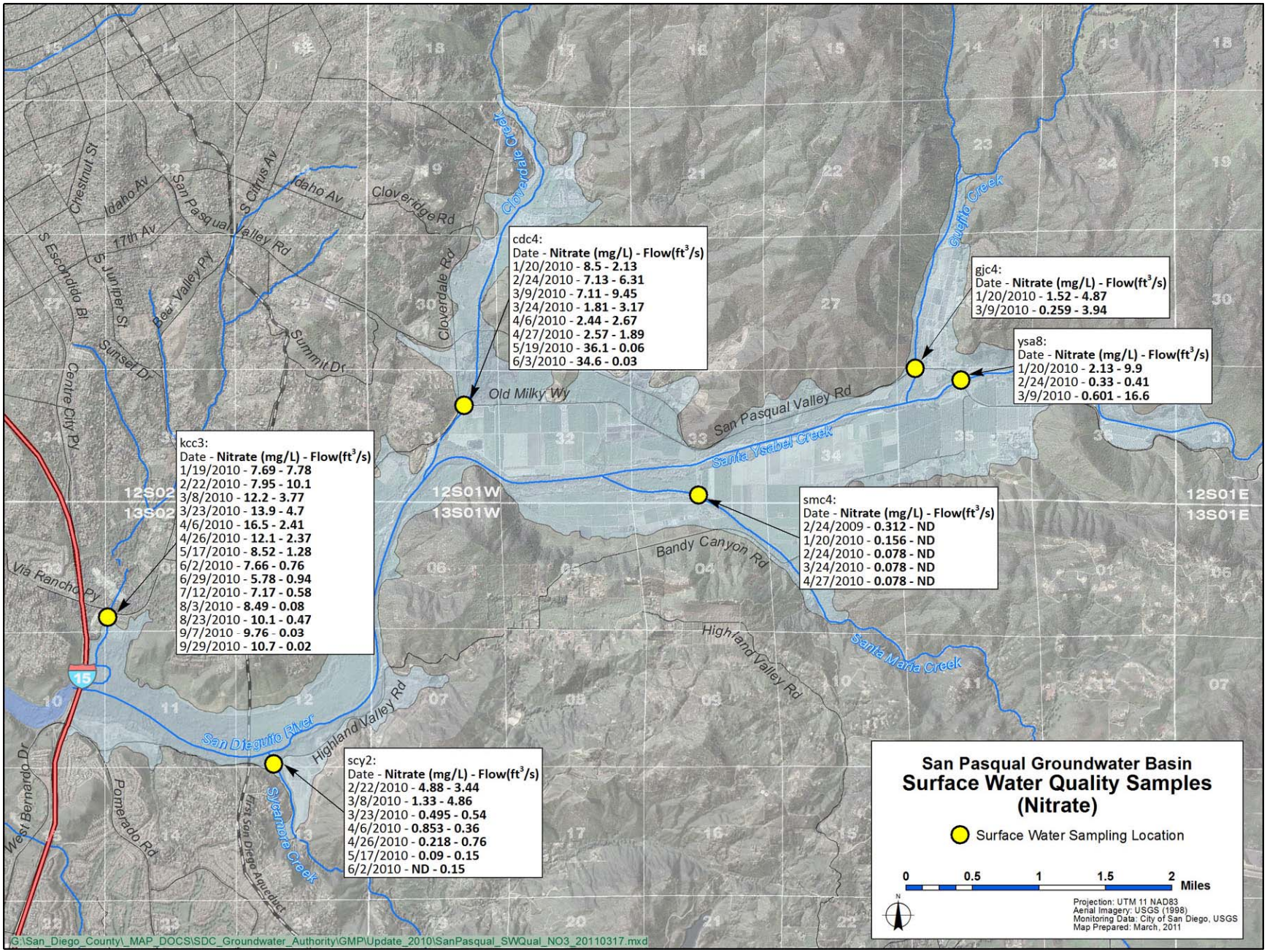

Figure 2-12. Nitrate Concentrations in Surface Water Flowing into San Pasqual Basin (2008-2010)

2.3.3 Land Use in San Pasqual

Figure 2-13 shows that land use in the basin is diverse. Native vegetation in the open spaces, parks, and preserves occupies almost half of the land within the basin. Agriculture accounts for most of the remaining land on the Valley floor. **Appendix C** is a map that details the types of agriculture currently in use in the basin, as provided by DWR and updated by JMLord, Inc., during a tour of the basin in late 2009. Land classified as pasture accounts for approximately 17 percent of the land, while land classified as citrus accounts for approximately 13 percent of the land. Vegetables, native riparian vegetation, and urban area account for the next largest percentages of land, ranging between 10 percent and 15 percent of the land. The remainder of the land is split among field crops, grains and hay, semi-agricultural land (includes livestock feed lots, dairies, and farmsteads), urban landscape, and vineyards, all at less than 10 percent. **Table 2-3** of the San Pasqual GMP summarizes the estimated water demand based on land use and crop type. Although crop types have changed a little since the San Pasqual GMP was adopted, the information provided in the San Pasqual GMP is still considered to be a reasonable estimate.

2.4 GROUNDWATER QUALITY MANAGEMENT

Managing water quality (often salts) within the San Pasqual Basin is of the utmost importance. If water quality is not actively managed the resultant impacts are significant. These impacts include: ending groundwater pumping and in turn eliminating agriculture in the Basin or requiring imported water, local economic impact of losing local agriculture, loss of a regional groundwater supply reservoir, and potential contamination of a key water supply reservoir (Lake Hodges).

The increases in the concentration of salt (TDS and NO_3) in surface and groundwater can be caused by various mechanisms. Evaporative enrichment is the process of increasing salinity levels in surface or groundwater by removing water via evaporation. Water uptake by plants can also increase soil salinity. Water percolating through the ground has salts dissolved in it. Plant roots work by taking in water while excluding salts. The salts left behind will steadily increase in concentration around the roots. Typically these salts are periodically pushed through the root zone or the salt build up will kill the plants. In many agricultural areas, not unlike the San Pasqual Valley, salts are flushed from the soil by applying irrigation water; these salts then enter groundwater.

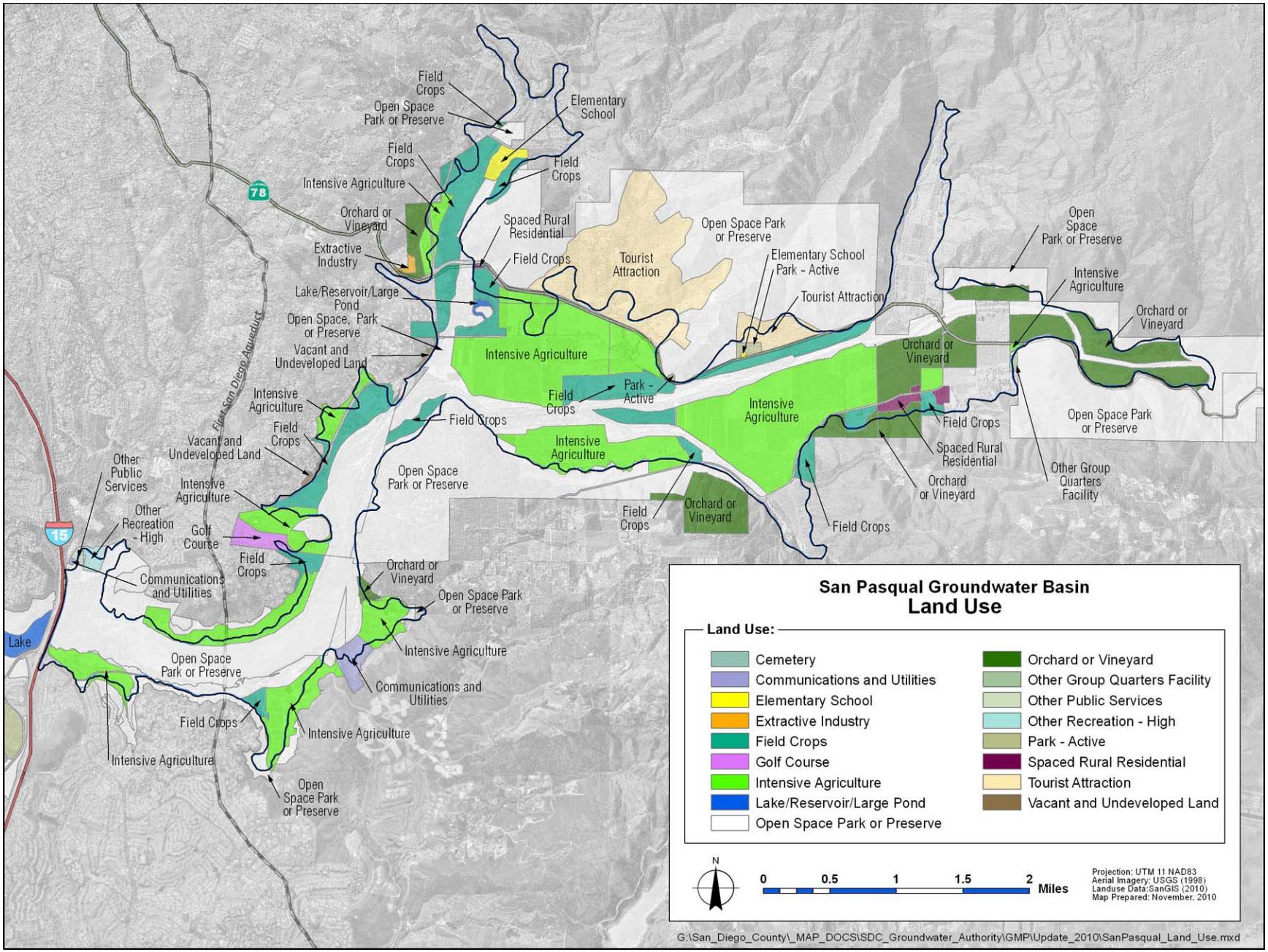

Figure 2-13. Land Use in San Pasqual Basin – 2010

Human activities also affect salinity levels in surface water and groundwater; this has been seen throughout California. Application of fertilizers can contribute salt to surface and groundwater. Nitrogen is a necessary nutrient for plant growth, and nitrogen fertilizers are typically in the form of the salt nitrates. Excess NO_3 fertilizer that is not utilized by plants will dissolve and move to groundwater. Similarly, manure from confined animal facilities contains nutrients and other salts, and can also increase salinity levels in surface and groundwater. Most wastewater treatment systems and facilities do not remove significant amounts of salt. Therefore, most domestic wastewater can increase surface and groundwater salt concentrations. Salts can also be imported via surface water runoff from urban watersheds and percolated into the groundwater body.

