I hereby certify that the foregoing Agenda was posted at least 72 hours prior to the time of the Regular Meeting so noticed below, at the usual agenda posting location of the San Juan Basin Authority.

Daniel R. Ferons
SAN JUAN BASIN AUTHORITY
and the Board of Directors thereof

AGENDA

SAN JUAN BASIN AUTHORITY
BOARD OF DIRECTORS' MEETING
SANTA MARGARITA WATER DISTRICT
BOARD ROOM
June 12, 2012
1:30 p.m.

Upon Request, this agenda will be made available in appropriate alternative formats to persons with disabilities, as required by Section 202 of the Americans with Disabilities Act of 1990. Any person with a disability who requires a modification or accommodation in order to participate in a meeting should direct such request to Daniel Ferons, Secretary, Board of Directors, at (949) 459-6590 at least 48 hours before the meeting if possible.

ITEMS DISTRIBUTED TO THE BOARD LESS THAN 72 HOURS PRIOR TO MEETING

Pursuant to Government Code section 54957.5, non-exempt public records that relate to open session agenda items and are distributed to a majority of the Board less than seventy-two (72) hours prior to the meeting will be available for public inspection in the lobby of the Authority's business office located at 26111 Antonio Parkway, Rancho Santa Margarita, California 92688, during regular business hours. When practical, these public records will also be made available on the Santa Margarita Water District's Internet Web Site, accessible at http://www.smwd.com. All documents available for public review are on file with the Authority's Secretary located at 26111 Antonio Parkway, Rancho Santa Margarita, California 92688.

I. CALL MEETING TO ORDER

II. PLEDGE OF ALLEGIANCE

III. ORAL COMMUNICATIONS

A. Persons wishing address the Board of Directors on matters not listed on the Agenda may do so at this time. "Request to be Heard" forms are available at the entrance to the Board Room. Comments are limited to three minutes, unless further time is granted by the Presiding Officer. Please submit the form to the Secretary prior to the beginning of the meeting.

Those wishing to address the Board of Directors on any items listed on the Agenda should submit a "request to be Heard" form to the Secretary before the Presiding Officer announces that agenda item. Your name will be called to speak at that time.

IV. CONSENT CALENDAR

A. Consideration and Action on Minutes of Regular Meeting of March 27, 2012..... **Page 4**

Staff Recommendation: Approve subject minutes.

B. Consideration and Action on Monthly Financial Statements for March, April and May 2012..... **Page 8**

Staff Recommendation: Receive and file the Monthly Financial Statements.

Note: Items on the CONSENT CALENDAR will be considered for approval without discussion in one vote. A Director may request that an item be taken off the Consent Calendar for full discussion.

[END OF CONSENT CALENDAR]

V. ACTION ITEMS

A. Consideration and Action on Adoption of Fiscal Year 2012-2013 Operating Budget..... **Page 13**

Staff Recommendation: Adopt the Fiscal 2012-2013 annual budget as presented

B. Consideration and Action on Election of Officers for Fiscal Year 2011-2012..... **Page 17**

Staff Recommendation: Elect the Chairman and Vice Chairman, Re-appoint Daniel Ferons as Secretary and Kristin Griffith as Treasurer for the upcoming Fiscal Year.

C. Presentation on 2011 Annual Integrated Environmental Monitoring Report by Wildermuth Environmental..... **Page 18**

Staff Recommendation: Receive and File the Report.

VI. CHAIRMAN'S REPORT

VII. ATTORNEY'S REPORT

VIII. OTHER MATTERS

A. Open Discussion or items received too late to be agendized.

IX. INFORMATION ITEMS

X. ADJOURNMENT

The next Regular Board of Directors' meeting is scheduled for **July 10, 2012 at 1:30 p.m.** at the Santa Margarita Water District, 26111 Antonio Parkway, Rancho Santa Margarita, California.

Unapproved

MINUTES OF THE MEETING
OF THE BOARD OF DIRECTORS
OF THE
SAN JUAN BASIN AUTHORITY

March 27, 2012

A Meeting of the Board of Directors (Board) of the San Juan Basin Authority (SJBA) was held on Tuesday, March 27, 2012 at the Moulton Niguel Water District, 27500 La Paz Road, Laguna Niguel, CA 92677. The following Directors and/or Alternate Directors were present:

Directors Present:

MIKE DUNBAR, South Coast Water District	Chairperson
LAURA FREESE, City of San Juan Capistrano	Vice Chairperson
JOHN SCHATZ, Santa Margarita Water District	Director
LARRY MCKENNEY, Moulton Niguel Water District	Director

Directors Absent: None

Support Services Present:

DANIEL R. FERONS	Secretary and Administrator
WEST CURRY	Administrator

Others Present:

Allison Burns, Legal Counsel
Mark Wildermuth, Wildermuth Environmental, Inc. (WEI)
Samantha Adams, WEI
Mike Cruikshank, WEI
Jerry King, WEI
John Thornton, PSOMAS
Leslie Gray, Moulton Niguel Water District
Cindy Lane, Santa Margarita Water District

I. CALL MEETING TO ORDER

Chairman Dunbar called the meeting to order at 1:30 p.m.

II. PLEDGE OF ALLEGIANCE

Dan Ferons led the Pledge of Allegiance.

III. ORAL COMMUNICATIONS

Director Dunbar invited members of the public to address the Board on matters that were not on the agenda. There being none, Director Dunbar proceeded with the meeting.

Unapproved

IV. CONSENT CALENDAR

A. Consideration and Action on Minutes of Regular Meeting of February 14, 2012.
B. Consideration and Action on Monthly Financial Statements for January and February 2012.

MOTION NO. 2012-03

Thereafter, upon a motion duly made by Dan Ferons, seconded by Director McKenney to approve the Consent Calendar (Item A - Consideration and Action on Minutes of Regular Meeting of February 14, 2012. Item B - Consideration and Action on Monthly Financial Statements for January and February 2012.) Motion passed 4-0.

V. ACTION ITEMS

A. Workshop Presentation on Update to the San Juan Creek Groundwater Management Plan by Wildermuth Environmental, Inc.

Director Dunbar introduced Dan Ferons. Mr. Ferons reviewed the subject for the workshop which was the State of the Basin report for the San Juan Basin Groundwater Management Plan. He then introduced Mark Wildermuth and Samantha Adams of Wildermuth Environmental, Inc.

Mr. Wildermuth stated that two additional WEI staff members were also present: Mike Cruikshank and Jerry King.

Mr. Wildermuth proceeded with the presentation; the following topics were addressed:

- Investigation Objective
- Outline of Workshop
  - State of the Basin
  - SJBA Water Demand and Supply Plans
  - Yield Concepts
  - What's Next and Schedule to Complete
- Re-evaluation of the Basin Hydrogeology
- Approach to Estimating change in Storage from Gravity Drainage
- The Wei Approach to Groundwater Storage is Well Established
- Climate Change Implications to San Juan Basin Hydrology
- Variation of Annual Precipitation for Selected 50-year Periods
- Re-evaluation of the Basin Water Quality
- Groundwater Quality Data Sources

Ms. Adams proceeded with water quality information.

- Surface Water Quality Data Sources
- Water Supplies and Demands

Mr. Wildermuth continued with the balance of the presentation.

- Yield Concepts
- Sustainability Metrics
- Methods to Estimate Developed Yield
- What's Next and Schedule
- Groundwater Management Plan Alternatives
- Schedule
  - Late April 2012
    - Task 5 Describe Water Management Issues and Strategies
    - Task 6 Define Alternative Management Plans
  - Late June 2012
    - Task 7 Evaluate Alternative Management Plans
  - Late July 2012
    - Task 8 Describe Recommended Plan
    - Task 9 Develop Monitoring and Reporting Protocols
  - Late August 2012
    - Task 10 Submit Draft Report

Mr. Wildermuth responded to questions from the Board and the public.

RECESS

Director Dunbar declared a recess at 2:40 p.m.; the meeting reconvened at 2:50 p.m.

VI. CHAIRMAN'S REPORT

A. Discussion Concerning Regionalization of the San Juan Capistrano Groundwater Recovery Plant Water Production.

Director Dunbar recommended the formation of a sub-committee consisting of Directors Freeze and Schatz to formulate communication points and to consider the feasibility of a regional benefit. There were no objections.

VII. ATTORNEY'S REPORT

Attorney Burns reminded the Board to fill out Form 700.

Unapproved

VIII. OTHER MATTERS

A. Open Discussion or items received too late to be agendized.

IX. INFORMATION ITEMS

X. ADJOURNMENT

There being no further business before the Board of Directors, a motion duly made and seconded to adjourn the meeting at 3:50 p.m. Motion passed unanimously.

Respectfully submitted,

Sharon D. Brimer, Recording Secretary

The next Regular Board of Directors' meeting is scheduled for April 10, 2012 at 1:30 p.m. at the Santa Margarita Water District, 26111 Antonio Parkway, Rancho Santa Margarita, California.

I DO HEREBY CERTIFY that the foregoing Minutes are true and correct copy of the Minutes adopted by the Board of Directors of the SAN JUAN BASIN AUTHORITY.

_____

Daniel R. Ferons, Administrator

SAN JUAN BASIN AUTHORITY

San Juan Basin Authority
Financial Statements
March 2012

	021	026	022	031	029	025	020	032	
	General Fund	P.C. 1 Ortega Well	P.C. 4 Desalter	P.C. 4 Debt Svc	P.C. 9 Well Field	P.C. 10 Monitoring	P.C.11 Future Projects	P.C. 13 USGS Co-Op GIS	Total
ASSETS									
Cash and Investments	$ 102,784	$ -	$ 45,931	$ -	$ -	$ 220,138	$ 3,816	$ 49,039	$ 421,708
Cash and Investment-Restricted for Construction	-	-	36,336	-	-	-	-	-	36,336
Cash and Investment-Restricted for Debt Service	-	-	-	2,306,444	-	-	-	-	2,306,444
Accounts Receivable - Lease prin	-	-	-	24,375,659	-	-	-	-	24,375,659
Prepaids	-	-	-	-	-	-	-	8,133	8,133
Utility Plant in Service	147,274	493,254	-	-	489,004	42,187	-	-	1,171,719
(Less) Accumulated Depreciation	(147,274)	(418,296)	-	-	(458,281)	(41,579)	-	-	(1,065,430)
TOTAL ASSETS	**$ 102,784**	**$ 74,958**	**$ 82,267**	**$ 26,682,103**	**$ 30,723**	**$ 220,746**	**$ 3,816**	**$ 57,172**	**$ 27,254,569**
LIABILITIES AND FUND EQUITIES									
Current - Accounts Payable	$ 3,173	$ -	$ 3,585	$ 439,973	$ -	$ 37,636	$ -	$ -	$ 484,367
Bonds Payable	-	-	-	25,735,000	-	-	-	-	25,735,000
TOTAL LIABILITIES	**3,173**	**-**	**3,585**	**26,174,973**	**-**	**37,636**	**-**	**-**	**26,219,367**
FUND EQUITIES									
Contributed Capital - Fund Balance	$ -	$ -	$ -	$ 4,413	$ -	$ -	$ -	$ -	$ 4,413
SMWD	14,338	41,803	-	-	16,988	28,404	954	6,670	109,157
MNWD	15,390	-	-	-	-	44,805	954	7,756	68,905
CITY OF SAN JUAN CAPISTRANO	15,374	41,804	36,689	-	16,989	49,899	954	7,756	169,465
SCWD	15,811	-	-	-	-	14,693	954	8,840	40,298
Current Year Fund Balance	38,698	(8,649)	41,993	502,717	(3,254)	45,309	-	26,150	642,964
TOTAL FUND EQUITIES	**99,611**	**74,958**	**78,682**	**507,130**	**30,723**	**183,110**	**3,816**	**57,172**	**1,035,202**
TOTAL LIABILITIES AND FUND EQUITIES	**$ 102,784**	**$ 74,958**	**$ 82,267**	**$ 26,682,103**	**$ 30,723**	**$ 220,746**	**$ 3,816**	**$ 57,172**	**$ 27,254,569**
REVENUES									
Investment Income	$ 19	$ -	$ -	$ 61,975	$ -	$ -	$ -	$ -	$ 61,994
Interest pmt from City SJC	-	-	-	1,584,384	-	-	-	-	1,584,384
Investment Income - Lease	-	-	-	-	-	-	-	-	-
Special assessments	$ 65,225	$ -	$ 13,531	$ -	$ -	$ 181,423	$ -	$ 26,150	$ 286,329
TOTAL REVENUES	**65,244**	**-**	**13,531**	**1,646,359**	**-**	**181,423**	**-**	**26,150**	**1,932,707**
EXPENDITURES-OPERATING									
Engineering Expense	$ 16,720	$ -	$ 7,874	$ -	$ -	$ 134,291	$ -	$ -	$ 158,885
Consulting Services	551	-	-	-	-	-	-	-	551
Legal Fees	3,090	-	-	-	-	-	-	-	3,090
Dues	685	-	-	-	-	-	-	-	685
Prior Year Expense	5,500	-	-	-	-	-	-	-	5,500
TOTAL EXPENDITURES-OPERATING	**26,546**	**-**	**7,874**	**-**	**-**	**134,291**	**-**	**-**	**168,711**
EXPENDITURES-NON-OPERATING									
Depreciation Expense	$ -	$ 8,649	$ -	$ -	$ 3,254	$ 1,823	$ -	$ -	$ 13,726
Debt Service and Interest Expense	-	-	-	1,107,306	-	-	-	-	1,107,306
TOTAL EXPENDITURES-NON-OPERATING	**$ -**	**$ 8,649**	**$ -**	**$ 1,107,306**	**$ 3,254**	**$ 1,823**	**$ -**	**$ -**	**$ 1,121,032**
TOTAL EXPENDITURES	**$ 26,546**	**$ 8,649**	**$ 7,874**	**$ 1,107,306**	**$ 3,254**	**$ 136,114**	**$ -**	**$ -**	**$ 1,289,743**
TRANSFERS									
Miscellaneous Transfers	$ -	$ -	$ 36,336	$ (36,336)	$ -	$ -	$ -	$ -	$ -
NET INCOME/(LOSS)	**$ 38,698**	**$ (8,649)**	**$ 41,993**	**$ 502,717**	**$ (3,254)**	**$ 45,309**	**$ -**	**$ 26,150**	**$ 642,964**

San Juan Basin Authority
Financial Statements
April 2012

	021	026	022	031	029	025	020	032	
	General Fund	P.C. 1 Ortega Well	P.C. 4 Desalter	P.C. 4 Debt Svc	P.C. 9 Well Field	P.C. 10 Monitoring	P.C.11 Future Projects	P.C. 13 USGS Co-Op GIS	Total
ASSETS									
Cash and Investments	$ 109,729	$ -	$ 45,931	$ -	$ -	$ 211,179	$ 3,816	$ 49,039	$ 419,694
Cash and Investment-Restricted for Construction	-	-	36,336	-	-	-	-	-	36,336
Cash and Investment-Restricted for Debt Service	-	-	-	2,306,444	-	-	-	-	2,306,444
Accounts Receivable - Lease prin	-	-	-	24,375,659	-	-	-	-	24,375,659
Prepaids	-	-	-	-	-	-	-	8,133	8,133
Utility Plant in Service	147,274	493,254	-	-	489,004	42,187	-	-	1,171,719
(Less) Accumulated Depreciation	(147,274)	(419,257)	-	-	(458,642)	(41,782)	-	-	(1,066,955)
TOTAL ASSETS	**$ 109,729**	**$ 73,997**	**$ 82,267**	**$ 26,682,103**	**$ 30,362**	**$ 211,584**	**$ 3,816**	**$ 57,172**	**$ 27,251,030**
LIABILITIES AND FUND EQUITIES									
Current - Accounts Payable	$ 4,165	$ -	$ 5,153	$ 439,973	$ -	$ 37,017	$ -	$ -	$ 486,308
Bonds Payable	-	-	-	25,735,000	-	-	-	-	25,735,000
TOTAL LIABILITIES	**4,165**	**-**	**5,153**	**26,174,973**	**-**	**37,017**	**-**	**-**	**26,221,308**
FUND EQUITIES									
Contributed Capital - Fund Balance	$ -	$ -	$ -	$ 4,413	$ -	$ -	$ -	$ -	$ 4,413
SMWD	14,338	41,803	-	-	16,988	28,404	954	6,670	109,157
MNWD	15,390	-	-	-	-	44,805	954	7,756	68,905
CITY OF SAN JUAN CAPISTRANO	15,374	41,804	36,689	-	16,989	49,899	954	7,756	169,465
SCWD	15,811	-	-	-	-	14,693	954	8,840	40,298
Current Year Fund Balance	44,651	(9,610)	40,425	502,717	(3,615)	36,766	-	26,150	637,484
TOTAL FUND EQUITIES	**105,564**	**73,997**	**77,114**	**507,130**	**30,362**	**174,567**	**3,816**	**57,172**	**1,029,722**
TOTAL LIABILITIES AND FUND EQUITIES	**$ 109,729**	**$ 73,997**	**$ 82,267**	**$ 26,682,103**	**$ 30,362**	**$ 211,584**	**$ 3,816**	**$ 57,172**	**$ 27,251,030**
REVENUES									
Investment Income	$ 21	$ -	$ -	$ 61,975	$ -	$ -	$ -	$ -	$ 61,996
Interest pmt from City SJC	-	-	-	1,584,384	-	-	-	-	1,584,384
Investment Income - Lease	-	-	-	-	-	-	-	-	-
Special assessments	93,225	-	44,000	-	-	224,000	-	28,500	389,725
TOTAL REVENUES	**$ 93,246**	**$ -**	**$ 44,000**	**$ 1,646,359**	**$ -**	**$ 224,000**	**$ -**	**$ 28,500**	**$ 2,036,105**
EXPENDITURES-OPERATING									
Engineering Expense	$ 17,768	$ -	$ 9,442	$ -	$ -	$ 142,631	$ -	$ -	$ 169,841
Consulting Services	552	-	-	-	-	-	-	-	552
Legal Fees	3,090	-	-	-	-	-	-	-	3,090
Dues	685	-	-	-	-	-	-	-	685
Prior Year Expense	5,500	-	-	-	-	-	-	-	5,500
TOTAL EXPENDITURES-OPERATING	**27,595**	**-**	**9,442**	**-**	**-**	**142,631**	**-**	**-**	**179,668**
EXPENDITURES NON-OPERATING									
Depreciation Expense	$ -	$ 9,610.0	$ -	$ -	$ 3,615.0	$ 2,026.0	$ -	$ -	$ 15,251.0
Debt Service and Interest Expense	-	-	-	1,107,306	-	-	-	-	1,107,306
Member Agency Distributions	21,000		30,469	-	-	42,577	-	2,350	96,396
TOTAL EXPENDITURES NON-OPERATING	**21,000**	**9,610**	**30,469**	**1,107,306**	**3,615**	**44,603**	**-**	**2,350**	**1,218,953**
TOTAL EXPENDITURES	**$ 48,595**	**$ 9,610**	**$ 39,911**	**$ 1,107,306**	**$ 3,615**	**$ 187,234**	**$ -**	**$ 2,350**	**$ 1,398,621**
TRANSFERS									
Miscellaneous Transfers	$ -	$ -	$ 36,336	$ (36,336)	$ -	$ -	$ -	$ -	$ -
NET INCOME/(LOSS)	**$ 44,651**	**$ (9,610)**	**$ 40,425**	**$ 502,717**	**$ (3,615)**	**$ 36,766**	**$ -**	**$ 26,150**	**$ 637,484**

San Juan Basin Authority
Financial Statements
May 2012

	021	026	022	031	029	025	020	032	
	General Fund	P.C. 1 Ortega Well	P.C. 4 Desalter	P.C. 4 Debt Svc	P.C. 9 Well Field	P.C. 10 Monitoring	P.C.11 Future Projects	P.C. 13 USGS Co-Op GIS	Total
ASSETS									
Cash and Investments	$ 106,552	$ -	$ 42,346	$ -	$ -	$ 182,502	$ 3,816	$ 49,039	$ 384,255
Cash and Investment-Restricted for Construction	-	-	36,336	-	-	-	-	-	36,336
Cash and Investment-Restricted for Debt Service	-	-	-	2,306,444	-	-	-	-	2,306,444
Accounts Receivable - Lease prin	-	-	-	24,375,659	-	-	-	-	24,375,659
Prepaids	-	-	-	-	-	-	-	8,133	8,133
Utility Plant in Service	147,274	493,254	-	-	489,004	42,187	-	-	1,171,719
(Less) Accumulated Depreciation	(147,274)	(420,218)	-	-	(459,004)	(41,984)	-	-	(1,068,480)
TOTAL ASSETS	**$ 106,552**	**$ 73,036**	**$ 78,682**	**$ 26,682,103**	**$ 30,000**	**$ 182,705**	**$ 3,816**	**$ 57,172**	**$ 27,214,066**
LIABILITIES AND FUND EQUITIES									
Current - Accounts Payable	$ 1,107	$ -	$ 1,568	$ 439,973	$ -	$ 8,340	$ -	$ -	$ 450,988
Bonds Payable	-	-	-	25,735,000	-	-	-	-	25,735,000
TOTAL LIABILITIES	**1,107**	**-**	**1,568**	**26,174,973**	**-**	**8,340**	**-**	**-**	**26,185,988**
FUND EQUITIES									
Contributed Capital - Fund Balance	$ -	$ -	$ -	$ 4,413	$ -	$ -	$ -	$ -	$ 4,413
SMWD	14,338	41,803	-	-	16,988	28,404	954	6,670	109,157
MNWD	15,390	-	-	-	-	44,805	954	7,756	68,905
CITY OF SAN JUAN CAPISTRANO	15,374	41,804	36,689	-	16,989	49,899	954	7,756	169,465
SCWD	15,811	-	-	-	-	14,693	954	8,840	40,298
Current Year Fund Balance	44,532	(10,571)	40,425	502,717	(3,977)	36,564	-	26,150	635,840
TOTAL FUND EQUITIES	**105,445**	**73,036**	**77,114**	**507,130**	**30,000**	**174,365**	**3,816**	**57,172**	**1,028,078**
TOTAL LIABILITIES AND FUND EQUITIES	**$ 106,552**	**$ 73,036**	**$ 78,682**	**$ 26,682,103**	**$ 30,000**	**$ 182,705**	**$ 3,816**	**$ 57,172**	**$ 27,214,066**
REVENUES									
Investment Income	$ 21	$ -	$ -	$ 61,975	$ -	$ -	$ -	$ -	$ 61,996
Interest pmt from City SJC	-	-	-	1,584,384	-	-	-	-	1,584,384
Investment Income - Lease	-	-	-	-	-	-	-	-	-
Special assessments	93,225	-	44,000	-	-	224,000	-	28,500	389,725
TOTAL REVENUES	**$ 93,246**	**$ -**	**$ 44,000**	**$ 1,646,359**	**$ -**	**$ 224,000**	**$ -**	**$ 28,500**	**$ 2,036,105**
EXPENDITURES-OPERATING									
Engineering Expense	$ 17,768	$ -	$ 9,442	$ -	$ -	$ 142,631	$ -	$ -	$ 169,841
Consulting Services	552	-	-	-	-	-	-	-	552
Legal Fees	3,149	-	-	-	-	-	-	-	3,149
Dues	745	-	-	-	-	-	-	-	745
Prior Year Expense	5,500	-	-	-	-	-	-	-	5,500
TOTAL EXPENDITURES-OPERATING	**27,714**	**-**	**9,442**	**-**	**-**	**142,631**	**-**	**-**	**179,787**
EXPENDITURES NON-OPERATING									
Depreciation Expense	$ -	$ 10,571	$ -	$ -	$ 3,977	$ 2,228	$ -	$ -	$ 16,776
Debt Service and Interest Expense	-	-	-	1,107,306	-	-	-	-	1,107,306
Member Agency Distributions	21,000		30,469	-	-	42,577	-	2,350	96,396
TOTAL EXPENDITURES NON-OPERATING	**21,000**	**10,571**	**30,469**	**1,107,306**	**3,977**	**44,805**	**-**	**2,350**	**1,220,478**
TOTAL EXPENDITURES	**$ 48,714**	**$ 10,571**	**$ 39,911**	**$ 1,107,306**	**$ 3,977**	**$ 187,436**	**$ -**	**$ 2,350**	**$ 1,400,265**
TRANSFERS									
Miscellaneous Transfers	$ -	$ -	$ 36,336	$ (36,336)	$ -	$ -	$ -	$ -	$ -
NET INCOME/(LOSS)	**$ 44,532**	**$ (10,571)**	**$ 40,425**	**$ 502,717**	**$ (3,977)**	**$ 36,564**	**$ -**	**$ 26,150**	**$ 635,840**

San Juan Basin Authority
Operating Budget
Fiscal Year 2011/2012

	Budget	July 2011	Aug	Sept	Oct	Nov	Dec	Jan 2012	Feb	March	April	May	June	Year to Date Expenditures	Budget Remaining
GENERAL FUND (021)	-														
Financial Services	$ 6,225	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 6,225
Legal Fees	7,000	-	-	-	84	1,062	531	-	-	1,413	-	59	-	3,149	3,851
Secretarial Administration	4,000	-	-	82	-	-	-	310	160	-	-	-	-	552	3,448
Audit Services	10,000	-	-	-	-	-	-	-	-	-	-	-	-	-	10,000
Miscellaneous	-	-	-	5,500	-	685	-	-	-	-	-	60	-	6,245	(6,245)
Project Management Services	66,000	-	-	880	5,500	-	3,300	5,280	-	1,760	1,048	-	-	17,768	48,232
	$ 93,225	$ -	$ -	$ 6,462	$ 5,584	$ 1,747	$ 3,831	$ 5,590	$ 160	$ 3,173	$ 1,048	$ 119	$ -	$ 27,714	$ 65,511
Project Committee 4 (022)															
Vegetation Monitoring	$ 44,000	$ -	$ 1,520	$ 847	$ -	$ -	$ 1,340	$ 582	$ -	$ 3,585	$ 1,568	$ -	$ -	9,442	$ 34,558
	$ 44,000	$ -	$ 1,520	$ 847	$ -	$ -	$ 1,340	$ 582	$ -	$ 3,585	$ 1,568	$ -	$ -	$ 9,442	$ 34,558
PROJECT COMMITTEE 10 (025)															
Water Rights Monitoring - Field	$ 124,000	$ 3,865	$ 5,007	$ 1,454	$ 1,675	$ -	$ 11,504	$ 14,287	$ -	$ 2,905	$ 1,297	$ -	$ -	$ 41,994	$ 82,006
** Groundwater Management Plan	181,249	11,432	23,105	3,571	7,517	-	2,625	10,614	8,959	25,772	7,042	-	-	100,637	$ 80,612
	$ 305,249	$ 15,297	$ 28,112	$ 5,025	$ 9,192	$ -	$ 14,129	$ 24,901	$8,959	$28,677	$ 8,339	$ -	$ -	$ 142,631	$ 162,618
PROJECT COMMITTEE 13 (032)															
USGS-Loop Agreement Steam Gauging	$ 28,500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 28,500
	$ 28,500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 28,500
TOTAL BUDGETED EXPENDITURES	$ 470,974	$ 15,297	$ 29,632	$ 12,334	$ 14,776	$ 1,747	$ 19,300	$ 31,073	$9,119	$35,435	$10,955	$ 119	$ -	$ 179,787	$ 291,187

****Note: The FY 2010/11 remaining budget has been added to the FY 2011/12 budget for the continuation of the Groundwater Mgmt Plan**

