

Notice and Agenda of a Workshop of the Yucaipa Sustainable Groundwater Management Agency

Wednesday, October 24, 2018 at 10:00 a.m.

City of Yucaipa, 34272 Yucaipa Boulevard
Yucaipa, California 92399
(909) 797-2489 | www.yucaipasgma.org

- I. Call to Order**
- II. Roll Call**
- III. Introductions of Board Members and Public Participants**
- IV. Public Comments** At this time, members of the public may address the representatives of the Yucaipa Groundwater Sustainability Agency on matters within its jurisdiction.
- V. Review and Approval of Meeting Minutes**
 - A. Meeting Minutes - September 26, 2018
- VI. Presentation**
 - A. Overview of the Yucaipa Basin Infiltration Testing Study by Edwin Lin, Todd Groundwater
 - B. Overview of the U.S. Geological Survey Groundwater Model of the Yucaipa Basin by Greg Mendez, U.S. Geological Survey
- VII. Discussion Items**
 - A. Discussion Regarding Correspondence from the City of Calimesa - Notice of Withdrawal from the Yucaipa - GSA
 - Meet and Confer Regarding: (i) Whether the withdrawing Party wishes to seek GSA status for a portion of the Basin underlying the jurisdictional area or service area of the withdrawing Party; (ii) Whether, as a result of the withdrawal, a co-GSA management or other arrangement with the withdrawing Party is necessary to satisfy the requirements of SGMA; and (iii) Any other issues and steps that are necessary to avoid triggering probationary status of the Basin and State Water Board intervention.
 - Discussion Regarding Financial Impacts to the Parties
 - Discussion Regarding Interim Voting and Quorum
 - Discussion Regarding Financial Obligations for Future Participation in the Yucaipa SGMA
 - Discussion Regarding Other Related Issues
 - B. Status Report on the Sustainable Groundwater Management Act Grant Supporting Work by the Yucaipa Sustainable Groundwater Management Agency - Bob Tincher / Tim Kellett
 - C. Discussion Regarding the Preparation of a Groundwater Sustainability Plan - All
 - Scheduled Kick-Off Meeting - Wednesday, November 14, 2018 at 9:30 am
 - Discussion Regarding the Workflow for Recommendations made by the Technical Advisory Group to the Board of Directors of the Yucaipa Sustainable Groundwater Management Agency
 - Discussion Regarding Data Collection and Compilation of Water Resources
 - Discussion Regarding Future Steps for the Preparation of a Groundwater Management Plan
 - Discussion Regarding Regular Meeting Date, Time, and Location for the Technical Advisory Group

- D. Discussion Regarding Correspondence from the San Gorgonio Pass Water Agency Requesting Modifications to the Yucaipa SGMA Bylaws

VIII. Topics for Future Meetings

- A. Yucaipa Sustainable Groundwater Management Agency
- Presentation by the United States Geological Survey Groundwater Flow Model - Tentatively Scheduled for January 23, 2019
 - Presentation by the City of Yucaipa Regarding the Project Components Necessary to Successfully Complete Stormwater Capture and Recharge Projects
 - Discussion Regarding Proposed Amendments to the Yucaipa SGMA Bylaws
- B. Technical Advisory Group
- Data Collection and Compilation
 - Regular Meeting Dates

IX. Comments by Board of Directors

X. Announcements - Future Meetings

- A. Wednesday, November 14, 2018 at 9:30 am - Technical Advisory Group - Ad Hoc Meeting
- B. Wednesday, January 23, 2019 at 10:00 am - Workshop Meeting
- C. Wednesday, February 27, 2019 at 10:00 am - Workshop Meeting
- D. Wednesday, March 27, 2019 at 10:00 am - Workshop Meeting
- E. Wednesday, April 24, 2019 at 10:00 am - Workshop Meeting

XI. Adjournment

Roll Call - Board of Directors

Purveyors	Present	Primary Representative	Present	Alternative Representative
South Mesa Water Company		David Armstrong		George Jorritsma
South Mountain Water Company		- -		- -
Western Heights Water Company		Mark Iverson		Tim Green
Yucaipa Valley Water District		Joseph Zoba		Jennifer Ares
Municipals				
City of Calimesa		Lori Askew		Bonnie Johnson
City of Redlands		Cecilia Griego		- -
City of Yucaipa		Ray Casey		Fermin Preciado
Regionals				
San Bernardino Valley MWD		Doug Headrick		Bob Tincher
San Gorgonio Pass Water Agency		Jeff Davis		Tom Todd
Stakeholders				
County of Riverside		Steve Horn		Jeff Johnson
County of San Bernardino		Bob Page		- -
* Quorum requires a total of five Purveyor, Municipal, Regional Members				

MINUTES OF THE YUCAIPA SUSTAINABLE GROUNDWATER MANAGEMENT AGENCY

September 26, 2018 - 10:00 a.m.

City of Yucaipa, 34272 Yucaipa Boulevard, Yucaipa, California

I. Call to Order - Chairman Mark Iverson called the meeting to order at 10:00 a.m.

II. Roll Call - The following representatives, as assigned by each Party, attended the meeting:

Purveyors	Present	Primary Representative	Present	Alternative Representative
South Mesa Water Company	✓	David Armstrong		George Jorritsma
South Mountain Water Company				
Western Heights Water Company	✓	Mark Iverson	✓	Tim Green
Yucaipa Valley Water District	✓	Joseph Zoba	✓	Jennifer Ares
Municipals				
City of Calimesa	✓	Lori Askew	✓	Bonnie Johnson
City of Redlands		Cecilia Griego		
City of Yucaipa	✓	Ray Casey	✓	Fermin Preciado
Regionals				
San Bernardino Valley MWD	✓	Doug Headrick	✓	Bob Tincher
San Gorgonio Pass Water Agency		Jeff Davis		
Stakeholders				
County of Riverside		Steve Horn		Jeff Johnson
County of San Bernardino		Bob Page		

A quorum of the Board of Directors was present at the meeting.

Members of the public and other attendees at the meeting included:

- Aaron Jones, San Bernardino Valley Municipal Water District
- Landon Kern, City of Yucaipa
- Jan Leja, Field Representative for Congressman Paul Cook
- Chris Mann, Yucaipa Valley Water District
- Joyce McIntyre, Public Attendee
- Wendy Moneypenny, South Mesa Mutual Water Company
- Adan Ortega, Ortega Strategies Group
- Tom Shalhoub, Yucaipa Valley Water District
- Linda Shelton, Public Attendee
- Gary Wilson, South Mesa Mutual Water Company
- Bob Zappia, Western Heights Mutual Water Company

III. Public Comments - There were no public comments.

IV. Review and Approval of Meeting Minutes

A. Approval of Meeting Minutes of August 29, 2018

David Armstrong moved to approve the meeting minutes.

Ray Casey seconded the motion.

Motion to approve the August 29, 2018 meeting minutes.	Yes	No	Abstain	Absent
South Mesa Water Company	✓			
South Mountain Water Company				✓
Western Heights Water Company	✓			
Yucaipa Valley Water District	✓			
City of Calimesa	✓			
City of Redlands				✓
City of Yucaipa	✓			
San Bernardino Valley Municipal Water District	✓			
San Gorgonio Pass Water Agency				✓

The Board of Directors approved the motion.

V. Presentation

A. Overview of a Proposed Detention Basin by the City of Calimesa as Regional Water Management Project

Lori Askew provided an overview of the Calimesa Creek Improvement Project located south of County Line Road. The proposed project is estimated to cost \$3.9 million to \$8.2 million.

VI. Discussion Items

A. Discussion regarding anticipated financial participation for Yucaipa SGMA member agencies through June 30, 2020

The board members discussed the need for financial assistance from the San Bernardino Valley Municipal Water District to fund: (1) the preparation of the Groundwater Sustainability Plan for the Yucaipa SGMA; and (2) to exclude the U.S. Geological Survey costs from the Proposition 1 grant. The board members agreed that it would be reasonable for the San Bernardino Valley Municipal Water District would pay for the U.S. Geological Survey model development up to the point that the model is released for use in its final form and to distribute the Proposition 1 grant as follows:

Yucaipa SGMA Member and Cost Share Pursuant to MOA	Total GSP Cost (Dudek)	Proposition 1 Grant Funding	Member Cost
South Mesa Mutual Water Company	\$152,718.75	\$111,514.10	\$41,204.64
South Mountain Water Company	\$152,718.75	\$111,514.10	\$41,204.64
Western Heights Mutual Water Co.	\$152,718.75	\$111,514.10	\$41,204.64
Yucaipa Valley Water District	\$152,718.75	\$111,514.10	\$41,204.64
City of Calimesa	\$40,725.00	\$29,737.09	\$10,987.91
City of Redlands	\$40,725.00	\$29,737.09	\$10,987.91
City of Yucaipa	\$40,725.00	\$29,737.09	\$10,987.91
San Bernardino Valley MWD	\$40,725.00	\$29,737.09	\$10,987.91
San Gorgonio Pass Water Agency	\$40,725.00	\$29,737.09	\$10,987.91
Total	\$814,500.00	\$594,741.85	\$219,758.11

Ray Casey moved to recommend the Chairman forward a request to the San Bernardino Valley Municipal Water District to request funding for the U.S. Geological Survey and the Groundwater Sustainability Plan as provided above.

Joseph Zoba seconded the motion.

Motion to request the San Bernardino Valley Municipal Water District fund the U.S. Geological Survey groundwater model up to the final release for use to the public; and distribute the costs of the Dudek contract pursuant to original Memorandum of Agreement.	Yes	No	Abstain	Absent
South Mesa Water Company	✓			
South Mountain Water Company				✓
Western Heights Water Company	✓			
Yucaipa Valley Water District	✓			
City of Calimesa	✓			
City of Redlands				✓
City of Yucaipa	✓			
San Bernardino Valley Municipal Water District	✓			
San Gorgonio Pass Water Agency				✓

The Board of Directors approved the motion.

- B. Status Report on the Sustainable Groundwater Management Act Grant Supporting Work by the Yucaipa Sustainable Groundwater Management Agency

Bob Tincher and Aaron Jones reported on the status of the grant and coordination efforts with the Department of Water Resources.

- C. Status Report on the Yucaipa Groundwater Model and Related Report by the United States Geological Survey

Doug Headrick and Bob Tincher reported that the U.S. Geological Survey groundwater model for the Yucaipa Basin was provided to the San Bernardino Valley Municipal Water District and already used by Geoscience for a study of the Santa Ana Watershed to Prado Dam. The U.S. Geological Survey will be

requested to provide a presentation to the Yucaipa SGMA group at the regular meeting on January 23, 2018.

D. Status Report on the Infiltration Testing Study for the Yucaipa Basin

Aaron Jones discussed the current status of the work by Todd Groundwater. A draft report is scheduled to be provided during the week of October 15, 2018. The draft report is expected to be discussed at the October 24, 2018 Yucaipa SGMA meeting.

E. Status Report on the Preparation of a Logo and Letterhead for the Yucaipa Sustainable Groundwater Management Agency

Lori Askew provided options for letterhead to be used by the Yucaipa SGMA.

After reviewing the samples, Doug Headrick moved to list the members without logos and change the tagline to “Achieving Sustainability Through Local Control”.

David Armstrong seconded the motion.

Motion to finalize the Yucaipa SGMA letterhead without logos and modify the tagline to “Achieving Sustainability Through Local Control”.	Yes	No	Abstain	Absent
South Mesa Water Company	✓			
South Mountain Water Company				✓
Western Heights Water Company	✓			
Yucaipa Valley Water District	✓			
City of Calimesa	✓			
City of Redlands				✓
City of Yucaipa	✓			
San Bernardino Valley Municipal Water District	✓			
San Gorgonio Pass Water Agency				✓

The Board of Directors approved the motion.

F. Status Report on the Contract with Dudek for the Development of a Groundwater Sustainability Plan for the Yucaipa Valley Basin Area

Bob Tincher reported that the San Bernardino Valley Municipal Water District will be discussing the contract with Dudek at the workshop on October 9, 2018 and the regular board meeting on October 16, 2018.

G. Discussion Regarding the Preparation of a Groundwater Sustainability Plan

The Board of Directors discussed the formation of a Technical Advisory Group.

Mark Iverson moved to publish meeting notices of the Technical Advisory Group in compliance with the Brown Act as an ad hoc meeting with all members of the Board of Directors to be included.

Joseph Zoba seconded the motion.

Motion to create a Technical Advisory Group consisting of all Yucaipa SGMA members as an ad hoc meeting with meeting notifications to comply with Brown Act requirements.	Yes	No	Abstain	Absent
South Mesa Water Company	✓			
South Mountain Water Company				✓
Western Heights Water Company	✓			
Yucaipa Valley Water District	✓			
City of Calimesa	✓			
City of Redlands				✓
City of Yucaipa	✓			
San Bernardino Valley Municipal Water District	✓			
San Gorgonio Pass Water Agency				✓

The Board of Directors approved the motion.

Doug Headrick moved to have the San Bernardino Valley Municipal Water District be the point of contact with Dudek.

Ray Casey seconded the motion.