Within the San Pasqual Basin, identified sources of potential contamination have been identified in the San Dieguito Watershed Management Plan (Weston Solutions, 2006), and more specifically in the MWH San Pasqual Agricultural Water and Salinity Budget Technical Memorandum (MWH, 2010). These include recreation, urban and industrial runoff, animal grazing, concentrated animal facilities, agriculture, septic systems, and solid and hazardous wastes. An analysis of operations with the San Pasqual Basin has not been completed within this GMP update, but typical high sources of salts include high concentration animal facilities; in the San Pasqual Basin these are present in dairies and livestock feed lots.

Studies and monitoring will not improve conditions directly but they will help understand the source and spatial distribution of the problem. Removal of mass (e.g. chloride or nitrogen) or dilution will improve conditions and are the mechanisms for improving water quality. Knowing this, the City is taking action to address high salts concentrations in the Basin. As a result of the Groundwater Management Plan (City of San Diego, 2007), management actions were developed to quantify and manage the high salts, and the City is moving forward with these management actions. For example:

- Management Action No. 6 advises more interaction with other watershed managers such as the Cities of Escondido, Poway, and the County of San Diego, to determine interests in considering improved standard to protect water quality and impacts of their projects. The City is now actively reviewing planning documents and providing comments to protect San Pasqual water quality.

- Management Action No. 26 calls for the development of a numerical groundwater model to evaluate the salt management alternatives. This has been completed and

utilized to consider conjunctive use alternatives to improve supply reliability and water quality.

- Management Action No. 38 recommends the City to review land use practices that may have adverse conditions to water quality and implement best management practices. A salinity study was conducted to evaluate and quantify potential salt sources. As a result of this study the City is now in the process of updating agricultural leases to address best management practices to reduce adverse impacts.

- Management Action No. 45 advocates for evaluating the feasibility of demineralization (removal of salts) and conjunctive use (dilution and removal of mass) within the San Pasqual Basin as a form of groundwater quality improvement. Alteratives continue to be evaluated that will increase reliability and improve water quality.

- As part of several management actions, continued regular groundwater quality monitoring by the City has provided great value in determining ambient water quality of the basin and distribution of salts within the Basin. These data assist in locating contaminant sources and project siting, such as demineralization extraction and/or conjunctive use recharge/extraction. It is recommended that the monitoring program continue.

In conjunction with these management actions and continued monitoring, it is strongly recommended that the City follow through with the recommendations outlined in San Pasqual Agricultural Water and Salinity Budget (MWH, 2010). The groundwater water quality in the basin is currently being degraded by agricultural processes. These recommendations aimed to decrease agricultural water use (concentrated return flows) and water quality impacts are as follows:

- Complete irrigation distribution uniformity evaluations (every two years).

- Salinity Management, using soil samples pre and post leaching with reporting that includes quantity recommendations based on irrigation system parameters, crop salt tolerances and soil types.

- Irrigation Scheduling, using the current CIMIS station and soil moisture monitoring with reporting that includes quantity recommendations based on irrigation system parameters, crop factors and soil types.

- Use of Best Management Practices (BMP) for crop production.

- Recommendations to decrease salt and nutrient use in agriculture production areas follows:

    - Nutrient Management, using tracking to monitor nutrient input and removal through crop harvest for all agricultural farming activities including orchards, animal facilities, turf and nurseries.

    - Routine testing of organic fertilizer being used to estimate nutrient and salt applications.

The groundwater management discussion here is a subset dedicated to water quality management. It is strongly recommended that the City continue surface water and groundwater monitoring, follow through with the recommendations outlined in San Pasqual Agricultural Water and Salinity Budget (MWH, 2010), and the implementation of the GMP (Groundwater Management Actions listed in Appendix D) to protect the water quality of the Basin. Groundwater Management Actions and implementation of the GMP are further discussed in Section 3 of this report.

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Section 3– Basin Management Activities

Management activities in the basin from 2008 to 2010 are described in three general categories in this section: overall implementation of the San Pasqual GMP, specific management activities by the City that warrant more detailed discussion, and other management activities beyond those identified in the San Pasqual GMP.

3.1 IMPLEMENTATION OF THE SAN PASQUAL GROUNDWATER MANAGEMENT PLAN

The San Pasqual GMP adopted by the City in November 2007 indentified 49 specific management actions for the groundwater basin. Significant progress was achieved in implementing these actions throughout the period from January 2008 to June 2010. While many of the actions are considered ongoing, many others have been completed. **Appendix D** provides a detailed status for each of the adopted actions.

3.2 KEY SAN PASQUAL GMP ACCOMPLISHMENTS

Several key management actions identified in the San Pasqual GMP warrant more detailed discussion. These include: (1) San Pasqual Conjunctive Use Study, (2) San Pasqual Groundwater Desalination Demonstration Project, and (3) San Pasqual Groundwater Monitoring Program Expansion. The City made significant progress on these activities from January 2008 to June 2010. Each is summarized in **Table 3-1** and discussed further below.

Table 3-1. Summary of Key Groundwater Management Activities in San Pasqual Basin

Project	Description	Start Date	End Date	Current Status	Planned Activities
San Pasqual GMP Implementation	Implementing the elements and recommendations from the GMP. Specialized services include well monitoring and basin analysis, resource protection, BMPs for agriculture leases, estimated groundwater use, development of water rates, and general technical assistance.	9/29/2008	6/1/2011	Implementing GMP basin recommendations, well characterization field activities complete. State of the Basin report currently being prepared by MWH.	Presentation of the State of the Basin report to San Pasqual Community Groups/stakeholders. Revise existing DMS database to include new GIS data for wells and water quality data.
San Pasqual Brackish Groundwater Desalination Demonstration Project	Pilot project to determine the feasibility of a full-scale 5-mgd desalination facility at the western end of the basin. Project consisted of extracting and desalinating native groundwater via reverse osmosis treatment for potable uses.	3/29/2007	8/2010	Project is complete. Final draft report has been submitted, City comments to report have been submitted to consultant (City of San Diego Public Utilities Department, 2010).	None.
San Pasqual Conjunctive Use Study	Feasibility study in San Pasqual Basin for storage and recovery of up to approximately 10,000 acre-feet per year of imported water for optimum use and increased reliability of the basin.	7/1/2007	7/2012	Final Feasibility Study is complete (City of San Diego Public Utilities Dept., 2010). Consultant is currently working on a new task to evaluate alternatives for source water.	Consultant team will continue evaluating potential options, including evaluation of the use of recycled water supplies.
DWR Monitoring Well Elevation	Hydrogeological consulting services in the San Pasqual Basin to include assessing basin characteristics, wells, and equipment for groundwater level monitoring.	9/23/2011	6/30/2013	Field work for DWR well inspections is complete	Meet with DWR to begin planning and selection of monitoring well equipment and review task orders.
USGS Monitoring Well	Install a multi-depth monitoring well in San Pasqual basin at a depth of 300 feet.	10/11/2010	10/24/2010	Drilling of 3-piezometer multi-depth well is complete. Vault installation is complete.	Install equipment for monitoring. Provide data online at USGS website, monitor for one year.
USGS Monitoring Wells (CIP)	Installation of two additional multi-depth monitoring wells in San Pasqual basin.	2011	2013	Finalizing Joint Funding Agreement	Project initiation
San Pasqual River Restoration Project	TBD	TBD	TBD		

Key:
BMP = best management practice
DMS = Data Management System
DWR = California Department of Water Resources
GIS = geographic information system
GMP = Groundwater Management Plan
mgd = million gallons per day
TBD = to be determined
USGS = U.S. Geological Survey

3.2.1 San Pasqual Conjunctive Use Study

Begun in July 2007, the purpose of the Conjunctive Use Study (City of San Diego Public Utilities Department, 2010) was to evaluate the feasibility for storage and recovery of imported water for seasonal storage in the groundwater basin to optimize use of surface and groundwater supplies and increase the water supply reliability of the basin. The feasibility study was completed in May 2010 and work has conducted to further evaluate sources of water for basin storage including local runoff and recycled water. Study conclusions are summarized below:

- The results of groundwater modeling indicate that a conjunctive use project could yield up to 3,000 acre-feet annually. This is consistent with past estimates.
- The conjunctive use project could be coordinated with the proposed groundwater desalination facility to optimize management of the basin.
- Recharge activities under the conjunctive use project could help increase long-term water levels and improve water quality in the basin that would help sustain additional pumping for the desalination project.
- Extracted water from the conjunctive use project could be blended with high-TDS water before treatment at the desalination facility. This could also reduce potential treatment costs.
- The desalination project could also provide treatment to the water extracted from the conjunctive use project, if necessary.