SAN JUAN BASIN AUTHORITY
OPERATING BUDGET DETAIL/CHECK REGISTER
AS OF MAY 31, 2012

					GENERAL FUND (21)						(021)	PC 4 DESALTER (22)	(022)
					Financial	Legal Fees	Secretarial	Audit	Misc	Contingency	TOTAL	Veg Monitoring	TOTAL
		BUDGET			$ 6,225.00	$ 7,000.00	$ 4,000.00	$ 10,000.00	$ -	$ 66,000.00	$ 93,225.00	$ 44,000.00	$ 44,000.00
Ck #	Date	Vendor	CHECK AMOUNT	Prior Yr Expenses									
		ACCRUALS BAL FWD Prior Year		109,953.42							-		-
2512	7/18/2011	WILDERMUTH ENVIRONMENTAL	52,130.91	(52,130.91)							-		-
2513	8/15/2011	U.S. GEOLOGICAL SURVEY	24,650.00	(24,650.00)							-		-
2514	8/18/2011	SHARON BRIMER	200.00	(200.00)							-		-
2515	8/18/2011	STRADLING YOCCA CARLSON & R	649.00	(649.00)							-		-
2516		VOID		-							-		-
2517	8/18/2011	WILDERMUTH ENVIRONMENTAL	13,479.64	(13,479.64)							-		-
2518		VOID		-							-		-
2519	9/29/2011	WILDERMUTH ENVIRONMENTAL	25,803.48	(10,506.32)							-		-
2520	10/13/2011	PSOMAS	5,500.00						5,500.00		5,500.00		-
2521	11/14/2011	WILDERMUTH ENVIRONMENTAL	5,872.37								-	847.35	847.35
2522	11/14/2011	PSOMAS	880.00							880.00	880.00		-
2523	11/14/2011	STRADLING YOCCA CARLSON & R	84.20			84.20					84.20		-
2524	11/17/2011	WILDERMUTH ENVIRONMENTAL	29,632.22								-	1,520.12	1,520.12
2525	11/17/2011	FECHTER & COMPANY	5,800.00	(5,800.00)							-		-
2526	11/17/2011	SANTA MARGARITA WATER DISTR	2,619.27	(2,537.55)			81.72				81.72		-
2527	11/17/2011	ST WATER RESOURCES CONTRO	684.60						684.60		684.60		-
2528		void									-		-
2529	12/8/2011	PSOMAS	5,500.00							5,500.00	5,500.00		-
2530	12/8/2011	WILDERMUTH ENVIRONMENTAL	9,191.06								-		-
2531	2/7/2012	STRADLING YOCCA CARLSON & R	1,593.00			1,593.00					1,593.00		-
2532	2/7/2012	SHARON BRIMER	310.00				310.00				310.00		-
2533	2/7/2012	WILDERMUTH ENVIRONMENTAL	15,469.46								-	1,339.27	1,339.27
2534	2/28/2012	SHARON BRIMER	160.00				160.00				160.00		-
2535	2/28/2012	WILDERMUTH ENVIRONMENTAL	25,482.25								-	582.59	582.59
2536	2/28/2012	PSOMAS	8,580.00							8,580.00	8,580.00		-
2537	4/2/2012	WILDERMUTH ENVIRONMENTAL	8,959.02								-		-
2538	4/2/2012	STRADLING YOCCA CARLSON & R	55.50			55.50					55.50		-
2539	5/3/2012	PSOMAS	1,760.00							1,760.00	1,760.00		-
2540	5/3/2012	WILDERMUTH ENVIRONMENTAL	32,261.96								-	3,585.05	3,585.05
2541	5/21/2012	DOMAIN REGISTRY OF AMERICA	60.00						60.00		60.00		-
2542	5/21/2012	STRADLING YOCCA CARLSON & R	1,357.00			1,357.00					1,357.00		-
											-		-
		Prior year pending payment		**(0.00)**							-		-
											-		-
		Accruals from FY 11/12								**1,107.00**	1,107.00	**1,568.00**	1,568.00
		BUDGET REMAINING 2011.12			**$ 6,225.00**	**$ 3,910.30**	**$ 3,448.28**	**$ 10,000.00**	**$ (6,244.60)**	**$ 48,173.00**	**$ 65,511.98**	**$ 34,557.62**	**$ 34,557.62**

			PC 10 MONITORING		(10)	PC 13 USGS CO-OP	(13)	(31)	TOTAL BUDGET
			Grdwtr monitoring	Grnd Mgmt Plan	TOTAL	Lp Agree Stm Gauging	TOTAL	Debt Svc Pmts	Used/Remaining
		BUDGET	$ 124,000.00	$ 181,249.00	$ 305,249.00	$ 28,500.00	$ 28,500.00		$ 470,974.00
Ck #	Date	Vendor							
					-		-		-
2512	7/18/2011	WILDERMUTH ENVIRONMENTAL			-		-		-
2513	8/15/2011	U.S. GEOLOGICAL SURVEY			-		-		-
2514	8/18/2011	SHARON BRIMER			-		-		-
2515	8/18/2011	STRADLING YOCCA CARLSON & RAUTH			-		-		-
2516		VOID			-		-		-
2517	8/18/2011	WILDERMUTH ENVIRONMENTAL			-		-		-
2518		VOID			-		-		-
2519	9/29/2011	WILDERMUTH ENVIRONMENTAL	3,865.45	11,431.71	15,297.16		-		(15,297.16)
2520	10/13/2011	PSOMAS			-		-		(5,500.00)
2521	11/14/2011	WILDERMUTH ENVIRONMENTAL	**1,453.82**	**3,571.20**	5,025.02		-		(5,872.37)
2522	11/14/2011	PSOMAS			-		-		(880.00)
2523	11/14/2011	STRADLING YOCCA CARLSON & RAUTH			-		-		(84.20)
2524	11/17/2011	WILDERMUTH ENVIRONMENTAL	**5,006.80**	**23,105.30**	28,112.10		-		(29,632.22)
2525	11/17/2011	FECHTER & COMPANY			-		-		-
2526	11/17/2011	SANTA MARGARITA WATER DISTRICT			-		-		(81.72)
2527	11/17/2011	ST WATER RESOURCES CONTROL BRD			-		-		(684.60)
2528	1/0/1900	void			-		-		-
2529	12/8/2011	PSOMAS			-		-		(5,500.00)
2530	12/8/2011	WILDERMUTH ENVIRONMENTAL	**1,674.87**	**7,516.19**	9,191.06		-		(9,191.06)
2531	2/7/2012	STRADLING YOCCA CARLSON & RAUTH			-		-		(1,593.00)
2532	2/7/2012	SHARON BRIMER			-		-		(310.00)
2533	2/7/2012	WILDERMUTH ENVIRONMENTAL	**11,505.19**	**2,625.00**	14,130.19		-		(15,469.46)
2534	2/28/2012	SHARON BRIMER			-		-		(160.00)
2535	2/28/2012	WILDERMUTH ENVIRONMENTAL	**14,286.57**	**10,613.09**	24,899.66		-		(25,482.25)
2536	2/28/2012	PSOMAS			-		-		(8,580.00)
2537	4/2/2012	WILDERMUTH ENVIRONMENTAL		**8,959.02**	8,959.02		-		(8,959.02)
2538	4/2/2012	STRADLING YOCCA CARLSON & RAUTH			-		-		(55.50)
2539	5/3/2012	PSOMAS			-		-		(1,760.00)
2540	5/3/2012	WILDERMUTH ENVIRONMENTAL	**2,905.41**	**25,771.50**	28,676.91		-		(32,261.96)
2541	5/21/2012	DOMAIN REGISTRY OF AMERICA			-		-		(60.00)
2542	5/21/2012	STRADLING YOCCA CARLSON & RAUTH			-		-		(1,357.00)
0	1/0/1900				-		-		-
		Accruals from FY 11/12	**1,297.00**	**7,043.00**	8,340.00		-		**11,015.00**
		BUDGET REMAINING	**$ 82,004.89**	**$ 80,612.99**	**$ 162,617.88**	**$ 28,500.00**	**$ 28,500.00**	**$ -**	**$ 291,187.48**

SAN JUAN BASIN AUTHORITY

26111 Antonio Parkway • Rancho Santa Margarita, CA 92688 (949) 459-6400 FAX (949) 459-6463

TO: Board of Directors **DATE:** June 12, 2012

FROM: Dan Ferons

SUBJECT: **Adoption of Fiscal Year 2012-2013 Operating Budget**

SUMMARY

Issue: Annually the Authority adopts a fiscal budget for its operation. The draft budget was reviewed and discussed with the member agencies and the Technical Advisory Committee.

Recommendation: Adopt the Fiscal Year 2012-2013 annual budget as presented.

Fiscal Impact: Establishes the annual operating budget.

Previously Related Action: The Authority annually adopts an operating budget.

DISCUSSION

The following proposed budget was reviewed with the member agencies:

Account Description	FY 10/11	FY 11/12	Proposed FY 12/13
Administration	$ 89,500	$ 93,225	$ 132,125
Project Committee 4 (022)	$ 44,000	$ 44,000	$ 25,000
Project Committee 10 (025)	$ 624,000	$224,000	$ 175,000
Project Committee 13 (032)	$ 27,000	$ 28,500	$ 29,000
Total Budget	**$ 684,500**	**$389,725**	**$ 361,125**

General Administration

- SMWD/CSJC provides general management and project management services. The budget provides for consultants acting as extended staff for the Authority. In addition, this year the Authority is proposing to reorganize its records and to develop a digital library and provide web access to data.
- SMWD will provide Financial Services in the amount of $6,225.
- The audit budget is $6,500 for Fechter and Associates.
- The legal services budget in the amount of $15,000; this is an increase to provide for potential agreement revisions and update of policies.
- Secretarial budget for preparation of the minutes in the amount of $4,000 is also included in the budget.

Project Committee 4 (022)
Vegetation Monitoring
The budget has been reduced to $25,000 due to revised permit requirements. This item is required by the terms of the Water Rights permits to assess the effect of groundwater pumping on the native vegetation along San Juan creek. Special observation stations are located at key locations along San Juan Creek and routine observations are needed by a qualified biologist to determine the health of the vegetation during the different seasons of the year. General botanical observations including species composition, amount of yellowing and leaf drop and general wildlife observations are documented costs that are included in the contract with Wildermuth Environmental, Inc.

Project committee 10 (025)
Hydrogeology Monitoring
The budget has been reduced to $75,000 due to revised permit requirements. The collection of hydrogeological data including static water level measurements in pumping wells and also monitoring wells is a requirement of the Water Rights permits. This data is used to calculate the amount of groundwater in storage in various segments of the groundwater basin. If the pumping results in a drawdown of 50% of the storage capacity, the SWRCB has the authority to order a cessation of pumping to avoid the over-drafting of the Basin. Water Quality data is also collected in order to evaluate any adverse conditions that may develop. The cost for the monitoring program is included in the Wildermuth contract awarded for that purpose.

Groundwater Management Plan
The preparation of the updated Groundwater Management Plan continues to be the focus of the Authority work effort and it will extend into the new fiscal year's activities. Funds remain from the current budget and those will carry over into the next year and a proposed additional budget of $100,000 is proposed to respond to any approved scope changes.

Project Committee 13 (032)
USGS – Loop Agreement Stream Gauging
This is a cooperative agreement with the USGS (Federal) and the County of Orange for the operation and maintenance of two gauging stations, one on San Juan Creek at La Novia, and one at Trabuco Creek near City Hall in San Juan Capistrano. The data collected from gauging stations are used to make various calculations on the amount of stream flow that is created each year and result in groundwater recharge and stream flow to the ocean. The cost last year was $28,500, and an amount of $29,000 is included in the proposed 2012-2013 budget.

Financial Impact

The following table summarizes the proposed contribution by agency for the fiscal year:

Agency	Percentage	Amount to be deposited
City of San Juan Capistrano	25%	$90,281.25
Moulton Niguel Water District	25%	$90,281.25
Santa Margarita Water District	25%	$90,281.25
South Coast Water District	25%	$90,281.25
Total	**100%**	**$361,125.00**

Annual billing will be adjusted to reflect any unencumbered funds remaining on deposit for each agency.

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Phase I Administration	FY 11/12	Proposed FY 12/13	Notes
SMWD/CSJC will provide general management and project management services	$66,000	$66,000	SMWD provides services at no charge this year. The budget has been utilized for extended staff services provided by John Thornton
Financial Services	$6,225	$6,225	SMWD provides services, no change proposed
Auditor	$6,775	$10,000	Meyer Hoffman has performed Audit for last three years, budget increase to allow for selection of new auditor at the discretion of the Board
Legal, SYC&R Allison Burns	$6,500	$7,000	Minor budget increase to cover cost increase
Secretarial (contract minutes)	$4,000	$4,000	Sharon Brimer provides the minutes, no change proposed
Subtotal	**$89,500**	**$93,225**	
Project Committee 4 (022)			
Vegetation Monitoring	$44,000	$44,000	The permit has not been amended; this budget may come down prior to adoption.
Project Committee 10 (025)			
Water Rights Monitoring	$124,000	$124,000	The permit has not been amended; this budget may come down prior to adoption.
Groundwater Management Plan	$400,000	$100,000	Previous authorization will carry-over into the next fiscal year. The proposed amount is to allow for development of next phase, if any, as a result of the adoption of the plan
Project Committee 13 (032)			
USGS – LOOP Agreement Stream Gauging	$27,000	$28,500	Budget increase is anticipated from USGS.
Total Budget Expenditures	**$684,500**	**$389,725**	
Carry over from previous year	**($35,000)**	**0**	
TOTAL	**$649,500**	**$389,725**	

SAN JUAN BASIN AUTHORITY

26111 Antonio Parkway • Rancho Santa Margarita, CA 92688 (949) 459-6400 FAX (949) 459-6463

TO: Board of Directors **DATE:** June 12, 2012

FROM: Dan Ferons

SUBJECT: **Election of Officers for Fiscal Year 2012-2013**

SUMMARY

Issue: Per the Bylaws, the Board elects a Chairman and Vice-Chairman annually in June and appoints the Authority Secretary and Treasurer.

Recommendation: Elect the Chairman and Vice Chairman, Re-appoint Daniel R. Ferons as Secretary and Kristin Griffith as Treasurer for the upcoming Fiscal Year.

Fiscal Impact: No fiscal impact.

Previously Related Action: The Authority annually appoints officers.

DISCUSSION

After electing the officers, it is recommended that Daniel R. Ferons, SMWD, be reappointed Secretary and Kristin Griffith, SMWD be reappointed Treasurer for the upcoming Fiscal Year. Both Mr. Ferons and Ms. Griffith are signatories to the SJBA accounts.

P:\Staff Reports\Election of Officers for Fiscal Year 2012-2013.docx.cl

SAN JUAN BASIN AUTHORITY

26111 Antonio Parkway • Rancho Santa Margarita, CA 92688 (949) 459-6400 FAX (949) 459-6463

TO: Board of Directors **DATE:** June 12, 2012

FROM: Dan Ferons

SUBJECT: **Presentation on 2011 Annual Integrated Environmental Monitoring Report by Wildermuth Environmental**

SUMMARY

Issue: The existing water rights permit requires annual compliance monitoring.

Recommendation: Receive and file the report.

Fiscal Impact: Annual cost for monitoring services.

Previously Related Action: The Authority annually reviews compliance monitoring.

DISCUSSION

Wildermuth Environmental will provide a verbal report on the status of the Annual Monitoring contract. Copies of the draft report have been presented to the member agencies for review and hard copies will be available at the meeting.

P:\Staff Reports\Annual Monitoring Report 2011.docx.cl

Integrated Environmental Monitoring Program
2011 Annual Report

D R A F T

May 3, 2012

Prepared for:

San Juan Basin Authority

Prepared by:

WILDERMUTH™
ENVIRONMENTAL INC.

23692 Birtcher Drive, Lake Forest California
Tel: 949.420.3030 Fax: 949.420.4040
www.WildermuthEnvironmental.com

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Acronyms, Abbreviations, and Initialisms

µg/L	micrograms per liter
acre-ft	acre-feet
ALERT	Automated Local Evaluation in Real Time
Basin Plan	Water Quality Control Plan for the San Diego Basin
CDFM	cumulative departure from the mean
CSJC	City of San Juan Capistrano
COC	Chain-of-Custody
DWR	California Department of Water Resources
EC	Electrical Conductivity
EPA	U.S. Environmental Protection Agency
FMND	Final Expanded Initial Study and Mitigated Negative Declaration
GAC	Granular Activated Carbon
GWRP	Groundwater Recovery Plant
mg/L	milligrams per liter
monitoring program	Integrated Environmental Monitoring Program
MTBE	methyl tert-butyl ether
MWH	MWH Laboratories
Plan	San Juan Basin Groundwater Management and Facility Plan
PMS	Plant Monitoring Site
QA/QC	quality assurance/quality control
SCWD	South Coast Water District
SCWD GRF	South Coast Water District Groundwater Recovery Facility
SJBA	San Juan Basin Authority
SJHGC	San Juan Hills Golf Course
SWRCB	State Water Resources Control Board
TDS	total dissolved solids
TBA	tert-butyl alcohol
USGS	U.S. Geologic Survey
WEI	Wildermuth Environmental, Inc.

This report summarizes the results of the Integrated Environmental Monitoring Program for the lower San Juan Basin (monitoring program). This hydrogeological and biological monitoring program was initially developed by Psomas (2001, 2004) and was implemented by Wildermuth Environmental, Inc. (WEI) between January and December 2011.

1.1 Background on San Juan Basin Desalter Projects

Due to increasing water demands in southern Orange County, the San Juan Basin Authority (SJBA)—comprised of the City of San Juan Capistrano (CSJC), Moulton Niguel Water District (MNWD), Santa Margarita Water District, and South Coast Water District (SCWD)—evaluated the potential for greater use of groundwater resources in the San Juan Basin. Local groundwater requires pretreatment for potable use due to high concentrations of total dissolved solids (TDS). Thus, the SJBA developed a plan, the San Juan Basin Groundwater Management and Facility Plan (Plan), to construct new production wells, water recharge basins, and a desalter plant (NBS Lowry, 1994). Phase I of the Plan included the construction of new production wells and a desalter facility, the Ground Water Recovery Plant (GWRP). The GWRP is operated by the CSJC. Production of the desalter wells and operation of the GWRP began in late 2004. Groundwater for the GWRP is produced pursuant to the SJBA's *Permit for Diversion and Use of Water* (No. 21074) issued by the State Water Resources Control Board (SWRCB).

In 2007, the SCWD completed the construction of a new production well and desalter facility, the SCWD Groundwater Recovery Facility (GRF). A second production well that will feed into the GRF is under construction and is expected to be completed in 2012. Groundwater for the GRF is produced pursuant to the SCWD's *Permit for Diversion and Use of Water* (No. 21138) issued by the SWRCB.

1.2 Integrated Environmental Monitoring Program Objectives

While the GWRP and SCWD GRF projects were designed to maximize the use of local groundwater and surface water from San Juan Creek, Trabuco Creek, and their tributaries, there are concerns about the impacts of increased production on the resources of the lower San Juan Basin. The objective of the monitoring program is to collect the data needed to evaluate potential hydrologic, hydrogeologic, and biologic impacts from groundwater extractions resulting from the implementation of the Plan and the SCWD GRF. The monitoring program is also intended to satisfy the mitigation monitoring recommendations and requirements described in the Final Expanded Initial Study and Mitigated Negative Declaration, San Juan Basin Groundwater Management and Facility Plan (Culbertson et al., 1995), the Water Rights Permit issued to the San Juan Basin Authority (No. 21074) by the SWRCB, the Water Rights Permit issued to the SCWD by the SWRCB (No. 21138), and suggestions from the U.S. Fish and Wildlife Service and other regulatory agencies pertaining to the implementation of these groundwater extraction projects.

1.3 Approach

To evaluate the impacts of the SJBA's GWRP and the SCWD's GRF, the monitoring program relies on the collection of surface water discharge and quality data; groundwater elevation, quality, and production data; precipitation data; vegetation data; and climate data. First, reliable sources of existing data are collected from local government agencies, and these data are then supplemented with surface water, groundwater, biotic, and climate data collected in the field.

1.4 Scope

The scope of services performed by WEI during 2011 in executing the monitoring program included the following tasks:

- Monthly collection of groundwater elevation and field water quality parameters at nine monitoring wells
- Biannual collection of groundwater samples for laboratory analysis at nine monitoring wells
- Monthly collection of field surface water quality parameters at five plant monitoring stations
- Biannual collection of surface water quality samples for laboratory analysis at five plant monitoring stations
- Monthly monitoring of vegetation and climate at five plant monitoring stations[1]
- Quarterly compilation of precipitation, surface water discharge, and groundwater production data collected from cooperating agencies
- Preparation of this annual report

1.5 Report Organization

Section 1 – Introduction: This section describes the background and purpose of the monitoring program.

Section 2 – Local Environment of the Lower San Juan Basin: Section 2 describes the hydrogeologic and biologic resources of the lower San Juan Basin.

Section 3 – Data Collection Methods and Work Performed in 2011: Section 3 describes the hydrologic, hydrogeologic, biotic, and climate data collected to characterize the impacts of increased groundwater extractions in the lower San Juan Basin and summarizes the work performed in 2011.

Section 4 – Analysis of Hydrologic, Hydrogeologic, Biotic, and Climate Data: Section 4 describes the analysis of hydrologic, hydrogeologic, and biotic data collected in 2011.

[1] Monthly vegetation monitoring was performed by Glenn Lukos Associates.

Section 5 – Conclusions and Recommendations: Section 5 summarizes the conclusions of the monitoring program through calendar year 2011 and provides recommendations for future monitoring.

Section 6 – References: Section 6 provides the references consulted in performing the analyses described herein and in writing this report.

Section 2 – Local Environment of the Lower San Juan Basin

The monitoring program study area is located in the lower coastal portion of the San Juan Creek Watershed and within the alluvial deposits of the lower Arroyo Trabuco (downgradient of the confluence of Oso Creek and Trabuco Creek) and the Lower and Middle sub-basins of the San Juan Groundwater Basin (see Figure 2-1), hereafter collectively referred to as the lower San Juan Basin or Study Area.

2.1 Climate

The climate of the San Juan Basin is characterized as Mediterranean, with cool, moist winters and warm, dry summers. Mean annual precipitation ranges from 12 inches along the coast to 35 inches at higher elevations in the inland mountains.

The Orange County Public Works department maintains several precipitation stations in and around the San Juan Basin. Of these, there are only six active gauges with long-term records. Figure 2-2 shows annual precipitation recorded at the Laguna Beach Station for water years 1929 to 2011.[2,3] The mean annual precipitation for the period of record is 12.8 inches with a maximum rainfall of 35 inches and a minimum rainfall of 4 inches. Figure 2-2 also displays the cumulative departure from the mean (CDFM) precipitation for the Laguna Beach Station. The CDFM plot is a useful way to characterize the occurrence and magnitude of wet and dry climatic periods: positive sloping segments (trending up to the right) indicate wet periods, and negative sloping segments (trending down to the right) indicate dry periods. As Figure 2-2 illustrates, the area experienced several prolonged dry periods, including 1946 to 1972, 1984 to 1991, and more recently, 1999 to 2010. Each of the long-term dry periods was punctuated with a few years of above average precipitation with continuous below-average periods lasting three to six years.

2.2 San Juan Creek Watershed

The San Juan Creek Watershed covers about 176 square miles, of which 90 percent lies in Orange County. The rest of the watershed is in Riverside County. The majority of the watershed overlies unincorporated Orange and Riverside County, but it does include portions of the Cities of Dana Point, Laguna Hills, Laguna Niguel, Mission Viejo, Rancho Santa Margarita, and San Juan Capistrano. The following physical descriptions of the San Juan Creek Watershed are from San Juan Creek Watershed Hydrology Study by PACE (2008).

San Juan Creek is the major creek of the watershed. Trabuco Creek is a tributary to San Juan Creek, entering just downstream of the Atchison, Topeka & Santa Fe Railroad Bridge. Oso Creek is a tributary to Trabuco Creek and merges into Trabuco Creek downstream of the Interstate 5 Bridge. The headwaters of San Juan Creek lie within the Cleveland National

[2] There are no other precipitation stations within the watershed boundary that have a comparable long-term record of data.

[3] The water year begins on October 1 and ends on September 30. For example, water year 2010 starts on October 1, 2009 and ends on September 30, 2010.

Forest in the Santa Ana Mountains. The San Juan Creek drains southwesterly towards the Pacific Ocean and outlets at Doheny State Beach near Dana Point Harbor, CA.

2.2.1 San Juan Creek

The San Juan Creek Watershed, excluding the Trabuco and Oso Creek Watersheds, originates from the Cleveland National Forest in the Santa Ana Mountains. The mainstem channel originates at an elevation of approximately 3,300 feet above sea level and flows approximately 29 miles southwesterly into the Pacific Ocean. The drainage area, excluding Trabuco and Oso Creeks, is approximately 122 square miles.

The major tributaries to San Juan Creek (from upstream to downstream, respectively) include Decker Canyon, Long Canyon, Bear Canyon, Lion Canyon, Hot Spring Canyon, Cold Spring Canyon, Lucas Canyon, Bell Canyon, Verdugo Canyon, Cañada Gobernadora, Cañada Chiquita, Horno Creek, and Trabuco Creek.

The upper third of the watershed is extremely rugged with steep slopes and deep cutting canyons with tributaries from these areas flowing out from sharp canyons. The center third is dominated by rolling hills, and the downstream third is a highly developed floodplain. As the streams come out of the canyon mouth, they widen out into several alluvial floodplains. Some larger tributaries join with San Juan Creek and widen the mainstem channel. The downstream 2½ miles of the Creek is an improved trapezoidal channel with concrete side slopes and an earthen bottom.

2.2.2 Trabuco Creek

The Trabuco Creek Watershed, excluding the Oso Creek Watershed, originates from the Cleveland National Forest in the Santa Ana Mountains at an elevation of approximately 5,600 feet above sea level. Trabuco Creek flows approximately 23 miles to join San Juan Creek and has a drainage area, excluding Oso Creek, of approximately 38 square miles. This entire watershed is long and narrow and appears to be an inefficient drainage watershed. The headwaters originate within the steep and mountainous terrain, and the basin typically tilts from east to west. As the mountains gradually give way to ridges and moderately steep hillsides, the canyons yield to a wider floodplain, and the streambed gradually turns northeast to southwest. The downstream portion of Trabuco Creek meanders through the developed floodplain area and flows mainly in a north to south direction, while the main channel remains mostly in a natural condition.

2.2.3 Oso Creek

Oso Creek originates in the foothills of the Santa Ana Mountains at an elevation of 1,600 feet above sea level. Oso Creek flows for a distance of 13 miles to enter Trabuco Creek with a drainage area of 16 square miles. The entire channel flows through the low, rolling foothills west of the Santa Ana Mountains in a north to south direction. Most of the Oso Creek Watershed is developed; however, there are a few detention basins within the watershed.

2.3 Groundwater Hydrology

Within the watershed, four groundwater sub-basins have been identified: (1) the Lower Basin, (2) the Middle Basin, (3) the Upper Basin, and (4) Arroyo Trabuco. Sub-basins were first delineated by California Department of Water Resources (DWR) in 1972 based on water quality differences. CDM (1987), NBS Lowery/PSOMAS (1994, annual reports), and others have modified the DWR sub-basin delineations to suit the needs of their respective studies. This study similarly adjusted the sub-basins. The Upper Basin was excluded because the majority of the land overlying the basin is privately owned, and data were not made available to the SJBA. The Arroyo Trabuco sub-basin was divided into a lower and upper portion, with the Lower Arroyo Trabuco—the portion down-gradient of the confluence of Oso Creek and Trabuco Creek—included in the study area. The Lower Arroyo Trabuco, Middle, and Lower sub-basins in this study overlie approximately 5.9 square miles of water-bearing alluvium.

2.3.1 Geologic Setting

The San Juan Creek Watershed is located on the western flank of the Santa Ana Mountains. The Santa Ana Mountains are part of a northwest-southeast trending fault block that has been tilted at a shallow angle in a westerly direction by the Elsinore fault system. The San Juan Creek Watershed is underlain by a variety of lithologies, including plutonic, volcanic, metamorphic, and sedimentary rocks (Morton, 2004). The two major faults in the San Juan Creek watershed are the northwest/southeast trending Mission Viejo and Cristianitos Faults. The Cristianitos Fault displaces Tertiary sedimentary rocks, and the Mission Viejo Fault bounds the Cretaceous sedimentary rocks on the west (Taylor, 2006).

2.3.2 Stratigraphy

The stratigraphy of the San Juan Creek Watershed can be divided into three categories: (1) Mesozoic and older bedrock units, (2) Tertiary bedrock units, and (3) late Holocene to Early Pleistocene surficial deposits, as shown in Figure 2-3. The Mesozoic and older bedrock units are further differentiated as: (a) Cretaceous formations of sedimentary origin, (b) Pre-Cretaceous metamorphic formations of sedimentary and volcanic origins, and (c) Granitic and other intrusive crystalline rocks. The Tertiary bedrock units are further differentiated as: (a) fine-grained formations and (b) coarse grained formations. The Late Holocene to Early Pleistocene surficial deposits are further differentiated as: (a) younger alluvial deposits, (b) landslide deposits, and (c) older alluvial deposits. The main water-bearing unit in the watershed is the younger alluvial deposits. These geologic formations are generally described below in stratigraphic order, starting with the oldest formations first.