Motion to have a representative from the San Bernardino Valley Municipal Water District be the point of contact with Dudek.	Yes	No	Abstain	Absent
South Mesa Water Company	✓			
South Mountain Water Company				✓
Western Heights Water Company	✓			
Yucaipa Valley Water District	✓			
City of Calimesa	✓			
City of Redlands				✓
City of Yucaipa	✓			
San Bernardino Valley Municipal Water District	✓			
San Gorgonio Pass Water Agency				✓

The Board of Directors approved the motion.

VII. Topics for Future Meetings

The meeting participants discussed the topics for future meetings and requested the following items be added to a future meeting agenda:

- A. Review of Draft Infiltration Study Report by Todd Groundwater - Tentatively Scheduled for October 24, 2018.
- B. Presentation by the United States Geological Survey Groundwater Flow Model Concepts and Goals - Tentatively Scheduled for October 24, 2018.

- C. Presentation by the United States Geological Survey Groundwater Flow Model for the Yucaipa Groundwater Basin - Tentatively Scheduled for January 23, 2019.

VIII. Comments by the Board of Directors

None

- IX. Announcements - The next meeting of the Yucaipa Sustainable Groundwater Management Agency is scheduled for Wednesday, October 24, 2018 at 10:00 a.m.

- X. Adjournment - The meeting was adjourned at 11:05 a.m.



City of Calimesa

October 2, 2018

Chairman Iverson and Members -- Yucaipa-GSA
Western Heights Water Company
32352 Avenue D
Yucaipa, Ca. 92399

Re: NOTICE OF WITHDRAWAL OF THE CITY OF CALIMESA FROM YUCAIPA-GSA

Dear CHAIRMAN IVERSON AND MEMBERS OF THE YUCAIPA-GSA.

In accord with the requirements of the Sustainable Groundwater Management Act ("SGMA") as set forth in California Government Code §§ 65350.5 et seq. and California Water Code §§ 1070 et seq., on June 5, 2017, the City Council of the City of Calimesa approved a Memorandum of Agreement (MOA) to form a Groundwater Sustainability Agency (GSA) for the Yucaipa Sub-Basin (Sub-Basin No. 8-02.07)("Yucaipa-GSA"). Members of the GSA include the City of Calimesa ("CALIMESA"), the City of Redlands ("REDLANDS") and the City of Yucaipa ("YUCAIPA"), collectively referred to as the "MUNICIPALITIES" and; South Mesa Water Company ("SOUTH MESA"), South Mountain Water Company ("SOUTH MOUNTAIN"), Western Heights Water Company ("WESTERN HEIGHTS") and Yucaipa Valley Water District ("YVWD"), collectively referred to as the "WATER PURVEYORS"; and, the San Bernardino Valley Municipal Water District ("SAN BERNARDINO VALLEY MUNICIPAL") and the San Gorgonio Pass Water Agency ("SAN GORGONIO"), collectively referred to as the "REGIONALS".

Section IX. B. of the MOA provides that any Party may decide, in its sole discretion, to withdraw from the MOA by providing ninety (90) days written notice to the other Parties.

This NOTICE constitutes CALIMESA's written statement of its intention to withdrawal from the MOA effective 90 days from the date of this NOTICE.

CALIMESA has struggled from the beginning with being a member of the GSA. It was represented to CALIMESA early on, that if CALIMESA was not a full voting member of the GSA, control of the Yucaipa Sub-Basin would revert to the State. Because CALIMESA understands

and recognizes the importance of local control over water resources, CALIMESA agreed to join the GSA. However, CALIMESA, throughout the formation process and since, has consistently expressed its concern regarding the various costs that will be incurred by Yucaipa-GSA. CALIMESA is by far the smallest MUNICIPALITY in the GSA and simply does not have the same financial resources as others in the GSA do. In addition, CALIMESA is frustrated with the apparent lack of due diligence exercised on behalf of the majority of the members when selecting the consultant to Develop the Groundwater Sustainability Plan (GSP).

On August 29, 2018, the GSA recommended contracting with Dudek in the amount of \$814,500 for the Development of a GSP. It should be noted that Dudek's original proposal was \$1,180,480 but was reduced by \$365,980 through subsequent conversations with Dudek. However, the lowest qualified cost proposal was submitted by Todd Groundwater with a projected cost of \$477,514. SOUTH MESA and CALIMESA both requested that Todd Groundwater be contacted again to ascertain why there was such a discrepancy in costs between the two proposals. The GSA Board voted down the request to contact Todd Groundwater. There would have been no cost in following up with the lowest qualified cost consultant. It may have permitted full compliance with the SGMA and saved all members a substantial amount of money in the end.

In light of these concerns and the limited financial resources available to CALIMESA for purposes of groundwater management, CALIMESA submits this written statement of withdrawal from the GSA. Under the provisions of the MOA, withdrawal by CALIMESA will "not cause or require the termination of [the] MOA or the existence of the YUCAIPA-GSA with respect to the non-withdrawing Parties." CALIMESA understands the requirement set forth in Section IX. B of the MOA to meet and confer with YUCAIPA-GSA as to various alternatives and options available to CALIMESA to fully comply with the requirements of SGMA during the 90-day notice period. CALIMESA is amenable to meet and confer as required and complete all statutory requirements to assure compliance.

Respectfully,



Bonnie Johnson
City Manager
City of Calimesa

Copies to:

South Mountain Water Company
35 Cajon Street
Redlands Ca. 92373
Attn: Cecilia Griego, Water Resources Specialist

South Mesa Water Company
391 West Avenue L
Calimesa, Ca. 92320
Attn: Dave Armstrong, General Manager

Yucaipa Valley Water District
12770 Second Street
Yucaipa, Ca. 92399
Attn: Joseph Zoba, General Manager

City of Redlands
35 Cajon Street
Redlands, Ca. 92373
Attn: Municipal Utilities and Engineering Director

City of Yucaipa
34272 Yucaipa Blvd.
Yucaipa, Ca. 92399
Attn: Ray Casey, City Manager

San Bernardino Valley Municipal Water District
280 E. Vanderbilt Way
San Bernardino, Ca. 92408
Attn: Douglas Headrick, General Manager

San Gorgonio Pass Water Agency
1210 Beaumont Avenue
Beaumont, Ca. 92223
Attn: Jeff Davis, General Manager and Chief Engineer

County of Riverside
4080 Lemon Street
Riverside, Ca. 92501
Attn: Steve Horn, Senior Mgmt. Analyst, Executive Office

County of San Bernardino
385 N. Arrowhead Avenue
San Bernardino Ca. 92415-0120
Attn: Bob Page, Principal Mgmt. Analyst, Special Projects

Yucaipa SGMA - Agenda Item 6.A.

Wednesday, October 24, 2018

Yucaipa SGMA Member and Cost Share Pursuant to MOA - With the City of Calimesa	Total GSP Cost (Dudek)	Proposition 1 Grant Funding	Member Cost
South Mesa Mutual Water Company	\$152,718.75	\$111,514.10	\$41,204.64
South Mountain Water Company	\$152,718.75	\$111,514.10	\$41,204.64
Western Heights Mutual Water Company	\$152,718.75	\$111,514.10	\$41,204.64
Yucaipa Valley Water District	\$152,718.75	\$111,514.10	\$41,204.64
City of Calimesa	\$40,725.00	\$29,737.09	\$10,987.91
City of Redlands	\$40,725.00	\$29,737.09	\$10,987.91
City of Yucaipa	\$40,725.00	\$29,737.09	\$10,987.91
San Bernardino Valley Municipal Water District	\$40,725.00	\$29,737.09	\$10,987.91
San Gorgonio Pass Water Agency	\$40,725.00	\$29,737.09	\$10,987.91
Total	\$814,500.00	\$594,741.85	\$219,758.11

Yucaipa SGMA Member and Cost Share Pursuant to MOA - Without the City of Calimesa	Total GSP Cost (Dudek)	Proposition 1 Grant Funding	Member Cost
South Mesa Mutual Water Company	\$152,718.75	\$111,514.10	\$41,204.64
South Mountain Water Company	\$152,718.75	\$111,514.10	\$41,204.64
Western Heights Mutual Water Company	\$152,718.75	\$111,514.10	\$41,204.64
Yucaipa Valley Water District	\$152,718.75	\$111,514.10	\$41,204.64
City of Redlands	\$50,906.25	\$37,171.37	\$13,734.88
City of Yucaipa	\$50,906.25	\$37,171.37	\$13,734.88
San Bernardino Valley Municipal Water District	\$50,906.25	\$37,171.37	\$13,734.88
San Gorgonio Pass Water Agency	\$50,906.25	\$37,171.37	\$13,734.88
Total	\$814,500.00	\$594,741.88	\$219,758.08



San Gorgonio Pass Water Agency

A California State Water Project Contractor
1210 Beaumont Avenue • Beaumont, CA 92223
Phone (951) 845-2577 • Fax (951) 845-0281

October 5, 2018

President:
David Fenn

Mr. Mark Iverson, Chair
Yucaipa Subbasin GSA
c/o San Bernardino Valley MWD
380 East Vanderbilt Way
San Bernardino, CA 92408

Vice President:
Ronald Duncan

Treasurer:
Leonard Stephenson

Dear Mr. Iverson:

Directors:
Dr. Blair M Ball
David Castaldo
Stephen Lehtonen
Michael Thompson

As you know, the San Gorgonio Pass Water Agency (Agency) is a member of the Yucaipa GSA. We have previously appointed myself as our representative to the GSA. We have not previously identified an alternate. This is to inform you that the Agency has appointed Finance Manager Tom Todd as our alternate to the GSA. Please make note of this in your records.

**General Manager
& Chief Engineer:**
Jeff Davis, PE

In addition, the Agency is requesting that a discussion and possible action on Section 1.3 of the GSA's by-laws be added to the next GSA meeting agenda. The purpose of the proposed discussion and action is to change the section, which currently allows only senior level employees of the Parties to be members or alternates. The proposed change is to delete the sentence "The individual appointed to the Yucaipa-SGMA shall be a senior executive management level employee of each designating Party." The proposed change, if implemented by the GSA, would allow each Party to appoint whomever it feels most comfortable with to represent its interests on the GSA, whether an employee, consultant, board member, or other individual.

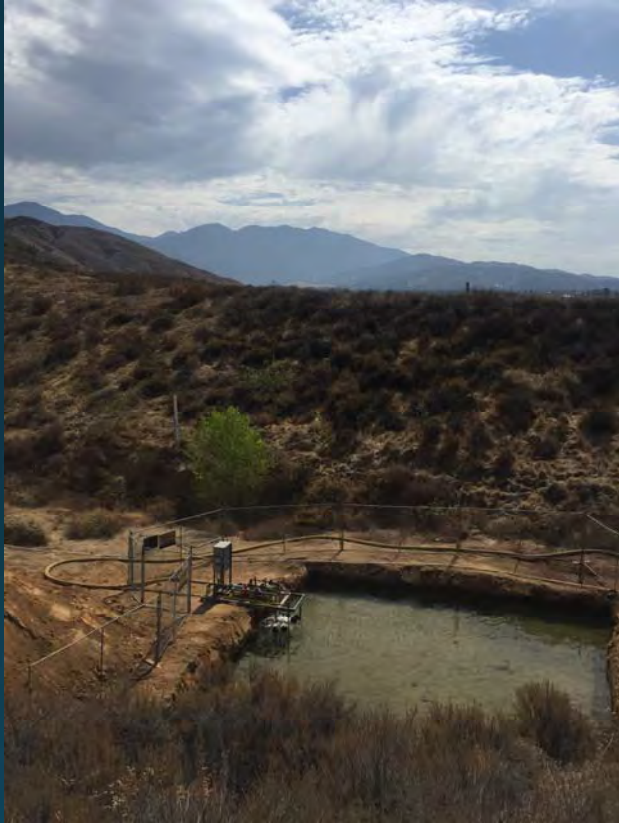
Legal Counsel:
Jeffry Ferre

Please do not hesitate to contact me if you have any questions.