3.2.2 San Pasqual Groundwater Desalination Demonstration Project

Begun in March 2007, the objective of the pilot project was to determine the feasibility of a full-scale 5-mgd desalination facility at the western end of the basin where TDS and NO_3 concentrations are relatively high. The project consisted of extracting and desalinating native groundwater via reverse osmosis (RO) treatment for potable uses. The project report was completed in August 2010. Study conclusions are summarized below:

- The water extracted from well BH-4B (source water) contained high levels of TDS and NO_3, which were expected, but also unexpected high levels of iron and

manganese in quantities that exceeded historical water quality data for the western portion of the basin. More information on the hydrogeology of the western portion of the basin is needed.

- Additional pretreatment is required to reduce levels of iron and manganese before traditional membrane treatment for desalination.

- The membrane treatment approach used a three-stage system composed of nanofiltration membranes in the first stage and RO membranes in the second and third stages.

- The pilot demonstration was successful in maintaining 85-percent recovery throughout the operational period with minimal fouling or scaling except during the period of improper pretreatment operation. With proper pretreatment, the system can be pushed to higher recovery – approaching 88 percent.

3.2.3 San Pasqual Groundwater Monitoring Program Expansion

Section 2 of this report presents San Diego's groundwater monitoring network and describes the results of recent groundwater monitoring in the basin. The City intends to continue monitoring these locations and intends to enhance this network with dedicated equipment installed in specific wells to monitor groundwater levels and temperatures. Funding assistance is being provided by DWR for one monitoring well and the City continues to explore opportunities for additional grant funding from DWR. The City has been successfully working with the U.S. Geologic Survey (USGS) for the construction of three new monitoring wells in the basin. To date, one of these new USGS wells has been constructed and two additional wells are planned.

3.3 OTHER GROUNDWATER MANAGEMENT ACTIVITIES IN SAN PASQUAL

In addition to making significant progress in the implementation of action items identified in the San Pasqual GMP, the City conducted a salinity study and rate study in the basin. These activities are briefly described below.

3.3.1 Salinity Study

The purpose of this study was to develop a detailed water budget and salinity budget to evaluate the salt-loading impacts in the basin using existing information. Water and salt budgets were developed to understand the movement of water and salts within the basin.

These budgets were used to evaluate current basin conditions. This study also involved touring confined animal facilities within the basin to better understand if best management practices are being followed for the protection of surface and groundwater quality. The water and salinity budget tools developed for this study can and should be used to reassess salinity impacts as new and more comprehensive groundwater and surface water quality data become available as the result of implementing the monitoring plan documented in the San Pasqual GMP adopted in November 2007, and refined under this San Pasqual GMP implementation contract (i.e., Monitoring Matrix). The study results indicate that reductions in salt loading are possible through improved nutrient management, routine testing of organic fertilizers, and improved irrigation scheduling.

3.3.2 Rate Study

The purpose of the rate study is to provide the analytical background for selecting an appropriate method of establishing water rates to be charged for pumping by City customers in the basin. Key to this study is its Decision Framework: a range of rate alternatives are defined followed by an evaluation of these rate alternatives against explicit criteria. This rate study included consideration of the costs and benefits of water consumption in the basin. Based on these analyses, this report provided several recommendations that the City is evaluating, including the need for universal metering, implementation of volumetric pricing, and development of parcel-specific water budgets.

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Section 4 – Summary and Recommendations

Throughout the reporting period of 2008 to 2010, the City made significant strides toward ensuring a reliable groundwater basin for future generations and advancing successful implementation of the City's Vision Plan for San Pasqual. The San Pasqual GMP presented 49 management actions developed with input from the groundwater stakeholders in the basin. During this reporting period, the City has either completed or is making progress in completing 32 of these actions.

As stated in the introduction to this report, the San Pasqual GMP adopted by the City includes five primary objectives. The City has made significant progress toward meeting each of these objectives. That progress is summarized below.

4.1 SAN PASQUAL GROUNDWATER MANAGEMENT PLAN OBJECTIVES

4.1.1 Protect and Enhance Water Quality

The City has made progress in achieving the goal of protecting and enhancing groundwater quality by completing a demonstration desalinization test on the western side of the basin. This technology is proving feasible at reducing the high TDS and No_3 concentrations in groundwater that will increase the beneficial uses of groundwater in the basin. Progress is also being made by the City in meeting this objective through the development and implementation of a comprehensive groundwater and surface water monitoring program to better understand potential sources of groundwater contamination in the basin. The City is recording groundwater monitoring data that allows for assessment of trends by basin managers.

4.1.2 Sustain a Reliable, Local Groundwater Supply

The City has made progress toward the objective of sustaining a reliable, local groundwater supply by completing a groundwater modeling study, a salinity study, and through the collection of groundwater level data in the basin. The groundwater modeling study helped refine the City's understanding of the basin-scale water budget. The groundwater modeling tool will be useful in establishing groundwater pumping goals based on hydrologic year type to protect the basin from over pumping. The salinity study

was helpful in better understanding the sources and quantities of salts being carried into the basin via surface water sources and through various land-use practices.

4.1.3 Reduce Dependence on Imported Water

The City's objective in reducing dependence on imported water was advanced through the completion of the Conjunctive Use Feasibility Study and the Desalination Demonstration Project (City of San Diego Public Utilities Department, 2010) during this reporting period. Combined, these projects could result in an estimated 6,000 acre-feet of new yield from the basin. These projects involve artificial recharge of imported water, local runoff, or recycled water in the eastern and central areas of the basin during periods of surplus water. This stored water could then be extracted and run through a desalination facility in dry periods. The City is currently in the process of reviewing remaining data gaps and evaluating recharge options.

4.1.4 Improve Understanding of Groundwater Elevation, Basin Yield and Hydrogeology

Significant progress is being made by the City to improve the understanding of the basin groundwater elevation, basin yield, and hydrogeology through the completion of the studies described in the preceding section. The Conjunctive Use Feasibility Study included the completion of a pilot boring and construction of a monitoring well that filled a data gap in an area of the basin where information was lacking. The City has been successful at obtaining grant funds from DWR for one deep boring and monitoring well. Two additional USGS monitoring wells will be installed between 2011 and 2013.

4.1.5 Partner with Agricultural and Residential Communities to Continue to Improve Implementation of Best Management Practices

As part of the San Pasqual Salinity Study completed by the City in 2010, the study team toured the basin and observed land-use practices. Based on their observation and discussions with leaseholders, recommendations are provided on how to further protect groundwater quality through the implementation of best management practices.

4.2 RECOMMENDATIONS FOR GMP OBJECTIVES AND ACTION ITEMS

The following recommendations build on the management actions developed in the San Pasqual GMP and help in achieving the BMOs. These recommendations are intended to incrementally guide the City in achieve their GMP goals and objectives. Listed below

are recommended action items for the City to 1) help understand and enhance the sustainability and quality of groundwater the Basin and 2) protect the groundwater resource for beneficial uses.

Recommendation 1: Develop Implementation Plan for Water Pricing – The rate study helped establish a framework for developing a fair unit cost of water in San Pasqual. The implementation plan should address the following:

- ***Universal Metering*** – Installing reliable water meters for all 57 leaseholders in the basin should be of the highest priority. The cost of meter purchase and installation, along with operation and maintenance costs, should be included in the implementation plan. This is the first step in generating a fair unit cost of water – knowing what people are using. A side benefit is that this is the simplest way to reduce uncertainty in the water budget.

- ***Implement Volumetric Pricing as Soon as Practicable*** – Charging a price for water pumped from the basin contributes to San Pasqual GMP BMOs by providing water customers with incentives for efficient water use. Volumetric pricing will also provide consistency with the treatment of other City water customers.

- ***Begin Development of Parcel-Specific Water Budgets***. Given that the City is striving to establish a "safe yield" for the basin based on hydrologic year type, water budget-based rate structures constitute an alternative form of volumetric rate that could help enact adherence to a "safe" yield.

Recommendation 2: Stakeholders List – Annual review and update of the stakeholders in the basin should precede all planned outreach efforts and will aid in the coordination/communication efforts described in the San Pasqual GMP.

Recommendation 3: Land-Use Authority Coordination – Contact with the land-use authority should be established in the watershed. Agencies such as the cities of Escondido and Poway, and the County of San Diego should be coordinated with formally to determine interests in considering improved standards to protect surface water quality.

Recommendation 4: Continue Biannual Reporting – The 2007 San Pasqual GMP was a concerted effort to enhance the long-term sustainability of groundwater within the basin. The City coordinated with stakeholders to protect this resource for beneficial uses

including water supply, agriculture, and the environment. The biannual reporting provides transparency to the community, demonstrates accountability, and verifies the City's commitment to the San Pasqual GMP.

Recommendation 5: Update DMS – Maintaining a custodian of the database and updating the Data Management System is vital to moving forward in managing the basin. Key actions depend on being able to efficiently input, update, or access groundwater quality and elevation data. Surface water quality data and flows into the basin should also be maintained in the DMS.

Recommendation 6: Implement Agricultural Recommendations – The salinity study completed in 2010 listed several agricultural (e.g., dairies, ostrich farms, stables) recommendations for implementation. The recommendations can provide a significant impact to water quality at little cost to the City and lessees.

Section 5 – References

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APPENDIX A

San Pasqual Basin
2010 Groundwater Management Status Report

CITY OF SAN DIEGO, CALIFORNIA

COUNCIL POLICY

CURRENT

SUBJECT:	PROTECTION OF WATER, AGRICULTURAL, BIOLOGICAL AND CULTURAL RESOURCES WITHIN THE SAN PASQUAL VALLEY
POLICY NO.:	600-45
EFFECTIVE DATE:	June 27, 2005

BACKGROUND:

For at least 50 years, the San Diego City Council has protected the treasured agricultural preserve of the San Pasqual Valley as well as the public's investment in water resources within the Valley by using land around Lake Hodges and its watershed for agriculture uses which are compatible with the vision to protect water quality, preserve open space and maintain the Valley's rural character.