2.3.2.1 Mesozoic and Older Bedrock Units

The Mesozoic crystalline igneous rocks, the Pre-Cretaceous metasedimentary rocks of the Bedford Canyon Formation, and the metamorphic rocks of the Menifee Valley Formation are exposed in the northeastern portion of the San Juan Creek Watershed and are considered non-water bearing. Resting on the igneous and metamorphic basement are Cretaceous sandstone and conglomerate sandstone, the Williams Formation, and the non-marine conglomerate and sandstone of the Trabuco Formation.

2.3.2.2 Tertiary Bedrock Units

The Tertiary bedrock units are divided into fine-grained and coarse-grained formations as grouped by the California Geological Survey Special Report 217 (2010). The fine-grained formations include the Capistrano and Monterey Formations, and the coarse-grained formations include the Santiago, Sespe, and Niguel Formations.

2.3.2.2.1 Coarse-Grained Formations

The Santiago and Sespe Formations are bound to the east by the Mission Viejo Fault and to the west by the Cristianitos Fault, as shown in Figure 2-3. The DWR (1972) identified both the Santiago and Sespe Formations as potential aquifers. The Santiago Formation is chiefly marine conglomerate with interbedded very fine- to coarse-grained sandstones and is estimated to be about 3,000 feet thick (DWR, 1972). The Sespe Formation is non-marine conglomeratic sandstone, sandstone, and silty sandstone, and is estimated to be about 1,500 feet thick.

In Bulletin No. 104-7, the DWR reported that a test hole drilled into the Santiago Formation only yielded 48 gallons per minute with a drawdown of 257 feet (specific capacity of about 5 gallons per minute per foot of drawdown). In the same report, the DWR reported that several outcrop samples from the Sespe Formation had porosities ranging between 20 and 25 percent.

The Pliocene Niguel Formation is about 350 feet thick and is comprised of sandstone interbedded with sandy siltstone. The Niguel Formation is located in the southwest portion of the watershed and overlies the Capistrano and Monterey Formations (DWR, 1972).

2.3.2.2.2 Fine-Grained Formations

The Capistrano and Monterey Formations outcrop in the southeast portion of the watershed. The Capistrano Formation consists of white to pale gray, massive to crudely bedded siltstone and mudstone. The Monterey Formation is primarily silty shale. Both the Capistrano and Monterey Formations are very prone to landslides. The Capistrano Formation also forms the base of the alluvial aquifer within the Study Area.

2.3.2.3 Late Holocene to Early Pleistocene Surficial Deposits

The late Holocene to Early Pleistocene deposits are divided into three groups: (1) older alluvial deposits, (2) landslide deposits, and (3) younger alluvial deposits.

2.3.2.3.1 Older Alluvial Deposits

The older alluvial deposits are stream terraces ranging in age from the Early to Late Pleistocene. These terrace deposits are composed of clays, silts, sands, and gravels, and range in thickness from about 13 to 98 feet (Taylor, 2006). These terrace deposits are normally above the water table; however, they may overlie the stream channel deposits in some locations (DWR, 1972).

2.3.2.3.2 Landslide Deposits

The landslides in the study area typically occur in the Capistrano and Monterey Formations. Like the stream terraces, they may overlie the water-bearing, stream-channel deposits.

2.3.2.3.3 Younger Alluvial Deposits

The main water-bearing sediments of the San Juan Basin are the younger alluvial deposits of the Late Pleistocene to the Holocene. The younger alluvium occupies streambeds, washes, floodplains, and other areas of recent sedimentation. The alluvial deposits consist of a heterogeneous mixture of sand, silt, and gravel. The sediment is derived from the erosion of the more resistant bedrock formations that make up most of the watershed.

2.3.3 Groundwater Occurrence and Movement

Groundwater within the San Juan Creek Watershed primarily occurs in the relatively thin alluvial deposits along the valley floors and within the major stream channels. The SWRCB has characterized the groundwater, from a water rights perspective, as flow of an underground stream.

Groundwater recharge occurs primarily as infiltration of flow within unlined stream channels, underflow from the saturated alluvium and fractures within the bordering bedrock hills, deep percolation of precipitation, and returns from use. Groundwater generally flows from areas of recharge in the surrounding highlands in the north and south towards the central axis of the basin and then southwesterly along the axis of the basin before exiting the basin into the Pacific Ocean.

Groundwater discharge occurs primarily as groundwater production from wells, evapotranspiration, and subsurface outflow to the Pacific Ocean.

2.3.4 Groundwater Storage

The storage capacity of the alluvial areas in the San Juan Creek Watershed was first calculated by the DWR in Bulletin No. 104-7 (1972). To calculate the storage capacity, the DWR divided the alluvial aquifer into segments designated by streams in the San Juan Basin. Then, a specific yield and an average alluvial thickness were assigned to each segment. The total storage capacity of the alluvial aquifer, from ground surface to the base of the aquifer in the entire San Juan Creek Watershed, was calculated to be about 90,000 acre-feet (acre-ft). Using the DWR's storage capacity estimates from Table 8 of Bulletin No. 104-7, the storage capacity within the Study Area sub-basins is approximately 40,000 acre-ft.

2.4 Biological Communities

The biological resources for the project area were assessed and described in the *Final Expanded Initial Study and Mitigated Negative Declaration* (FMND) for the project (Culbertson et al., 1995). Within the project area, the FMND identified 22 vegetation communities. Of these, nine were identified as native plant communities, and thirteen were identified as developed communities (e.g. community parks with ornamental landscaping, rural residential landscapes, vineyards, dairies, or flood control channels). In addition to identifying the plant communities, the FMND also made an assessment as to the sensitivity of each plant community to the implementation of the Phase I Plan. The sensitivity level of each native plant community is shown in Table 2-1.

Table 2-1
Native Plant Communities
within the Desalter Study Area

Plant/Habitat Type	Sensitivity Level
Southern Cottonwood-Willow Riparian Forest	High
Southern Coast Live Oak Riparian Forest	High
Southern Sycamore Riparian Woodland	High
Southern Willow Scrub	High
Mulefat Scrub	Moderate
Floodplain Sage Scrub	High
Coastal Freshwater Marsh	High
Coastal Brackish Marsh	High
Riparian Herb	Moderate-Low

117°40'0"W

33°40'0"N

Irvine

Lake Forest

El Toro

Mission Viejo

Laguna Hills

Aliso Viejo

Laguna Beach

Laguna Niguel

Dana Point

San Juan Capistrano

San Clemente

Lake Elsinore

Santiago Peak

Trabuco Forestry

Coto de Caza

Palisades Reservoir

Marine Corps Base Camp Pendleton

Riverside County

San Diego County

Orange County

Riverside County

PACIFIC OCEAN

11075800 11048400 11048200 11047500 11047200 11047000 11046500 11046530 11047300 11046550 11046501 11047350 11047700 11046400 11046300 11046350 11046359 11046360

Santiago Creek, Bee Canyon Wash, Agua Chinon Wash, Borrego Canyon Wash, Serrano Creek, San Diego Creek, Aliso Creek, Oso Creek, Arroyo Trabuco, Tijeras Canyon, Sulphur Creek, Salt Creek, Horno Creek, San Juan Creek, Arroyo Salado, Cristianitos Creek, San Mateo Creek

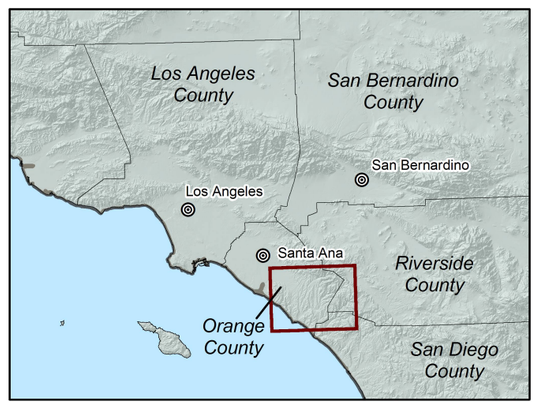
Santa Ana Mountains

San Juan Creek Groundwater Sub-basins

- Arroyo Trabuco
- Lower Basin
- Middle Basin
- Upper Basin

Other Features

- Precipitation Gage with Long-Term Record
- USGS Gaging Station
- San Juan Watershed
- Rivers and Streams
- City Boundary
- County Boundary
- Military Boundary



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0 1.25 2.5 3.75 5 Miles

0 2 4 6 KM

SAN JUAN BASIN AUTHORITY

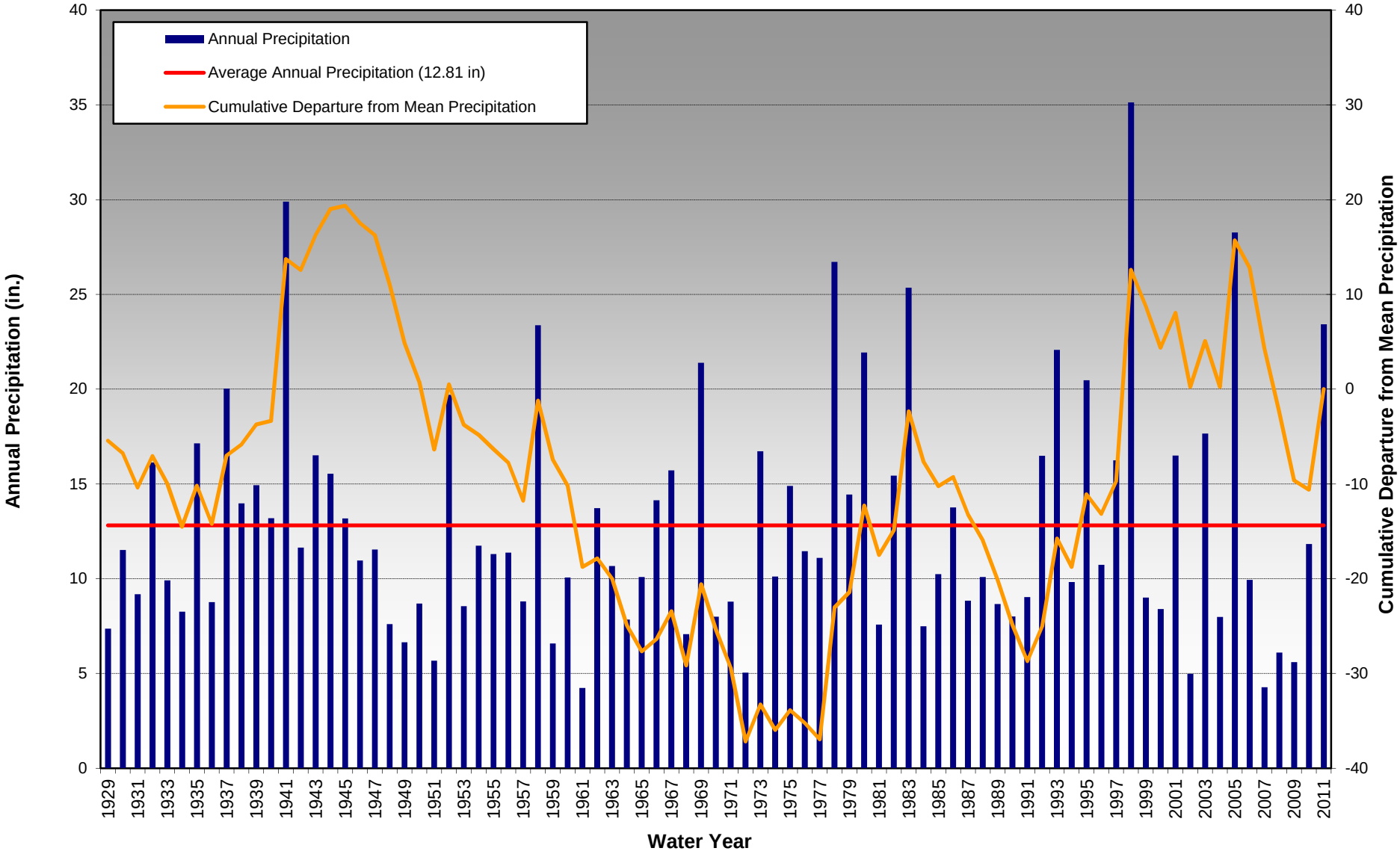
Integrated Environmental Monitoring Program Annual Report -- 2011

075-004-001

Study Area

Figure 2-1

Figure 2-2
Annual Precipitation at the Laguna Beach Gage Station



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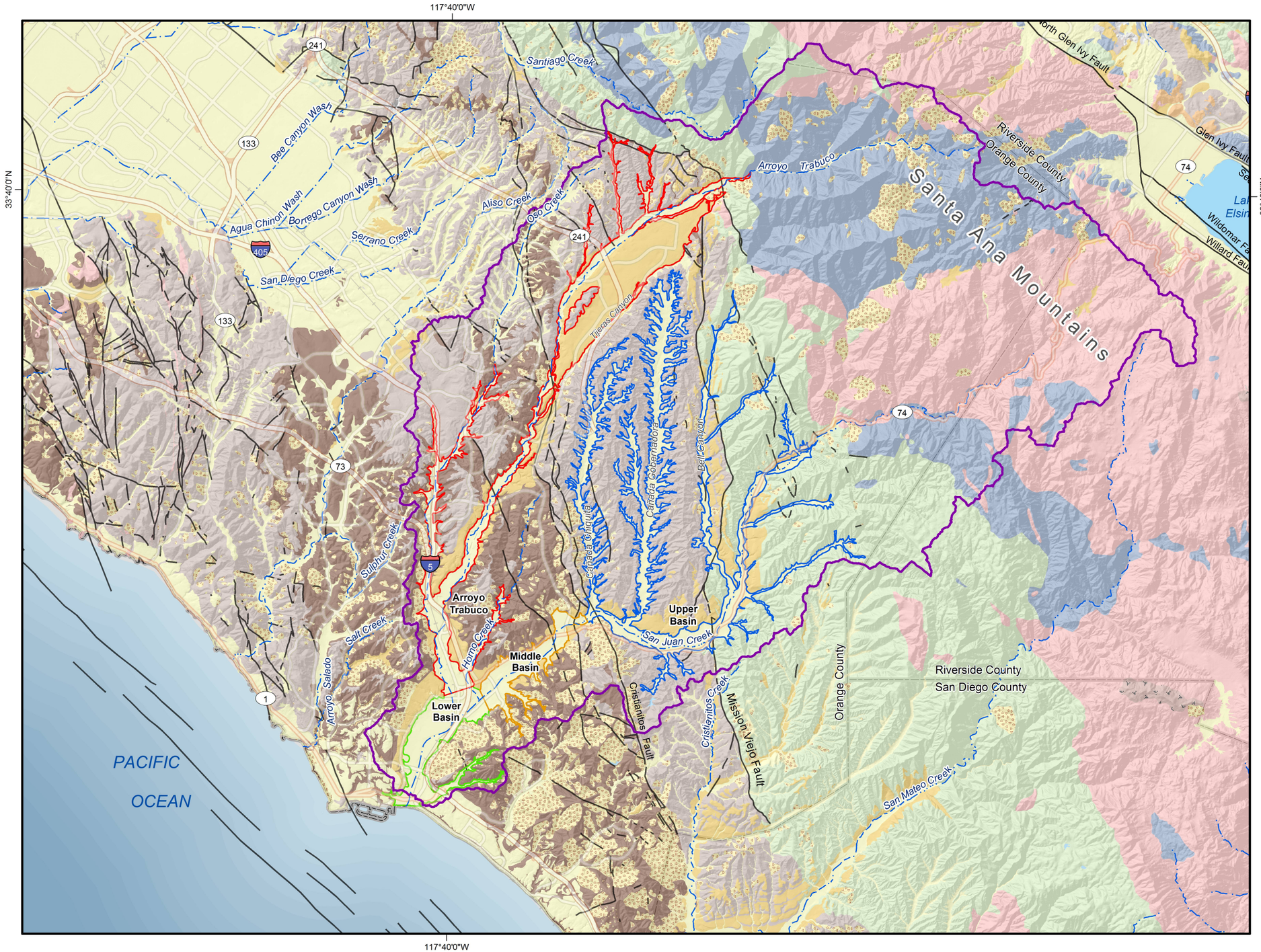


San Juan Watershed Boundary

San Juan Creek Groundwater Sub-basins

- Arroyo Trabuco
- Lower Basin
- Middle Basin
- Upper Basin

Geology

Late Holocene to Early Pleistocene Surficial Deposits

- Younger Alluvial Deposits
- Landslide Deposits
- Older Alluvial Deposits

Tertiary Bedrock Units

- Fine-grained Formations (Capsitrano and Monterey Formations)
- Coarse-grained Formations (Santiago,Sespe, and Niguel Formations)

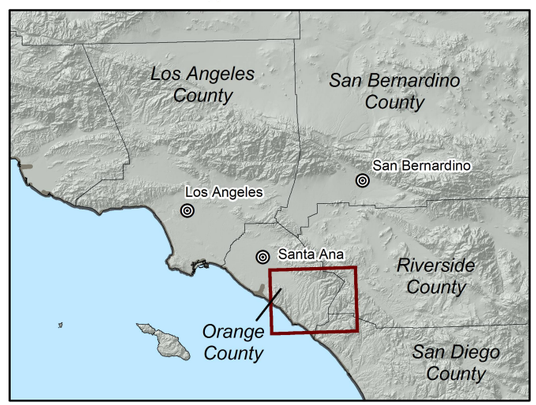
Mesozoic and Older Bedrock Units

- Cretaceous Age Formations of Sedimentary Origin (Williams and Trabuco Formations)
- Pre-Cretaceous Metamorphic Formations of Sedimentary and Volcanic Origins (Menifee Valley and Bedford Canyon Formations)
- Granitic and other intrusive crystalline rocks

Source: CGS Special Report 217.

Faults

- Location Certain
- Location Approximate



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0 1 2 3 4 Miles
0 2 4 6 KM

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Generalized Geology and Locations of Groundwater Sub-Basins

Figure 2-3

Section 3 – Data Collection Methods and Work Performed in 2011

3.1 Hydrologic Data Collection

3.1.1 Precipitation

The County of Orange maintains records for 166 recording and non-recording precipitation stations in and adjacent to Orange County. In addition, the County operates and maintains an Automated Local Evaluation in Real Time (ALERT) flood detection system. The ALERT network includes approximately 65 precipitation gauges located throughout Orange County and the surrounding area. Key precipitation stations in the project vicinity are listed in Table 3-1 and shown in Figure 3-1. These stations have a precipitation record dating back to 1996. Provisional precipitation data from the stations listed in Table 3-1 are collected quarterly from the County of Orange. Daily precipitation data for calendar year 2011 have been included with this report in Table A-1 of Appendix A.

3.1.2 Surface Water Discharge

Surface water discharge within San Juan Creek and Trabuco Creek is recorded by the U.S. Geologic Survey (USGS) using automated equipment. The key historical and active sites monitored by the USGS are listed in Table 3-2 and shown in Figure 3-1. The SJBA has a cooperative agreement with the USGS to fund 50 percent of the cost of maintaining the stream gaging stations on San Juan Creek at La Novia Street and Trabuco Creek at Del Obispo Street. These stations are maintained by the USGS and linked to the ALERT system. Stream discharge records are collected quarterly from the USGS. Daily stream discharge data for calendar year 2011 are included with this report in Table A-2 of Appendix A.

3.1.3 Surface Water Quality

Five surface water quality monitoring sites were established along San Juan Creek to correspond with each plant moisture stress (PMS) monitoring site in the vegetation monitoring program (discussed in Section 3.3). The surface water monitoring locations are shown in Figure 3-2. The surface water monitoring sites are visited monthly to collect field water quality parameters, including water temperature, pH, and electrical conductivity (EC).[4] The field water quality parameters are measured with a Hydrolab Quanta® water quality monitoring system and recorded on standardized field data sheets. The Hydrolab Quanta® is calibrated per the manufacturer's instructions prior to each monitoring event. The Hydrolab Quanta® range, accuracy, and resolution are shown in Table B-1 of Appendix B.

In addition to the monthly monitoring of field water quality parameters, surface water samples are collected biannually for laboratory analysis of the general physical and mineral constituents listed in Table 3-3. The samples are collected in accordance with U.S. Environmental Protection Agency (EPA) methods, including the strict use of Chain-of-Custody (COC) procedures, labeled containers, and appropriate sample preservatives. Table 3-3 summarizes the analytical methods, sample containers, preservatives, and hold times associated with each

[4] Electrical conductivity is measured as Specific Conductance at 25 ºC.

parameter. After collection, samples are placed into ice-chests containing Blue Ice™ and/or ice cubes for transportation to MWH Laboratories (MWH). The samples are picked up by an MWH courier and taken to the lab which is located at 750 Royal Oaks Drive #100, Monrovia, California. MWH is certified by the California Department of Public Health under the Environmental Laboratory Accreditation Program (ELAP No. 1422).

During 2011, monthly field water quality parameters were measured, and samples for laboratory analysis were collected in May 2011 and November 2011. All field and laboratory data were checked for quality assurance/quality control (QA/QC) and loaded to HydroDaVE™, a centralized relational database. The field data sheets from all surface water monitoring events in 2011 are included in Appendix B of this report. The laboratory reports from the biannual monitoring events are included in Appendix C.

3.2 Hydrogeologic Data Collection

3.2.1 Groundwater Production

There are two municipal entities that produce groundwater from the lower San Juan Basin: the CSJC and the SCWD. The CSJC operates eight wells that feed the GWRP, two of which came on-line during 2011 (South Cooks and Well #5). Additionally, the CSJC operates several wells that feed into their non-potable distribution system. The SCWD operates one production well that feeds into the SCWD GRF. The major private producer in the lower San Juan Basin is the San Juan Hills Golf Course (SJHGC). The locations of the major production wells used by these entities are shown in Figure 3-2. Production data is collected quarterly from the CSJC, the SCWD, and the SJHGC.

In addition, the Municipal Water District of Orange County (MWDOC), along with five project partners (City of San Clemente, the CSJC, Laguna Beach County Water District, the MNWD, and the SCWD), is developing the South Orange Coastal Ocean Desalination Project (SOCOD). SOCOD's proposed desalination facility would produce approximately 15 million gallons of water per day from wells located adjacent to San Juan Creek on the ocean side of Pacific Coast Highway. These wells would produce a combination of ocean water and fresh water from the San Juan Basin. At full operation, computer-simulation modeling has estimated that the wells will produce 95% ocean water and 5% fresh water. An updated computer-simulation model is currently being prepared to confirm this number based on test well production results. In June 2010, SOCOD began pumping a test well for the project. The location of the test well is shown in Figure 3-2. Production data is collected annually from MWDOC.

3.2.2 Field Groundwater Monitoring

Nine monitoring wells, shown in Figure 3-2, were established in 2004 for the implementation of the monitoring program.[5] At that time, each well was equipped with an In-Situ Multi-Parameter TROLL 9000 data logger, containing a pressure transducer and EC probe to collect groundwater data at 12-hour intervals. During 2010, the data loggers in monitoring wells MW-

[5] There are eight monitoring well locations. Monitoring well MW-01 is a dual-nested piezometer and is considered two wells (MW-01N and MW-01S). No data logger was ever installed in MW-01N.

06, MW-02, and MW-01S failed and were replaced. During 2011, the transducers in the remaining wells (MW-03, MW-04, MW-05, MW-07, and MW-08) were replaced. Each failed data logger was replaced with an In-Situ Aqua TROLL 200, containing a pressure transducer and EC probe set to record water level and EC data at one-hour intervals.

3.2.2.1 Monthly Monitoring

Monitoring wells are visited monthly (1) to collect a manual depth to groundwater measurement, (2) to download and maintain the data loggers, and (3) to collect field water quality parameters. Manual water level measurements are made using a Solinst electronic well sounder equipped with gradations of 1/100th of a foot. A disposable polyethylene bailer is utilized to obtain a water sample from each well for measurement of field temperature, pH, and EC. The field water quality parameters are measured with a Hydrolab Quanta® water quality monitoring system and recorded on standardized field data sheets. The Hydrolab Quanta® is calibrated per the manufacturer's instructions prior to each monitoring event. The range, accuracy, and resolution of the field parameters as measured by the Hydrolab Quanta® are shown in Table B-1 of Appendix B.

During 2011, field groundwater data was collected monthly. These data were checked for QA/QC and loaded to HydroDaVE™. The field data sheets from the monthly groundwater monitoring events in 2011 are provided in Appendix B.

3.2.2.2 Biannual Groundwater Quality Monitoring

In addition to the monthly monitoring of field water quality parameters, groundwater samples are collected biannually for laboratory analysis. The SJBA's water rights permit (No. 21074) requires that the monitoring program include analysis of chloride and TDS concentrations in the San Juan Basin to document concentrations relative to the water quality objectives in the Water Quality Control Plan for the San Diego Basin (Basin Plan). In addition to testing the groundwater for chloride and TDS concentrations, the samples are analyzed for the general physical and mineral constituents listed in Table 3-3. Table 3-3 also summarizes the analytical methods, sample containers, preservatives, and hold times associated with each parameter.

In 2009, methyl-tert-butyl-ether (MTBE) was added to the list of analytes in the biannual groundwater sampling program. MTBE and other gasoline-related products are present in the groundwater of the San Juan Basin as a result of leaking underground storage tanks. The MTBE concentrations detected in production wells in the basin resulted in a complete shut-down of the GWRP in 2008. The CSJC has since added a Granular Activated Carbon (GAC) treatment system to their facilities to ensure the water is treated to potable use standards. All groundwater samples were tested for MTBE in 2011.

The biannual groundwater samples are collected in general accordance with EPA methods, including the strict use of COC procedures, labeled containers, and appropriate sample preservatives. Prior to collecting water quality samples, each monitoring well is purged of a minimum of three-casing volumes of water using a submersible pump. Field water quality parameters (temperature, pH, and EC) are measured after each casing volume is purged to ensure parameter stabilization. After the water level in a well recovers to 85 percent of the

static level measured prior to purging, a sample is obtained with a disposable bailer.[6] After collection, the samples are placed into ice chests containing Blue Ice™ and/or ice cubes for transportation to MWH. The samples are picked up by an MWH courier and taken to the lab which is located at 750 Royal Oaks Drive #100, Monrovia, California. As noted previously, MWH is certified by the California Department of Public Health under the Environmental Laboratory Accreditation Program (ELAP No. 1422).

During 2011, samples for laboratory analysis were collected on May 24th and 25th and November 2nd and 3rd. The laboratory reports from the biannual monitoring events are provided in Appendix C.

3.3 Biotic and Climate Data Collection

Five PMS monitoring sites were selected along San Juan Creek for monitoring habitat to assess potential biological impacts from the groundwater extraction occurring under the Plan: one reference monitoring site outside of the study area and four monitoring sites within the study area. Figure 3-2 depicts the monitoring and reference site locations along San Juan Creek. The reference site is referred to as PMS-Control (PMS-C) and the remaining monitoring sites are referred to as PMS-01, PMS-02, PMS-03, and PMS-04.

PMS-C lies outside of the study area and is positioned outside of the radius of impact of the groundwater extraction occurring under the Plan. Microclimatic conditions at the site are similar to those at the study sites. Incorporating the reference site into the monitoring protocol provided a benchmark for distinguishing between regional fluctuations in riparian habitat conditions versus fluctuations potentially attributable to the Plan operations.

Note that the reference site is immediately upstream of the Cristianitos Fault. The fault zone may be a natural impediment to groundwater flow, causing rising groundwater along the reach of San Juan Creek where the reference site is located. Unlike the PMS monitoring sites, the reference site supports perennial flow, resulting from its position along San Juan Creek in relation to the Cristianitos Fault.

Biological monitoring was performed monthly by a biologist from Glenn Lukos Associates at each PMS monitoring site from January through December 2011. During each monthly monitoring event, the biotic and climate conditions measured at the PMS monitoring sites were documented on standardized field data sheets. Site photographs—documenting environmental conditions at the PMS monitoring sites—were taken during all monthly monitoring events. The data sheets and photographs from the 2011 monitoring events are provided in Appendix D.