Very truly yours,


Jeff Davis

*Yucaipa City Hall
October 24, 2018*



Yucaipa Groundwater Sustainability Agency
**Yucaipa Basin Area
Infiltration Testing Results**

Project Overview

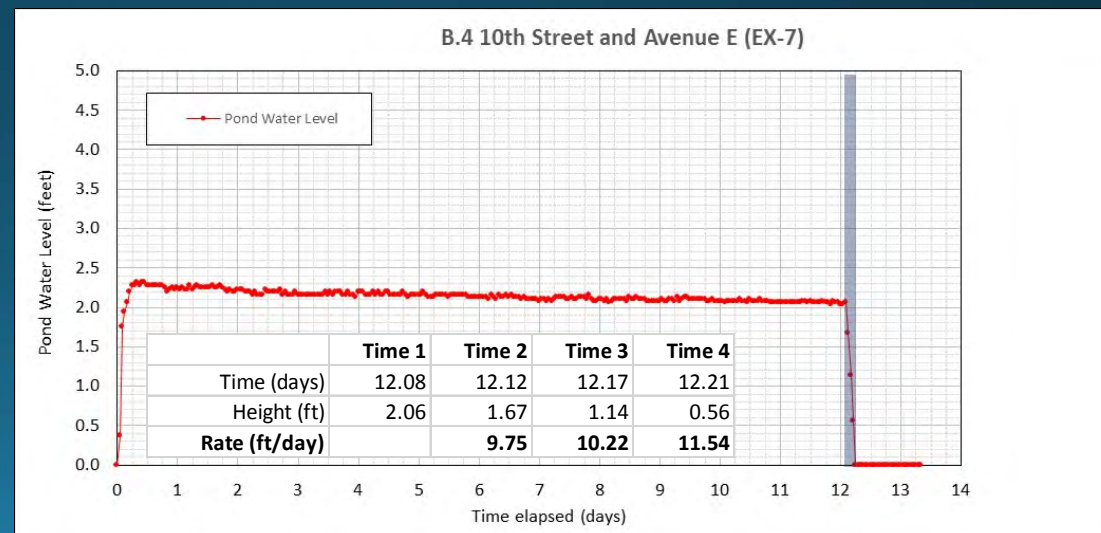
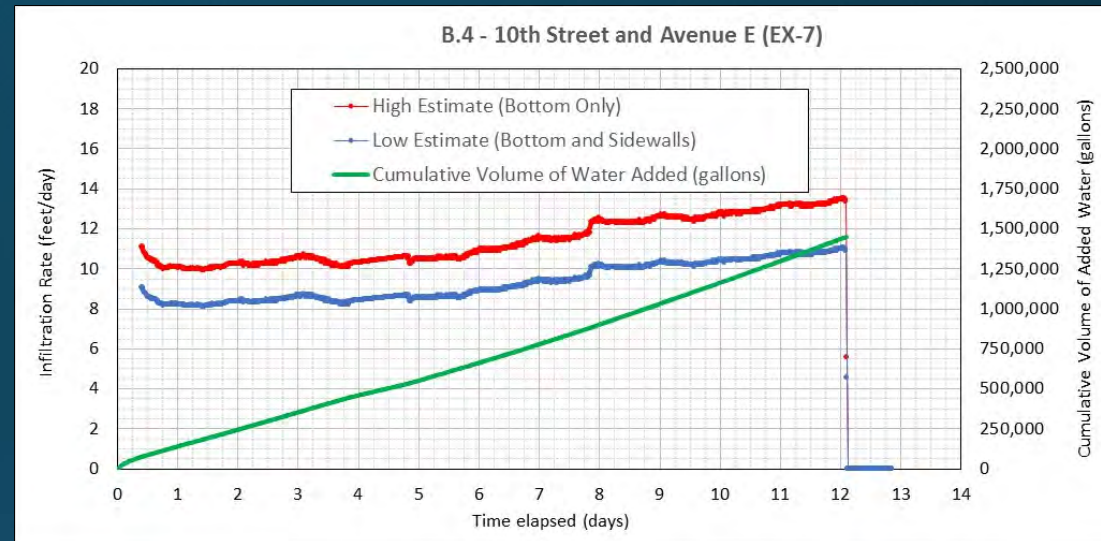
- Field program conducted continuously over 12 weeks (Jul 9 – Oct 1)
- 12 tests / 11 sites
- Field-scale test basins
 - Approximately 30' x 30' x 5'
 - Up to two weeks per test
- Implementation involved...
 - Soil excavation
 - Water conveyance, automated flow control, and metering
 - Remote access / telemetry
 - Traffic control and site security

Field Setup



Data Collected

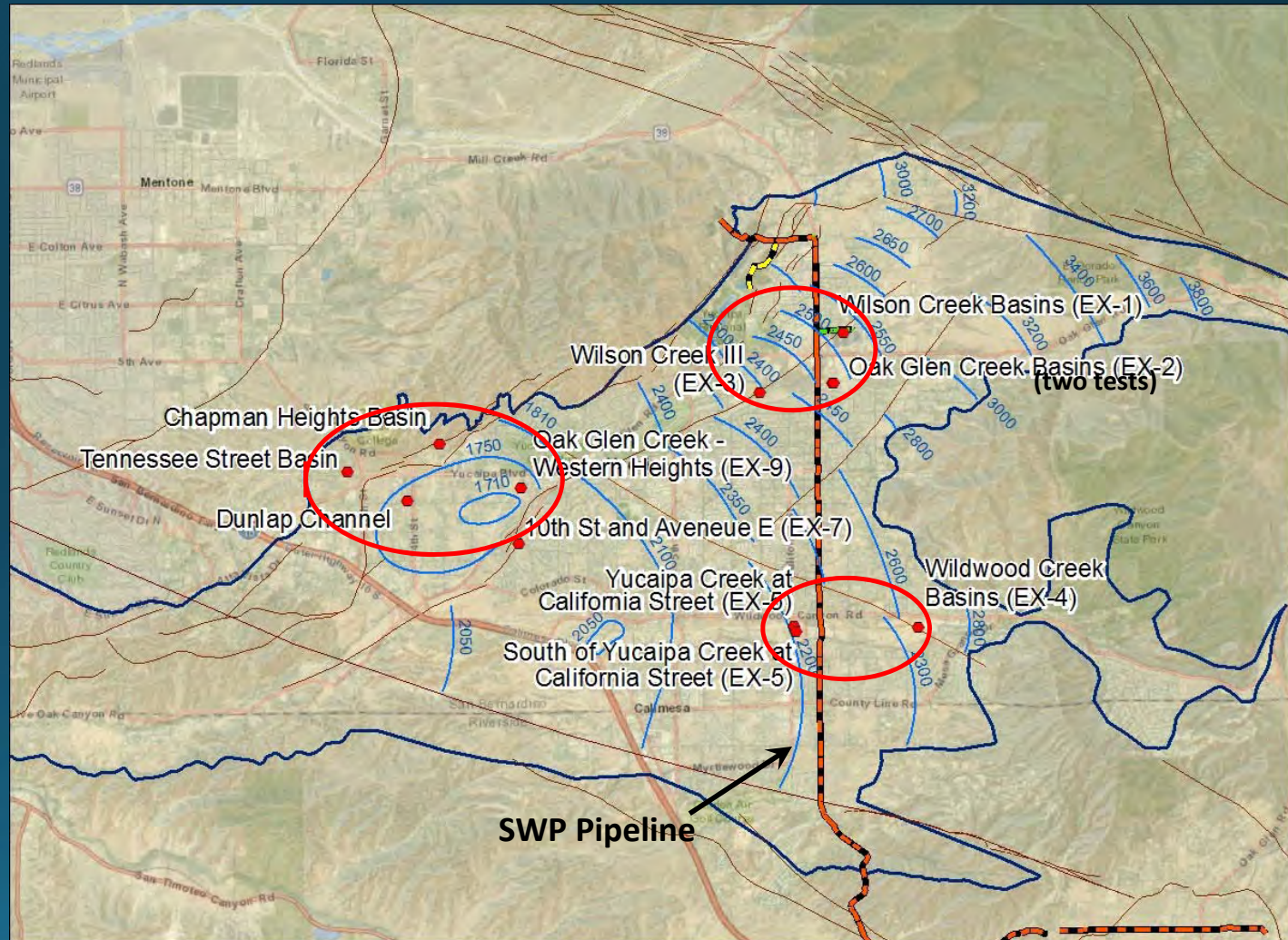
- Soil examination (0-5 feet)
- Continuous Flow and Water Depth
- Total Volume of Water Added
- Calculated 1-D Infiltration Rates
 - Constant-head
 - High estimate (bottom only)
 - Low estimate (bottom and sidewalls)
 - Falling-head test
 - High and low estimates (bottom only)
- Groundwater level changes
 - Wildwood Creek Basin MW



Test Sites

Yucaipa Basin Subareas

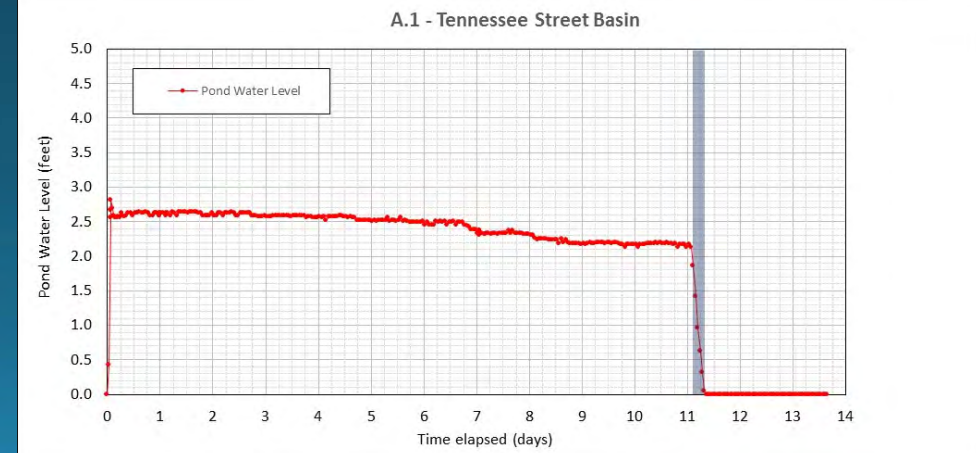
- Western Heights (5)
- Calimesa (3)
- Gateway (4)



Tennessee Street Basins

Rate: 9.2 – 12.3 ft/d (constant-head)

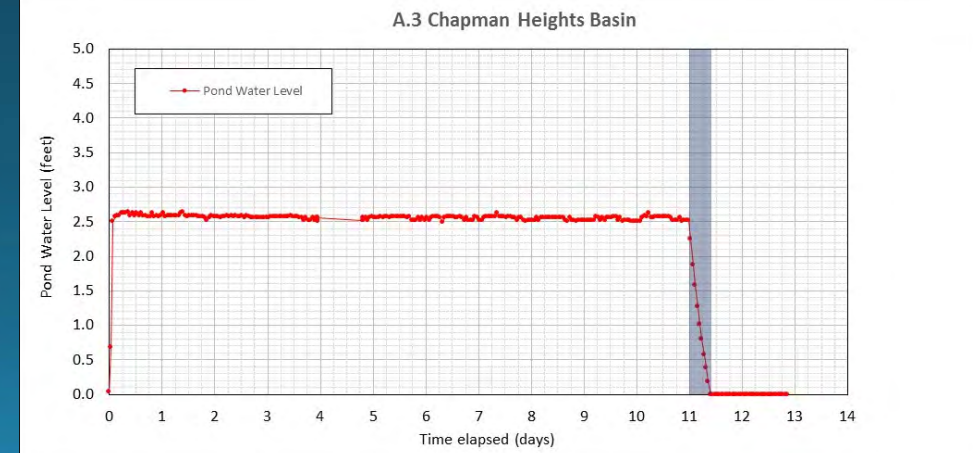
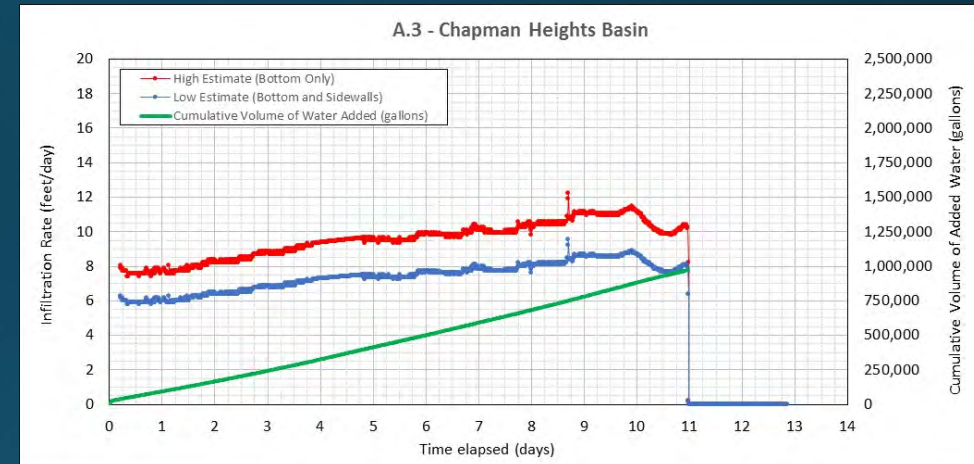
Rate: 9.5 – 11.1 ft/d (falling-head)



Chapman Heights Basin

Rate: 8.8 – 11.5 ft/d (constant-head)