Beginning in the late 1940's the City of San Diego Water Department began acquiring large parcels of land in the San Pasqual Valley for water-supply purposes. At present time, the City owns most of the land in the Valley, with only a very small portion remaining in private ownership. The Real Estate Assets Department currently manages the land on behalf of the Water Department, leasing the property in a manner which is consistent with the goals of protecting the watershed, rural character and biological resources of the San Pasqual Valley.

The San Pasqual Valley Plan, adopted by the San Diego City Council on June 27th 1995 and amended in March 1996, recognizes the Valley as an important water, agricultural and natural resource, home to San Diego County's most sensitive habitats. The Plan, however, also designates a finite number of sites for limited commercial uses associated with low-impact recreation and agriculture. Today, with the increasing urbanization of surrounding communities, the natural resources of the Valley could be threatened. In the time since the Plan's adoption it has become apparent that some approved land uses are deteriorating the vision for the Valley.

The Multiple Species Conservation Program (MSCP) is a regional conservation plan in which the City of San Diego is a participating member. The City Council, on March 18, 1997, authorized the City's MSCP implementing agreement with the U.S. Fish and Wildlife Agency and the California Fish and Game (R28455), thereby agreeing to implement the City of San Diego MSCP Subarea Plan and other MSCP implementing regulations. Section 1.5.9 of the Subarea Plan sets forth specific management policies and directives for San Pasqual Valley, including biological management measures, land management and planning directives, and access planning guidelines, however these policies do not cover the entire San Pasqual Valley area.

In addition to the adoption of the San Pasqual Valley Plan and the MSCP Subarea Plan, in 2002 the City Council adopted the Strategic Framework Element as part of the City's General Plan Update. The Strategic Framework Element reinforces the preservation of San Pasqual Valley for agricultural use and open space. Further, the General Plan identifies the large City-owned agricultural preserve in the San Pasqual Valley as a unique feature that adds significantly to the overall image and quality of life typical of San Diego.

As an historic step in protecting the San Pasqual Valley's vital water resources, preserving it's rural character and encouraging appropriate agricultural uses, in 2004 the San Pasqual Vision Plan was drafted. The plan recognizes the groundwater resources, natural habitat values, sustainable agricultural opportunities, cultural and historic resources, and outdoor recreational opportunities present in the San Pasqual Valley and the responsibility of the City to manage these lands. One of the goals listed in the plan is the preparation and adoption of this Council Policy to prohibit any further commercialization of the San Pasqual Valley and protect the rural character.

PURPOSE:

It is the desire of the City of San Diego to ensure the long-term protection of the significant water resources within the San Pasqual Valley, as these resources will play an important role in helping to meet the City's future water supply needs. It is also the desire of the City to preserve the Valley's significant agricultural areas, sensitive native habitats and unique scenic qualities. The irreplaceable glimpses of San Diego's natural and cultural heritage that are preserved within this Valley must not be lost. Significant biological and cultural resources will be protected and properly managed; quality of the groundwater basin will be ensured; appropriate agricultural activities will be facilitated; and compatible, passive recreational uses will be pursued. All of these goals are to be accomplished for the enjoyment and appreciation of future generations. This Council Policy will reinforce the goals of both the General Plan and the San Pasqual Valley Community Plan, which identify the San Pasqual Valley as an agricultural preserve with significant open space values.

POLICY:

It shall be the policy of the City to preserve the existing rural character of the San Pasqual Valley by tailoring the Valley's zoning and land use policies prohibiting any further commercialization and further protecting the Valley's vital water resources. The City shall protect the quality and capacity of the San Pasqual/Lake Hodges Surface Water and Groundwater Basin as well as protect, enhance and restore sensitive habitats within the Valley. The City shall educate the public on the importance of the Valley's resources, in order to build a sense of stewardship to sustain the long-term success of the important natural resources of the San Pasqual Valley. The City is directed to preserve, promote and sustain agricultural uses in the Valley. The City shall seek to build consensus with surrounding jurisdictions and other entities in order to ensure a mutual understanding of the need to be sensitive to the vision for the Valley. Implementation of this Policy should ensure that the primary goal of protecting water resources and subsequent goals of natural habitat preservation, retention of agriculture, and passive recreation are achieved in a manner which is complimentary to each other, thus avoiding any condition in which one goal would compete with another. Together these actions, along with any additional protections which the City Manager may identify, are intended to ensure the permanent protection of the San Pasqual Valley's unique water, agricultural, biological and cultural resources.

IMPLEMENTATION:

The protection of water resources, agricultural, biological and cultural resources within the San Pasqual Valley is intended to be implemented through the following actions:

1) The City shall institute an amendment to the Land Development Code to tailor the types of uses allowed in the AG-1-1 zone, as to prohibit uses which are detrimental to the vision for the San Pasqual Valley. The City shall next institute a rezone of all City-owned parcels in the Valley from AR-1-1 to AG-1-1, to ensure that all City-owned parcels are in compliance with the vision. This Council Policy is not intended to restrict the ability of the Wild Animal Park to 1) operate its visitor-serving activities within the current or future Park boundaries or 2) to further its animal conservation and propagation mission, including development of new, and renovation or refurbishment of existing, exhibits and facilities, within the limits of its current boundaries or any future leases or rights of entry. Nor is this Policy intended to prohibit those limited commercial uses that are directly associated with the agricultural activities occurring in the Valley. Additionally, the City shall amend the San Pasqual Valley Plan as to strengthen the language describing the types of land uses envisioned for the Valley. In order to complement the Land Development Code Amendment to the AG-1-1 zone, the San Pasqual Valley Plan shall be amended with language clearly establishing the intention for a strict limitation on development within the Valley. The Community Plan language should provide the framework to further protect the Valley's vital natural resources, reinforcing the goals of previously adopted documents to maintain the Valley as an agricultural preserve.

2) The City, jointly with other stakeholders, is preparing a San Dieguito River Watershed Management Plan. Preparation of a San Pasqual Groundwater Basin Management Plan is included as part of the City evaluation and potential development of the groundwater while protecting the agriculture resource. These plans shall include an evaluation of how best to effectively protect, manage, and utilize the Valley's water resources, while considering agricultural uses, native habitats, cultural resources, and passive recreational opportunities. As the primary landowner in the San Pasqual Valley, the City of San Diego is responsible for ensuring that there is a high quality drinking water supply for City of San Diego residents. Much of the land owned by the City has the potential to influence the quantity and quality of source water that reaches the groundwater and Lake Hodges, one of the City's water supply reservoirs. The Water Department is responsible for managing these watershed lands and the groundwater basin to meet their water supply objectives.

3) In order to provide a comprehensive review of existing and proposed leases in the San Pasqual Valley, the City shall establish a multi-discipline review committee consisting of staff representatives from various City departments. The committee shall prepare an annual report summarizing the status of all leases in the San Pasqual Valley. This report shall also include the status of proposed habitat management actions, as well as the identification of obstacles related to implementation, and a study of leasehold boundaries, including identification of sensitive habitat encroachment. In addition to the report, the City shall establish an encroachment monitoring program to ensure the leaseholders activities are consistent with the terms and conditions of their lease. Finally, the annual report shall provide a summary of ongoing recreation projects in the Valley as well as identify potential areas appropriate for

habitat restoration activities, consistent with the San Dieguito River Watershed Management Plan, which is currently being developed.

4) The City shall work with other public agencies to create a comprehensive interpretive program for the San Pasqual Valley, including the construction of an interpretive center. A major component of any successful habitat preservation project is to educate the citizenry about the importance of the natural features which are contained within that area. In order to ensure the long-term success of the San Pasqual Valley it is important for the residents of San Diego to recognize the Valley's unique natural habitat, its historical role in terms of watershed protection. The Valley is a unique natural and archaeological treasure that is envisioned to become a valuable educational and interpretive resource for the surrounding communities. Interpretive programs often encompass informational exhibits, interpretive stations, interpretive signage, educational resources and materials, as well as interpretive centers. The specific location of trails within the planning area would be proposed by organizations such as the San Dieguito River Park Joint Powers Authority (JPA) and reviewed and approved by the Water, Real Estate Assets and Development Services Deparments. Existing resources, including the San Pasqual Battlefield State Historic Park, the San Diego Wild Animal Park, Sikes Adobe, the Mule Hill/San Pasqual Trail, the Orfilia Vineyards, the San Diego Archaeological Center and the Ruth Merrill Interpretive Trail should all become key components which will serve as hubs along a developed interpretive corridor. City staff shall work closely with public agencies, organizations and community members to provide a variety of interpretive and educational resources throughout the Valley.

5) The City shall establish a San Pasqual Land Use Task Force to devote its focus and attention to current issues which relate to present San Pasqual Valley leaseholds or which affect the integrity and preservation of the Valley. The Task Force shall evaluate the merits of long-term leases, in order to preserve, promote and sustain agricultural uses which are compatible with the protection of water quality. The San Pasqual Land Use Task Force shall be comprised of a total of nine to eleven members from various community groups, City departments and other agencies, including: the San Pasqual/Lake Hodges Community Planning Group, the Rancho Bernardo Community Planning Board, the San Diego Wild Animal Park, the City's Real Estate Assets Department, the City's Water Department, the City's Planning Department, the Farm Bureau, the Natural Resource Conservation District, and a resident selected by the City Councilmember with jurisdiction over the San Pasqual Valley. Members of the Task Force shall be appointed by the Councilmember with jurisdiction over the San Pasqual Valley. Following the completion of their evaluation of the leasehold process, the Task Force shall submit a report of their findings, including recommendations, to the Councilmember.