3.3.1 Biotic Parameters

The plant communities within the PMS monitoring sites are categorized as "arroyo willow series" or "red willow series" (Sawyer & Keeler-Wolf 1995) and "southern cottonwood-willow riparian forest" or "southern willow scrub" (Holland, 1986). A general account of the biotic

[6] When purged at about six gallons per minute, well MW-01N completely dewaters. The water level does not always recover by 85 percent within the eight-hour sampling event. Thus, the well is purged at the beginning of the day, and the sample is collected at the end of the day regardless of the percent recovery.

resources occurring within the study area is documented in *Final Expanded Initial Study and Mitigated Negative Declaration* (Culbertson et al., 1995).

The assessment of biotic parameters at the PMS monitoring sites included botanical observations, ranging from species composition, amount of leaf yellowing and leaf drop, and any relevant notes regarding, but not limited to, plants, wildlife, and San Juan Creek. All biotic parameter data were documented on separate field data sheets for the reference and study sites and are provided in Appendix D.

3.3.2 Climatic Parameters

Climatic parameters measured at the PMS monitoring sites include air temperature in degrees Fahrenheit, percent relative humidity, average wind speed in miles per hour, and percent cloud cover. Air temperature, relative humidity, and wind speed data are measured using a Kestrel 3000 pocket weather meter. Percent cloud cover is estimated by the site biologist conducting the monitoring. Each parameter is measured and documented at the PMS monitoring sites two times per monitoring event—once upon arriving at the sites and again prior to leaving the sites. All climate data are documented on separate field data sheets for the PMS monitoring sites and are provided in Appendix D.

3.3.3 Site Photographs

During each monthly monitoring event, four photographs are taken at each monitoring site. Photographs were taken in upstream, downstream, right stream, and left stream directions, and the plants represented in the photographs are documented on the corresponding data sheet. The photographs document the basic health and vigor of the plant species represented, seasonal changes (including leaf yellowing and leaf drop), and the condition of San Juan Creek. Monthly site photographs are provided in Appendix D.

Table 3-1
County of Orange Automated Precipitation Gages in the San Juan Basin

Station Number[1]	Station Name	Location
207	El Toro Station	El Toro (outside watershed)
209	San Juan Guard Station	San Juan Creek
213	Oso Creek	Crown Valley Parkway
215	San Juan Capistrano	San Juan Creek at La Novia Street
232	Lower Oso Creek	Lower Oso Creek
297	Upper Oso Creek	Upper Oso Creek
1160[2]	El Cariso Guard Station	San Juan Creek

1--ALERT stations operated by the County of Orange.
2--precipitation data is no longer available from this station.

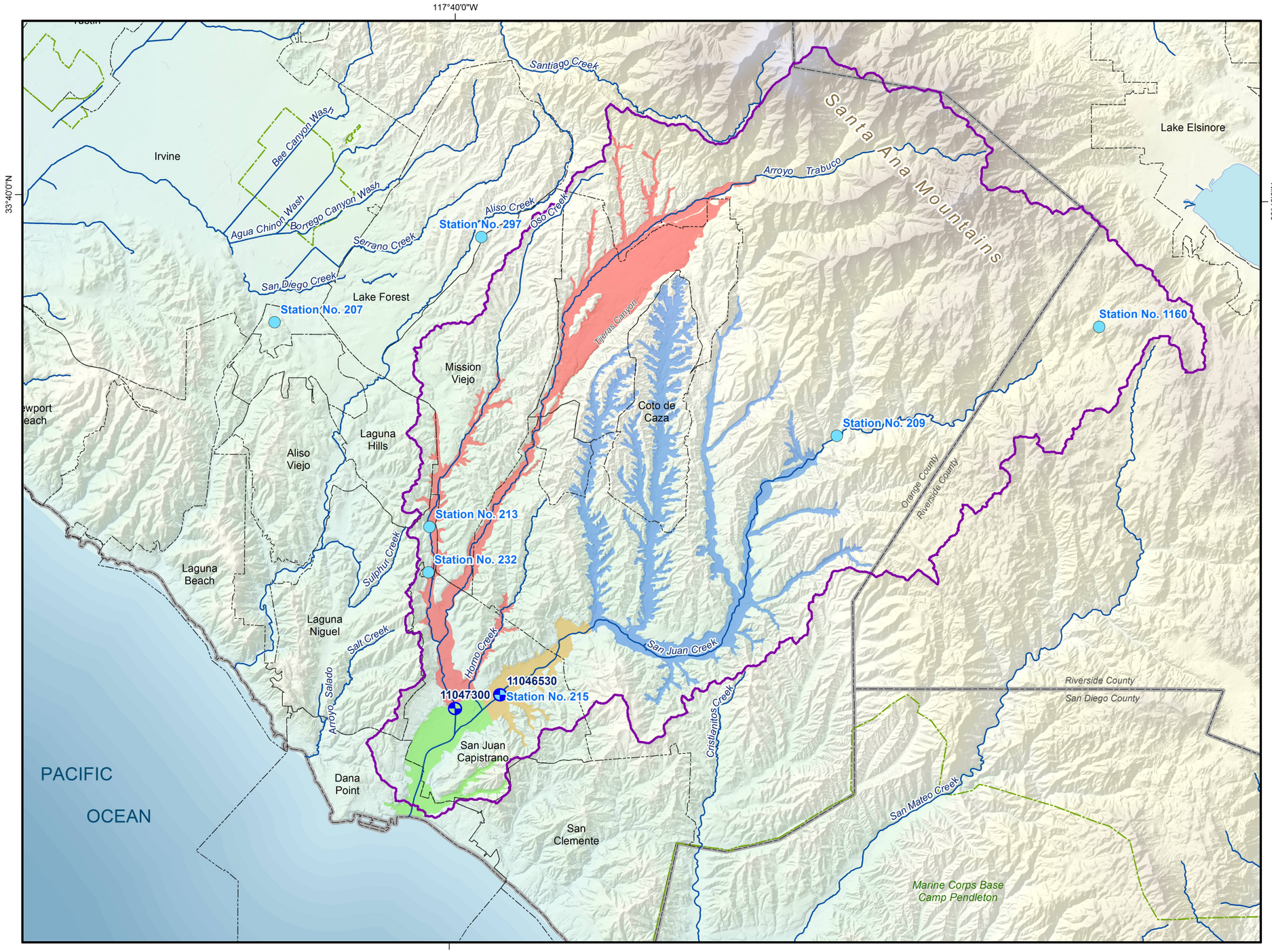
Table 3-2
Active and Historical Stream Gaging Stations in the San Juan Basin

Station Number	Agency	Location
11046530	USGS	San Juan Creek at La Novia Street near San Juan Capistrano
11047300	USGS	Trabuco Creek at Del Obispo Street in San Juan Capistrano
11047350	USGS	San Juan Creek at Stonehill Drive near Dana Point
11046400	USGS	San Juan Creek at Casper Regional Park near San Juan Capistrano
11046500	USGS	San Juan Creek near San Juan Capistrano
218	OCPFRD	Oso Creek at Crown Valley Parkway

Table 3-3
Laboratory Analyses for the Surface Water and Groundwater Monitoring Program

Analytical Parameter	Colletion Method	Analytical Method	Sample Container	Preservative	Hold Time (Days)
Bicarbonate Alkalinity (as HCO_3)	Grab	SM2330B	250 ml poly	Cool 4° C	14
Calcium	Grab	EPA 200.7	500 ml poly	HNO_3, Cool 4° C	180
Carbonate Alkalinity (as CO_3)	Grab	SM2330B	250 ml poly	Cool 4° C	14
Chloride	Grab	EPA 300.0	125 ml poly	Cool 4° C	28
Color	Grab	SM2120B	1 L amber glass	Cool 4° C	2
Copper	Grab	EPA 200.8	500 ml poly	HNO_3, Cool 4° C	180
Hardness ($CaCO_3$)	Grab	SM2340B	500 ml poly/glass	HNO_3, Cool 4° C	180
Hydroxide Alkalinity (as OH)	Grab	SM2330B	250 ml poly	Cool 4° C	14
Iron	Grab	EPA 200.7	500 ml poly	HNO_3, Cool 4° C	180
Magnesium	Grab	EPA 200.7	500 ml poly	HNO_3, Cool 4° C	180
Manganese	Grab	EPA 200.8	500 ml poly	HNO_3, Cool 4° C	180
MTBE[1]	Grab	EPA 524.2	3 - 40 ml VOA	HCL, Cool 4° C	14
Odor	Grab	SM2150B	1 L amber glass	Cool 4° C	1
pH	Grab	SM4500-HB	500 ml poly/glass	Cool 4° C	15 min
Potassium	Grab	EPA 200.7	500 ml poly	HNO_3, Cool 4° C	180
Sodium	Grab	EPA 200.7	500 ml poly	HNO_3, Cool 4° C	180
Specific Conductance	Grab	SM2510B	125 ml poly	Cool 4° C	28
Sulfate	Grab	EPA 300.0	125 ml poly	Cool 4° C	28
Surfacatants (MBAS)	Grab	SM5540C/EPA 425.1	500 ml poly	Cool 4° C	2
Total Dissolved Solids	Grab	SM2540C/E160.1	500 ml poly	Cool 4° C	7
Turbidity	Grab	EPA 180.1	1 L amber glass	Cool 4° C	2
Zinc	Grab	EPA 200.8	500 ml poly	HNO_3, Cool 4° C	180

Notes:
1--MTBE is measured at groundwater monitoring sites only



Hydrolologic Monitoring Sites

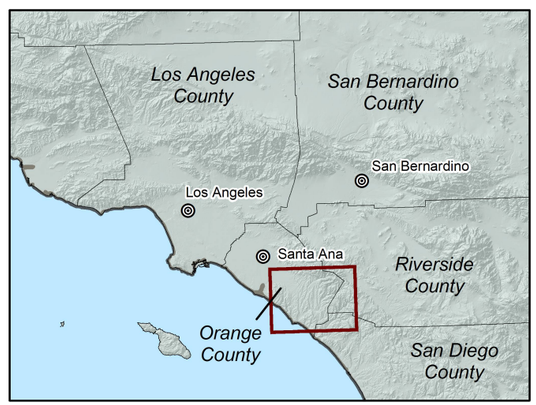
- ALERT Precipitation Gage
- USGS Gage Stations

San Juan Creek Groundwater Sub-basins

- Arroyo Trabuco
- Lower Basin
- Middle Basin
- Upper Basin

Other Features

- San Juan Watershed
- Rivers and Streams
- City Boundary
- County Boundary
- Military Boundary



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0 2 4 6 KM

SAN JUAN BASIN AUTHORITY

Integrated Environmental Monitoring Program
Annual Report -- 2011
075-004-001

Hydrologic Monitoring Sites in the San Juan Basin

Figure 3-1

117°40'0"W

Rosenbaum 1
North Open Space(NOS)
Oso Creek
Horno Creek
MW-08
PMS-Control
San Juan Creek
PMS-04
MW-06
CVWD #5
MW-05
SJHGC-Large
PMS-03
SJHGC-Small
South Cooks
MW-04
Mission Street
Hollywood 2A
MW-07
Tirador
PMS-02
PMS-01
Trabuco Arroyo
Dance Hall
CVWD-1
SJBA-2
MW-03
Kinoshita
SJBA-4
MW-02
San Juan Creek
Stonehill
MW-01S
MW-01N
SOCOD Test Well

Los Angeles County
San Bernardino County
Los Angeles
San Bernardino
Santa Ana
Riverside County
Orange County
San Diego County

117°40'0"W

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Monitoring Sites

- SJBA Monitoring Well
- Plant and Surface Water Monitoring Station

Production Wells in the San Juan Basin

- San Juan Capistrano GWRP Desalter Well
- South Coast Water District GRF Desalter Well
- Other Groundwater Production Well

San Juan Creek Groundwater Sub-basins

- Arroyo Trabuco
- Middle Basin
- Lower Basin

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0 2,000 4,000 Feet

0 500 1,000 Meters

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Field Surface Water and Groundwater Monitoring Sites in the San Juan Basin

Figure 3-2

Section 4 – Analysis of Hydrologic, Hydrogeologic, Biotic, and Climate Data

4.1 Analysis of Hydrologic Data

4.1.1 Precipitation

The daily precipitation data collected for calendar year 2011 are shown in Table A-1 of Appendix A. Total annual precipitation measured at Active ALERT stations in the San Juan Creek Watershed ranged between 8.88 and 17.60 inches. Annual precipitation values for selected stations (209, 213, 215 and 297) for the 1996 to 2011 period are summarized in Table 4-1. At all four stations, total precipitation in 2011 was less than the average precipitation for the 1996 to 2011 time period. Total precipitation at these stations ranged between 74 and 80 percent of the average value for the 1996 to 2011 time period.

The precipitation gage at San Juan Creek at La Novia Street (station 215) is centrally located within the Study Area and provides a representative, recent rainfall record for the lower San Juan Basin. During 2011, there were 37 days of measureable precipitation at station 215. Total precipitation for the year was about 9.64 inches, compared to the 1996 to 2011 average of 12.96 inches. The 2011 maximum daily precipitation measured at station 215 was 1.18 inches on March 21, 2011.

4.1.2 Surface Water Discharge

The daily surface water discharge data collected for calendar year 2011 are shown in Table A-2 of Appendix A. The time history of daily mean discharge for the 1996 through 2011 period is shown in Figure 4-1. Surface water discharge in San Juan Creek and Trabuco Creek fluctuates seasonally with annual maximum discharge values observed in the wet winter months and minimum discharge values observed in the summer. During 2011, as is typical for the time period, Trabuco Creek at Del Obispo Street sustained perennial flows throughout the year while San Juan Creek at La Novia Street was dry in August and September. However at PMS-01 and PMS-02, south of the San Juan Creek at La Novia Street gage station, surface water discharge was observed year round in San Juan Creek. These flows are associated with urban runoff and/or rising groundwater. Total annual surface water discharge for the 1996 through 2011 period is summarized in Table 4-2, and Table 4-3 summarizes the total monthly surface water discharge for the 1996 through 2011 period at the San Juan Creek at La Novia Street gaging station. In 2011, the total surface water discharge in San Juan Creek was 99 percent of the average for the 1996 through 2011 period. Surface water discharge in San Juan Creek was above average in January, March, April, June, July and November 2011.

4.1.3 Surface Water Quality

Table 4-4 summarizes the field water quality measurements collected during 2011 at the PMS monitoring sites. Figure 4-2 shows the time history of field EC measurements since the start of the monitoring program in 2004. In general, EC varies seasonally, with the lowest values observed in wet winter months and the highest values observed in summer months. EC values are highest at PMS-01 and PMS-02, which are dominated by urban runoff during non-winter

months. Furthermore, the winter minimum and summer maximum concentrations are lower in wet years (winter 2004/05 and 2010/11) compared to dry years (2007-2009).

Table 4-5 summarizes the laboratory results of the surface water samples collected through 2011.[7] Also shown in Table 4-5 are any corresponding surface water quality objectives contained in the Basin Plan. While surface water samples have not been collected for laboratory analysis for a sufficient period of time to assess trends, the available data show that surface water quality in San Juan Creek occasionally exceeds Basin Plan objectives for chloride (250 milligrams per liter [mg/L]), color (20 units), iron (0.30 mg/L), and manganese (0.05 mg/L). Since laboratory analyses began in 2009, with the exception of the May 2011 sampling event, all samples collected from San Juan Creek have had sulfate concentrations in excess of the Basin Plan objective (250 mg/L). And, all samples from San Juan Creek have had TDS concentrations in excess of the Basin Plan objective (500 mg/L). There are no surface water quality data prior to the startup of the GWRP to compare with results collected since 2009.

4.2 Analysis of Hydrogeologic Data

4.2.1 Groundwater Production

Table 4-6 summarizes total reported annual groundwater production in the lower San Juan Basin, by well, since 2004.[8] The wells are grouped in the table and in some of the figures by their use-type. These groups include:

- **CSJC GWRP**. Currently, there are eight GWRP production wells: Dance Hall, SJBA No. 4, SJBA No. 2, CVWD No. 1, Kinoshita, Tirador, South Cooks, and Well #5.
- **SCWD GRF**. Currently one production well supplies the GRF: Stonehill.
- **Other Groundwater Production**. There are seven active wells included in this production group. They include four wells owned by the City of San Juan Capistrano (Rosenbaum No. 1, North Open Space, Hollywood 2A, and Mission St.), two wells owned by the San Juan Hills Golf Course (Small Well and Large Well), and the SOCOD test well. The production values reported for the SOCOD test well represent the portion of total SOCOD production that comes from the San Juan Groundwater Basin.

Total GWRP production was 3,436 acre-ft in 2011. Since the first full year of production in 2005, GWRP production has ranged from a minimum of 1,450 acre-ft in 2008 to a maximum of 4,846 acre-ft in 2006, averaging 2,754 acre-ft per year. Groundwater production in 2011 was the highest it has been since 2006. The increase in production in 2011 is attributable to the startup of the MTBE GAC treatment facilities and the addition of two new wells to the GWRP system: South Cooks and Well #5.

Total Production at the SCWD desalter well was 1,141 acre-ft in 2011, which is the highest annual production volume for this well since it began producing in 2007. The increase in

[7] Surface water samples were not always collected for laboratory analysis. This task was added to the monitoring program in calendar year 2009.

[8] Reported production does not include pumping from minor private producers in the lower San Juan Basin.

production occurred as a result of the SCWD obtaining an amended water rights permit from the SWRCB that increased their total production right from 976 acre-ft per year to 1,300 acre-ft per year.

Other basin production totaled 2,957 acre-ft in 2011, the highest production volume for this group of wells since 2004. The increase in production is attributable to the SOCOD test well and to the CSJC's increased use of the Mission Street well for non-potable use.

Total reported production in the San Juan Basin has ranged from a minimum of 3,628 acre-ft in 2008 to a maximum of 7,534 acre-ft in 2011, averaging 5,162 acre-ft per year over the 2004 to 2011 period.

4.2.2 Groundwater Elevation

Figure 4-3 shows the groundwater elevation time-histories of the eight monitoring wells equipped with pressure transducers and the total monthly production for all wells in the study area over the 2004 to 2011 period. In general, groundwater elevations in most of the monitoring wells fluctuate seasonally, with maximum annual groundwater elevations observed during wet winter months and annual minimums observed in the dry summer months. As is typical for the period of record, in 2011 groundwater elevations decreased steadily throughout the year from the peak winter elevations (observed on December 22, 2010, the end of a seven-day period in which nearly ten inches of precipitation was recorded at the San Juan Creek at La Novia Street precipitation gage).

The groundwater elevation data from wells MW-02 and MW-07, located in the Lower Basin, and MW-08, located in the Lower Arroyo Trabuco Basin, do not show long-term continuous declines. Wells MW-02 and MW-08 typically fluctuate in response to climatic conditions and less so to nearby production. Similarly, groundwater elevation data from wells MW-04, MW-05, and MW-06, all located in the Middle Basin, fluctuate in response to climatic conditions and do not show long-term continuous groundwater elevation declines. However, groundwater elevation responses to production were observed in 2011 at MW-04, MW-05, and MW-06 after the startup of new two new Middle Basin GWRP production wells. The South Cooks well, located adjacent to MW-04, started producing in April 2011. Well #5, located between MW-04 and MW-05, started producing in September 2011. The new GWRP wells have not been in production long enough to determine the impacts to groundwater elevation in the Middle Basin.

At well MW-01S, located in the southern section of the Lower Basin, changes in groundwater elevations correspond primarily to production at the SCWD's desalter well, which is located approximately 1,500 feet north-west of the monitoring well. The groundwater elevation in MW-01S declines steadily throughout the spring, summer and fall months during full production (~750 gallons per minute) of the GRF well. Groundwater elevations increase when GRF production decreases. For example, as shown in Figure 4-3, the recovery of groundwater elevations at MW-01S in November 2008 and July 2009 corresponded with decreased production at the desalter well. The annual minimum elevation has decreased each year since monitoring began in 2004 as groundwater production at the GRF has increased. The start-up of the SOCOD test well may also be contributing to declining groundwater elevations at MW-01S.

Similar to MW-01S, changes in groundwater elevations at MW-03, also located in the Lower Basin, correspond to production at nearby GWRP wells. Well MW-03 is surrounded by five of the eight desalter wells. When the wells are offline (see February through July 2008 for example), groundwater elevations increase and fluctuate very little on a day-to-day basis. When the wells are online, the groundwater elevation in MW-03 declines by approximately 10 to 15 feet. When the GWRP wells are not pumping and groundwater elevations are able to recover at well MW-03, the data indicate that increased production in the San Juan Basin has resulted in about a four-foot decrease in groundwater elevation in the vicinity of this well since the startup of the GWRP.

4.3 Change in Storage

Groundwater elevation data collected for the monitoring program were used to calculate the monthly and cumulative change in storage in the Study Area, following methods developed by the DWR to compute total storage in the basin. The segments, as shown in Figure 4-4, only include the portion of the basin with alluvial sediments. Table 4-7 defines each segment of the basin as a reach of San Juan Creek or Trabuco Creek and shows the approximate area, assigned specific yield, and monitoring well used to compute the change in storage for each segment. Segment 3 includes segments 3a and 3b, as shown in Figure 4-4.

For each segment and corresponding monitoring well, the manual groundwater elevation recorded during the monthly field monitoring visit was used to assess the groundwater elevation change for the entire segment. In some instances, two wells were used to assess the change; in such instances, the change at the two wells was averaged to determine the groundwater elevation change for the entire segment.

The change in storage was calculated using the following equations:

$$\Delta D_n = DTW_{0,n} - DTW_{t,n}$$

where:

ΔD_n = change in groundwater depth (ft) in basin segment n,

$DTW_{0,n}$ = depth to water (ft) measured at the beginning of the time period in segment n,

$DTW_{t,n}$ = depth to water (ft) measured at the end of the time period in segment n, and

n = basin segment number;

and

$$\Delta S_n = \Delta D_n * Sy_n * A_n$$

where:

ΔS_n = change in storage in segment n (acre-ft),

Sy_n = specific yield of segment n (unitless), and

A_n = area of segment n (acres).

Total change in storage is then calculated as:

$$\sum \Delta S_n = \Delta S_1 + \Delta S_2 + \ldots + \Delta S_6$$

The cumulative change in storage in the Study Area for 2004 through 2011 is shown in Figure 4-5. Table E-1 of Appendix E details the monthly and cumulative change in storage for each individual segment. Also shown in Figure 4-5 are total monthly groundwater production and total monthly precipitation recorded at the San Juan Creek at La Novia Avenue gage. In general, storage increases during the winter and spring months when precipitation events recharge the basin and decreases during the summer and fall when groundwater production and phreatophyte extraction are highest and recharge is lowest.

Since April 2004, the cumulative change in storage has ranged between a high of +350 acre-ft and a low of -1,150 acre-ft. Between May 2006 and January 2009, a relatively dry period, the storage change oscillated regularly on a seasonal basis from a high of about -200 acre-ft to a low of -1,000 acre-ft. Above average rainfall (for the reporting period) in December 2010, combined with lower than average production, increased the cumulative storage in the basin to 275 acre-ft. In September 2011, the cumulative storage change decreased to -1,150 acre-ft, which is the lowest value calculated since this analysis began in 2004. As of December 2011, the cumulative change in storage was about -800 acre-ft.

4.4 Groundwater Quality

Table 4-8 summarizes the field water quality measurements collected at groundwater monitoring wells in 2011. Table 4-9 summarizes the laboratory results for groundwater samples collected from 2004 through 2011. Of particular concern to the SWRCB is the impact of increased groundwater production on chloride and TDS concentrations and EC. The SJBA's water rights permit from the SWRCB (No. 21074) requires that the monitoring program include analysis of chloride and TDS concentrations in the San Juan Basin to document concentrations relative to the water quality objectives in the Basin Plan. If concentrations of these constituents were in excess of the objectives prior to the start of GWRP production, desalter production should not cause additional increases in TDS or chloride concentrations. Figures 4-6, 4-7, and 4-8 show the time history of chloride and TDS concentrations and EC at groundwater and surface water monitoring sites in the lower San Juan Basin. Each figure analyzes a sub-section of the lower San Juan Basin, divided by the groundwater sub-basins defined by the DWR (1972): the Middle Basin (Figure 4-6), the Lower Basin (Figure 4-7), and the lower portion of the Arroyo Trabuco Basin (Figure 4-8). The following sections summarize the groundwater quality trends for each sub-basin since monitoring began in 2004.

4.4.1 Groundwater Quality Trends in the Middle Basin

As shown in Figure 4-6, chloride concentrations at all three monitoring wells in the Middle Basin have fluctuated around 200 mg/L. In May 2011, all-time low chloride concentrations were measured at wells MW-04 and MW-05. This decrease may have been in response to the startup of the two new GWRP production wells (South Cooks and Well #5) and/or the groundwater recharge associated with the large precipitation event at the end of December

2010. Note that the chloride concentrations in wells MW-04 and MW-05 were about the same as the concentrations observed in the surface water flowing in San Juan Creek at PMS-C, PMS-04 and PMS-03. In contrast, chloride concentrations in well MW-06 increased slightly in 2011 and did not fluctuate in unison with the nearby surface water stations. Chloride concentrations in all three wells remained below the Basin Plan objective of 400 mg/L.

The EC and TDS trends were different for each of the wells in the Middle Basin. At MW-06, EC showed no change and very little seasonal fluctuation until May 2011.[9] EC had ranged from about 1,600 µS/cm to about 1,950 µS/cm since 2004, but increased steadily to a high of 2,800 µS/cm by October 2011. Similarly, the TDS concentrations in MW-06 had always been at or below the basin plan objective of 1,200 mg/L until October 2010 when concentrations began a steady increase. The maximum concentration since monitoring began, 1,800 mg/L, was observed in November 2011.

In contrast to the trends observed in MW-06, the EC in well MW-05 has always fluctuated seasonally: EC increases during dry periods and decreases during wet periods. However, the seasonal peak in 2011 was well below the peak concentrations observed in previous years. The recent decrease in EC at MW-05 is coincident with decreases in TDS concentrations measured from this well. The minimum concentration since monitoring began, 600 mg/L, was observed in May 2011. As was observed for chloride, the concentrations in MW-05 were about equal to the concentrations observed in the surface water flowing in San Juan Creek at PMS-C, PMS-04 and PMS-03.

From 2004 through March 2011, the EC values measured at MW-04 were observed to fluctuate greatly on a daily basis, changing by as much as 1,000 µS/cm during a 12-hour period. It is not clear from the available data what was driving the daily fluctuations recorded by the data logger in well MW-04. A new transducer was installed in February 2011, and immediately thereafter the regular daily fluctuations ceased. The new transducer was installed two months before production began at the South Cooks well, which is located within 100 feet of well MW-04. The small time history of data available before production began suggests that the new production caused the EC to decrease. As with well MW-05, the minimum TDS concentration since monitoring began, 580 mg/L, was observed in May 2011 and was about equal to the concentrations observed in the surface water flowing in San Juan Creek at PMS-C, PMS-04, and PMS-03.

The groundwater and surface water quality data collected in 2011 suggest that new GWRP production in the Middle Basin has impacted groundwater quality in terms of chloride, EC, and TDS. However, given that production at South Cooks and Well #5 only just began and the changed water quality trends were also coincident with the largest rainfall event that has occurred since monitoring began in 2004, there is not a sufficient time history of data to draw conclusions about how continued GWRP production in the Middle Basin will impact groundwater quality.

4.4.2 Groundwater Quality Trends in the Lower Basin

Figure 4-7 shows that, within the Lower Basin, impacts to TDS and chloride concentrations and EC were not observed at wells MW-02 or MW-07. Both wells have concentrations below

[9] The transducer that records continuous EC readings in well MW-06 was replaced in March 2010.

the Basin Plan objective for chloride (400 mg/L). TDS concentrations at wells MW-02 and MW-07 have exceeded the objective of 1,200 mg/L since water-quality monitoring began in January 2004.