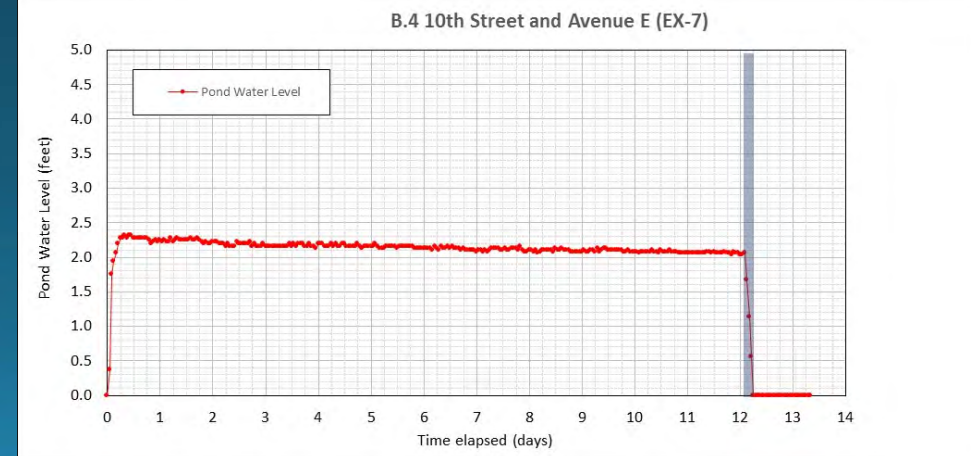
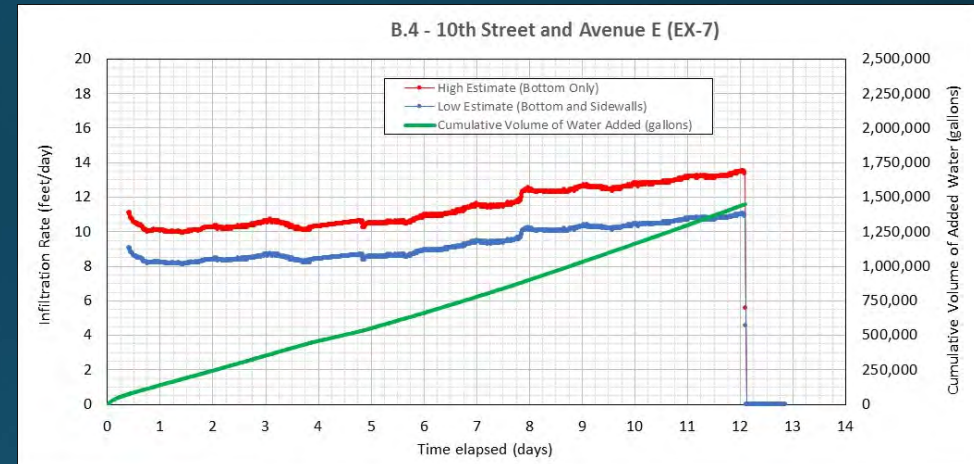
Rate: 7.3 – 9.5 ft/d (falling-head)



10th Street and Avenue E (EX-7)

Rate: 12.0 – 13.4 ft/d (constant-head)

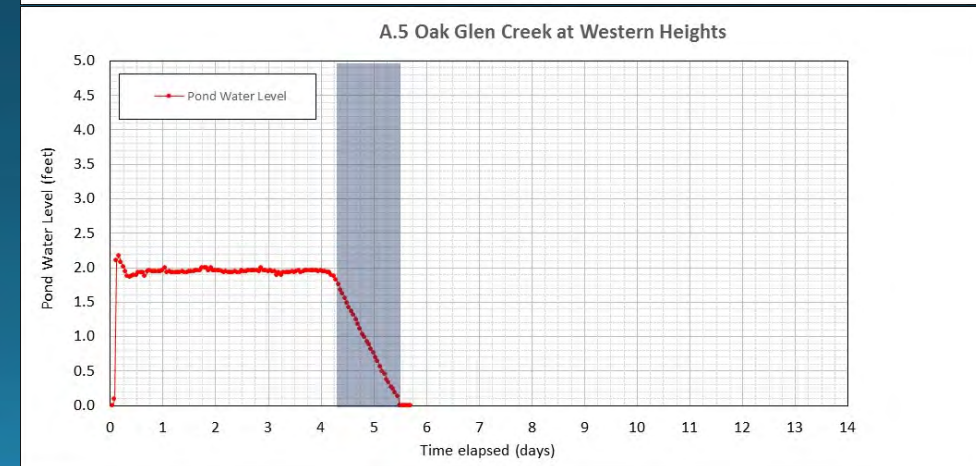
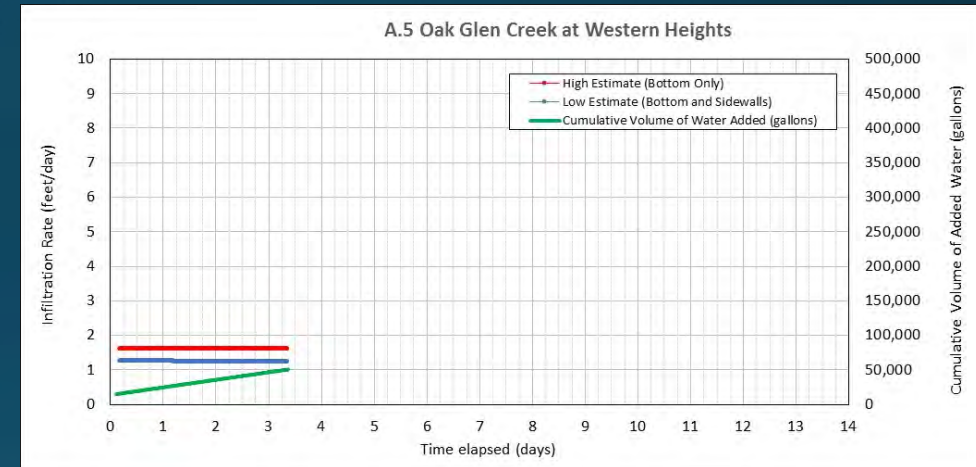
Rate: 9.8 – 11.5 ft/d (falling-head)



Oak Glen Creek - Western Heights (EX-9)

Rate: 1.2 – 1.6 ft/d (constant-head)

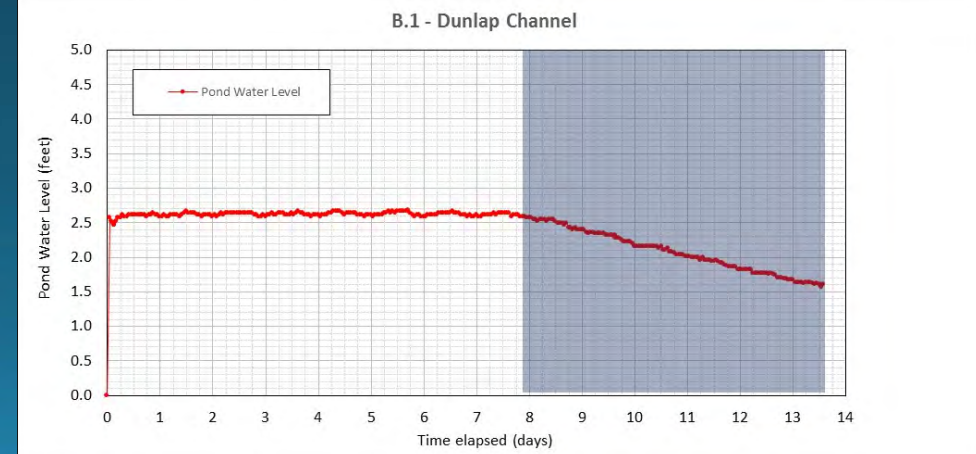
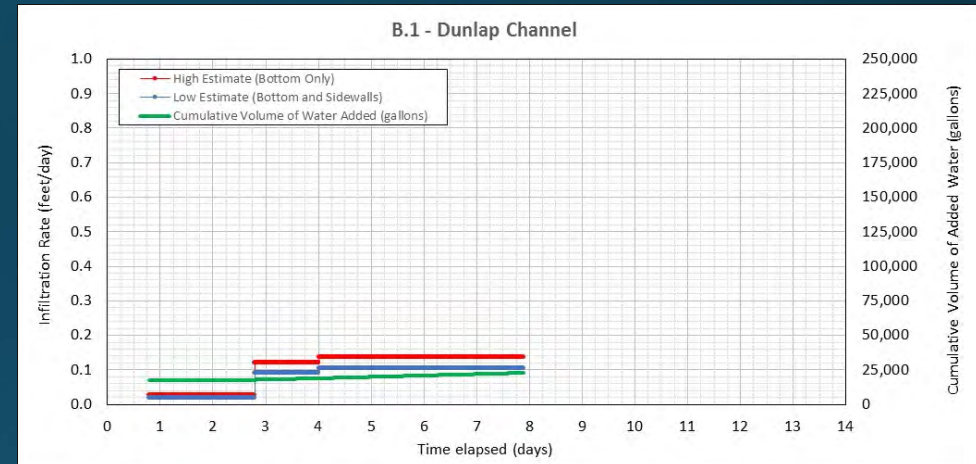
Rate: 1.5 – 1.6 (falling-head)



Dunlap Channel

Rate: 0.1 ft/d (constant-head)

Rate: 0.2 ft/d (falling-head)



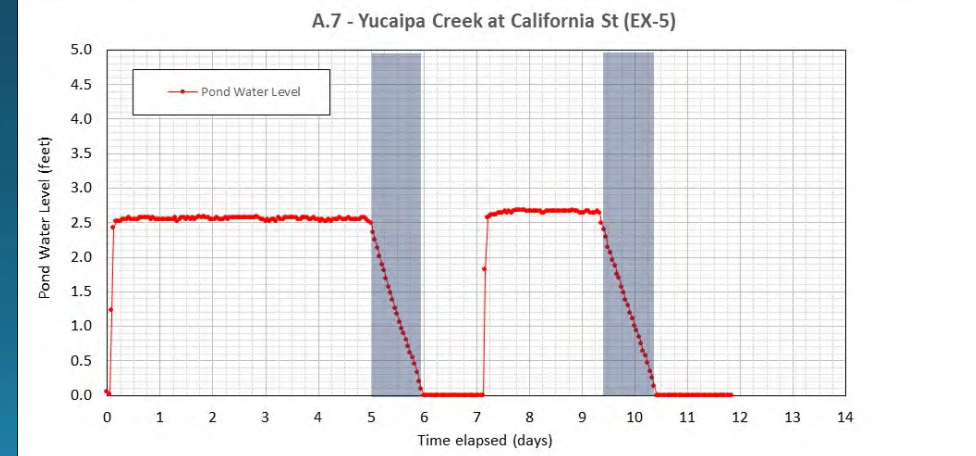
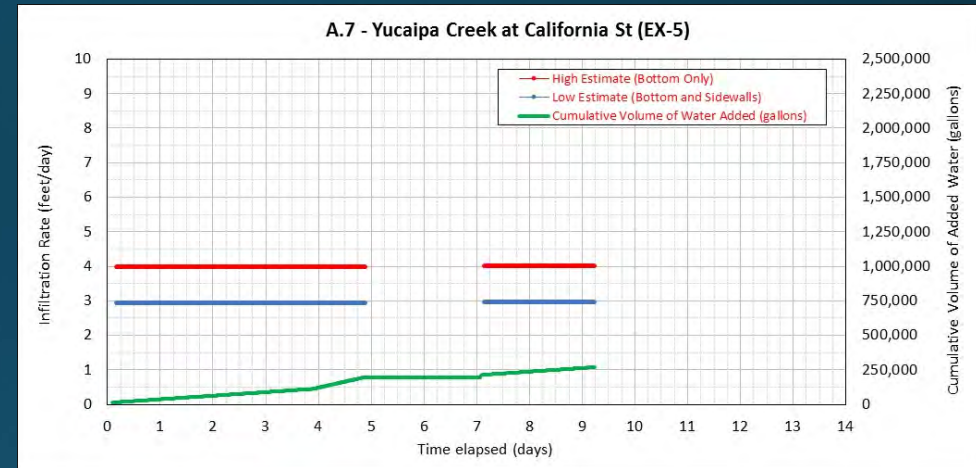
Summary of Western Heights Sites

- Favorable Sites
 - Tennessee Street Basins
 - Chapman Heights Basins
 - 10th Street at Avenue E (right on Chicken Hills Fault)
- Unfavorable Sites
 - Oak Glen Creek at Western Heights (fine channel sediments)
 - Dunlap Channel (regional shallow clay layers)

Yucaipa Creek at California Street (EX-5)

Rate: 2.9 – 4.0 ft/d (constant-head)

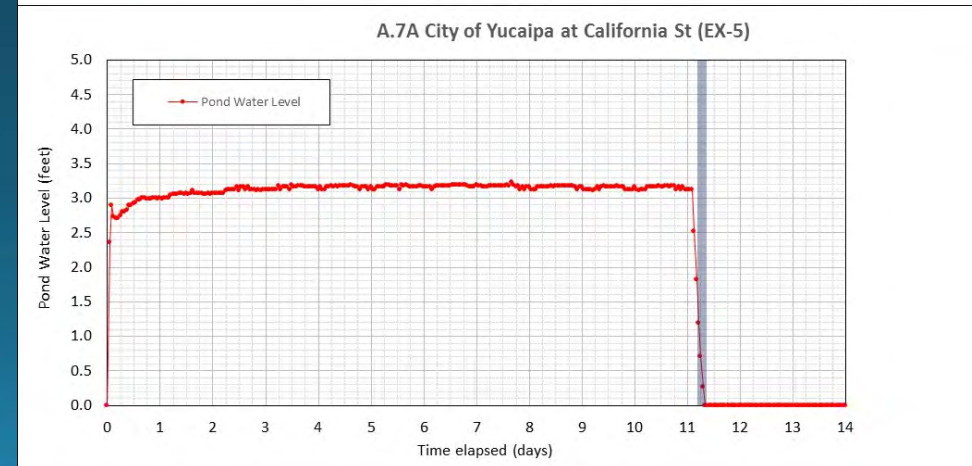
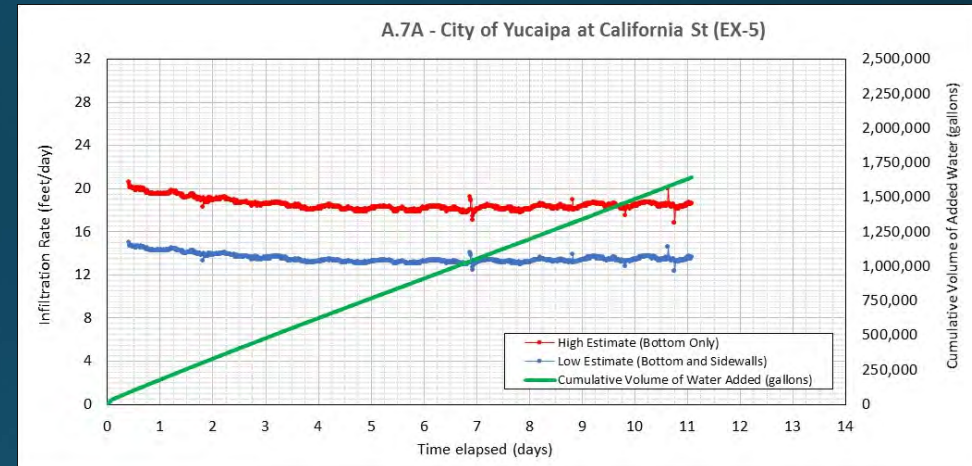
Rate: 2.4 – 3.1 ft/d (falling-head)