6) The City shall seek to establish cooperative relationships with the surrounding municipalities, agencies and community planning groups, adjacent to the San Pasqual Valley. Because issues such as water quality, ground water recharge and habitat preservation do not necessarily follow jurisdictional boundaries, governmental bodies and other organizations must work together to protect the beneficial uses of the watershed. In order to ensure that development proposed around the perimeter of the Valley, as well as upstream of the Valley, will not have a negative impact on the qualities and resources of the San Pasqual Valley, the City shall meet

with neighboring entities to convey the importance of addressing onsite urban runoff and storm water issues, including attention to downstream conditions of concern, flooding, erosion and water quality. In addition, the City shall request that these entities institute a practice of regular notification to the City's Real Estate Assets Department, of any land use proposals around the perimeter of the Valley, which may potentially impact the Valley. This coordination should take account of both public and private development projects, including transportation and public utility projects. The entities involved in this collaborative partnership should specifically include the surrounding jurisdictions of Poway, Escondido and the County of San Diego, as well as other agencies and organizations, including the San Pasqual/Lake Hodges Community Planning Group, the Rancho Bernardo Community Planning Board and the San Dieguito River Park JPA.

7) All City Departments shall be required to notify both the San Pasqual/Lake Hodges Community Planning Group and the Rancho Bernardo Community Planning Board of any proposals, public or private, that may affect the lands included within the boundaries of the San Pasqual Valley Plan area. Although the San Pasqual/Lake Hodges Community Planning Group is the City's officially-recognized community planning group for the San Pasqual Valley, per Council Policy 600-24, the Rancho Bernardo Community Planning Board has a long history of participation with land use issues related to the protection of the San Pasqual Valley, therefore will continue this role as well.

8) The City shall identify and review ways to ensure the long-term protection of the Valley's unique water, agricultural, biological and cultural resources. One option the City shall explore is the possibility of an amendment to the City Charter establishing the requirement that a majority vote of the people shall be obtained before any development which is inconsistent with the Council-adopted San Pasqual Valley Plan can be approved within the Valley. Included in this potential City Charter amendment should be the language that a majority vote of the people would also be required prior to the sale of any City-owned property within the San Pasqual Valley for purposes other than agriculture or habitat preservation. The City shall also explore the possible establishment of a conservation easement or appropriate land dedication over the Valley to permanently protect water, agricultural and biological resources. Included in this action, the City Attorney shall provide a legal analysis of the applicability of the Williamson Act to publicly-owned agricultural land. Additionally, the City shall explore the potential to dedicate all of the City-owned parcels within the San Pasqual Valley as parkland. All of the above options should take into account the understanding that they would most likely require that the City reimburse the Water Department for the acquisition of the property, as the property was originally purchased for "water storage" purposes. Finally, the City shall study the potential for further land acquisitions to expand the boundaries of the San Pasqual Valley. By exploring these and other options, the City can develop a feasible solution to permanently protecting the precious resources of the San Pasqual Valley.

PHASING:

The eight steps outlined as the implementation actions in this policy represent a comprehensive strategy for accomplishing the vision for the San Pasqual Valley, to ensure the long-term protection of the Valley's unique water, agricultural, biological and cultural resources.

Initial steps to implement the vision should include:

- A rezone action for all City-owned property in the San Pasqual valley to AG-1-1 (with the exception of the Wild Animal Park).
- A Land Development Code Amendment to the AG-1-1 zone as to forbid a number of non-agricultural uses that are not appropriate in the Valley.
- A Community Plan Amendment to the San Pasqual Valley Plan.
- On a case-by-case basis, consider entering into long-term leases with those uses that are clearly compatible with the vision for the Valley.
- Ensuring that both the San Pasqual/Lake Hodges Community Planning Group and the Rancho Bernardo Community Planning Board are informed of all planning and land use issues that pertain to the San Pasqual Valley Plan Area.
- Exploration of ways to permanently protect the San Pasqual Valley.

Mid-term implementation actions should include:

- Preparation of a San Pasqual/Lake Hodges Surface Water and Groundwater Basin Management Plan.
- Establishment of a San Pasqual Land Use Task Force.
- Creation of a comprehensive interpretive program.

Long-term/ongoing actions include:

- Construction of an interpretive center.
- Preparation of annual status report on leasehold activities.
- Establishment of collaborative partnerships among the adjacent jurisdictions.
- Implementation of the San Dieguito Watershed Management Plan.

HISTORY:

Adopted by Resolution R-300588 06/27/2005

APPENDIX B

San Pasqual Basin
2010 Groundwater Management Status Report

Appendix B

Surface Water Quality Constituents Analyzed in San Paqual Basin

Organic Analytes
1,1,1,2-tetrachloroethane
1,1,1-trichloroethane
1,1,2,2-tetrachloroethane
1,1,2-trichloroethane
1,1,2-trichlorotrifluoroethane
1,1-dichloroethane
1,1-dichloroethene
1,1-dichloropropene
1,2,3-trichlorobenzene
1,2,4-trichlorobenzene
1,2,4-trimethylbenzene
1,2-dichlorobenzene
1,2-dichloroethane
1,2-dichloropropane
1,3,5-trimethylbenzene
1,3-dichlorobenzene
1,3-dichloropropane
1,4-dichlorobenzene
2,2-dichloropropane
2-chlorotoluene
3-Hydroxycarbofuran
4-chlorotoluene
4-isopropyltoluene
Acenaphthylene
Alachlor
Aldicarb sulfone
Aldicarb sulfoxide
Aldicarb
Aldrin
Anthracene
Atrazine
BHC, Gamma isomer
Baygon
Benzene
Benzo(A)anthracene
Benzo(A)pyrene
Benzo(G,H,I)perylene
Benzo(K)fluoranthene
Benzo(b)fluoroanthene
Bis-(2-ethylhexyl) phthalate
Bromobenzene
Bromochloromethane
Bromodichloromethane
Bromoform
Bromomethane
Butyl benzyl phthalate
Carbaryl

Inorganic Analytes	MDL/Units
Avg Depth	FT
Suspended Solids (TSS)	mg/l
Total Nitrogen	mg/l
Width	FT
Aluminum	10.000 UG/L
Aluminum (Dissolved)	2.000 UG/L
Ammonia-N(MDL)	mg/L
Antimony	1.000 UG/L
Antimony (Dissolved)	0.500 UG/L
Arsenic	2.000 UG/L
Arsenic (Dissolved)	1.000 UG/L
Barium	20.000 UG/L
Beryllium	1.000 UG/L
Beryllium (Dissolved)	0.200 UG/L
Boron	5.000 UG/L
Boron (Dissolved)	5.000 UG/L
Cadmium	1.000 UG/L
Cadmium (Dissolved)	1.000 UG/L
Chromium	1.000 UG/L
Chromium (Dissolved)	1.000 UG/L
Conductivity	US/CM
Copper	2.000 UG/L
Copper (Dissolved)	2.000 UG/L
Dissolved Barium	1.000 UG/L
Dissolved Oxygen	MG/L
Flow	FT^3/S
Lead	2.000 UG/L
Lead (Dissolved)	2.000 UG/L
Manganese	2.000 UG/L
Manganese (Dissolved)	2.000 UG/L
Nickel	2.000 UG/L
Nickel (Dissolved)	2.000 UG/L
Nitrate(MDL)	mg/l
Nitrite (NO2)	mg/l
Ortho phosphates	mg/l
Oxidation-Reduction Potential	MV
pH	pH
Phosphorus	mg/L
Selenium	3.000 UG/L
Selenium (Dissolved)	3.000 UG/L
Silver	1.000 UG/L
Temp Deg. C	
Thallium	ug/l
Thallium	1.000 UG/L
Thallium (Dissolved)	ug/l
Thallium (Dissolved)	0.200 UG/L
Total Dissolved Solids	mg/L

Appendix B

Surface Water Quality Constituents Analyzed in San Paqual Basin

Organic Analytes
Carbofuran
Carbon tetrachloride
Chlorobenzene
Chlorodibromomethane
Chloroethane
Chloroform
Chloromethane
Chrysene
DBCP
Di-Isopropyl-Ether
Di-n-butyl phthalate
Dibenzo(A,H)anthracene
Dibromomethane
Dichlorodifluoromethane
Dieldrin
Diethyl phthalate
Diethylhexylphthalate
Dimethyl phthalate
EDB
Endrin
Ethyl Tertiary Butyl Ether
Ethylbenzene
Fluorene
Heptachlor epoxide
Heptachlor
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclopentadiene
Indeno(1,2,3-CD)pyrene
Isopropylbenzene
Methiocarb
Methomyl
Methoxychlor
Methyl-tert-butyl ether
Methylene chloride
Molinate
Naphthalene
ORTHO_XYLENE
Oxamyl
PCB 1016 / 1242
PCB 1221
PCB 1232
PCB 1248
PCB 1254
PCB 1260
Phenanthrene
Propachlor

Inorganic Analytes	MDL/Units
Total Organic Carbon	mg/l
Vanadium	ug/l
Vanadium	3.000 UG/L
Vanadium (Dissolved)	ug/l
Vanadium (Dissolved)	3.000 UG/L
Zinc	ug/l
Zinc	8.000 UG/L
Zinc (Dissolved)	ug/l
Zinc (Dissolved)	8.000 UG/L

Appendix B

Surface Water Quality Constituents Analyzed in San Paqual Basin

Organic Analytes
Pyrene
Simazine
Styrene
Tertiary amyl methyl ether
Tetrachloroethylene
Thiobencarb
Toluene
Total Chlordane
Total Toxaphene
Trichloroethylene
Trichlorofluoromethane
Trifluralin
Vinyl chloride
cis-1,2-dichloroethene
cis-1,3-dichloropropene
gamma-BHC
meta,para xylenes
n-butylbenzene
n-propylbenzene
sec-butylbenzene
t-Butyl alcohol
tert-butylbenzene
trans-1,2-dichloroethene
trans-1,3-dichloropropene