Chloride concentrations have increased recently in wells MW-01N (from about 300 mg/L in 2004 to 440 mg/L in 2011), MW-01S (from below 100 mg/L in 2004 to 280 mg/L in 2011), and MW-03 (from 250 mg/L in 2004 to 430 mg/L in 2011). Chloride concentrations in MW-01N and MW-03 equaled or exceeded the groundwater quality objective of 400 mg/L in both 2011 sampling events. However, it is difficult to conclude if increased groundwater production near these wells was the cause of the increased concentrations. The increasing trend, as well as irregular fluctuations observed over the years, could be an artifact of the sampling methodology used at these wells.[10,11] Similarly, irregular spikes in the TDS concentrations at wells MW-01S, MW-01N, and MW-03 make it difficult to assess the trends at these wells—all of which have had TDS concentrations above and below the objective of 1,200 mg/L. However, given that EC and TDS are directly correlated, the continuous EC readings recorded by data loggers in MW-01S, MW-01N, and MW-03 suggest that groundwater production may not be causing an increase, or decrease, in the TDS concentrations at these wells[12]: EC trends have changed little in MW-01S, MW-01N, and MW-03 since the data loggers were installed. Note that groundwater EC in well MW-03 is influenced by desalter pumping in the Lower Basin. That the most noticeable impacts are observed at this well is not surprising given that it is surrounded by five of the eight GWRP wells. The EC data from MW-03 shows that EC values are lowest when the desalter wells are pumping and that EC increases when the desalters are shut down (see February through August 2008 for example). Because there is no continuous EC data available for this well prior to the startup of desalter production, it is unknown what the impacts of production have been relative to pre-GWRP conditions.

4.4.3 Groundwater Quality Trends in the Lower Arroyo Trabuco Basin

Figure 4-8 shows that since 2004, there has been little change in EC and in chloride and TDS concentrations in the lower Arroyo Trabuco Basin. Chloride concentrations have fluctuated

[10] Unlike the majority of the monitoring program wells, Wells MW-01S and MW-01N are only perforated in the bottom 10 feet of the well. Most of the other monitoring program wells are perforated across at least 90 feet of casing. Thus, it is more difficult to be sure that the stagnant casing water at the top of the well casing is entirely purged during sampling. If not, the use of a bailer to collect the sample could result in the collection of stagnant water or a mix thereof with water from the screened interval. The wide range of anion/cation balances at these wells suggests this might be the case for some sampling events.

[11] Unlike the majority of the monitoring program wells, Well MW-03 is an abandoned production well. The well has an 18-inch casing diameter, which is much more difficult to completely purge with a 2-inch portable pump than the 4-inch casings of the monitoring wells. Like well MW-01S, it is difficult to be sure that the stagnant water at the top of the well casing is entirely purged during sampling. And thus, the use of a bailer to collect the sample could result in the collection of stagnant water or a mix thereof with water from the screened interval. The wide range of water character at well MW-03, as shown on the Piper Plot in Figure 4-6, suggests that this might be the case for some sampling events.

[12] The EC data loggers are located within the screened intervals of the monitoring wells and are therefore not subject to the sampling problems discussed in footnotes 9 and 10.

around 200 mg/L, below the 400 mg/L objective. TDS concentrations at MW-08 have always been above the groundwater objective of 1,200 mg/L, ranging from 1,200 mg/L to 2,500 mg/L.

4.4.4 Groundwater Contaminants of Concern

During 2011, there were no detections of MTBE in any of the groundwater monitoring wells except well MW-01N. In May 2011, MTBE was detected in this well at a concentration 0.53 µg/L in May 2011.

4.5 Biotic Data

The following sections address the results of plant monitoring at the reference (PMS-C) and study sites (PMS-01, PMS-02, PMS-03, and PMS-04).

4.5.1 PMS-C: Reference Site

Vegetation within reference site PMS-C consists of a tall canopy of arroyo willow (*Salix lasiolepis*), red willow (*Salix laevigata*), scattered sandbar willow (*Salix exigua*), and western sycamore (*Platanus racemosa*) along the banks of San Juan Creek within a dense riparian stand. The understory consists mainly of mulefat (*Baccharis salicifolia*), southern cattail (*Typha domingensis*), tall umbrella sedge (*Cyperus eragrostis*), seep monkeyflower (*Mimulus guttanus*), and California evening primrose (*Oenothera californica*), as well as non-native bristly ox-tongue (*Pichris echiodes*), Spanish sunflower (*Pulicaria paludosa*), yellow sweet clover (*melilotus albus*), sweet alyssum (*Lobularia maritime*), giant reed (*Arundo donax*), sowthistle (*Sonchus asper*), and pampas grass (*Cortaderia selloana*).

At the time of the January monitoring event, multiple species of willow exhibited yellowing leaves, which is typical of that time of year. Debris racks and bent vegetation were present as a result of increased flows associated with a recent rain event. In June, riparian habitat within the site appeared green, vibrant, and healthy. Tall umbrella sedge started to flourish. Infrequent occurrences of giant reed and pampas grass were identified, and yellow sweet clover was common. In July, the riparian habitat remained green and full, and cattails and willows were blooming. In August, a dewatering and discharging process began at an upstream site (Antonio Bridge widening project); however, no net loss of downstream flows was noted. During September, the riparian habitat appeared the same as it had during the summer months, though drier to a minimal extent. The first signs of willow leaf yellowing and leaf drop appeared in November. In December, yellowing of cattails and wilting of Spanish sunflower was noted.

4.5.2 PMS-01

Vegetation within study area PMS-01 consisted of a canopy of arroyo willows, red willows, and western cottonwood (*Populus fremontii*) approximately 20 feet tall with a dense understory consisting of willows, mugwort (*Artemisia douglasiana*), mulefat, poison oak, California wild rose (*Rosa californica*), cocklebur (*Xanthium strumarium*), non-native English ivy (*Hedera helix*), Spanish sunflower, and sweet clover. Dense stands of southern cattail appeared in wetter areas along the creek banks. The herbaceous understory was comprised of American wild carrot

(*Daucus pusillus*), California willow-herb (*Epilobium foliosum*), Mexican rush (*Juncus mexicanus*), yerba mansa (*Anemopsis californica*), and non-native bristly ox-tongue.

During January, as is typical of the time of year, the upper limbs of willows were yellow and the level of surface water appeared high. In April, riparian habitat looked green and healthy, and the level of surface water had diminished. By May, no surface water was present. From June through September, riparian habitat exhibited signs of good health. Southern cattails grew to a height of 12 to 15 feet and Spanish sunflower was prevalent within the understory. During October, the first signs of willow and southern cattail leaf yellowing and leaf drop were detected. Through November and December, leaf yellowing and leaf drop increased in a seasonally appropriate manner.

The rains in late December 2010 increased overall flows in San Juan Creek and resulted in the removal of a significant amount of riparian vegetation in the low flow channel of San Juan Creek, which resulted in significant scour within the creek. The remaining riparian habitat occupying the creek banks exhibited no signs of stress as a result of insufficient water; however, portions of the remaining habitat did show signs of physical damage. For the 2011 monitoring year, the riparian habitat at PMS-01 exhibited no signs of stress resulting from insufficient amounts of water or excessive sedimentation. During 2011, riparian habitat exhibited a full recovery from the high flows and scour of the 2010 rain events.

4.5.3 PMS-02

Vegetation within study area PMS-02 consisted of a canopy of red, black (*Salix gooddingii*), and sandbar willows approximately 20 feet tall with a dense understory of sapling willows, mulefat, cocklebur, southern cattail, yellow sweet clover, mugwort, duckweed (*Lemna minor*), pampas grass, prickly lettuce (*Lactuca* sp.), Spanish sunflower, twiggy wreath plant (*Stephanomeria virgata*), and giant reed.

In January, typical of the time of year, willow leaves were yellow. As a result of rain events, debris racks were present, and riparian habitat within the channel that was not washed downstream was bent toward the ground in a downstream direction. From April through September, the riparian habitat appeared vibrant and green. In June, mulefat started to brown after flowering. In October, the riparian habitat continued to remain healthy and the first signs of southern cattail leaf yellowing were detected. Willow leaf yellowing started in November and continued through December.

Surface water remained in San Juan Creek at PMS-02 during the entire 2011 monitoring period. Note that San Juan Creek's flow pattern at PMS-02 changed considerably after the 2010 December storm events. Surface water was consistently present in the low-flow channel of the creek while the braid at the PMS-02 monitoring location remained dry for the majority of the year. The water in the low-flow braid of the creek is primarily made up of urban runoff during non-winter months. San Juan Creek supported a steady, high rate of flow at the time of the January monitoring. Notwithstanding physical effects to riparian plants from 2010 December rain events, the habitat exhibited no signs of water stress within PMS-02 during the 2011 monitoring period.

4.5.4 PMS-03

Vegetation at study site PMS-03 consisted of arroyo, red, and sandbar willows, mulefat, bristly ox-tongue, castor bean (*Ricinus communis*), cattail, cocklebur, duckweed, yellow sweet clover, black mustard (*Brassica nigra*), Spanish sunflower, giant reed, rabbitsfoot grass (*Polypogon monspeliensis*), water cress, and wild radish (*Raphanus raphanistrum*), which occurred mainly along the creek banks. Within PMS-03, San Juan Creek flows along the southern edge of the site. Vegetation in the area occurs in a sandy scoured channel with a sparsely vegetated understory of riparian and upland species amid dense stands of riparian habitat.

As a result of December 2010 rain events, debris racks were present and riparian habitat was bent toward the ground in a downstream direction during early 2011. From June through October, the riparian habitat appeared green and full, and mulefat shrubs appeared to brown after flowering. Willow leaf yellowing started to occur in November and continued through December while dense stands of sandbar willow saplings exhibited continuous growth throughout the year.

While surface water was visible in San Juan Creek at PMS-03 during the entire 2011 monitoring period, the water was stagnant and did not flow during August and September. Riparian habitat exhibited no signs of water stress within PMS-03 during the 2011 monitoring period.

4.5.5 PMS-04

Canopy vegetation within study site PMS-04 consisted of a dense stand of arroyo willow, sandbar willow, and black willow with mulefat, poison oak, southern cattail, giant reed, cocklebur, creek monkey flower, duckweed, curly dock (*Rumex crispus*), pampas grass, tall flatsedge (*Cyperus eragrostis*), yellow sweet clover and a considerable amount of Spanish sunflower occurring in the understory.

During January, the site contained large debris racks and bent vegetation resulting from prior storm events. In April, the riparian habitat appeared green and healthy. From June through October, the habitat remained vibrant and full, and mulefat appeared to brown after flowering. Willow leaf yellowing started in November and continued through December.

Surface water remained in San Juan Creek at PMS-04 during the entire 2011 monitoring period. The highest surface water levels were observed during the January through May monitoring events. Riparian habitat exhibited no signs of water stress within PMS-04 during the 2011 monitoring period.

4.6 Climate Data

Air temperatures documented from the reference and study sites during the 2011 monitoring period ranged from 40.9 to 82.6 degrees Fahrenheit. The low occurred during the November monitoring event and the high during the July event. Wind speeds documented at the control and study sites ranged from 0.0 to 6.9 miles per hour with the lowest wind speed occurring during various monitoring events and the highest during the March event. Relative humidity

ranged from 24.2 percent, occurring in December, to 74.0 percent in June. Cloud cover ranged from 0.0 percent during various monitoring events to 100 percent in July.

Table 4-1
Total Annual Rainfall at Selected Precipitation Stations
in the Lower San Juan Basin
Calendar Years 1996 through 2011
(inches)

Year	San Juan Guard Station No. 209	Oso Creek at Crown Valley Station No. 213	San Juan Creek at La Novia St. Station No. 215	Upper Oso Creek Station No. 297
1996	19.44	16.93	16.74	19.21
1997	10.77	11.24	10.45	12.49
1998	17.86	25.22	26.29	27.25
1999	4.73	4.31	4.44	4.79
2000	10.72	9.46	10.58	9.4
2001	12.57	12.14	16.06	11.51
2002	6.35	1.71	6.32	6.2
2003	11.42	8.79	13.13	14.37
2004	15.1	16.21	15.51	17.03
2005	16.04	19.4	20.59	11
2006	8.04	7.9	8.46	8.02
2007	6.63	4.66	5.37	4.44
2008	10.8	10.57	11.57	13.23
2009	6.16	6.42	6.63	4.68
2010	24.01	23.39	25.6	22.31
2011	9.49	8.88	9.64	8.96
Min	4.73	1.71	4.44	4.44
Max	24.01	25.22	26.29	27.25
Average	11.88	11.70	12.96	12.18
Ratio of 2011 to Avg.	80%	76%	74%	74%

Table 4-2
Total Annual Surface Water Discharge
in the Lower San Juan Basin
Calendar Years 1996 through 2011
(acre-ft)

Year	11046530 San Juan Creek at La Novia St.	11047300 Trabuco Creek at Del Obispo St.
1996	5,168.7	14,621.4
1997	11,784.2	17,657.1
1998	72,049.2	48,606.1
1999	1,457.8	4,826.4
2000	3,162.5	11,316.4
2001	4,798.7	14,787.8
2002	534.7	5,712.8
2003	8,127.6	14,309.4
2004	5,029.6	15,496.8
2005	71,850.2	41,354.2
2006	4,011.2	9,257.4
2007	472.6	4,737.5
2008	2,320.2	10,942.4
2009	1,022.1	7,240.3
2010	32,943.6	33,624.3
2011	14,802.2	14,300.8
Min	472.6	4,737.5
Max	72,049.2	48,606.1
Average	14,970.9	16,799.4
Ratio of 2011 to Avg.	99%	85%

Table 4-3
Monthly Surface Water Discharge in San Juan Creek at La Novia Street
Calendar Years 1996 through 2011
(acre-ft)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1996	452.8	1,368.2	725.2	661.3	276.5	74.7	2.1	0.0	0.0	10.8	562.1	1,035.0
1997	7,627.2	1,684.0	676.6	293.4	200.7	125.0	26.4	1.4	0.2	0.0	126.0	1,023.5
1998	622.8	45,296.5	9,486.9	7,176.2	5,837.4	1,517.4	548.8	235.4	198.1	200.7	401.5	527.4
1999	429.2	328.7	278.9	285.0	83.2	51.6	0.0	0.0	0.3	0.0	0.0	0.8
2000	30.5	1,771.2	1,016.3	230.8	42.8	0.9	0.0	0.0	0.0	44.1	18.6	7.2
2001	739.0	2,169.1	676.8	444.7	147.4	32.4	1.0	0.0	0.0	0.0	493.2	95.2
2002	108.1	42.6	104.1	73.7	8.4	0.0	0.0	0.0	0.0	0.0	5.7	192.2
2003	37.7	1,549.1	4,669.5	891.6	436.4	153.7	33.6	13.5	0.0	0.9	65.2	276.5
2004	297.9	1,214.1	439.9	195.7	4.2	4.5	0.0	0.0	0.0	1,670.1	209.9	993.3
2005	37,985.5	19,267.4	8,739.2	2,437.7	1,693.9	614.5	182.5	121.2	59.5	315.5	202.3	231.1
2006	554.4	365.2	990.1	1,717.7	184.9	25.6	0.7	0.0	0.2	0.1	0.4	172.0
2007	166.6	87.0	60.9	71.0	1.6	1.3	0.0	0.0	1.8	2.3	4.8	75.4
2008	922.8	421.7	110.9	18.4	38.3	5.9	15.8	12.0	3.3	0.2	72.5	698.5
2009	18.2	922.5	71.0	9.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9
2010	3,659.7	1,717.5	536.3	304.5	109.1	48.8	22.1	0.2	0.0	103.6	135.3	26,306.6
2011	4,103.8	3,393.7	3,869.8	1,674.0	553.2	248.7	93.1	6.8	1.9	152.6	410.0	294.5
minimum	18.2	42.6	60.9	9.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8
maximum	37,985.5	45,296.5	9,486.9	7,176.2	5,837.4	1,517.4	548.8	235.4	198.1	1,670.1	562.1	26,306.6
average	3,609.8	5,099.9	2,028.3	1,030.3	601.1	181.6	57.9	24.4	16.6	156.3	169.2	1,995.6
Ratio of 2011 to Avg.	114%	67%	191%	162%	92%	137%	161%	28%	11%	98%	242%	15%

Table 4-4
Field Measurements of Surface Water Quality in San Juan Creek
January through December 2011

Station Name	Measurement Date	Measurement Time	pH (units)	Temperature (ºC)	Electrical Conductivity[1] (µS/cm)
PMS 01	1/25/2011	7:59	8.73	10.0	1,177
PMS 01	2/23/2011	7:54	7.39	10.9	1,110
PMS 01	3/28/2011	8:15	6.96	12.4	920
PMS 01	4/27/2011	8:06	7.86	15.3	998
PMS 01	5/25/2011	8:39	7.27	17.5	1,173
PMS 01	6/23/2011	7:45	7.88	19.6	1,780
PMS 01	7/25/2011	8:01	7.18	21.1	2,100
PMS 01	8/22/2011	8:12	7.98	20.4	4,060
PMS 01	9/27/2011	7:50	7.74	17.6	4,190
PMS 01	11/3/2011	9:38	8.24	13.6	4,530
PMS 01	11/30/2011	7:38	7.98	10.6	1,930
PMS 01	12/28/2011	7:40	8.04	7.1	2,450
PMS 02	1/25/2011	8:17	9.17	10.1	1,024
PMS 02	2/23/2011	8:08	7.5	10.9	937
PMS 02	3/28/2011	8:28	7.27	12.5	933
PMS 02	4/27/2011	8:17	7.89	15.3	831
PMS 02	5/25/2011	9:04	7.34	17.7	986
PMS 02	6/23/2011	7:59	7.98	19.8	1,169
PMS 02	7/25/2011	8:28	7.99	20.2	1,920
PMS 02	8/22/2011	8:30	dry	dry	dry
PMS 02	9/27/2011	8:02	dry	dry	dry
PMS 02	11/3/2011	9:55	dry	dry	dry
PMS 02	11/30/2011	7:54	8.36	10.7	1,389
PMS 02	12/28/2011	8:00	8.52	6.4	1,500
PMS 03	1/25/2011	8:39	9.29	10.3	950
PMS 03	2/23/2011	8:51	7.52	11.8	908
PMS 03	3/28/2011	8:44	7.6	12.5	711
PMS 03	4/27/2011	8:37	7.93	15.8	788
PMS 03	5/25/2011	9:24	7.29	18.5	958
PMS 03	6/23/2011	8:17	7.99	20.1	1,134
PMS 03	7/25/2011	8:44	8	22.7	1,400
PMS 03	8/22/2011	8:42	dry	dry	dry
PMS 03	9/27/2011	8:15	dry	dry	dry
PMS 03	11/3/2011	10:18	8.54	15.8	1,570
PMS 03	11/30/2011	8:08	8.27	12.0	1,337
PMS 03	12/28/2011	8:16	8.17	8.7	1,394
PMS 04	1/25/2011	8:53	9.32	10.2	924
PMS 04	2/23/2011	8:30	7.55	10.9	862
PMS 04	3/28/2011	9:00	7.57	12.4	693
PMS 04	4/27/2011	8:46	7.81	15.2	764
PMS 04	5/25/2011	9:40	7.31	17.7	933
PMS 04	6/23/2011	8:33	7.77	19.8	1,990
PMS 04	7/25/2011	8:57	7.87	20.2	1,920
PMS 04	8/22/2011	8:57	6.13	21.3	1,660
PMS 04	9/27/2011	8:24	7.81	18.4	1,152
PMS 04	11/3/2011	10:36	8.3	16.5	1,540
PMS 04	11/30/2011	8:21	8.08	13.2	1,336
PMS 04	12/28/2011	8:25	8.07	10.5	1,402
PMS Control	1/25/2011	9:15	9.32	10.7	898
PMS Control	2/23/2011	9:11	7.46	18.8	836
PMS Control	3/28/2011	9:15	7.53	12.7	658
PMS Control	4/27/2011	9:04	7.76	15.6	747
PMS Control	5/25/2011	10:00	7.21	18.0	907
PMS Control	6/23/2011	8:57	7.55	19.6	1,145
PMS Control	7/25/2011	9:20	7.57	21.0	1,290
PMS Control	8/22/2011	9:15	6.07	20.4	1,960
PMS Control	9/27/2011	8:42	7.69	19.7	1,510
PMS Control	11/3/2011	10:57	8.02	19.4	1,520
PMS Control	11/30/2011	8:39	7.96	14.7	1,306
PMS Control	12/28/2011	8:57	7.98	12.5	1,519

Notes:
1--Measured as Specific Conductance @ 25ºC

Table 4-5
Analytical Laboratory Results for Surface Water Quality Monitoring Sites in the San Juan Basin - Calendar Years 2009 through 2011

Station Name	Measurement Date	Bicarbonate (as HCO_3^-) (mg/L)	Calcium (mg/L)	Carbonate (as CO_3^{2-}) (mg/L)	Chloride (mg/L)	Color (units)	Copper (mg/L)	Iron (mg/L)	Magnesium (mg/L)	Manganese (mg/L)	MBAS (mg/L)	Odor (TON)	pH (units)	Potassium (mg/L)	Sodium (mg/L)	Sodium %	Specific Conductance (µS/cm)	Sulfate (mg/L)	TDS (mg/L)	Total Hardness (mg/L)	Turbidity (NTU)	Zinc (mg/L)
PMS 01	6/30/2009	293	260	< 1.2	580	35	< 0.01	2.80	160	0.47	0.12	19	8.0	30	400	39%	4,200	1,800	3,500	1,300	80	0.025
PMS 01	12/2/2009	293	320	< 1.2	530	25	< 0.01	0.41	200	0.09	0.12	< 1	7.7	32	500	40%	4,200	1,700	3,600	1,600	4.5	0.043
PMS 01	4/30/2010	232	150	< 1.2	190	18	< 0.01	0.08	60	0.05	< 0.1	2	8.0	7.1	170	37%	1,900	550	1,300	630	< 1	< 0.02
PMS 01	10/29/2010	244	230	< 1.2	330	25	< 0.01	0.19	130	0.25	< 0.1	17	7.9	19	330	39%	3,100	1,100	2,500	1,100	1.8	< 0.02
PMS 01	5/25/2011	190	95	3.2	100	15	< 0.002	0.02	30	0.02	< 0.05	4	8.4	3.5	88	34%	1,100	260	770	360	0.4	< 0.02
PMS 01	11/3/2011	300	330	2	530	30	0.004	0.09	210	0.05	0.05	4	8.0	29	440	36%	4,400	1,600	3,600	1,700	2.4	< 0.02
PMS 02	6/30/2009	207	270	9.6	550	40	< 0.01	0.27	170	0.05	< 0.1	3	8.5	33	410	39%	4,100	1,700	3,200	1,400	7.1	< 0.02
PMS 02	12/2/2009	305	330	< 1.2	540	25	< 0.01	0.44	210	0.05	0.11	< 1	7.9	34	530	40%	4,300	1,700	3,700	1,700	9	0.043
PMS 02	4/30/2010	232	160	< 1.2	220	20	< 0.01	0.10	67	0.03	< 0.1	5	8.1	7.9	180	36%	2,100	670	1,500	680	1.2	< 0.02
PMS 02	10/29/2010	244	210	< 1.2	310	30	< 0.01	0.27	120	0.26	< 0.1	8	8.1	16	290	38%	2,900	1,000	2,300	1,000	2.6	< 0.02
PMS 02	5/25/2011	190	85	3.3	86	15	< 0.002	< 0.02	23	0.01	< 0.05	4	8.4	2.5	78	35%	980	200	650	310	0.5	< 0.02
PMS 02[1]	11/3/2011	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PMS 03[2]	6/30/2009	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PMS 03[2]	12/2/2009	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PMS 03	4/29/2010	220	130	< 1.2	120	18	< 0.01	0.06	31	0.05	< 0.1	2	8.1	3.4	110	34%	1,400	330	940	450	< 1	< 0.02
PMS 03	10/29/2010	256	160	< 1.2	180	20	< 0.01	0.19	51	0.19	< 0.1	10	8.1	5.3	170	38%	1,900	480	1,300	610	1.6	< 0.02
PMS 03	5/25/2011	200	83	3	80	15	< 0.002	< 0.02	21	0.01	< 0.05	4	8.4	2.3	68	33%	940	180	620	290	0.49	< 0.02
PMS 03	11/3/2011	240	130	2.3	180	10	< 0.002	0.04	35	0.01	< 0.05	2	8.2	3.2	150	41%	1,500	360	1,100	470	0.529	< 0.02
PMS 04[3]	6/30/2009	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PMS 04[3]	12/2/2009	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PMS 04	4/29/2010	232	130	< 1.2	130	22	< 0.01	0.14	29	0.05	< 0.1	3	8.3	3.4	100	33%	1,400	340	940	440	1.8	< 0.02
PMS 04	10/29/2010	268	180	< 1.2	190	18	< 0.01	0.20	48	0.22	< 0.1	5	8.1	4.8	180	37%	1,900	480	1,300	650	1.6	0.028
PMS 04	5/25/2011	190	78	3	77	15	< 0.002	0.03	19	0.02	< 0.05	4	8	2	72	0	910	180	610	270	0	< 0.02
PMS 04	11/3/2011	240	120	< 2	170	15	< 0.002	0.27	32	0.15	< 0.05	2	8	3	140	0	1,500	350	1,000	440	3	< 0.02
PMS Control	6/30/2009	317	190	< 1.2	260	15	< 0.01	0.65	53	1.00	< 0.1	3	7.4	4.8	220	41%	2,200	620	1,600	690	5.1	< 0.02
PMS Control	12/2/2009	317	210	< 1.2	270	5	< 0.01	2.70	56	0.93	< 0.1	< 1	7.1	4.8	250	42%	2,000	620	1,600	760	20	< 0.02
PMS Control	4/29/2010	220	130	< 1.2	130	20	< 0.01	0.13	28	0.09	< 0.1	3	8.1	2.9	100	33%	1,400	340	960	440	1.9	< 0.02
PMS Control	10/29/2010	244	170	< 1.2	180	15	< 0.01	0.31	46	0.38	< 0.1	6	7.8	4.7	160	36%	1,900	520	1,300	620	3.5	< 0.02
PMS Control	5/25/2011	200	81	2.299	75	15	< 0.002	0.07	20	0.03	< 0.05	4	8.3	2.2	70	35%	880	170	580	280	0.439	< 0.02
PMS Control	11/3/2011	240	120	< 2	170	20	< 0.002	1.20	32	0.45	< 0.05	3	7.8	3.3	150	43%	1,500	340	1,000	440	8.5	< 0.02
Basin Plan Objective		n/a	n/a	n/a	250	20	n/a	0.3	n/a	0.05	0.5	n/a	n/a	n/a	n/a	60%	n/a	250	500	n/a	20	n/a

Notes:
1--Surface water site PMS-02 was dry during the 11/3/2011 sampling event.
2--Surface water site PMS-03 was dry during the 6/30/2009 and 12/2/2009 sampling events.
3--Surface water site PMS-04 was dry during the 6/30/2009 and 12/2/2009 sampling events.

Table 4-6
Annual Reported Production in the San Juan Basin - Calendar Years 2004 through 2011

Year	GWRP Production									SCWD GRF	Other Groundwater Production									Total Production
											City of San Juan Capistrano				*San Juan Hills Golf Course*					
	Dance Hall	SJBA No. 4	SJBA No. 2	CVWD No. 1	Kinoshita	Tirador	South Cooks	Well #5	Total	Stonehill Well	Rosenbaum No. 1	North Open Space	Hollywood 2A	Mission St.	SJHGC #2,#3,#4	Small Well	Large Well	*SOCOD*	Total Other	
2004	3	66	6	62	12	17	n/a	n/a	166	n/a	1,878	978	1,263	0	323	n/a	n/a	n/a	4,441	4,607
2005	505	1,005	1,179	1,242	261	617	n/a	n/a	4,809	n/a	555	446	329	0	338	n/a	n/a	n/a	1,668	6,477
2006	860	924	1,082	1,102	81	796	n/a	n/a	4,846	n/a	410	323	260	0	0	142	113	n/a	1,249	6,094
2007	552	616	666	41	466	407	n/a	n/a	2,748	132	366	207	79	0	0	108	308	n/a	1,067	3,948
2008	29	479	424	390	58	71	n/a	n/a	1,450	822	376	344	291	0	0	79	268	n/a	1,357	3,628
2009	1	695	780	797	2	258	n/a	n/a	2,533	961	21	266	190	0	0	79	265	n/a	821	4,315
2010	7	353	806	444	1	437	n/a	n/a	2,048	976	0	15	0	94	0	35	213	1,312	1,669	4,693
2011	490	684	313	485	183	377	508	395	3,436	1,141	8	23	0	1,409	0	71	280	1,167	2,957	7,534
Min	1	66	6	41	1	17	508	395	166	132	0	15	0	0	0	35	113	1,167	821	3,628
Max	860	1,005	1,179	1,242	466	796	508	395	4,846	1,141	1,878	978	1,263	1,409	338	142	308	1,312	4,441	7,534
Average	306	603	657	570	133	373	508	395	2,754	806	452	325	301	188	83	86	241	1,240	1,904	5,162

Table 4-7
Basin Segment Locations and Parameter Values Used to Estimate Change in Storage for the San Juan Basin

Segment No.	Reach Segment (ft. from Mouth of Creek)		Area (acres)	Specific Yield (unitless)[1]	Monitoring Well Used to Determine Average Segment Groundwater Elevation
	Begin	End			
San Juan Creek					
1	0	5,000	346.7	0.075	MW-1S & 1N
2	5,000	10,000	439.2	0.07	MW-2
3	10,000	14,000	564	0.04	MW-3 & 7
4	14,000	19,500	338	0.075	MW-4
5	19,500	30,000	492	0.17333	MW-5 & 6
Arroyo Trabuco					
3	0	6,000	Included with San Juan Creek		
6	6,000	16,500	502	0.1433	MW-8

Notes:

1--DWR (1972) reported specific yield of altitude segments in the basin. These values were assigned based upon correlation to the average altitude for that segment.
In the instance of the last segment of San Juan Creek, the Value was averaged from the 80-110 altitude segment and the 110-160 altitude segment.