South of Yucaipa Creek at California Street (EX-5)

Rate: 13.6 – 18.5 ft/d (constant-head)

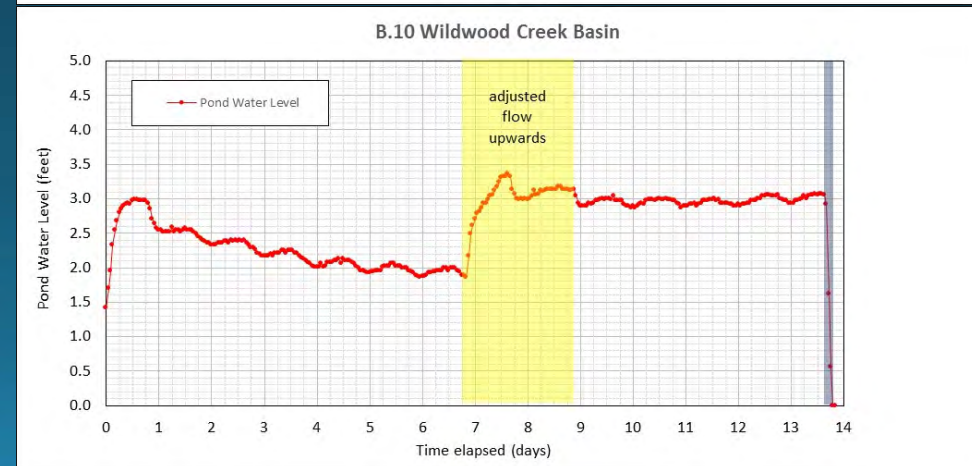
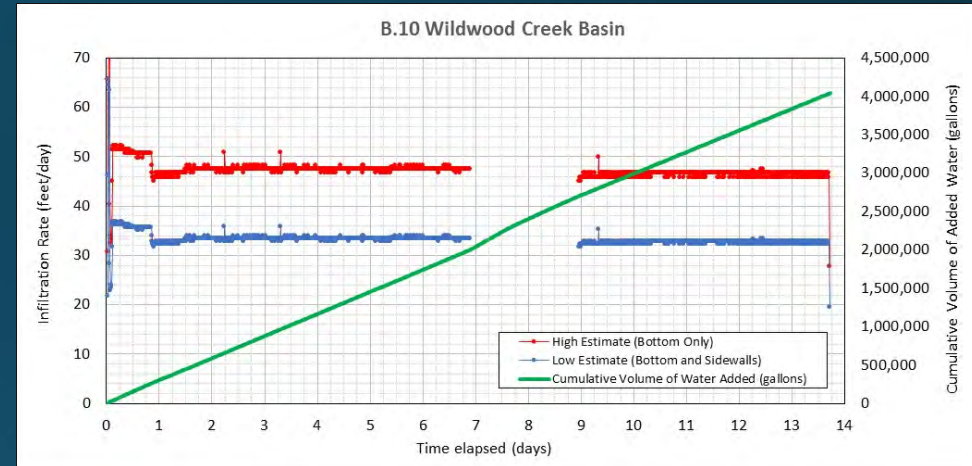
Rate: 14.5 – 16.8 ft/d (falling-head)



Wildwood Creek Basins (EX-4)

Rate: 32.2 – 45.8 ft/d (constant-head)

Rate: 28.3 – 31.2 (falling-head)



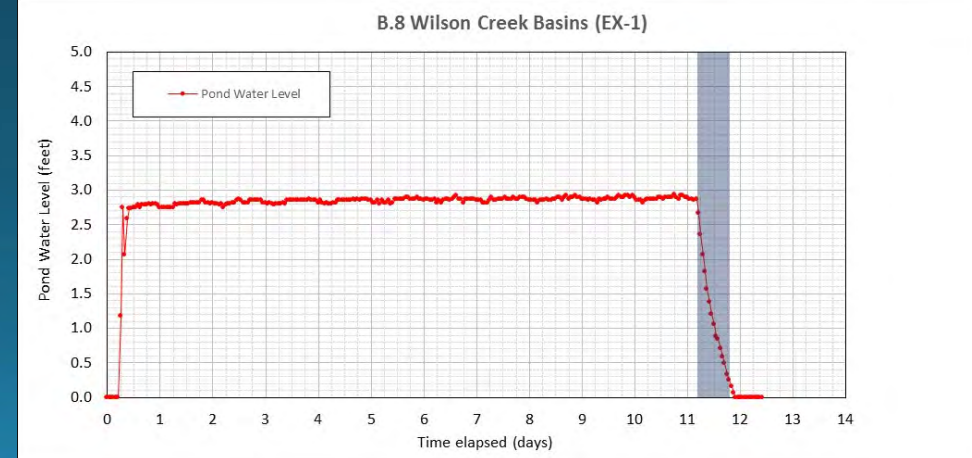
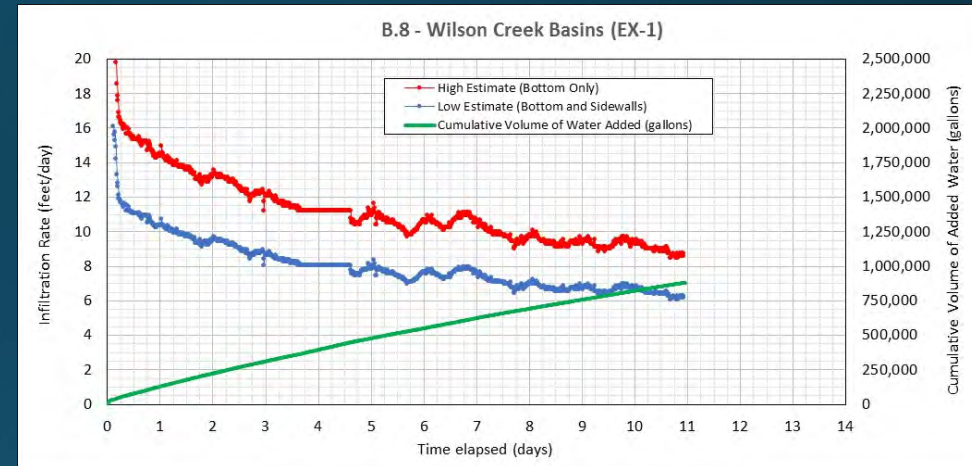
Summary of Calimesa Sites

- Favorable Sites
 - South of Yucaipa Creek at California Street
 - Wildwood Creek Basins (South Mesa Barrier)
- Unfavorable Sites
 - Yucaipa Creek at California Street (Fine channel sediments below ~10-12')

Wilson Creek Basins (EX-1)

Rate: 6.1 – 8.7 ft/d (constant-head)

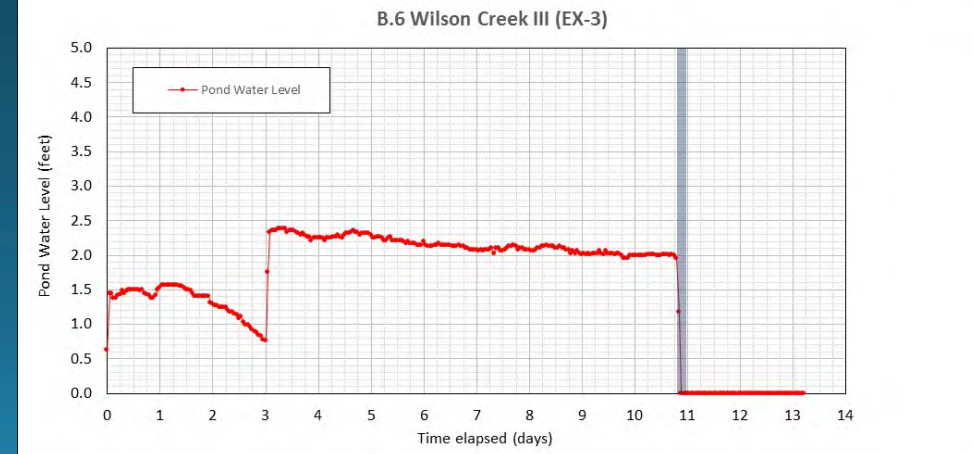
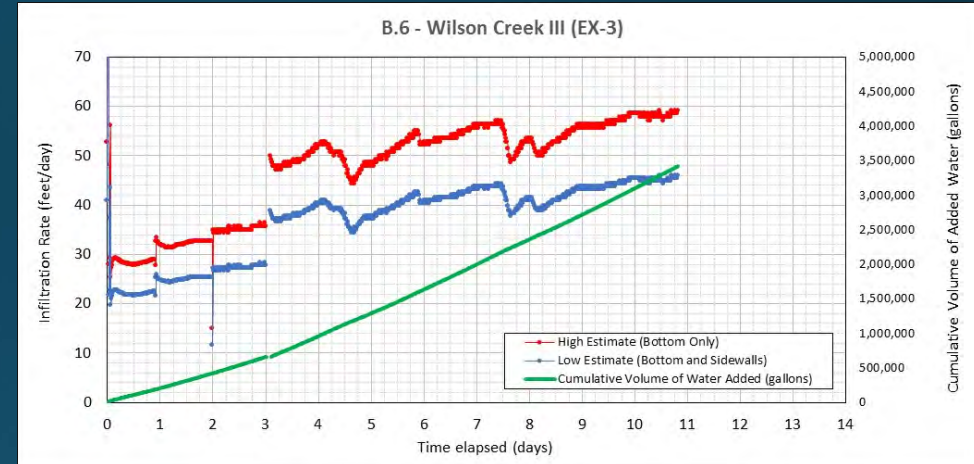
Rate: 5.5 – 7.4 ft/d (falling-head)



Wilson Creek III (EX-3)

Rate: 44.8 – 59.2 ft/d (constant-head)

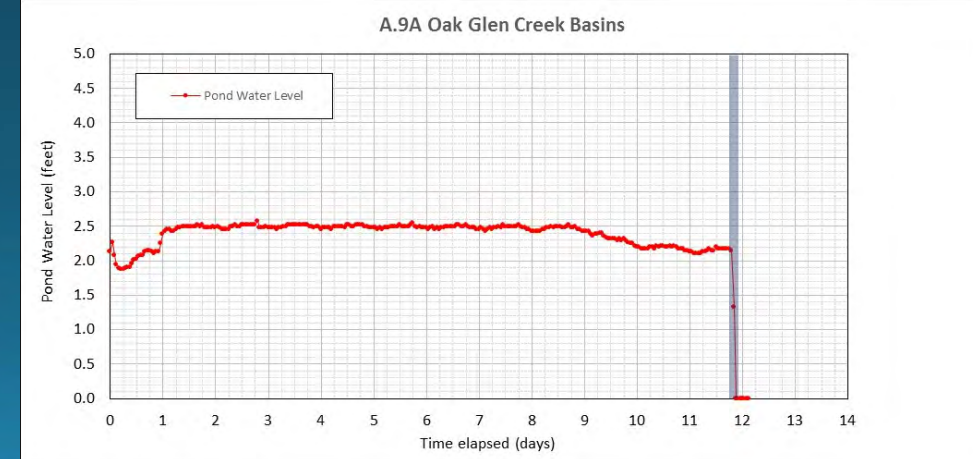
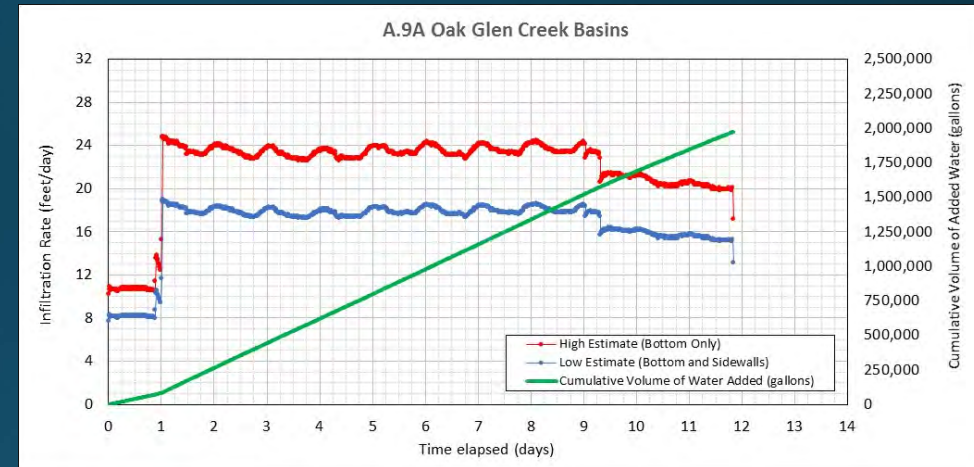
Rate: Not Measurable (falling-head)