Appendix B

Groundwater Quality Constituents Analyzed in San Paqual Basin

Inorganic Analytes	Units	MDL
1,1,1,2-tetrachloroethane	UG/L	0.2
1,1,1-trichloroethane	UG/L	0.2
1,1,2,2-tetrachloroethane	UG/L	0.2
1,1,2-trichloroethane	UG/L	0.2
1,1,2-trichlorotrifluoroethane	UG/L	0.2
1,1-dichloroethane	UG/L	0.2
1,1-dichloroethene	UG/L	0.2
1,1-dichloropropene	UG/L	0.2
1,2,3-trichlorobenzene	UG/L	0.2
1,2,4-trichlorobenzene	UG/L	0.2
1,2,4-trimethylbenzene	UG/L	0.2
1,2-dichlorobenzene	UG/L	0.2
1,2-dichloroethane	UG/L	0.2
1,2-dichloropropane	UG/L	0.2
1,3,5-trimethylbenzene	UG/L	0.2
1,3-dichlorobenzene	UG/L	0.2
1,3-dichloropropane	UG/L	0.2
1,4-dichlorobenzene	UG/L	0.2
2,2-dichloropropane	UG/L	0.2
2-chlorotoluene	UG/L	0.2
4-chlorotoluene	UG/L	0.2
4-isopropyltoluene	UG/L	0.2
Acenaphthylene	UG/L	0.5
Alachlor	UG/L	0.5
Aldrin	UG/L	0.075
Anthracene	UG/L	0.5
Atrazine	UG/L	0.4
Benzene	UG/L	0.2
Benzo(A)anthracene	UG/L	0.5
Benzo(A)pyrene	UG/L	0.1
Benzo(b)fluoroanthene	UG/L	0.5
Benzo(G,H,I)perylene	UG/L	0.5
Benzo(K)fluoranthene	UG/L	0.5
BHC, Gamma isomer	UG/L	0.2
Bis-(2-ethylhexyl) phthalate	UG/L	3
Bromobenzene	UG/L	0.2
Bromochloromethane	UG/L	0.2
Bromodichloromethane	UG/L	0.2
Bromoform	UG/L	0.2
Bromomethane	UG/L	0.2
Butyl benzyl phthalate	UG/L	0.5
Carbon tetrachloride	UG/L	0.2
Chlorobenzene	UG/L	0.2
Chlorodibromomethane	UG/L	0.2
Chloroethane	UG/L	0.2
Chloroform	UG/L	0.2
Chloromethane	UG/L	0.2
Chrysene	UG/L	0.5

Inorganic Analytes	Units	MDL
Aluminum	UG/L	15
Antimony	UG/L	1
Arsenic	UG/L	2
Barium	UG/L	10
Beryllium	UG/L	1
Bicarbonate	MG/L	
Boron	UG/L	10
Bromide	MG/L	0.1
Cadmium	UG/L	1
Calcium	MG/L	
Calcium Hardness (CaCO3)	MG/L	2
Carbonate	MG/L	
Chloride	MG/L	0.5
Chromium	UG/L	1
Copper	UG/L	5
Fluoride	MG/L	0.1
Iron	UG/L	50
Lead	UG/L	2
Magnesium	MG/L	
Manganese	UG/L	2
Mercury	UG/L	0.2
Nickel	UG/L	2
Nitrate	MG/L	0.4
Non-Carb-Hard	MG/L	
Ortho phosphates	MG/L	0.2
Partial Alkalinity(Carbonate)	MG/L	0
Perchlorate	UG/L	4
pHs	PH	
Potassium	MG/L	0.5
Selenium	UG/L	3
Silica	MG/L	2.5
Silver	UG/L	3
Sodium	MG/L	20
Sulfate	MG/L	0.5
Thallium	UG/L	1
Total Alkalinity	MG/L	3
Total Dissolved Solids	MG/L	10
Total Hardness (CaCO3)	MG/L	2
Total Organic Carbon	MG/L	0.3
Turbidity	NTU	0.07
Vanadium	UG/L	2
Zinc	UG/L	15

Appendix B

Groundwater Quality Constituents Analyzed in San Paqual Basin

Inorganic Analytes	Units	MDL
cis-1,2-dichloroethene	UG/L	0.2
cis-1,3-dichloropropene	UG/L	0.2
DBCP	UG/L	0.01
DBCP	UG/L	0.2
Dibenzo(A,H)anthracene	UG/L	0.5
Dibromomethane	UG/L	0.2
Dichlorodifluoromethane	UG/L	0.2
Dieldrin	UG/L	0.02
Diethyl phthalate	UG/L	0.5
Diethylhexylphthalate	UG/L	2
Di-Isopropyl-Ether	UG/L	0.2
Dimethyl phthalate	UG/L	0.5
Di-n-butyl phthalate	UG/L	2
EDB	UG/L	0.02
EDB	UG/L	0.2
Endrin	UG/L	0.1
Endrin	UG/L	0.1
Ethyl Tertiary Butyl Ether	UG/L	0.2
Ethylbenzene	UG/L	0.2
Fluorene	UG/L	0.5
gamma-BHC	UG/L	0.2
Heptachlor	UG/L	0.01
Heptachlor epoxide	UG/L	0.01
Hexachlorobenzene	UG/L	0.5
Hexachlorobenzene	UG/L	0.5
Hexachlorobutadiene	UG/L	0.2
Hexachlorocyclopentadiene	UG/L	0.2
Hexachlorocyclopentadiene	UG/L	0.5
Indeno(1,2,3-CD)pyrene	UG/L	0.5
Isopropylbenzene	UG/L	0.2
meta,para xylenes	UG/L	0.5
Methoxychlor	UG/L	0.5
Methoxychlor	UG/L	0.5
Methylene chloride	UG/L	0.2
Methyl-tert-butyl ether	UG/L	0.2
Molinate	UG/L	0.5
Naphthalene	UG/L	0.2
Naphthalene	UG/L	0.4
n-butylbenzene	UG/L	0.2
n-propylbenzene	UG/L	0.2
ORTHO_XYLENE	UG/L	0.2
Phenanthrene	UG/L	0.5
Propachlor	UG/L	0.5
Propachlor	UG/L	0.4
Pyrene	UG/L	0.5
sec-butylbenzene	UG/L	0.2
Simazine	UG/L	0.5

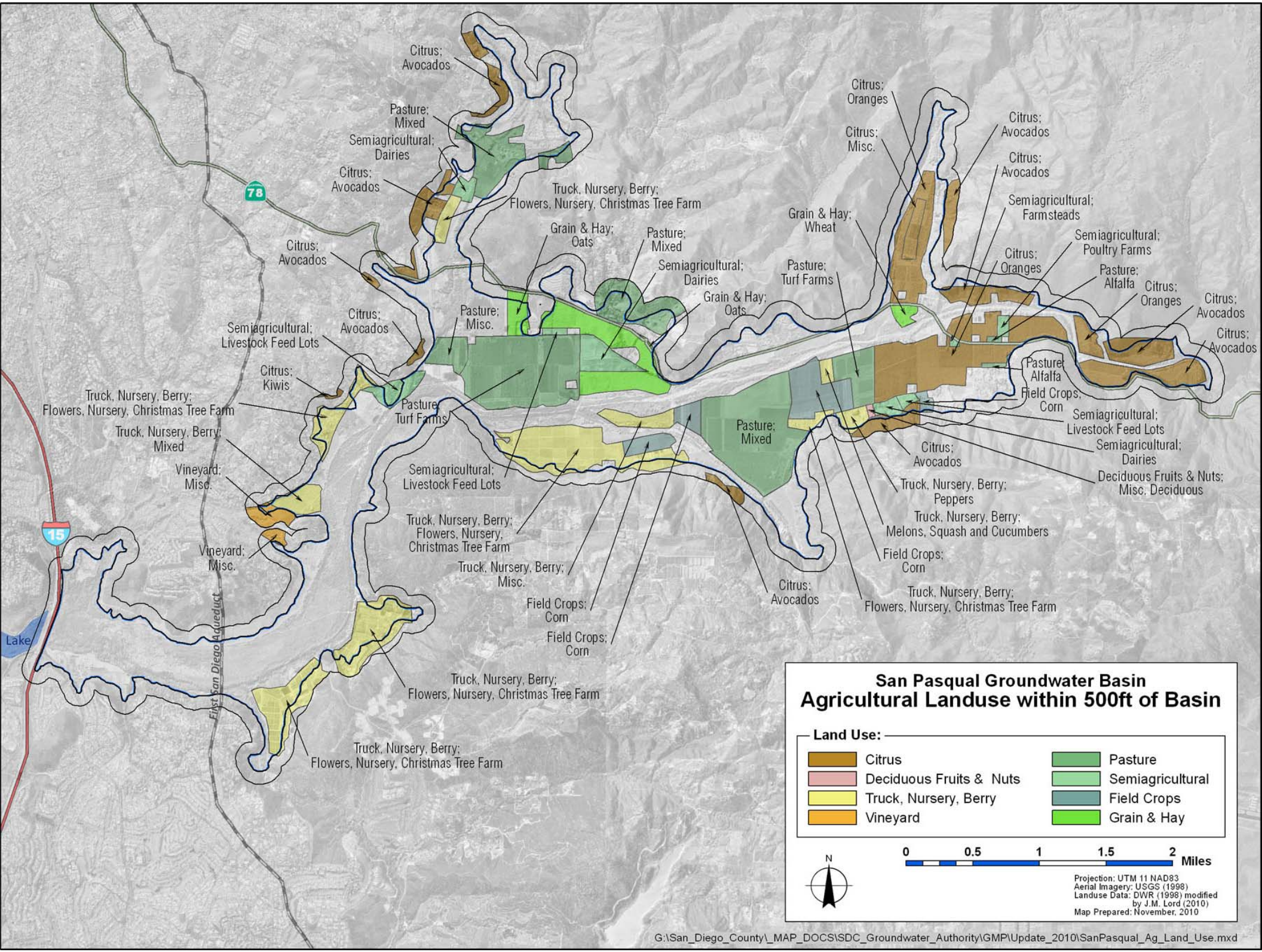
Appendix B

Groundwater Quality Constituents Analyzed in San Paqual Basin

Inorganic Analytes	Units	MDL
Styrene	UG/L	0.2
t-Butyl alcohol	UG/L	1.7
tert-butylbenzene	UG/L	0.2
Tertiary amyl methyl ether	UG/L	0.2
Tetrachloroethylene	UG/L	0.2
Thiobencarb	UG/L	0.5
Toluene	UG/L	0.2
trans-1,2-dichloroethene	UG/L	0.2
trans-1,3-dichloropropene	UG/L	0.2
Trichloroethylene	UG/L	0.2
Trichlorofluoromethane	UG/L	0.2
Trifluralin	UG/L	0.5
Vinyl chloride	UG/L	0.2