Table 4-8
Field Measurements of Groundwater Quality in San Juan Basin
January through December 2011

Well Name	Sample Date	pH	Temperature (ºC)	Electrical Conductivity as Specific Conductance @ 25 ºC (µmhos/cm)
MW-01N	1/25/2011	8.6	20.4	2,040
	2/24/2011	7.9	19.2	1,900
	3/28/2011	7.3	20.1	2,120
	4/27/2011	7.8	20.4	1,970
	5/24/2011	7.8	19.3	1,990
	6/23/2011	7.4	20.4	2,840
	7/25/2011	7.8	20.2	2,680
	8/22/2011	7.7	20.2	2,420
	9/27/2011	7.4	20.2	2,660
	11/2/2011	7.3	17.1	2,564
	12/1/2011	7.7	19.9	2,530
	12/28/2011	7.6	20.1	2,370
MW-01S	1/25/2011	9.7	20.3	862
	2/24/2011	8.3	19.2	2,020
	3/28/2011	7.4	20.1	1,440
	4/27/2011	7.5	20.1	1,660
	5/24/2011	7.8	20.2	1,980
	6/23/2011	7.7	20.0	2,020
	7/25/2011	8.0	20.2	1,890
	8/22/2011	7.9	20.3	2,120
	9/27/2011	7.4	20.5	2,130
	11/2/2011	7.2	20.1	2,767
	12/1/2011	7.7	19.8	2,150
	12/28/2011	7.6	20.0	2,350
MW-02	1/25/2011	8.2	20.8	2,740
	2/24/2011	8.0	18.0	2,490
	3/28/2011	6.9	20.3	2,790
	4/27/2011	7.0	20.2	2,210
	5/25/2011	7.2	20.5	2,610
	6/23/2011	7.0	20.9	2,580
	7/25/2011	7.1	21.0	2,410
	8/22/2011	7.8	20.0	1,970
	9/27/2011	6.9	21.8	2,570
	11/3/2011	6.9	21.3	2,461
	12/1/2011	7.1	21.2	2,510
	12/28/2011	7.2	21.4	2,400

Table 4-8
Field Measurements of Groundwater Quality in San Juan Basin
January through December 2011

Well Name	Sample Date	pH	Temperature (ºC)	Electrical Conductivity as Specific Conductance @ 25 ºC (µmhos/cm)
MW-03	1/25/2011	8.6	21.0	1,940
	2/24/2011	8.1	18.2	1,870
	3/28/2011	7.1	20.6	1,910
	4/27/2011	7.2	20.8	1,670
	5/25/2011	7.4	19.8	2,140
	6/23/2011	8.4	20.2	1,650
	7/25/2011	8.2	20.9	1,920
	8/22/2011	8.0	21.2	2,110
	9/27/2011	7.9	20.8	1,590
	11/3/2011	7.0	19.7	2,627
	12/1/2011	8.0	21.0	1,570
	12/28/2011	7.9	19.9	1,800
MW-04	1/25/2011	8.0	19.9	2,530
	2/24/2011	6.8	19.7	2,590
	3/28/2011	6.8	19.2	2,610
	4/27/2011	7.0	19.3	1,550
	5/24/2011	7.3	19.5	919
	6/23/2011	7.0	19.8	1,128
	7/25/2011	6.9	20.2	1,177
	8/22/2011	7.2	20.3	1,920
	9/27/2011	6.9	21.9	1,399
	11/2/2011	6.7	23.3	1,760
	11/30/2011	7.0	18.7	1,279
	12/28/2011	7.2	19.1	1,970
MW-05	1/25/2011	8.4	17.3	1,283
	2/24/2011	6.9	16.2	1,490
	3/28/2011	7.0	15.9	1,199
	4/27/2011	7.1	16.9	1,173
	5/24/2011	7.0	18.7	1,009
	6/23/2011	6.9	18.7	1,041
	7/25/2011	7.0	19.3	1,900
	8/22/2011	7.1	21.4	2,060
	9/27/2011	6.9	22.6	1,770
	11/2/2011	6.8	21.9	1,560
	11/30/2011	7.1	20.2	1,398
	12/28/2011	7.3	20.3	1,910

Table 4-8
Field Measurements of Groundwater Quality in San Juan Basin
January through December 2011

Well Name	Sample Date	pH	Temperature (ºC)	Electrical Conductivity as Specific Conductance @ 25 ºC (µmhos/cm)
MW-06	1/25/2011	8.5	19.7	1,900
	2/24/2011	7.0	14.3	1,890
	3/28/2011	7.1	19.4	1,880
	4/27/2011	7.1	19.9	2,050
	5/24/2011	7.0	21.1	2,300
	6/23/2011	6.9	19.6	2,110
	7/25/2011	7.0	20.1	2,210
	8/22/2011	7.2	21.9	2,150
	9/27/2011	6.7	20.4	2,320
	11/2/2011	6.8	20.7	1,997
	11/30/2011	7.2	19.5	2,460
	12/28/2011	7.2	20.2	2,320
MW-07	1/25/2011	8.0	21.4	3,160
	2/24/2011	7.8	18.2	2,640
	3/28/2011	6.8	20.1	3,240
	4/27/2011	7.0	20.2	2,900
	5/25/2011	7.1	20.6	2,920
	6/23/2011	6.8	20.4	2,990
	7/25/2011	7.0	20.9	2,870
	8/22/2011	7.5	20.5	2,610
	9/27/2011	6.7	21.7	2,990
	11/3/2011	7.0	21.7	2,448
	11/30/2011	7.1	22.4	2,290
	12/28/2011	7.1	21.8	2,190
MW-08	1/25/2011	8.1	19.9	2,620
	2/24/2011	7.8	17.3	2,110
	3/28/2011	6.9	19.5	2,590
	4/27/2011	7.1	19.9	2,330
	5/24/2011	7.3	19.3	2,280
	6/23/2011	6.9	19.7	2,360
	7/25/2011	7.1	20.3	2,170
	8/22/2011	7.3	20.2	2,010
	9/27/2011	6.8	19.9	2,310
	11/3/2011	6.4	20.5	2,250
	11/30/2011	7.0	19.4	2,250
	12/28/2011	7.2	20.2	2,190

Table 4-9
Analytical Laboratory Results for Groundwater Monitoring Wells in the San Juan Basin - Calendar Years 2004 through 2011[1]

WellName	SampleDate	Chloride	TDS	pH	Turbidity	Color	Odor	Calcium	Magnesium	Potassium	Sodium	Sodium[2]	Bicarbonate Ion	Carbonate Ion	Sulfate	Specific Conductance @25°C	Total Hardness	Copper	Iron	Manganese	Zinc	MBAS	MTBE
		mg/L	*mg/L*	*units*	*NTU*	*units*	*TON*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*%*	*mg/L*	*mg/L*	*mg/L*	*µS/cm*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µg/L*
SJBA MW-01N	3/10/2004	300	860	7.44	36	19	< 1	38	11	NA	210		71	< 2	140	1,400	140	< 0.01	1.9	0.17	0.064	< 0.1	NA
SJBA MW-01N	11/24/2004	280	1,500	7.4	53	< 1	2	170	55	4.9	230	43%	268	< 2	510	2,200	660	< 0.01	8.9	0.88	0.026	< 0.1	NA
SJBA MW-01N	10/13/2005	320	950	8.66	360	19	4	69	37	6.7	220	59%	207	7.2	220	1,600	320	0.12	98	0.91	0.26	0.11	NA
SJBA MW-01N	10/4/2006	370	740	8.55	14	< 1	3	24	19	4.2	220	77%	71	< 2	120	1,500	140	< 0.01	2.7	0.076	0.029	< 0.1	NA
SJBA MW-01N	4/11/2007	320	1,400	7.62	10	19	6	210	82	6.2	250	38%	354	< 2	610	2,400	870	< 0.01	67	0.92	< 0.02	< 0.1	NA
SJBA MW-01N	11/14/2007	300	1,300	8.29	7	10	4	75	56	5.9	230	54%	171	< 2	380	2,300	420	< 0.01	0.25	0.13	< 0.02	< 0.1	NA
SJBA MW-01N	5/15/2008	290	1,100	8.38	4	< 1	8	50	50	4.9	250	62%	73	< 2	350	1,700	330	< 0.01	0.21	0.098	< 0.02	< 0.1	NA
SJBA MW-01N	12/9/2008	290	1,600	8.17	4	10	22	68	65	5.6	260	56%	220	< 2	560	2,200	440	< 0.01	0.38	0.16	< 0.02	< 0.1	NA
SJBA MW-01N	7/1/2009	310	1,100	8.38	30	< 1	5	47	51	5.0	270	64%	122	< 2	330	1,800	330	< 1.0	1.1	0.11	< 0.02	0.14	< 1
SJBA MW-01N	12/3/2009	330	1,100	8.18	9	3	1	49	57	5.0	270	62%	63	2.4	410	1,800	360	< 1.0	0.58	0.12	< 0.02	< 0.1	< 1
SJBA MW-01N	4/29/2010	300	1,000	7.43	39	8	5	36	37	5.1	220	66%	46	< 2	330	1,700	240	< 0.01	3.6	0.27	< 0.02	< 0.1	< 1
SJBA MW-01N	10/28/2010	350	1,200	7.97	19	3	39	66	56	5.7	270	59%	73	< 2	450	2,000	400	< 0.01	1.1	0.22	< 0.02	< 0.1	< 1
SJBA MW-01N	5/24/2011	400	1,900	8.00	30	15	3	140	86	6.4	330	50%	140	< 2	770	2,700	710	0.01	11	0.37	0.024	< 0.05	0.53
SJBA MW-01N	11/2/2011	440	1,700	7.40	43	100	2	88	80	5.1	320	56%	48	< 2	730	2,500	550	< 0.002	2.8	0.26	< 0.02	0.074	< 0.5
SJBA MW-01S	3/10/2004	75	580	7.75	9	19	< 1	55	15	NA	57		134	< 2	120	690	200	< 0.01	0.73	0.063	0.022	< 0.1	NA
SJBA MW-01S	5/27/2004	72	480	7.47	10	10	< 1	53	14	8.4	58	39%	146	< 2	110	670	190	< 0.01	0.35	0.078	< 0.02	0.16	NA
SJBA MW-01S	11/24/2004	310	1,900	7.18	52	< 1	2	290	67	4.9	220	32%	427	< 2	700	2,900	1,000	< 0.01	5.4	1.1	< 0.02	< 0.1	NA
SJBA MW-01S	10/13/2005	79	470	7.64	10	19	< 1	60	17	8.4	68	39%	146	< 2	140	740	220	< 0.01	0.86	0.18	0.027	0.17	NA
SJBA MW-01S	10/4/2006	100	640	7.28	7	19	< 1	91	23	7.7	90	37%	171	< 2	220	1,100	320	< 0.01	0.35	0.13	0.075	0.2	NA
SJBA MW-01S	4/11/2007	130	750	7.78	8	19	< 1	120	29	7.6	110	36%	171	< 2	260	1,300	410	< 0.01	0.51	0.13	0.049	0.15	NA
SJBA MW-01S	11/14/2007	170	1,100	8.17	8	19	< 1	150	35	7.2	130	35%	220	< 2	330	2,000	520	< 0.01	0.52	0.078	0.039	0.17	NA
SJBA MW-01S	5/15/2008	170	1,100	7.79	8	10	< 1	150	35	7.7	130	35%	232	< 2	370	1,500	510	< 0.01	0.48	0.062	0.072	0.14	NA
SJBA MW-01S	12/9/2008	160	1,000	7.89	6	19	3	140	32	6.0	120	35%	220	< 2	370	1,500	470	< 0.01	0.43	0.053	0.075	0.13	NA
SJBA MW-01S	7/1/2009	320	2,000	7.43	79	< 1	< 1	300	71	5.2	220	31%	415	< 2	700	2,600	1,100	< 1.0	5.4	1.1	< 0.02	< 0.1	< 1
SJBA MW-01S	12/3/2009	350	1,900	7.52	56	5	5	300	74	5.4	240	33%	415	< 2	770	2,600	1,100	< 1.0	6.1	1.2	< 0.02	< 0.1	< 1
SJBA MW-01S	4/29/2010	190	960	7.88	10	12	4	170	41	7.1	140	34%	268	< 2	460	1,800	600	< 0.01	0.45	0.24	0.068	< 0.1	< 1
SJBA MW-01S	10/28/2010	200	1,300	8.10	17	8	7	210	45	8.0	190	36%	268	< 2	460	1,800	710	0.016	0.73	0.19	0.11	< 0.1	< 1
SJBA MW-01S	5/24/2011	220	1,400	8.10	8	< 3	2	190	48	5.4	170	35%	290	2.5	480	1,900	670	0.0027	1	0.52	0.085	< 0.05	< 0.5
SJBA MW-01S	11/2/2011	280	1,700	7.50	47	60	1	250	60	4.6	200	33%	360	< 2	650	2,400	860	0.0031	6.8	0.97	0.048	0.092	< 0.5
SJBA MW-02	3/10/2004	240	1,900	7.15	170	37	< 1	280	68	NA	210		427	< 2	760	2,500	980	0.013	13	0.41	0.039	< 0.1	NA
SJBA MW-02	5/27/2004	240	1,900	6.91	98	10	< 1	260	62	5.9	220	34%	342	< 2	710	2,400	910	< 0.01	9.1	0.2	< 0.02	< 0.1	NA
SJBA MW-02	11/24/2004	230	1,900	7.06	72	< 1	< 1	270	65	4.7	190	30%	1061	< 2	720	2,700	940	< 0.01	3.1	0.18	< 0.02	< 0.1	NA
SJBA MW-02	10/13/2005	230	1,800	7.11	1,300	28	< 1	290	69	5.6	190	29%	427	< 2	730	2,400	1,000	0.011	190	0.32	0.024	< 0.1	NA
SJBA MW-02	10/4/2006	240	2,100	7.25	350	28	< 1	280	68	5.8	190	30%	415	< 2	740	2,300	980	< 0.01	37	0.54	0.039	< 0.1	NA
SJBA MW-02	4/11/2007	230	1,400	7.19	210	28	6	280	72	6.2	200	30%	390	< 2	700	2,300	1,000	< 0.01	67	0.5	< 0.02	< 0.1	NA
SJBA MW-02	11/14/2007	220	1,600	7.88	250	19	4	260	67	6.8	180	30%	378	< 2	620	1,600	930	< 0.01	30	0.27	< 0.02	< 0.1	NA
SJBA MW-02	5/15/2008	230	1,800	7.11	190	19	94	240	63	6.0	170	30%	378	< 2	720	2,200	860	< 0.01	37	0.28	< 0.02	5.5	NA
SJBA MW-02	12/9/2008	230	1,800	7.29	89	19	12	250	62	4.8	180	31%	415	< 2	710	2,400	870	< 0.01	15	0.18	< 0.02	< 0.1	NA
SJBA MW-02	7/1/2009	240	1,800	7.25	7	< 1	< 1	280	70	5.0	190	29%	415	< 2	660	2,400	990	< 1.0	0.49	0.18	< 0.02	< 0.1	< 1
SJBA MW-02	12/3/2009	280	1,800	7.45	2	8	< 1	280	83	6.1	270	36%	403	< 2	770	2,300	1,000	< 1.0	7.6	2.4	0.048	< 0.1	< 1
SJBA MW-02	4/29/2010	240	1,800	7.32	33	8	< 1	270	58	4.8	190	31%	439	< 2	700	2,400	920	< 0.01	5.4	0.18	< 0.02	< 0.1	< 1
SJBA MW-02	10/28/2010	260	1,900	7.67	13	< 1	49	300	61	5.2	230	33%	439	< 2	710	2,400	1,000	0.022	4	0.19	< 0.02	< 0.1	< 1
SJBA MW-02	5/25/2011	290	1,900	8.00	27	30	16	310	63	4.7	200	30%	440	2.7	690	2,600	1,000	0.007	14	0.35	0.022	< 0.05	< 0.5
SJBA MW-02	11/3/2011	280	1,800	7.20	66	100	2	300	64	5.3	210	31%	450	< 2	680	2,500	1,000	0.01	10	0.23	0.027	< 0.05	< 0.5

Table 4-9
Analytical Laboratory Results for Groundwater Monitoring Wells in the San Juan Basin - Calendar Years 2004 through 2011[1]

WellName	SampleDate	Chloride	TDS	pH	Turbidity	Color	Odor	Calcium	Magnesium	Potassium	Sodium	Sodium[2]	Bicarbonate Ion	Carbonate Ion	Sulfate	Specific Conductance @25°C	Total Hardness	Copper	Iron	Manganese	Zinc	MBAS	MTBE
		mg/L	*mg/L*	*units*	*NTU*	*units*	*TON*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*%*	*mg/L*	*mg/L*	*mg/L*	*µS/cm*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µg/L*
SJBA MW-03	1/9/2004	250	1,000	8.57	13	37	< 1	36	45	NA	210		73	< 2	330	1,600	280	< 0.01	1.3	0.068	< 0.02	< 0.1	NA
SJBA MW-03	5/27/2004	230	1,100	7.75	22	54	< 1	44	48	5.2	210	59%	107	< 2	380	1,600	310	< 0.01	2.4	0.17	< 0.02	< 0.1	NA
SJBA MW-03	11/24/2004	240	1,700	7.45	130	< 1	< 1	230	64	4.5	210	35%	390	< 2	620	2,600	850	< 0.01	11	2.2	< 0.02	< 0.1	NA
SJBA MW-03	10/13/2005	150	940	7.61	54	46	< 1	91	39	3.9	150	45%	98	< 2	390	1,400	390	< 0.01	58	0.66	0.076	< 0.1	NA
SJBA MW-03	10/4/2006	250	1,200	7.20	88	120	2	170	44	3.4	170	38%	117	< 2	500	1,800	560	< 0.01	26	1.1	0.025	< 0.1	NA
SJBA MW-03	4/11/2007	290	800	7.27	34	140	4	130	40	3.8	180	44%	44	< 2	380	1,700	480	< 0.01	8.4	0.47	< 0.02	< 0.1	NA
SJBA MW-03	11/14/2007	300	960	7.81	34	46	3	94	30	4.5	160	49%	12	< 2	250	1,600	360	< 0.01	3	0.17	< 0.02	< 0.1	NA
SJBA MW-03	5/15/2008	340	1,100	7.64	57	19	< 1	97	34	3.9	180	50%	24	< 2	300	1,600	380	< 0.01	8.1	0.21	< 0.02	< 0.1	NA
SJBA MW-03	12/9/2008	360	980	7.51	44	54	7	90	30	3.7	170	51%	26	< 2	220	1,700	350	< 0.01	24	0.26	< 0.02	< 0.1	NA
SJBA MW-03	7/1/2009	310	2,100	7.35	36	5	< 1	280	88	5.8	250	34%	244	< 2	880	2,800	1,100	< 1.0	6.6	2.5	< 0.02	< 0.1	< 1
SJBA MW-03	12/3/2009	350	2,200	7.51	54	< 1	1	280	90	5.9	260	34%	268	< 2	990	2,700	1,100	< 1.0	8.2	2.5	< 0.02	< 0.1	< 1
SJBA MW-03	4/29/2010	390	1,100	7.49	110	< 1	7	93	33	3.9	170	50%	18	< 2	210	1,800	370	< 0.01	13	0.17	< 0.02	< 0.1	< 1
SJBA MW-03	10/29/2010	410	1,200	7.46	12	50	11	96	35	3.9	190	52%	24	< 1.199	190	1,800	380	< 0.01	2.3	0.18	< 0.02	< 0.1	< 1
SJBA MW-03	5/25/2011	430	1,000	7.80	10	20	2	74	29	3.5	180	56%	20	< 2	150	1,700	300	0.0021	3.1	0.064	< 0.02	0.064	< 0.5
SJBA MW-03	11/3/2011	430	1,300	7.10	110	150	4	190	63	4.4	230	40%	170	< 2	330	2,400	730	< 0.002	23	1.4	< 0.02	0.055	< 0.5
SJBA MW-04	1/9/2004	190	1,400	6.95	140	110	< 1	200	58	NA	180		415	< 2	520	2,100	740	0.013	9.9	0.28	0.052	< 0.1	NA
SJBA MW-04	5/27/2004	200	1,400	6.72	160	19	< 1	180	51	7.1	180	37%	256	< 2	530	1,900	660	< 0.01	11	0.38	< 0.02	< 0.1	NA
SJBA MW-04	11/24/2004	260	1,800	6.82	3	< 1	< 1	260	78	4.9	190	30%	342	< 2	710	2,600	980	< 0.01	1.3	0.73	< 0.02	< 0.1	NA
SJBA MW-04	10/13/2005	220	1,500	6.93	130	37	< 1	210	65	6.6	170	32%	378	< 2	530	2,000	790	0.018	33	0.85	0.041	0.13	NA
SJBA MW-04	10/4/2006	170	1,200	6.92	130	28	< 1	160	45	3.9	150	36%	293	< 2	420	1,700	590	< 0.01	15	0.23	< 0.02	< 0.1	NA
SJBA MW-04	4/11/2007	190	1,100	6.87	260	140	< 1	180	50	4.8	150	33%	281	< 2	420	1,800	650	< 0.01	39	0.35	< 0.02	< 0.1	NA
SJBA MW-04	11/14/2007	180	1,200	7.69	160	46	< 1	160	42	4.5	150	36%	220	< 2	400	1,700	570	< 0.01	13	0.14	< 0.02	0.1	NA
SJBA MW-04	5/15/2008	240	1,600	7.02	340	28	< 1	210	65	4.6	170	32%	354	< 2	600	2,000	790	< 0.01	32	0.86	< 0.02	< 0.1	NA
SJBA MW-04	12/9/2008	200	1,400	6.95	56	46	46	190	51	4.2	160	34%	281	< 2	570	2,000	670	< 0.01	9	0.35	< 0.02	< 0.1	NA
SJBA MW-04	7/1/2009	220	1,500	6.96	12	15	< 1	210	62	4.0	180	33%	317	< 2	530	2,100	790	< 1.0	3.9	0.3	< 0.02	< 0.1	< 1
SJBA MW-04	12/3/2009	270	1,600	7.23	15	10	< 1	190	63	5.7	220	39%	293	< 2	700	2,100	730	< 1.0	0.8	0.57	< 0.02	< 0.1	< 1
SJBA MW-04	4/30/2010	240	1,600	6.90	150	3	4	220	67	4.7	200	34%	293	< 2	670	2,200	820	< 0.01	15	0.5	< 0.02	< 0.1	< 1
SJBA MW-04	10/28/2010	280	1,800	7.59	76	12	12	260	73	5.6	230	34%	390	< 2	720	2,400	960	< 0.01	9	0.74	< 0.02	< 0.1	< 1
SJBA MW-04	5/24/2011	79	580	7.70	14	10	3	73	20	2.3	73	37%	160	< 2	190	830	270	< 0.002	0.86	0.01	< 0.02	< 0.05	< 0.5
SJBA MW-04	11/2/2011	170	1,300	7.00	50	100	1	180	50	4.4	130	30%	210	< 2	590	1,800	670	0.007	18	0.78	< 0.02	< 0.05	< 0.5
SJBA MW-05	1/9/2004	150	1,100	6.93	100	46	< 1	140	53	NA	140		256	< 2	380	1,600	570	< 0.01	5	0.041	0.02	< 0.1	NA
SJBA MW-05	5/27/2004	130	890	6.59	48	10	< 1	100	39	5.2	130	40%	207	< 2	320	1,300	410	< 0.01	3.3	0.033	0.023	< 0.1	NA
SJBA MW-05	11/24/2004	120	760	6.93	10	< 1	< 1	85	35	4.0	100	38%	195	< 2	270	1,300	360	< 0.01	0.86	0.17	< 0.02	< 0.1	NA
SJBA MW-05	10/13/2005	160	1,100	7.17	260	19	< 1	130	54	7.7	130	34%	232	< 2	400	1,500	560	0.012	15	0.18	0.046	< 0.1	NA
SJBA MW-05	10/4/2006	250	1,700	7.17	20	19	< 1	240	71	6.1	220	35%	329	< 2	790	2,400	880	< 0.01	1.5	0.076	0.023	< 0.1	NA
SJBA MW-05	4/11/2007	170	1,100	7.37	49	19	< 1	150	48	4.8	150	36%	256	< 2	380	1,600	560	< 0.01	4	0.069	< 0.02	< 0.1	NA
SJBA MW-05	11/14/2007	210	1,700	7.89	750	28	< 1	220	70	11.0	210	35%	293	< 2	610	2,200	830	0.035	42	1.2	0.093	< 0.1	NA
SJBA MW-05	5/15/2008	220	1,400	7.16	10	10	< 1	160	56	4.9	170	37%	281	< 2	540	1,900	630	< 0.01	1.8	0.06	< 0.02	< 0.1	NA
SJBA MW-05	12/9/2008	230	1,800	7.18	47	19	14	200	65	6.6	200	36%	305	< 2	760	2,400	770	< 0.01	3.5	0.11	< 0.02	< 0.1	NA
SJBA MW-05	7/1/2009	220	1,600	7.27	17	5	< 1	200	70	5.4	190	34%	305	< 2	600	2,100	800	< 1.0	0.92	0.16	< 0.02	< 0.1	< 1
SJBA MW-05	12/3/2009	250	1,500	7.41	4	12	< 1	200	70	5.7	210	37%	256	< 2	710	2,000	790	< 1.0	0.95	0.62	< 0.02	< 0.1	< 1
SJBA MW-05	4/30/2010	140	1,100	7.10	18	5	< 1	110	43	4.0	150	42%	195	< 2	420	1,500	460	< 0.01	0.76	0.033	< 0.02	< 0.1	< 1
SJBA MW-05	10/29/2010	220	1,700	7.32	40	5	15	200	77	6.5	200	35%	293	< 2	680	2,200	820	< 0.01	2.9	0.045	< 0.02	< 0.1	< 1
SJBA MW-05	5/24/2011	80	600	7.60	3	10	1	65	27	3.4	93	42%	220	< 2	190	920	270	< 0.002	1.5	0.023	< 0.02	< 0.05	< 0.5
SJBA MW-05	11/2/2011	180	1,000	7.10	15	30	2	130	41	4.4	140	38%	220	< 2	370	1,500	490	0.0027	0.94	0.52	< 0.02	< 0.05	< 0.5

Table 4-9
Analytical Laboratory Results for Groundwater Monitoring Wells in the San Juan Basin - Calendar Years 2004 through 2011[1]