Oak Glen Creek Basins (EX-2) - Excavated

Rate: 17.9 – 24.1 ft/d (constant-head)

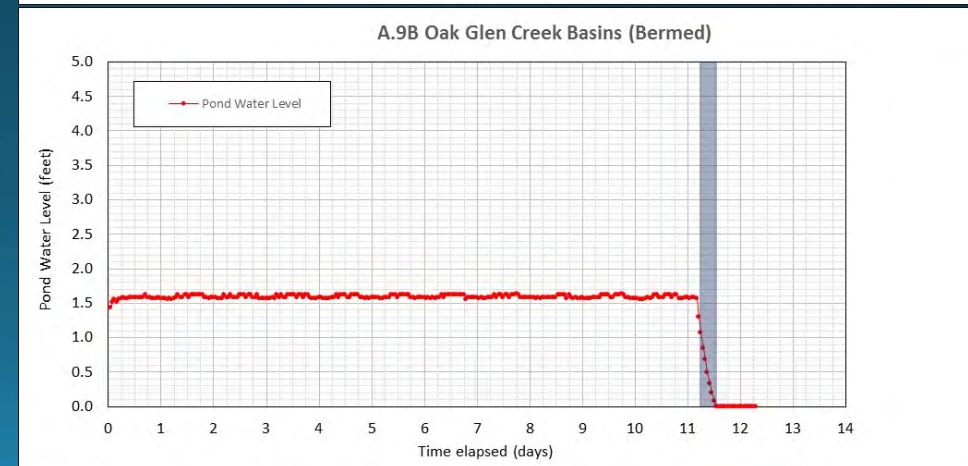
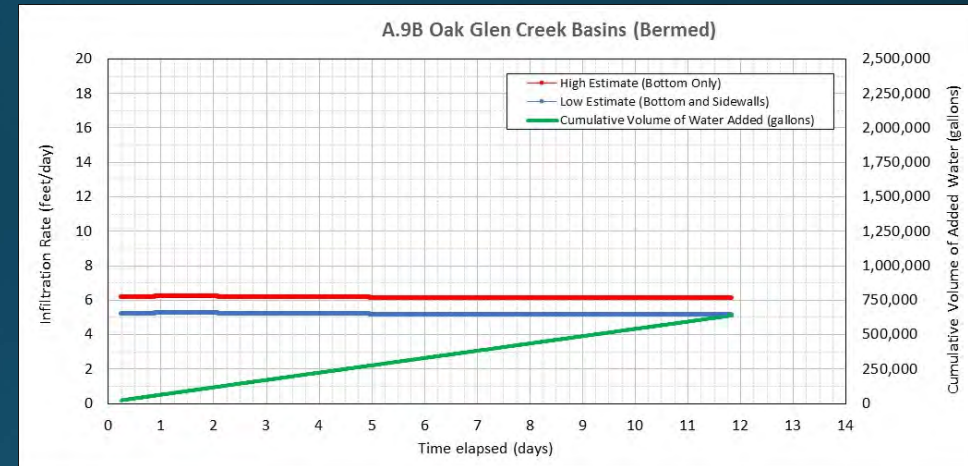
Rate: 19.7 (falling-head)



Oak Glen Creek Basins (EX-2) - Bermed

Rate: 5.2 – 6.1 ft/d (constant-head)

Rate: 5.2 – 6.6 (falling-head)



Summary of Gateway Sites

- Favorable Sites
 - Wilson Creek Basins (perching condition at 30-40 feet)
 - Oak Glen Creek Basins
 - Wilson Creek III
- Demonstrated feasibility and benefits at
 - Wilson Creek Basins
 - Oak Glen Creek Basins
 - (Need to remove upper 2-3 feet of material)



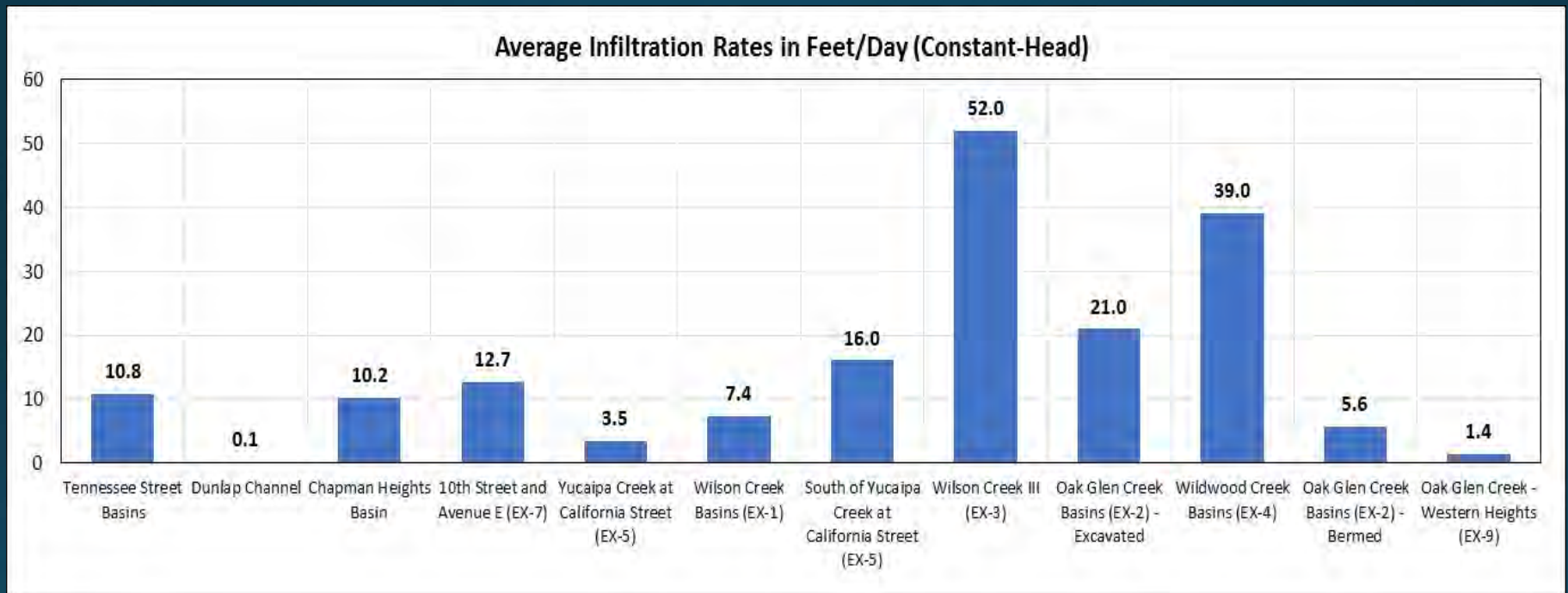
Considerations for Recharge Feasibility

- Favorable sites can accommodate planned basin recharge (3,500 AFY)
- Potential size of full-scale recharge project at undeveloped sites?
- Available vadose zone storage capacity?
 - Depth to water generally sufficient at most sites (200-250 feet)
 - Wildwood Creek Basins – ~100' (long-term effect of South Mesa Barrier?)
- Distance to SWP Pipeline
- Groundwater storage benefits over time
- Operations and maintenance

Questions



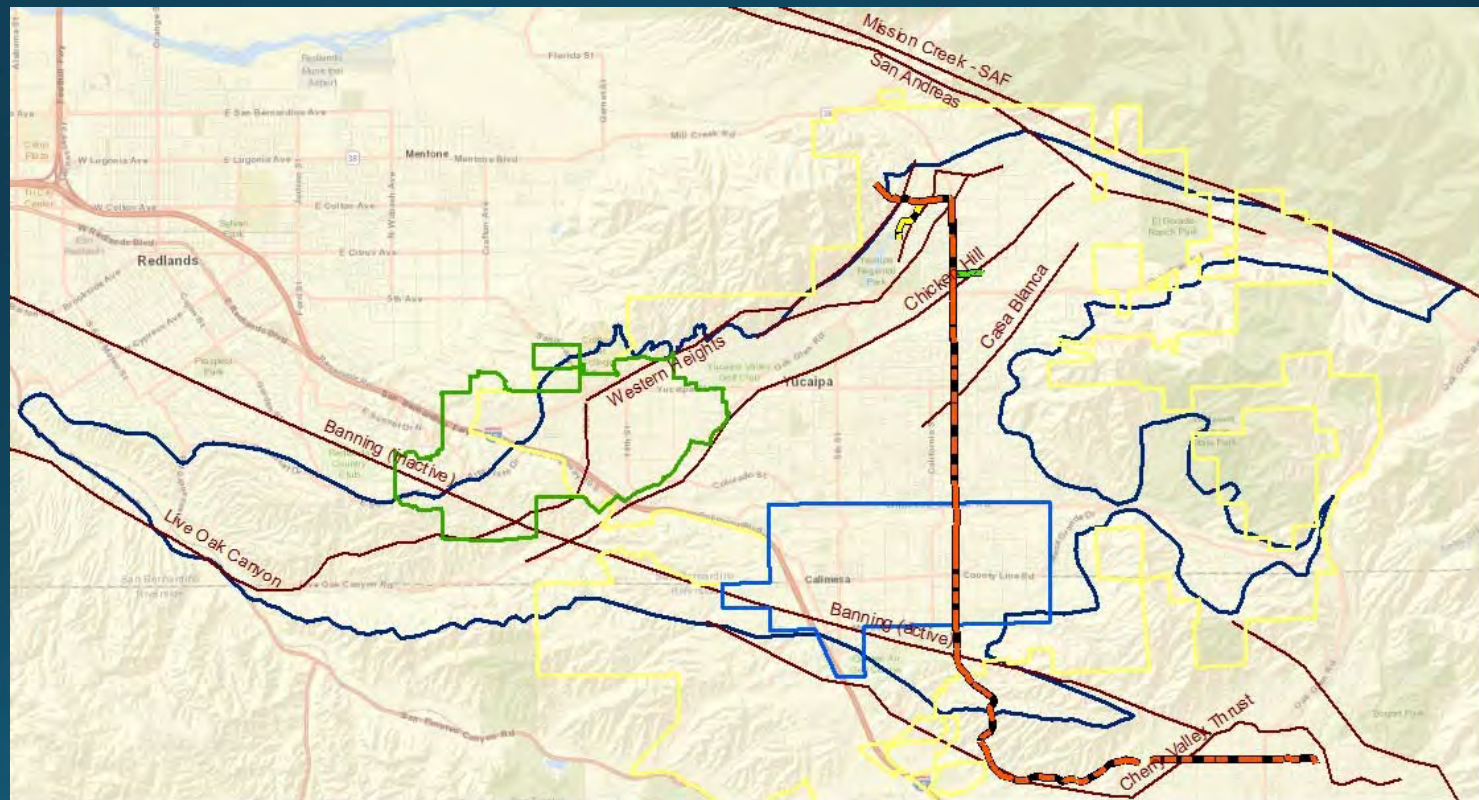
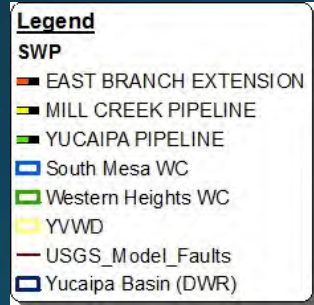
Test Sites