APPENDIX C

San Pasqual Basin
2010 Groundwater Management Status Report


Citrus; Avocados
Pasture; Mixed
Semiagricultural; Dairies
Citrus; Avocados
Truck, Nursery, Berry; Flowers, Nursery, Christmas Tree Farm
Grain & Hay; Oats
Pasture; Mixed
Semiagricultural; Dairies
Grain & Hay; Oats
Citrus; Avocados
Pasture; Misc.
Citrus; Avocados
Semiagricultural; Livestock Feed Lots
Citrus; Kiwis
Truck, Nursery, Berry; Flowers, Nursery, Christmas Tree Farm
Truck, Nursery, Berry; Mixed
Vineyard; Misc.
Pasture; Turf Farms
Semiagricultural; Livestock Feed Lots
Truck, Nursery, Berry; Flowers, Nursery, Christmas Tree Farm
Truck, Nursery, Berry; Misc.
Field Crops; Corn
Field Crops; Corn
Vineyard; Misc.
Lake
First San Diego Aqueduct
Truck, Nursery, Berry; Flowers, Nursery, Christmas Tree Farm
Truck, Nursery, Berry; Flowers, Nursery, Christmas Tree Farm
Citrus; Oranges
Citrus; Misc.
Citrus; Avocados
Citrus; Avocados
Semiagricultural; Farmsteads
Grain & Hay; Wheat
Semiagricultural; Poultry Farms
Pasture; Turf Farms
Citrus; Oranges
Pasture; Alfalfa
Citrus; Oranges
Citrus; Avocados
Citrus; Avocados
Pasture; Alfalfa
Field Crops; Corn
Pasture; Mixed
Semiagricultural; Livestock Feed Lots
Semiagricultural; Dairies
Citrus; Avocados
Deciduous Fruits & Nuts; Misc. Deciduous
Truck, Nursery, Berry; Peppers
Truck, Nursery, Berry; Melons, Squash and Cucumbers
Field Crops; Corn
Citrus; Avocados
Truck, Nursery, Berry; Flowers, Nursery, Christmas Tree Farm
78
15
San Pasqual Groundwater Basin
Agricultural Landuse within 500ft of Basin
Land Use:
Citrus
Deciduous Fruits & Nuts
Truck, Nursery, Berry
Vineyard
Pasture
Semiagricultural
Field Crops
Grain & Hay
N
0
0.5
1
1.5
2
Miles
Projection: UTM 11 NAD83
Aerial Imagery: USGS (1998)
Landuse Data: DWR (1998) modified by J.M. Lord (2010)
Map Prepared: November, 2010
G:\San_Diego_County_MAP_DOCS\SDC_Groundwater_Authority\GMP\Update_2010\SanPasqual_Ag_Land_Use.mxd

APPENDIX D

San Pasqual Basin
2010 Groundwater Management Status Report

Appendix D
Status of Groundwater Management Actions in San Pasqual Basin (December 2010)

Implementation Status
Not started
In progress
Completed

Basin Management Objectives (BMO's)	
No. 1	*Protect and enhance groundwater quality.*
No. 2	*Sustain a safe, reliable local groundwater supply.*
No. 3	*Reduce dependence on imported water.*
No. 4	*Improve understand-ing of groundwater elevation, basin yield and hydrogeology*
No. 5	*Partner with agricultural and residential communities to continue to improve implementation of best management practices.*

Management Actions	BMO No. 1.	BMO No. 2.	BMO No. 3.	BMO No. 4.	BMO No. 5.	Comments
Component No. 1 Stakeholder Involvement						
Involving the Public				✓	✓	
1 Update Public Outreach Plan Every Five Years.						To be completed in 2012 - San Pasqual GMP Update presentation to the San Pasqual Hodges Planning Group, August 5, 2010
2 Implement Public Outreach Plan Developed for the San Pasqual GMP.						San Pasqual GMP Update presentation to the San Pasqual Hodges Planning Group, August 5, 2010
3 Provide biannual briefings to the Policy Advisory Committee (PAC) and invite stakeholders listed in**Attachment A,** including the domestic and agricultural groundwater users, on San Pasqual GMP implementation progress.						Lead Public Meeting 3rd Qtr 2010 to report on Status of GMP Implementation. State of the Basin Report 2010 being developed
4 Create a new GMP website or use an existing San Diego website to display San Pasqual GMP information. Relevant website content may include outreach material, groundwater levels, groundwater quality and project updates.						Considered for 2nd Quarter 2010, launch in April or May to coincide with completion of "State of the Basin" Report. Ground Water Reports and Fact Sheets are available through the City's website:http://www.sandiego.gov/water/gen-info/watersupply.shtml
5 Annually review list of stakeholders and update as necessary.						List updated in October 2010
Involving Other Agencies Within & Adjacent to the San Pasqual GMP Area	✓	✓		✓	✓	
6 Contact the land use authority in the watershed such as the Cities of Escondido, Poway, and the County of San Diego, to determine interests in considering improved standard to protect water quality.						Review current actions to protect water quality within watersheds. Develop recommendations for how to improve current situation. Meet with municipal and County staff to present recommendations. Work with municipal and County staff to implement recommendations. August 30, 2010: For the Escondido General Plan Update (Case No.: PHG 09-0020) and Climate Action Plan (Case No.: PHG 10-0016), the City reviewed and provided comments to the Program Environmental Impact Report (PEIR) dated July 22, 2010.
7 Monitor and review new development proposals and projects within the watershed to ensure that these proposals incorporate appropriate measures to protect downstream water quality and water quantity, as described in the Watershed Management Plan.						Need commitment from cities and county to further protect water quality.
8 Provide copies of the adopted San Pasqual GMP and subsequent bi-annual state of the basin assessments to representatives from City of Escondido, San Diego County Water Authority and the County of San Diego and other interested parties.						2nd Quarter 2010. Invite them to download from new website. San Pasqual GMP, Ground Water Reports and Fact Sheets are available through the City's website:http://www.sandiego.gov/water/gen-
Developing Relationships with Local, State and Federal Agencies	✓	✓		✓		

Appendix D
Status of Groundwater Management Actions in San Pasqual Basin (December 2010)

Implementation Status
Not started
In progress
Completed

Basin Management Objectives (BMO's)	
No. 1	*Protect and enhance groundwater quality.*
No. 2	*Sustain a safe, reliable local groundwater supply.*
No. 3	*Reduce dependence on imported water.*
No. 4	*Improve understand-ing of groundwater elevation, basin yield and hydrogeology*
No. 5	*Partner with agricultural and residential communities to continue to improve implementation of best management practices.*

	Management Actions	BMO No. 1.	BMO No. 2.	BMO No. 3.	BMO No. 4.	BMO No. 5.	Comments
9	Establish a formal process whereby jurisdictions in the watershed will notify the Water Department of any new residential, commercial, or agricultural development proposals or projects in the watershed; thus providing an opportunity for the Water Department to review and comment on the development, and verify that measures to protect water quality, as described in the SDWMP are being incorporated into the designs.						To be initiated
10	Partner with local, state and federal regulatory agencies to ensure that non-compliance fees are returned to the City of San Diego to fund water resource improvement programs in San Pasqual Basin.						To be initiated
11	Establish a point of contact within local, state, and federal regulatory agencies that have responsibility for resource management within San Pasqual Basin. Important resource agencies include: DWR, DEH, RWQCB, U.S. Fish and Wildlife Service, California Dept of Fish and Game, JPA, USDA / Forest Service						DWR and JPA are listed as PAC Advisory Committee. Finalized an Agreement, Aug 2010, with DWR for Hydrological Investigations. Task Order #1 Monitoring Equipment Installation, Nov 2010.
	Pursuing Partnership Opportunities	✓	✓	✓	✓	✓	
12	Continue to promote partnerships with water purveyors and municipalities to achieve regional water supply reliability for the City of San Diego in San Pasqual Basin.						In progress with the Desal and Conjunctive Use projects and IRWMP activities.
13	Continue to track and apply for grant opportunities to fund GMP activities and local water management/development projects.						Have applied for and received 1 AB303 grant. Next application expected out in late 2010. 2 AB 303, 1 USBOR, 1 LISA
	Component No. 2 Monitoring Program and Basin Understanding						
	Groundwater Elevation Monitoring		✓		✓		
14	Identify and select production/monitoring well locations for installation of groundwater elevation data loggers.						Completed this with input from City Staff. DWR Agreement, Aug 2010, Hydrological Investigations. Task Order #1 Monitoring Equipment Installation, Nov 2010.
15	Continue to collect and evaluate groundwater elevation data from existing production and monitoring wells.						Effort is ongoing
	Surface Water Flow Monitoring				✓		
16	Continue to collect, evaluate and archive stream flow data from the creeks and streams entering and exiting the basin.						Identified as a priority for funding in 2011
	Groundwater Quality Monitoring	✓	✓		✓		
17	Continue to collect and evaluate relevant existing production and monitoring well groundwater quality data and further identify water quality constituents of concern.						According to monitoring matrix
18	Evaluate the potential mobilization of water quality contaminants as a result of rising groundwater elevations in response to implementation of a conjunctive use within the groundwater basin.						First need solid baseline of monitoring data by implementing the plan outlined in the monitoring matrix