WellName	SampleDate	Chloride	TDS	pH	Turbidity	Color	Odor	Calcium	Magnesium	Potassium	Sodium	Sodium[2]	Bicarbonate Ion	Carbonate Ion	Sulfate	Specific Conductance @25°C	Total Hardness	Copper	Iron	Manganese	Zinc	MBAS	MTBE
		mg/L	*mg/L*	*units*	*NTU*	*units*	*TON*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*%*	*mg/L*	*mg/L*	*mg/L*	*µS/cm*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µg/L*
SJBA MW-06	1/9/2004	180	1,000	7.23	200	110	< 1	130	32	NA	160		281	< 2	270	1,600	450	< 0.01	9.3	0.99	0.028	< 0.1	NA
SJBA MW-06	5/27/2004	200	1,000	7.05	350	19	< 1	120	30	4.7	170	46%	256	< 2	290	1,600	430	< 0.01	14	0.96	< 0.02	< 0.1	NA
SJBA MW-06	11/24/2004	200	1,100	7.24	28	< 1	2	130	31	3.9	160	43%	415	< 2	300	1,800	440	< 0.01	2.9	0.93	< 0.02	< 0.1	NA
SJBA MW-06	10/13/2005	210	1,100	7.29	660	56	< 1	150	35	4.4	160	40%	305	< 2	330	1,600	510	< 0.01	74	1.3	< 0.02	< 0.1	NA
SJBA MW-06	10/4/2006	210	1,100	7.23	88	37	< 1	140	34	4.2	170	43%	293	< 2	320	1,700	480	< 0.01	21	1.1	< 0.02	< 0.1	NA
SJBA MW-06	4/11/2007	210	940	7.28	180	95	< 1	150	36	4.4	170	41%	293	< 2	310	1,700	520	< 0.01	24	1.1	< 0.02	< 0.1	NA
SJBA MW-06	11/14/2007	210	1,100	7.92	330	46	< 1	140	33	5.0	170	43%	281	< 2	290	1,700	490	< 0.01	35	1.1	< 0.02	< 0.1	NA
SJBA MW-06	5/15/2008	220	1,100	7.33	330	28	< 1	140	34	4.3	160	41%	293	< 2	340	1,900	490	< 0.01	29	1.1	< 0.02	< 0.1	NA
SJBA MW-06	12/9/2008	210	1,100	7.32	110	28	9	140	32	4.1	150	40%	305	< 2	330	1,800	480	< 0.01	16	1	< 0.02	< 0.1	NA
SJBA MW-06	7/1/2009	210	1,200	7.49	51	5	< 1	150	38	4.2	170	41%	293	< 2	320	1,800	540	< 1.0	5.3	1.1	< 0.02	< 0.1	< 1
SJBA MW-06	12/3/2009	220	1,100	7.61	17	8	< 1	140	38	4.6	170	42%	268	< 2	340	1,600	520	< 1.0	5	1	0.037	< 0.1	< 1
SJBA MW-06	4/29/2010	210	1,100	7.51	140	12	4	140	35	4.2	150	40%	293	< 2	340	1,700	500	< 0.01	15	1	< 0.02	< 0.1	< 1
SJBA MW-06	10/29/2010	200	1,400	7.22	140	3	9	190	53	4.3	170	35%	293	< 2	510	2,000	690	< 0.01	17	1.2	< 0.02	< 0.1	< 1
SJBA MW-06	5/24/2011	230	1,600	7.50	14	150	3	210	62	4.6	170	32%	280	< 2	670	2,100	780	< 0.002	14	0.67	< 0.02	< 0.05	< 0.5
SJBA MW-06	11/2/2011	240	1,800	7.00	210	300	1	200	57	4.5	160	32%	290	< 2	660	2,000	750	0.0027	32	0.63	< 0.02	0.31	< 0.5
SJBA MW-07	1/9/2004	360	2,300	7.05	590	180	< 1	350	84	NA	250		427	< 2	810	3,200	1,200	0.032	29	0.41	0.1	< 0.1	NA
SJBA MW-07	5/27/2004	370	2,200	6.91	330	< 1	< 1	320	76	7.7	270	34%	427	< 2	770	2,900	1,100	0.019	16	0.25	0.1	< 0.1	NA
SJBA MW-07	11/24/2004	320	2,100	6.83	47	< 1	< 1	310	71	4.6	240	33%	427	< 2	760	3,000	1,100	< 0.01	2.7	0.39	< 0.02	< 0.1	NA
SJBA MW-07	10/13/2005	370	2,100	6.94	530	10	< 1	350	83	8.6	220	28%	403	< 2	780	2,900	1,200	0.033	25	0.91	0.075	0.19	NA
SJBA MW-07	10/4/2006	320	1,700	7.05	240	19	< 1	260	65	4.3	220	34%	293	< 2	750	2,400	910	0.024	2.5	0.95	0.024	0.19	NA
SJBA MW-07	4/11/2007	240	1,300	7.19	180	28	< 1	210	61	8.2	190	34%	256	< 2	540	2,000	790	0.03	22	1.8	0.051	< 0.1	NA
SJBA MW-07	11/14/2007	340	2,000	7.82	240	19	< 1	260	71	7.4	250	36%	293	< 2	730	2,600	940	0.016	14	2.1	0.034	< 0.1	NA
SJBA MW-07	5/15/2008	320	1,900	7.05	190	10	< 1	260	71	5.8	210	33%	366	< 2	710	2,400	950	0.012	7.3	1.1	0.021	< 0.1	NA
SJBA MW-07	12/9/2008	340	2,100	7.19	120	37	< 1	260	79	8.1	250	36%	317	< 2	870	2,800	980	0.02	16	1.3	0.041	< 0.1	NA
SJBA MW-07	7/1/2009	300	1,900	7.27	100	< 1	< 1	270	77	4.7	210	31%	317	< 2	720	2,600	1,000	0.012	NA	1.7	< 0.02	< 0.1	< 1
SJBA MW-07	12/3/2009	380	2,200	7.41	17	5	< 1	270	88	6.1	280	37%	317	< 2	930	2,700	1,000	< 1.0	4.8	0.49	< 0.02	< 0.1	< 1
SJBA MW-07	4/29/2010	280	1,800	7.59	86	3	< 1	220	69	5.1	190	33%	366	< 2	680	2,500	840	< 0.01	3.2	0.28	< 0.02	< 0.1	< 1
SJBA MW-07	10/28/2010	370	2,200	7.73	59	3	3	290	87	6.9	320	39%	366	< 2	860	2,800	1,100	< 0.01	2.1	0.62	< 0.02	< 0.1	< 1
SJBA MW-07	5/25/2011	370	2,100	7.90	92	40	2	310	86	6.6	220	30%	440	2.5	740	2,900	1,100	0.012	10	2.8	0.025	< 0.05	< 0.5
SJBA MW-07	11/3/2011	330	1,800	7.10	23	50	1	260	66	4.2	210	33%	380	< 2	800	2,500	910	0.0065	1.1	2.1	< 0.02	< 0.05	< 0.5
SJBA MW-08	1/9/2004	220	2,100	6.97	1,900	460	< 1	340	99	NA	240		439	< 2	840	2,700	1,300	0.12	97	1	0.37	< 0.1	NA
SJBA MW-08	5/27/2004	210	1,700	6.95	140	10	< 1	240	55	5.4	230	38%	366	< 2	700	2,300	820	< 0.01	4.7	0.25	< 0.02	< 0.1	NA
SJBA MW-08	11/24/2004	150	1,200	6.93	20	< 1	< 1	170	39	3.5	150	36%	317	< 2	470	1,900	580	< 0.01	2.5	0.083	< 0.02	< 0.1	NA
SJBA MW-08	10/13/2005	190	1,700	7.01	530	10	< 1	250	61	6.4	180	31%	354	< 2	670	2,100	880	0.023	14	1.6	0.059	< 0.1	NA
SJBA MW-08	10/4/2006	200	1,500	7.00	17	10	< 1	230	52	3.2	190	34%	342	< 2	680	2,200	780	< 0.01	1.3	0.28	0.02	< 0.1	NA
SJBA MW-08	4/11/2007	200	1,500	7.06	77	28	< 1	240	56	4.4	200	34%	317	< 2	640	2,200	830	< 0.01	4	0.15	< 0.02	< 0.1	NA
SJBA MW-08	11/14/2007	220	1,900	7.87	120	19	< 1	260	62	5.5	230	35%	354	< 2	740	2,400	910	< 0.01	6.8	0.29	0.021	0.18	NA
SJBA MW-08	5/15/2008	200	1,500	7.11	100	< 1	< 1	220	53	4.2	200	36%	329	< 2	600	2,100	770	< 0.01	4.9	0.18	0.03	< 0.1	NA
SJBA MW-08	12/9/2008	230	2,200	7.07	19	19	< 1	270	70	3.8	240	35%	390	< 2	870	2,700	960	< 0.01	1.1	< 0.02	< 0.02	< 0.1	NA
SJBA MW-08	7/1/2009	220	1,900	7.27	23	< 1	< 1	270	69	3.7	230	34%	415	< 2	740	2,500	970	< 1.0	1.2	< 0.02	< 0.02	< 0.1	< 1
SJBA MW-08	12/3/2009	240	1,900	7.40	6	< 1	< 1	280	66	3.9	240	35%	427	< 2	810	2,500	970	< 1.0	0.75	< 0.02	< 0.02	< 0.1	< 1
SJBA MW-08	4/29/2010	210	1,800	7.68	19	< 1	< 1	250	59	3.6	200	33%	439	< 2	720	2,400	880	< 0.01	2.2	0.024	< 0.02	< 0.1	< 1
SJBA MW-08	10/28/2010	210	1,800	7.67	88	< 1	17	250	60	4.2	260	39%	451	< 2	720	2,400	880	< 0.01	2.6	0.054	0.034	< 0.1	< 1
SJBA MW-08	5/24/2011	210	1,700	7.80	2	3	1	230	58	3.6	220	37%	440	< 2	650	2,300	820	0.0025	2.6	0.024	< 0.02	< 0.05	< 0.5
SJBA MW-08	11/3/2011	210	1,600	7.10	13	20	1	210	53	3.0	210	38%	450	< 2	590	2,200	750	0.0021	1.1	0.021	< 0.02	< 0.05	< 0.5

Notes:
1--result value of "NA" indicates the sample was not analyzed for the subject water quality parameter
2--Values for Calcium, Sodium, Magensium, and Potassium must be available to calculate the percent of total cations represented by Sodium.

Figure 4-1
Daily Mean Surface Water Discharge in the San Juan Basin
Calendar Years 1996 - 2011

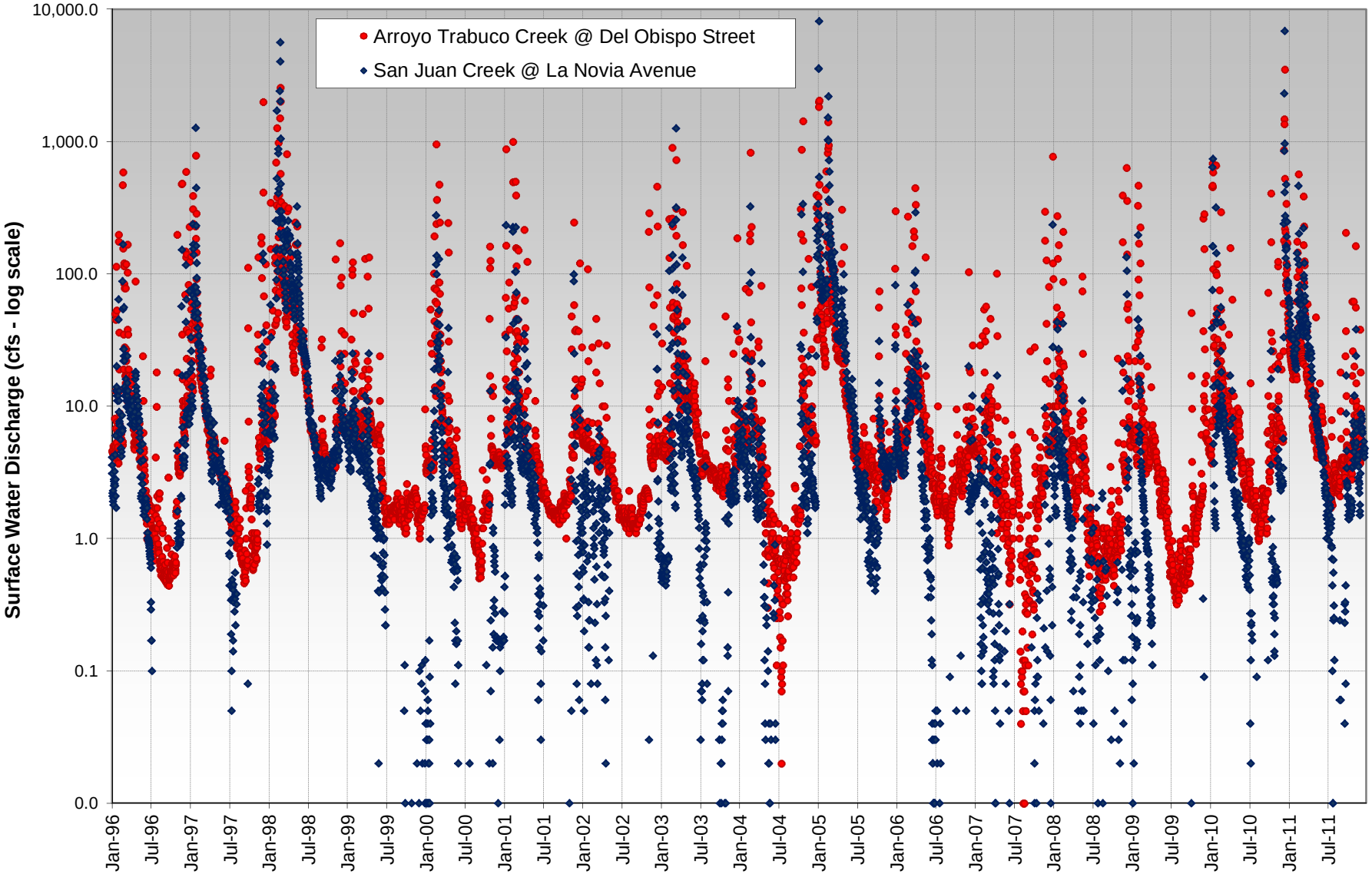

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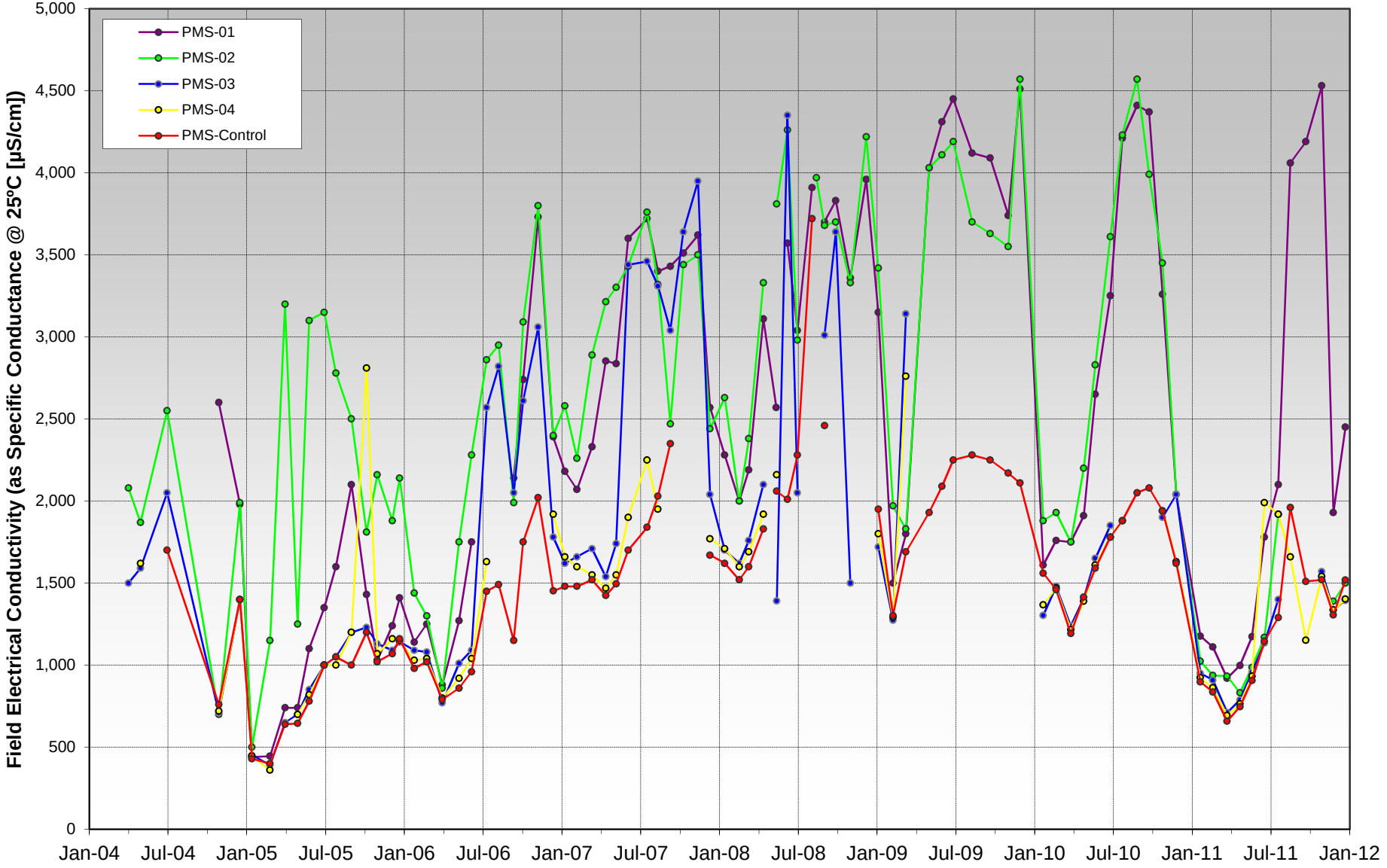
Figure 4-2
Field Electrical Conductivity of the San Juan Surface Water Quality Monitoring Stations
Calendar Years 2004 - 2011



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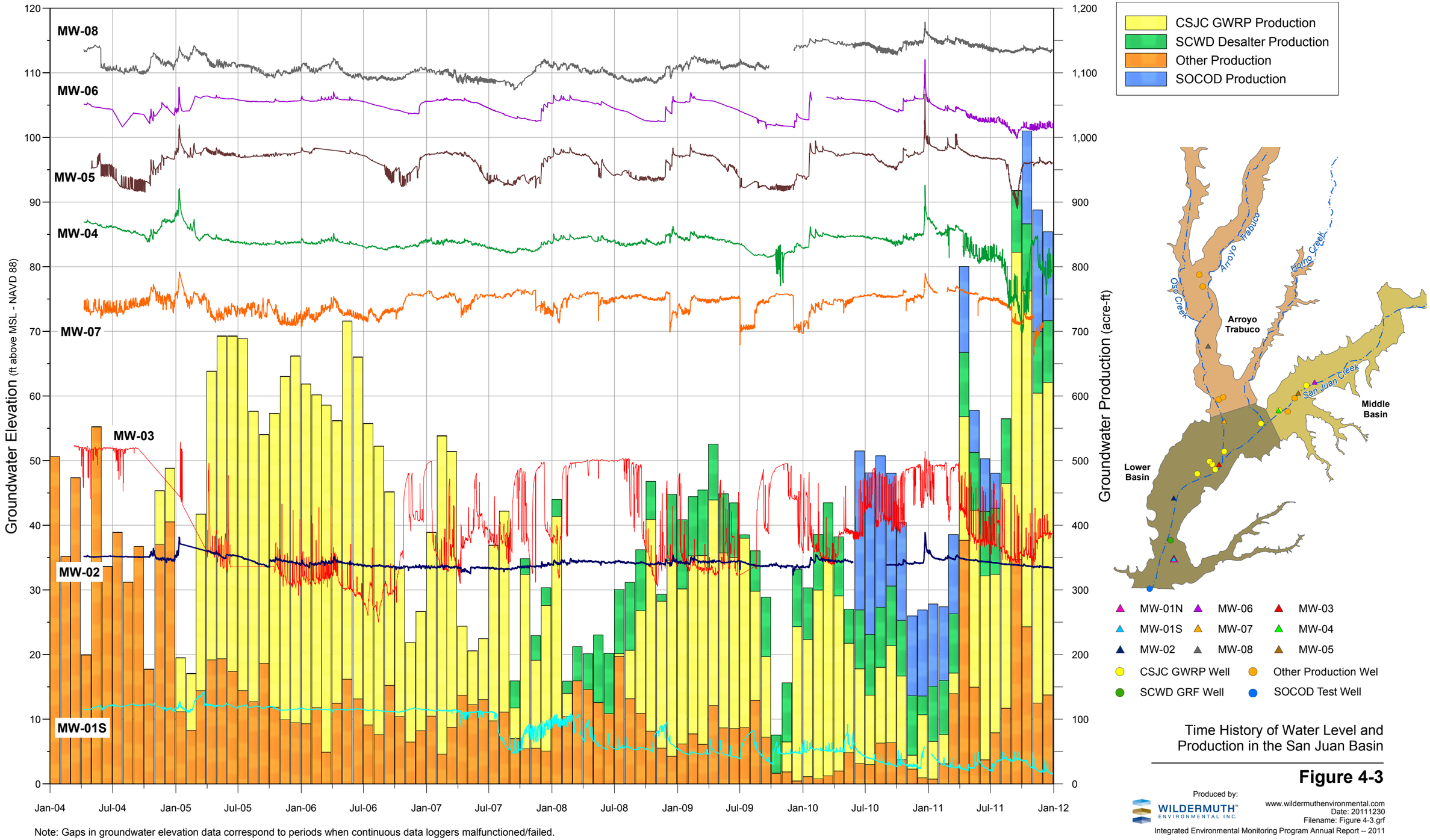

Note: Gaps in groundwater elevation data correspond to periods when continuous data loggers malfunctioned/failed.

Time History of Water Level and Production in the San Juan Basin

Figure 4-3

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Date: 20111230
Filename: Figure 4-3.grf

117°40'0"W

Oso Creek
Trabuco, Arroyo
Rosenbaum 1
North Open Space(NOS)
6
MW-08
Horno Creek
San Juan Creek
PMS-Control
5
CVWD #5
MW-06
PMS-04
SJHGC-Large
MW-05
PMS-03
MW-04
SJHGC-Small
South Cooks
Mission Street
Hollywood 2A
3B
MW-07
Tirador
PMS-02
4
3A
PMS-01
Trabuco, Arroyo
Dance Hall
CVWD-1
SJBA-2
MW-03
SJBA-4
Kinoshita
2
MW-02
San Juan Creek
Stonehill
MW-01N
MW-01S
1
SOCOD Test Well

117°40'0"W

Storage Change Segments
Plant Monitoring Station
SJBA Monitoring Well
San Juan Capistrano GWRP Desalter Well
South Coast Water District GRF Desalter Well
Other Groundwater Production Well

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0 2,000 4,000 Feet
0 500 1,000 Meters

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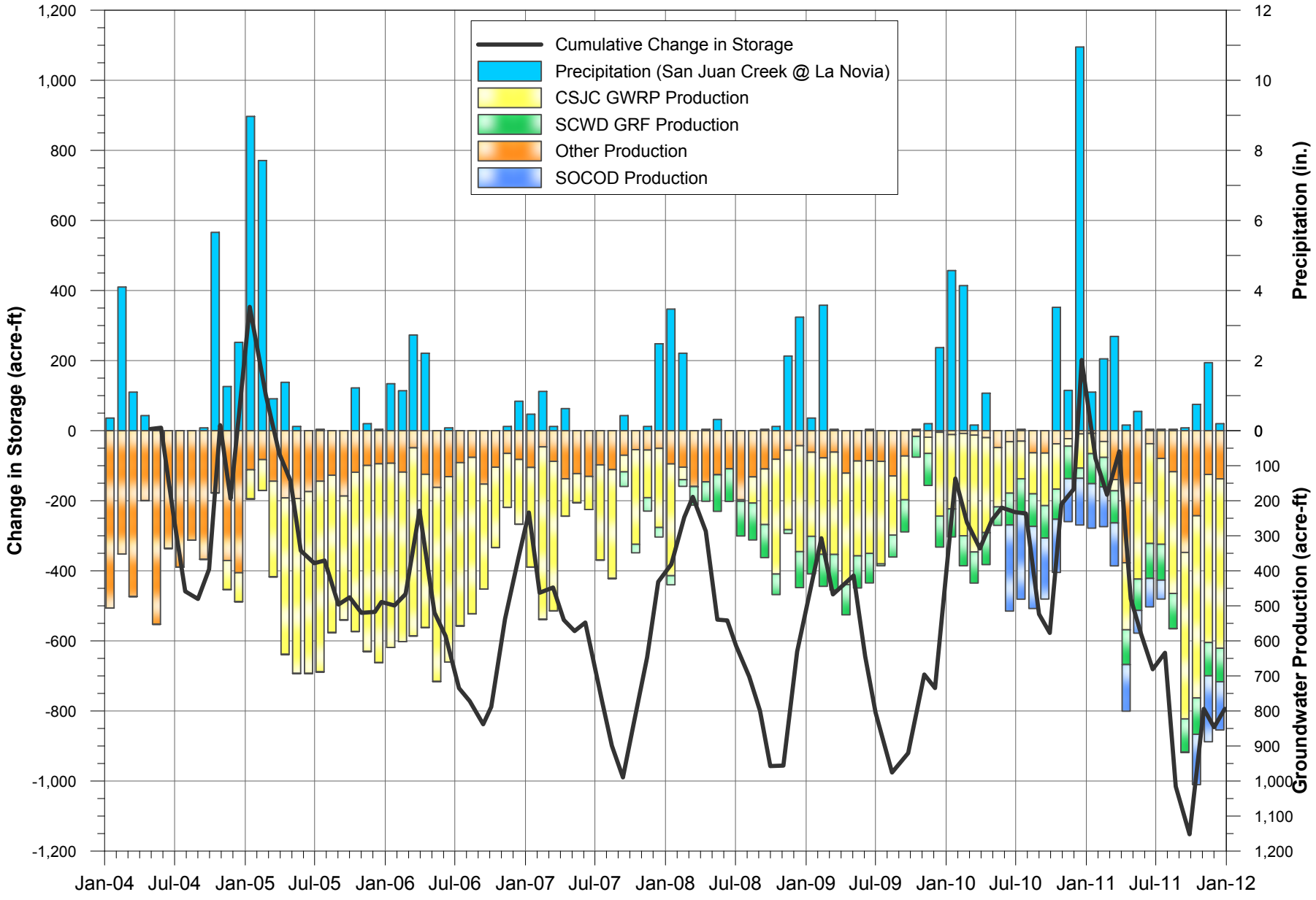
075-004-001

Groundwater Storage Change Segments of the Lower and Middle San Juan Groundwater Basin

Figure 4-4

Path: N:\MapDocs\Clients\SJBA\Monitoring Program Annual Reports\2011\Figure 4-4.mxd, Date: 4/26/2012, Author: WEL

Figure 4-5
Monthly and Cumulative Change in Groundwater Storage in the Lower San Juan Basin
April 2004 through December 2011



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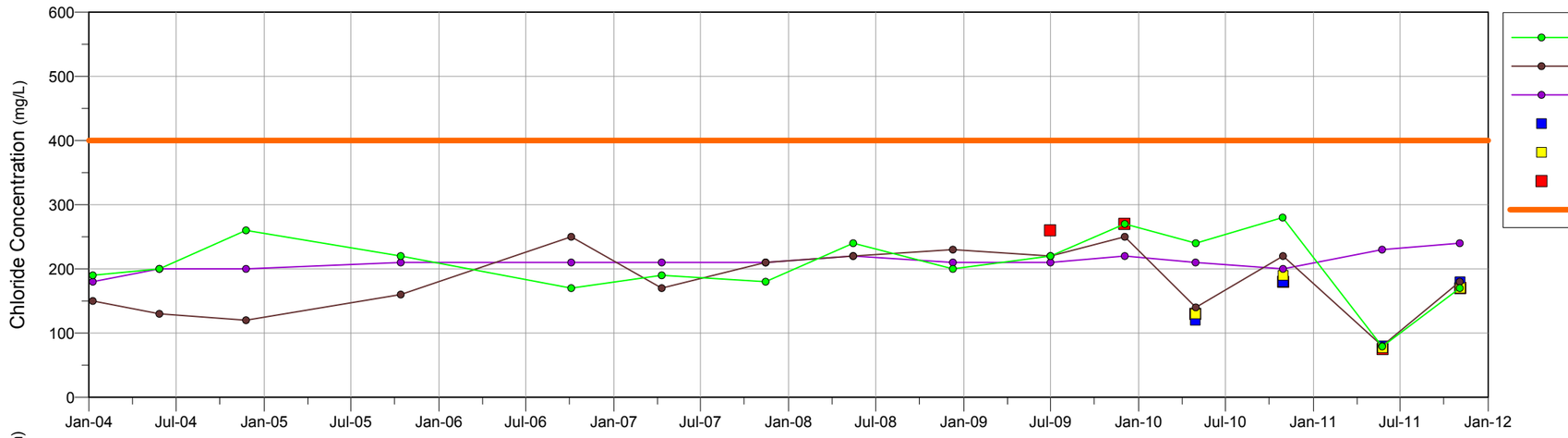