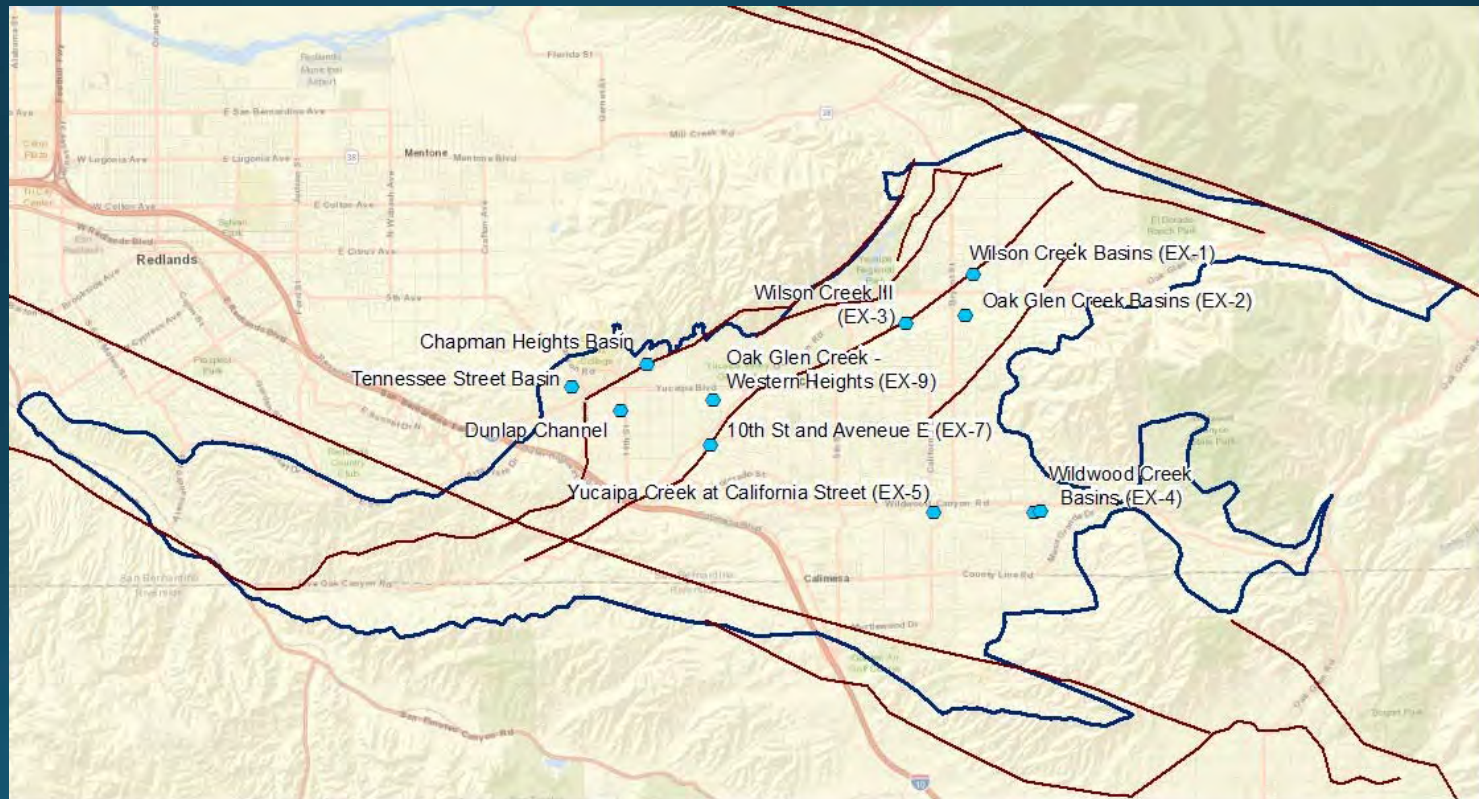
Test Sites

Test Site	Test Start	Test End	Basin Dimensions			Infiltrating Area		Total Water Added Gallons	Infiltration Rate (Constant-Head)				Infiltration Rate (Falling-Head)	
			Length (ft)	Width (ft)	Water Height (ft)	Basin Bottom (ft ²)	Bottom + Walls (ft ²)		Low ^a	High ^b	Average	Trend	Low	High
Tennessee Street Basins	7/9/2018	7/23/2018	32	30	2.5	960	1,270	871,782	9.2	12.3	10.8	Rising	9.5	11.1
Dunlap Channel	7/16/2018	7/30/2018	33	30	2.5	990	1,305	22,895	0.1	0.1	0.1	Flat	0.2	0.2
Chapman Heights Basin	7/23/2018	8/6/2018	37	33	2.5	1,221	1,571	974,084	8.8	11.5	10.2	Rising	7.3	9.5
10th Street and Avenue E (EX-7)	7/30/2018	8/13/2018	39	36	2.1	1,404	1,719	1,451,335	12.0	13.4	12.7	Rising	9.8	11.5
Yucaipa Creek at California Street (EX-5)	8/6/2018	8/20/2018	42	21	2.5	882	1,197	270,060	2.9	4.0	3.5	Flat	2.4	3.1
Wilson Creek Basins (EX-1)	8/13/2018	8/27/2018	32	29	3.0	928	1,294	882,120	6.1	8.7	7.4	Falling	5.5	7.4
South of Yucaipa Creek at California Street (EX-5)	8/20/2018	9/3/2018	33	32	3.0	1,056	1,446	1,646,180	13.6	18.5	16.0	Flat	14.5	16.8
Wilson Creek III (EX-3)	8/27/2018	9/10/2018	45	20	2.0	900	1,160	3,426,110	44.8	59.2	52.0	Rising	N/A; too fast	
Oak Glen Creek Basins (EX-2) - Excavated	9/3/2018	9/17/2018	32	32	2.5	1,024	1,344	1,974,600	17.9	24.1	21.0	Flat	19.7	19.7
Wildwood Creek Basins (EX-4)	9/10/2018	9/24/2018	29	28	3.0	812	1,154	4,040,929	32.2	45.8	39.0	Flat	28.3	31.2
Oak Glen Creek Basins (EX-2) - Bermed	9/17/2018	10/1/2018	34	34	1.6	1,156	1,374	639,130	5.2	6.1	5.6	Flat	5.2	6.6
Oak Glen Creek - Western Heights (EX-9)	9/24/2018	10/1/2018	46	20	2.0	920	1,184	50,632	1.2	1.6	1.4	Flat	1.5	1.6