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	Management Actions	BMO No. 1.	BMO No. 2.	BMO No. 3.	BMO No. 4.	BMO No. 5.	Comments
19	Periodically collaborate with the U.S. Geological Survey (USGS) and the State Water Resources Control Board (SWRCB) to include monitoring results from the Groundwater Ambient Monitoring and Assessment (GAMA) program in updates to the bi-annual state of the basin assessment.						Ongoing activity of City Staff. USGS San Pasqual Multilevel Monitoring Well project to be completed by Dec 2010, Project has DWR Grant Agreement w/ scope to update GAMA.
	Surface Water Quality Monitoring	✓	✓		✓		
20	Archive the analytical results of surface water sampling in the SPGMP						Need to verify with watershed group that we have all available data in the DMS. Data received from lab for 2006 to present has been added to DMS
21	Collect and analyze surface water samples for stable isotopes to better understand surface water/groundwater interaction.						Surface water data has been received from lab
	Surface Water Groundwater Interaction	✓	✓		✓		
22	Regularly summarize groundwater and Lake Hodges water quality in the bi-annual state of the basin assessments.						To be included in state of the basin report in 2010
23	Summarize surface water quality data from existing City of San Diego monitoring points in the Bi-annual State of the Basi assessments.						To be included in state of the basin report in 2010
	Protocols for Collection of Groundwater Data	✓	✓		✓		
24	Determine monitoring network adequacy and periodically review and expand as appropriate to meet the needs of the GMP on a 5 year frequency or on a special project need basis.						Should be covered under SBX7.6 Drafting a letter to DWR to meet the Jan 2011 target date to identify monitoring entity
25	Establish protocols for methods and frequency of collection, storing, and disseminating data. These protocols will be documented in the GMP and may be updated in the bi-annual state of the basin assessments.						To be included in state of the basin report in 2010
	Groundwater Reporting and Modeling				✓		
26	Determine the need for a numerical groundwater model and re-evaluate the need during development of the bi-annual state of the basin assessment. If deemed necessary, provide resources for maintaining, updating and utilizing a groundwater model. A potential application of a numerical model may be to assist in the development of a basin wide salt balance.						Groundwater model completed for Conjunctive Use Study
27	Develop and present a bi-annual state of the basin assessment.						Target date is December 2010
28	Review and update of GMP action items bi-annually. This information may be included bi-annual state of the basin reports.						Target date is December 2010
	Evaluate Bedrock Underlying San Pasqual Valley	✓	✓		✓		
29	Review well construction information to identify groups of wells screened within alluvial formations and groups screened within underlying bedrock. If information is available, evaluate grouped well data (quality and elevations) to determine if groundwater within the bedrock system is a viable groundwater water supply resource.						MWH began this process for the GMP, Antero has continued the well evaluation. Evaluation of bedrock was proposed by USGS in the San Pasqual workshop in Feb 2009. This could also be evaluated by DWR under their new contract.
	Data Management System	✓	✓		✓		

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	Management Actions	BMO No. 1.	BMO No. 2.	BMO No. 3.	BMO No. 4.	BMO No. 5.	Comments
30	Bi-annual update Data Management System (DMS) with future groundwater elevation and quality, well construction and lithology, borehole geophysical data and surface water stream gauge data.						MWH has worked with City staff to accomplish this under the GMP implementation contract. DMS to be manage by the Water Reliability Section, Long Range Planning and Water Resources Division.
31	Provide City's available resources for maintaining and updating the DMS.						Contact person within City required
	Component No. 3 Groundwater Resource Protection						
	Well Construction Policies	✓	✓				
32	Ensure that future production and monitoring wells are constructed per the County DEH well ordinance and City of San Diego staff understands the proper well construction procedures.						To be included in state of the basin report in December 2010
33	Inform lessees and other groundwater users who are constructing production and monitoring wells of available information related to water quality concerns to assist with proper well siting. This information may be included on the GMP website.						Potential Implementation Action in 2010-2011
34	Provide lessees and other groundwater users with guidance on the importance and use of exploratory borehole information (lithologic descriptions and geophysical data) in the design and construction of production and monitoring wells. This guidance information may be included on the GMP website.						Potential Implementation Action in 2010-2011
	Well Abandonment and Destruction Policies	✓	✓				
35	Document well status (active, operational, and currently in use), inactive (not currently being used, but operational, with potential for future use), or abandoned (inoperable, or permanently inactive, with no potential for future use) as part of the well inventory survey completed during the development of the GMP. Based on survey results, if wells are classified as inactive, then resurvey every 5 years to establish current well classification and follow appropriate protocols based on well status change. Abandoned wells, not included in the groundwater monitoring program, should be properly destroyed. Based on survey results, if wells are classified as abandoned, develop phased schedule for well destruction following DWR and/or County DEH standards.						Consider requesting AB303 funds in 2010 to destroy known abandoned wells
36	Ensure that land lessees are provided a copy of the County DEH's code and understanding the proper destruction procedures and support implementation of these procedures. A link to this information shall be provided on the "GMP" website.						Potential Implementation Action in 2011-2012
37	Follow up with the County DEH on the reported abandoned and destroyed wells to confirm the information has been provided to the DWR and visa versa. The City of San Diego will also keep a record of well status in the groundwater Data Management System.						Potential Implementation Action in 2011-2012
	Protection of Recharge Areas	✓	✓				

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	Management Actions	BMO No. 1.	BMO No. 2.	BMO No. 3.	BMO No. 4.	BMO No. 5.	Comments
38	If groundwater quality monitoring data indicate groundwater contamination, review current and past land use practices to determine adverse impacts on groundwater quality. If correlations between land use and groundwater contamination are observed, then implement Best Management Practices (BMPs) or report to appropriate enforcement agency.						City has completed a Salt Balance Study to better understand sources of high TDS and nitrates in the basin The City is currently in the process to modify Ag lease contracts to address these concerns.
	Wellhead Protection Measures	✓	✓				
39	If a conjunctive use project is implemented, contact groundwater basin managers in other areas of the state for technical advice, effective management practices, and "lessons learned", regarding establishing wellhead protection areas.						Information being collected as part of the conjunctive use study will be considered before implementing this action
	Control of the Migration and Remediation of Contaminated Groundwater	✓	✓				
40	Continue reviewing groundwater quality data collected for potential presence of contamination and include status in bi-annual state of the basin assessment or every 5 years.						To be included in state of the basin report in 2010
41	If contaminant detections occur take the appropriate action to implement groundwater protection BMP or report to appropriate enforcement agency (i.e. Regional Water Quality Control Board).						The City continues to monitor water quality and elevations in the basin. Based on the findings in the Salinity Report recommendation for additional BMPs, the City may move forward to implement BMPs.
42	If contaminant detection occurs, provide the County DEH and others with all information on mapped contaminant polluters and Leaky Underground Storage Tank (LUST) sites for their information in developing groundwater extraction patterns and in the siting of future production or monitoring wells.						To be completed be City Staff. Contaminant and pollutants require notification to the appropriate authority as standard practices.
43	If contaminant detection occurs, identify point and non-point sources of groundwater contamination.						Salinity assessment is helping characterize non-point sources
	Component No. 4 Groundwater Sustainability						
	Conjunctive Management Activities			✓			
44	Continue to investigate conjunctive use opportunities and implement technically, economically environmentally feasible projects. Consideration should be given to improving the understanding of potential contaminant mobilization during recharge and rising groundwater elevations.						Ongoing and status will be reported in 2010 state of basin report. SP Groundwater Conjunctive Use Study completed May 2010, follow-on studies to be completed in 2012
45	Investigate groundwater desalination opportunities on the west side of the basin.						Ongoing and status will be reported in 2010 state of basin report. City to investigate alternatives to recharge the basin.
	Component No. 5 Planning Integration						

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	Management Actions	BMO No. 1.	BMO No. 2.	BMO No. 3.	BMO No. 4.	BMO No. 5.	Comments
	IRWMP, UWMP, Land Use Planning, and Groundwater Modeling	✓	✓	✓	✓		
46	Establish a point of contact with the San Diego Integrated Regional Water Mgt. Planning process and be involved in preparing grant application for Prop 50, Prop 84, and future funding, through the IRWMP effort.						The City participated in reviewing and commenting on the IRWMP guidelines. Cathy Perroni is the representative for the City. The City participated in the first round and several projects were submitted and subsequently pulled due to the anticipated project schedule.
47	Participate in Vision Plan updates, other relevant planning documents (i.e. UWMP, Land Use Planning, etc.) and water resources management activities.						Water Reliability Section is currently reviewing the UWMP and it is to be finalize early 2011 and Council approval of the plan is anticipated by mid to late 2011
48	The City of San Diego will include a requirement in its Source Water Protection Plan that the City Water Department will review and comment on proposals for development in the San Pasqual/Hodges watershed.						Item to be investigated further and formalized; action plan to be determined.
49	City of San Diego will seek an agreement with all jurisdictions in the drinking water source watershed. This agreement will ensure that those jurisdictions notify the City Water Department for comment on all land use proposals within the drinking water source watershed. Alternatively, the City could initiate legislation to add language to CEQA requiring jurisdictions in a drinking water source watershed to notify the water agency responsible for the drinking water source for comment on all land use proposals within the drinking water source watershed.						Item to be investigated further and formalized; action plan to be determined.

SAN PASQUAL

2010 Groundwater Management State of the Basin Report

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