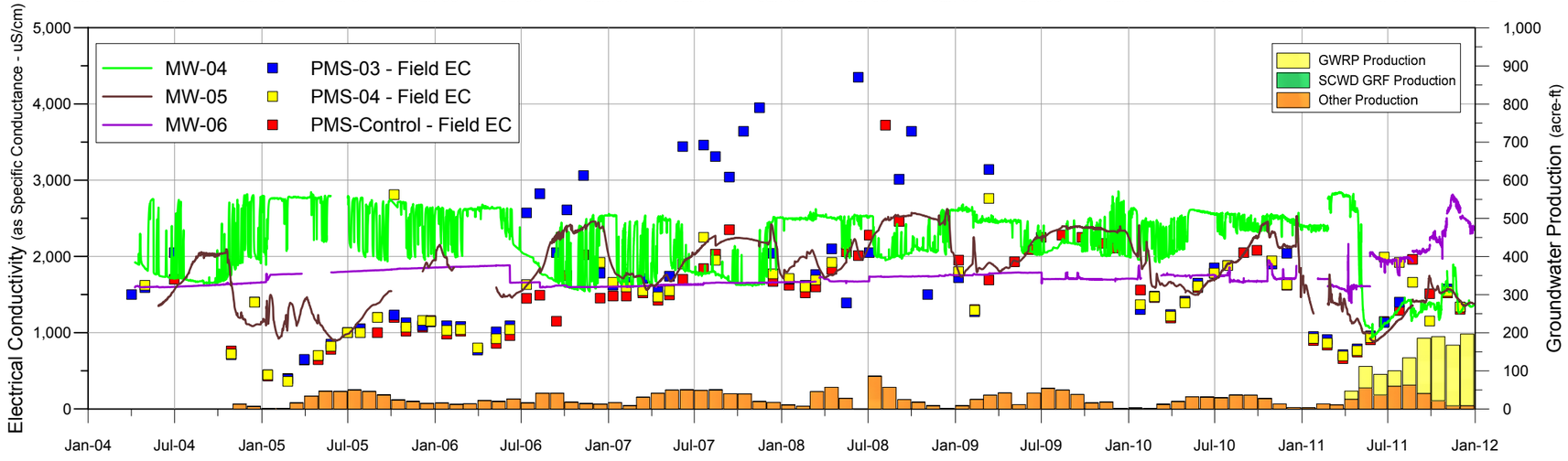

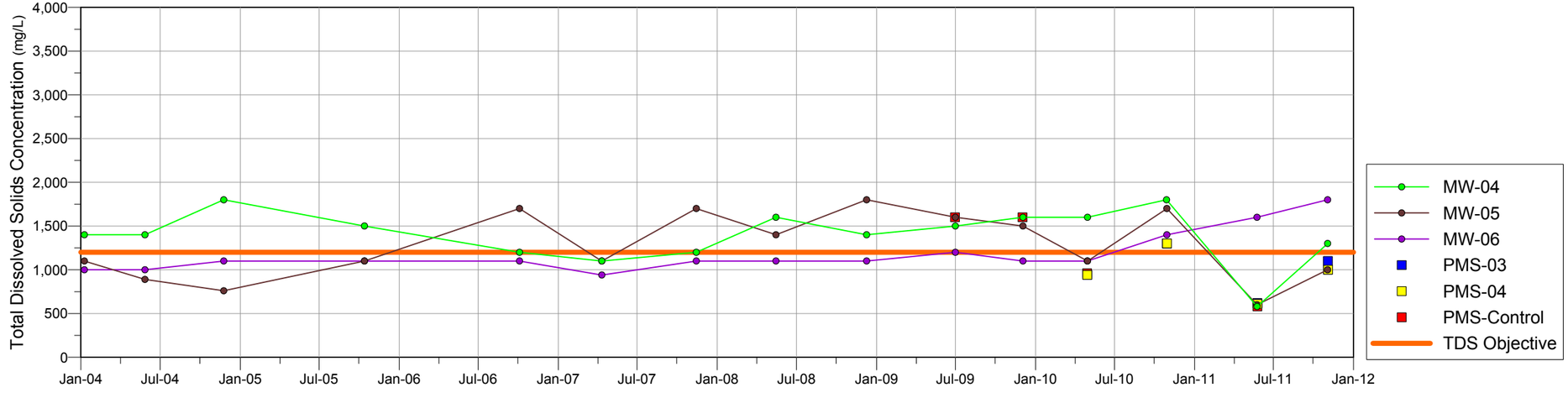

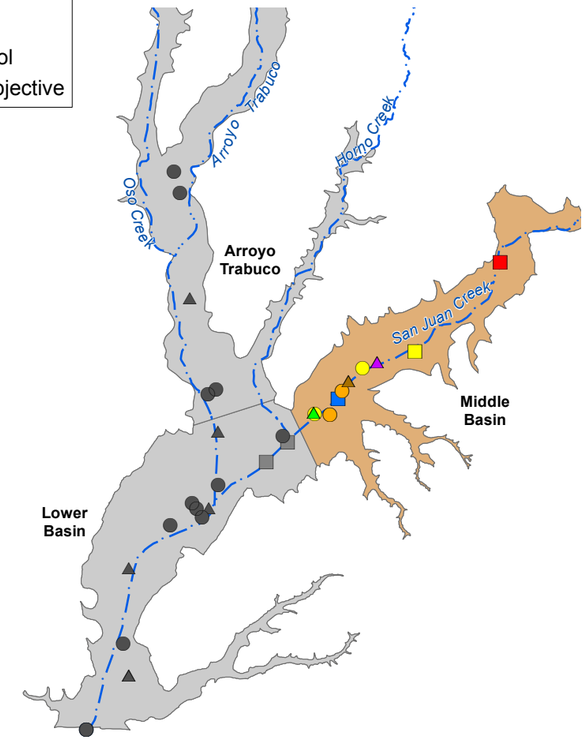

Middle Basin Wells and PMS Stations

MW-04
MW-05
MW-06
PMS-03
PMS-04
GWRP Well
SCWD GRF Well
Other Production Well
PMS-Control

Monitoring Well Water Quality in the Middle Sub-basin

Figure 4-6

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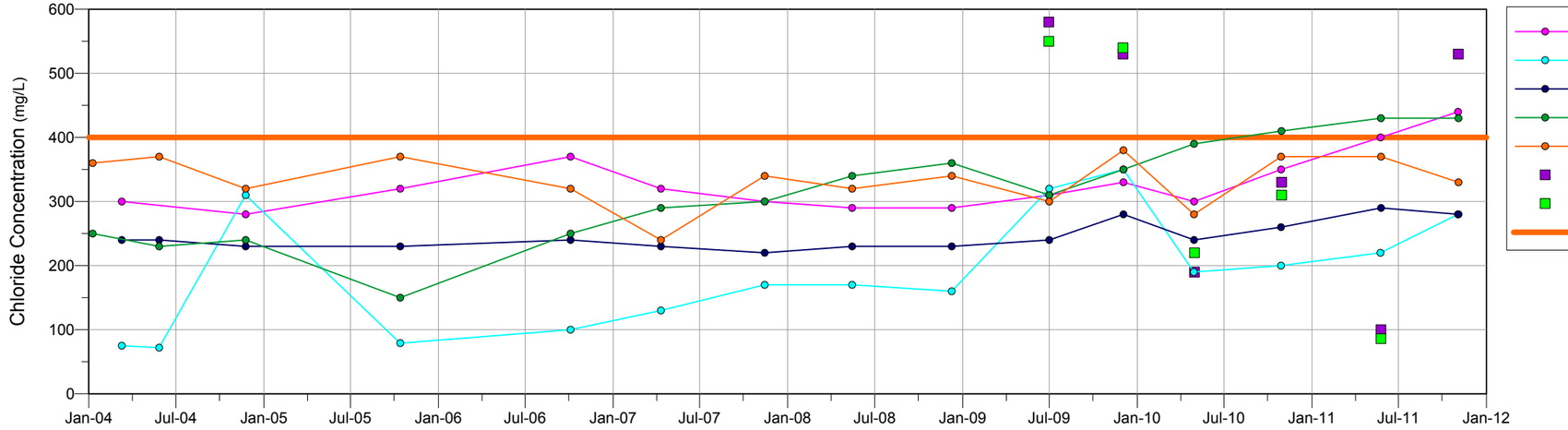

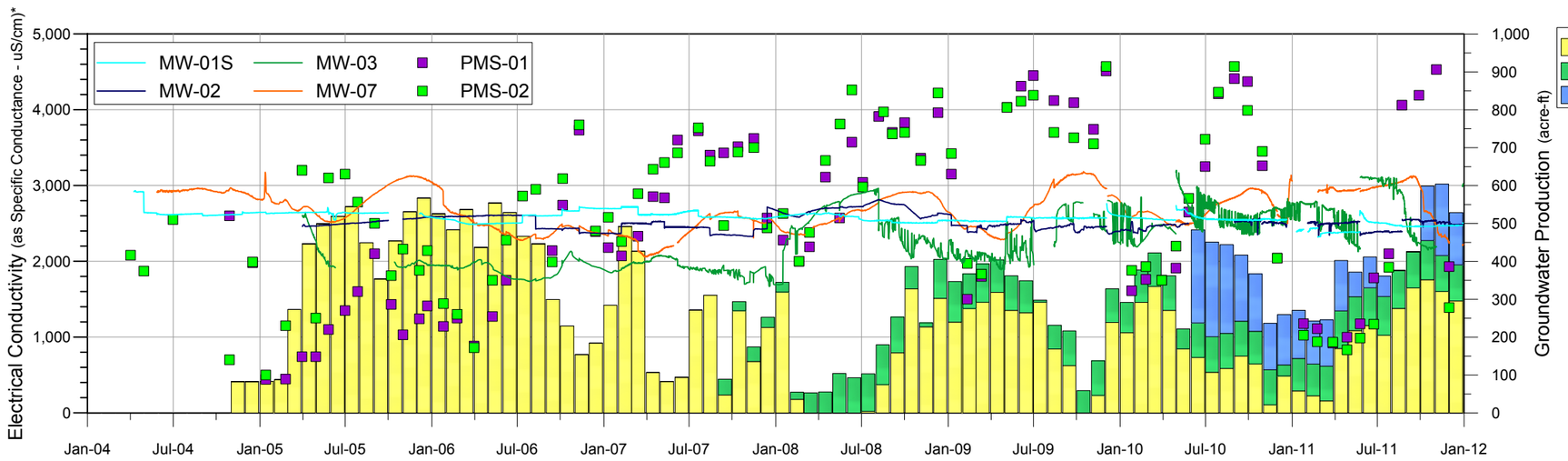

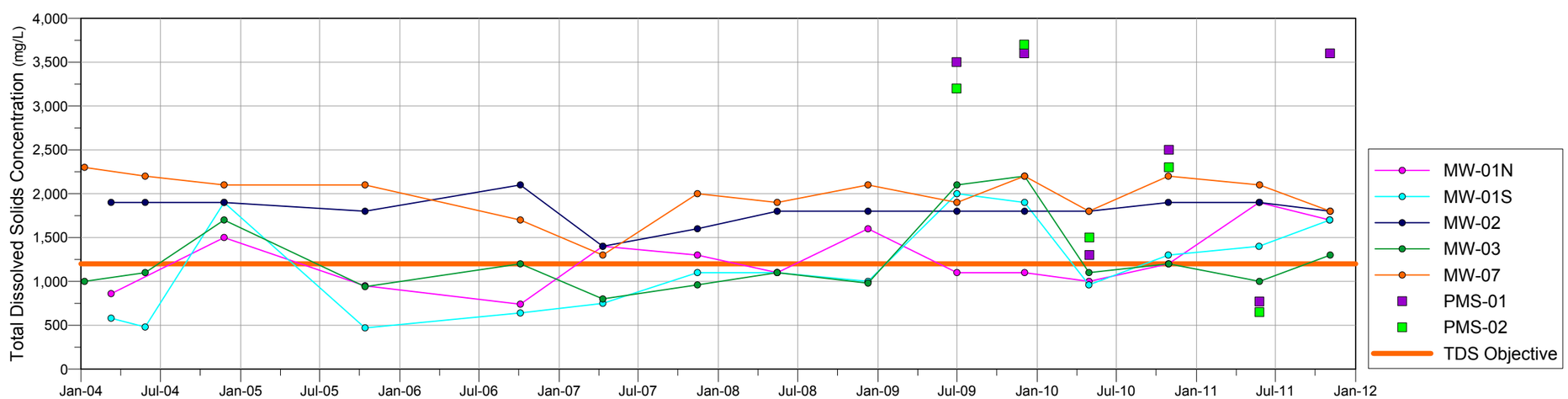

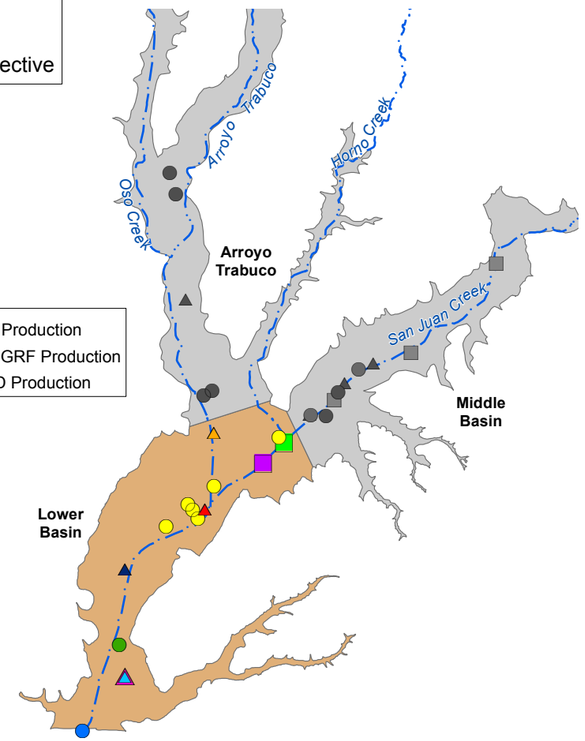

Lower Basin Wells and PMS Stations

MW-01N	Phase I Desalter Well
MW-01S	SCWD Desalter Well
MW-02	SOCOD Test Well
MW-03	PMS-01
MW-07	PMS-02

*Note: Well MW-01N is not equipped with a transducer and does not have continuous Electrical Conductivity readings.

Monitoring Well Water Quality
in the Lower Sub-basin

Figure 4-7

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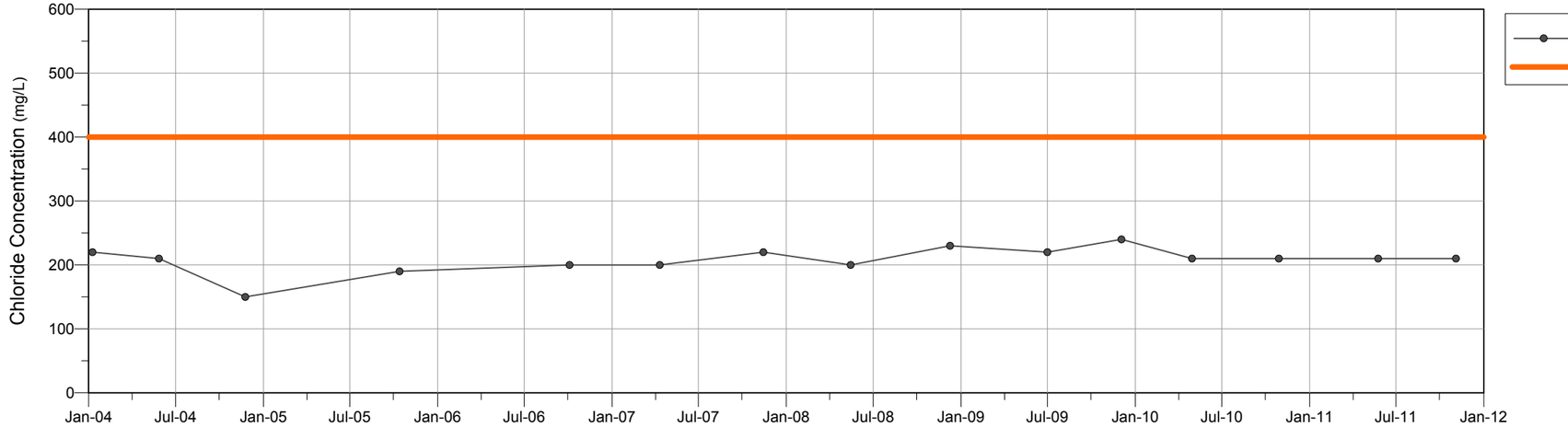

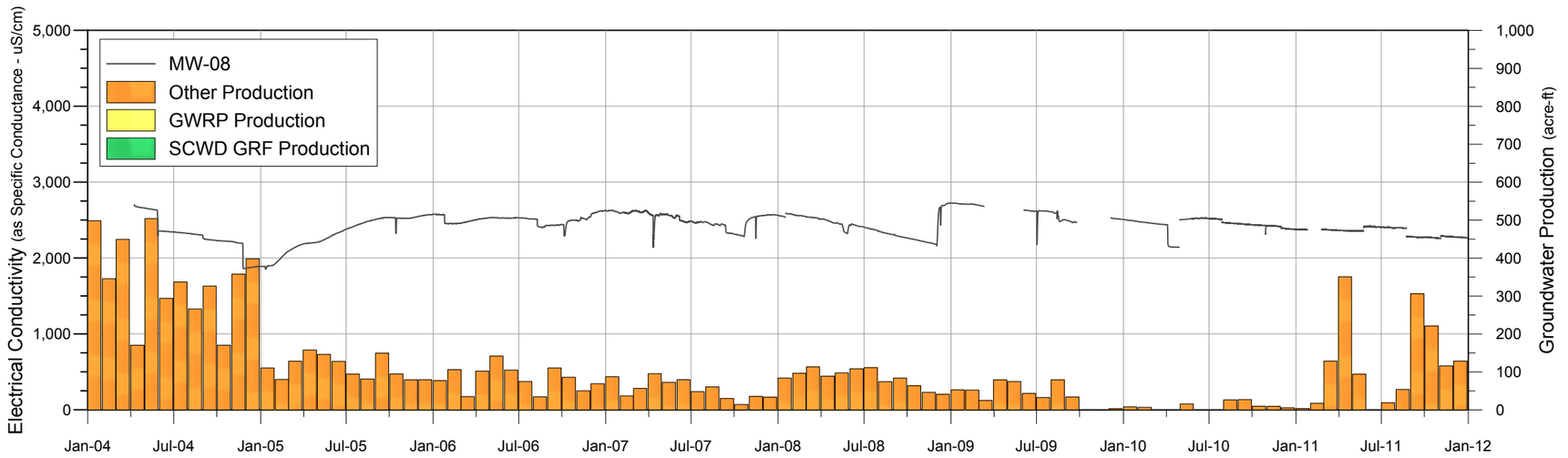

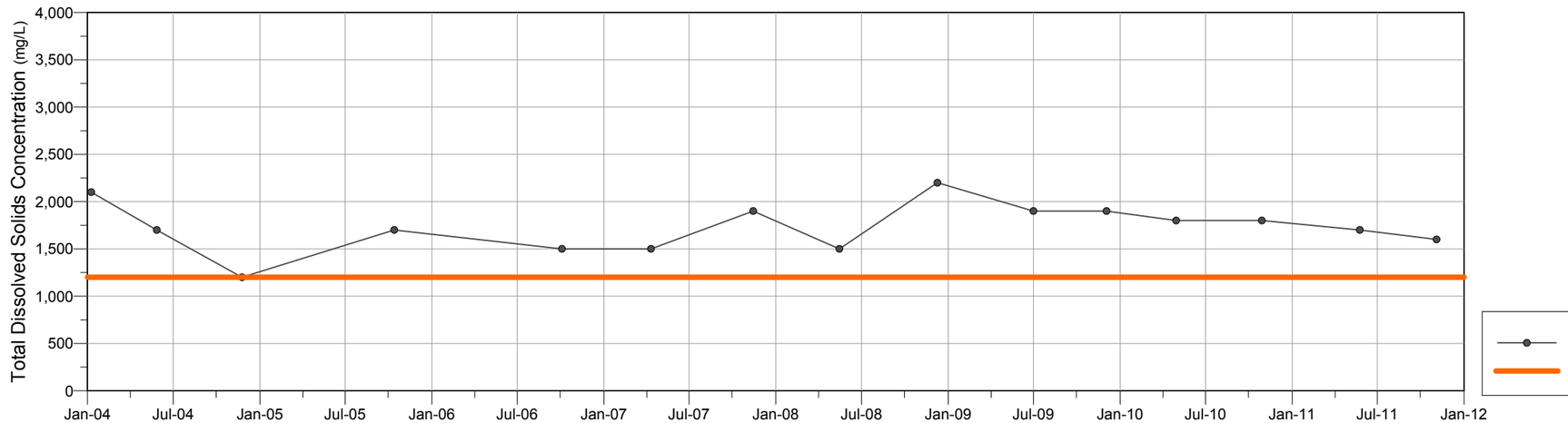

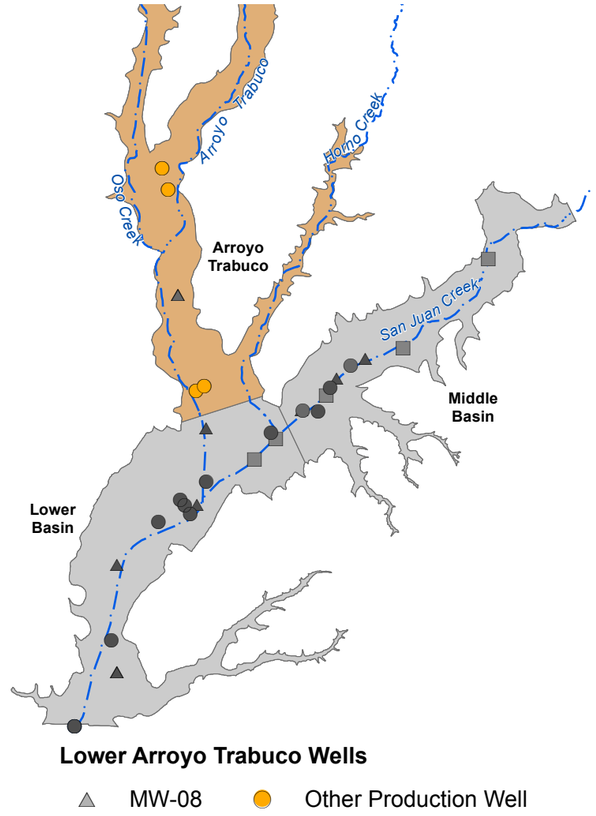

Monitoring Well Water Quality
in the Lower Arroyo Trabuco Sub-basin

Figure 4-8

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Section 5 – Conclusions and Recommendations

5.1 Summary of Conclusions

The following is a summary of the conclusions drawn from the analysis of data collected for the monitoring program for calendar year 2011:

- Precipitation in the San Juan Basin was about 74 to 80 percent of average for the period of 1996 to 2011.
- Total surface water discharge in San Juan Creek was 99 percent of the average for the period of 1996 to 2011.
- In general, surface water EC varies seasonally with the lowest values observed in wet winter months and the highest values observed in summer months. Field EC measurements are highest at the two stations that are dominated by dry-season urban runoff: PMS-01 and PMS-02.
- Surface water samples have not been collected for laboratory analysis for a sufficient period of time to assess surface water quality trends. The available data show that surface water quality in San Juan Creek occasionally exceeds Basin Plan objectives for chloride, color, iron, manganese, and sulfate. Since laboratory analysis of surface water quality began in 2009, all samples from San Juan Creek have had TDS concentrations in excess of the Basin Plan objective.
- Total reported groundwater production in the lower San Juan Basin was 7,534 acre-ft in 2011, which is the highest annual production since 2004. The increase in production was attributable to increased production capabilities and facility improvements at the GWRP, increases in groundwater pumping at the CSJC's non-potable system, increased pumping by the SCWD in accordance with their amended water rights permit, and pumping by the SOCOD test well.
- Total GWRP production in 2011 was 3,436 acre-ft, compared to the average of 2,754 acre-ft for the period of 2004 to 2011. Production at the SCWD GRF Well was 1,141 acre-ft, which is the highest annual production value for this well since it began producing in 2007.
- The groundwater elevation data from wells MW-02, MW-04, MW-05, MW-06, MW-07, and MW-08 do not show long-term continuous decreases in water levels and generally fluctuate in response to climatic conditions. In addition, the data from wells MW-04 and MW-05, located in the Middle Basin, show recent groundwater elevation declines in response to the startup of two new Middle Basin GWRP production wells: the South Cooks well in April 2011 and Well #5 in September 2011. The new GWRP wells have not been in production long enough to determine the impacts to groundwater elevation in the Middle Basin.
- Groundwater elevation data from wells MW-01S and MW-03 show decreases in water levels relative to the time period before GWRP and GRF production began in the

basin. In December 2011, the lowest water level elevation was recorded at MW-01S since the start of the monitoring program in April 2004.

- The cumulative change in storage has ranged between 350 acre-ft and -1,150 acre-ft. The cumulative change in storage between April 2004 and December 2011 was about -800 acre-ft.

- Groundwater quality data collected from wells in the Middle Basin show that all-time low EC and chloride and TDS concentrations were observed in May 2011 in wells MW-04 and MW-05. The opposite trend was observed in MW-06. The decreased concentrations observed in wells MW-04 and MW-05 may have been in response to the April 2011 startup of two new Middle Basin GWRP production wells (South Cooks and Well #5) and/or the groundwater recharge associated with the large precipitation event at the end of December 2010. Given that production at South Cooks and Well #5 only just began, there is not a sufficient time history of data to draw conclusions about how continued GWRP production in the Middle Basin will impact groundwater quality.

- The first exceedances of the Basin Plan objective for chloride were observed in Lower Basin wells MW-03 and MW-01N in 2011. However, the sampling methodology at these wells may be producing results that are not representative. EC readings recorded by data loggers in MW-01S, MW-01N, and MW-03 suggest that groundwater production may not be causing an increase, or decrease, in TDS concentrations at these wells: EC trends have changed little since 2005. Groundwater quality data collected from wells MW-02 or MW-07, also in the Lower Basin, show little to no change in chloride and TDS concentrations or EC since monitoring began in April 2004.

- Groundwater quality data collected from well MW-08 in the Lower Arroyo Trabuco Basin shows that GWRP production has not impacted chloride and TDS concentrations or EC since monitoring began in April 2004.

- During the spring, summer, and early fall months, the riparian communities monitored at the control and study sites were green, vibrant, and healthy with surface waters present at most times in San Juan Creek. During the late fall and winter months, the monitored habitat exhibited typical leaf yellowing and leaf drop but remained healthy. During the 2011 monitoring period, the riparian plant communities assessed at the control and study sites did not exhibit signs of either drought or water stress. These results remain consistent with results from the 2004 through 2010 monitoring periods, maintaining that any impacts occurring under the San Juan Basin Authority's *Phase I San Juan Basin Groundwater Management and Facility Plan* have not adversely affected riparian habitat along San Juan Creek during 2011.

5.2 Recommendations

Hydrologic, hydrogeologic, and biotic data has been collected for the monitoring program for eight years pursuant to water rights permit 21074. Based on the conclusions to date, the SWRCB adopted an amended permit for the SJBA, which modified the monitoring

requirements. The amount and type of monitoring to be performed in any given year is based on total projected GWRP production in the Basin. Phase I production is any amount up to 4,800 acre-ft/year, and Phase II production is any amount over 4,800 acre-ft/year up to the permit limit of 8,026 acre-ft/year. Given that the CSJC projects to produce more than 4,800 acre-ft of groundwater in calendar year 2012, the following actions are recommended:

- A new monitoring program work plan should be developed and submitted to the SWRCB, describing how the SJBA will comply with the amended monitoring requirements under Phase II production levels.

- While the Phase II monitoring plan is in development, monitoring should consist of: monthly vegetation monitoring, monthly field surface-water-quality monitoring, and quarterly monitoring of groundwater elevations and EC.

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Appendices A through E

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