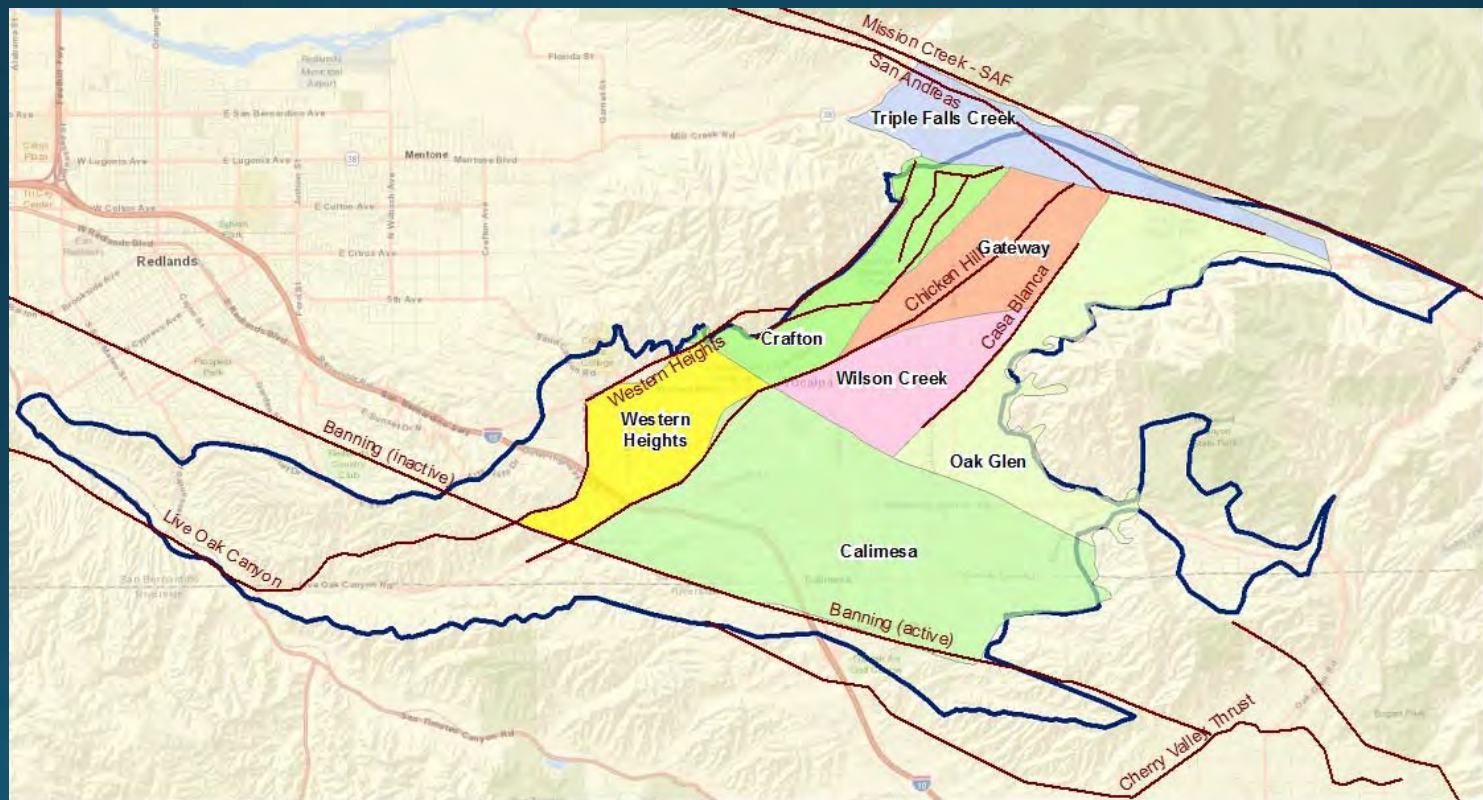
Service areas and SWP Pipeline



Recharge test sites



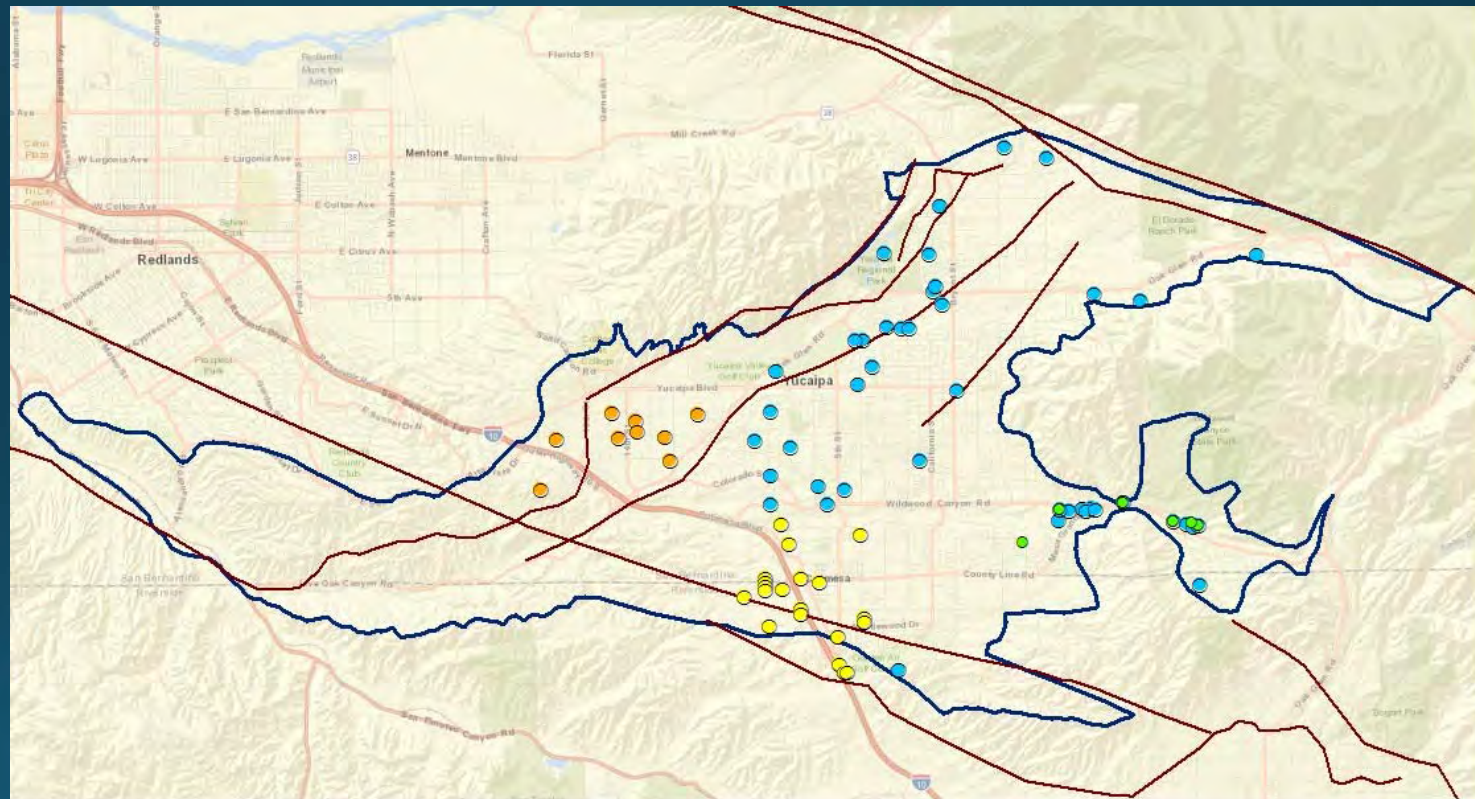
Subareas



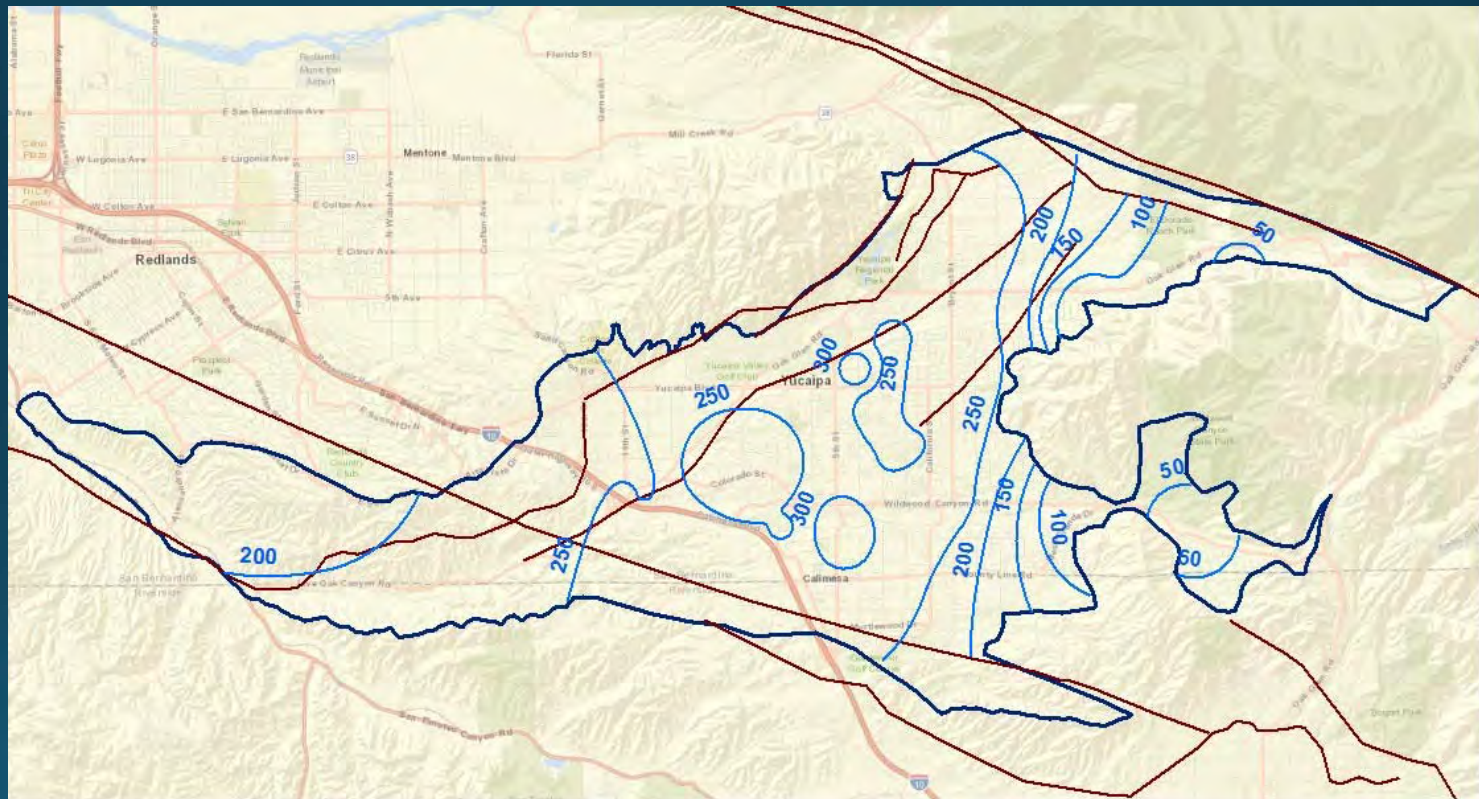
Faults



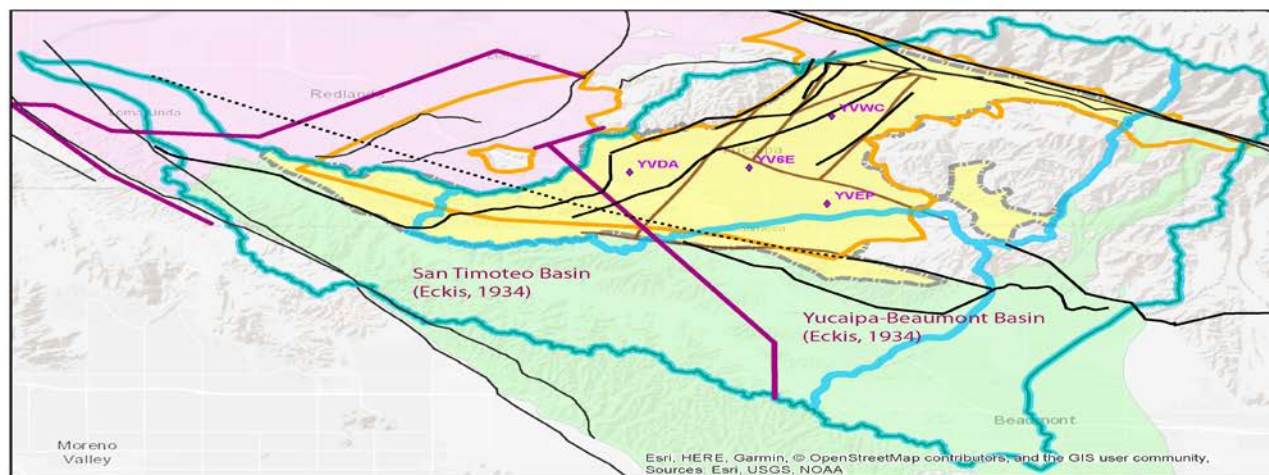
Production Wells



Depth to water 2016



United States Geological Survey Yucaipa Subbasin Cooperative Program



Legend

- ◆ USGS Wells
- Yucaipa Subbasin (CADWR, 2016)
- Study Area - Yucaipa Area Watershed
- Yucaipa Groundwater Divide (Eckis, 1934)
- Yucaipa Subbasin (Burnham and Dutcher, 1960; CADWR, 2004)
- GW Flow Barriers (Moreland, 1970)
- Upper Santa Ana River Valley Sub-watersheds

Subbasin_N

- BUNKER HILL
- SAN TIMOTEO

YA_Masterfaults_5918

- ### Modelfault
- inactive
 - no
 - yes

•This information is preliminary and is subject to revision. It is being provided to meet the need for timely best science. The information is provided on the condition that neither the U.S. Geological Survey nor the U.S. Government shall be held liable for any damages resulting from the authorized or unauthorized use of the information."

Scope of Presentation

- Background
- Multiple-well monitoring sites
- Water-Quality Analysis
 - Local studies
- Possible concerns
- Yucaipa Groundwater Subbasin model
- Questions

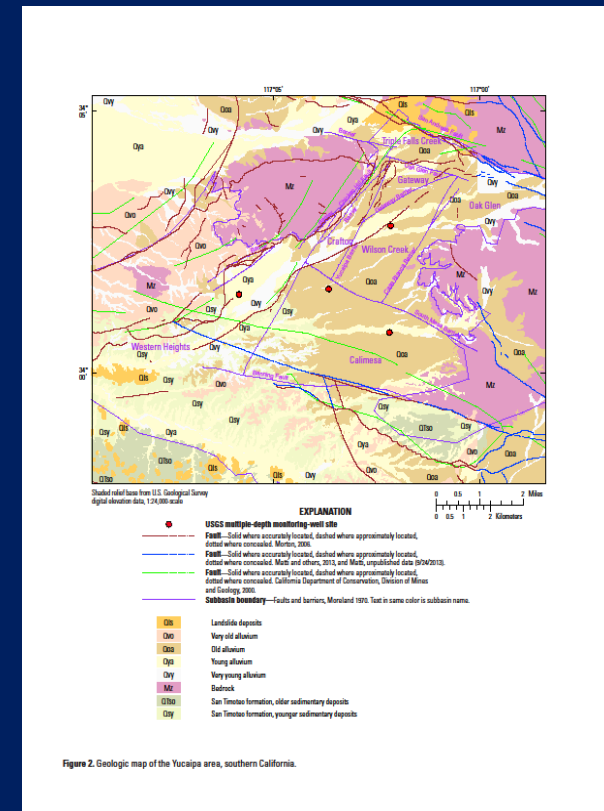
"Preliminary Information-Subject to Revision. Not for Citation or Distribution."

Background

- USGS started work in Yucaipa Subbasin, 1996
- Installed 4 multiple-well monitoring sites
- Completed several water-quality studies
- Completed gravity study to quantify valley alluvial deposits, 2009
- Completed recharge study in Wilson Creek area 2008-2016
- Started Geologic framework model in 2014
- Started Yucaipa Subbasin Groundwater flow model in 2015 and planned completion in 2019

Multiple-well monitoring site

- All data can be found on Yucaipa project web page at
 - <https://ca.water.usgs.gov/yucaipa/>
- Installed 4 multiple-well monitoring sites in different areas
 - YVEP; drilled 1998 (Calimesa)
 - YVWC; drilled 2001 (Wilson Creek)
 - YV6E; drilled 2003 (Calimesa)
 - YVDA; drilled 2004 (Western Heights)



Water-quality Analysis

- Collected 132 samples from 4 USGS multiple-well monitoring sites
- Collected 402 samples from about 80 local supply and monitoring wells
- Data used for several local studies

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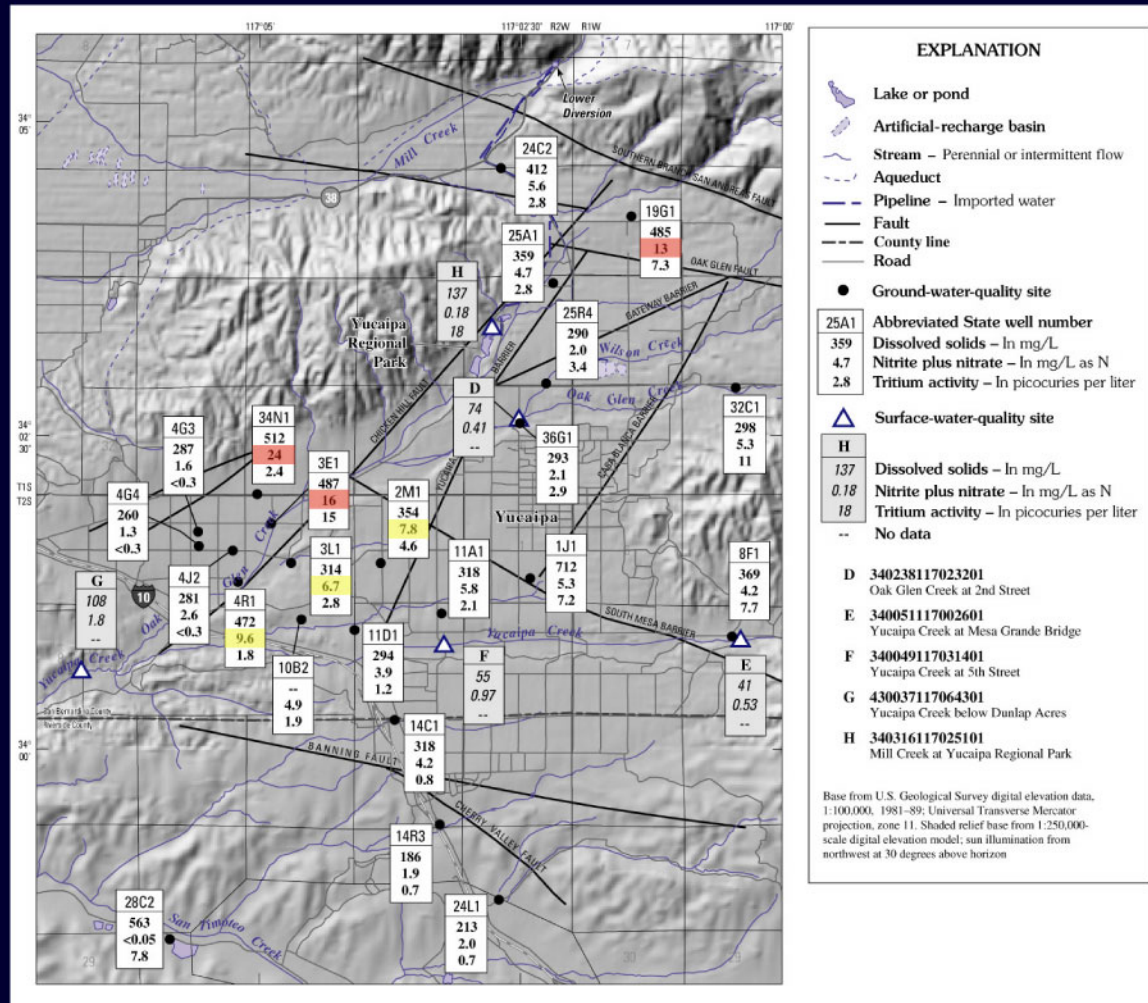


Local Studies

SW and GW Quality

- Collected areal QW samples from 3 creeks and 25 wells from 1996 to 1998
- Analyzed for nitrate, cations and ions, trace metals, stable isotopes, and age dating
- Identify water types using stiff diagrams and trilinear plots – calcium bicarbonate type
- Data collected was used to identify water-quality on a basin scale

Areal survey detects high nitrate



Explanation

Nitrate/Nitrite as Nitrogen

- > 10 mg/L
- > 6 mg/L

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Local Studies- cont.

Nitrate Study

- Collected surface discharge samples at 18 wells
- Collected depth-dependent samples from 11 wells to create nitrate profile
- Determine highest nitrate occurs near the water table likely coming from surface infiltration

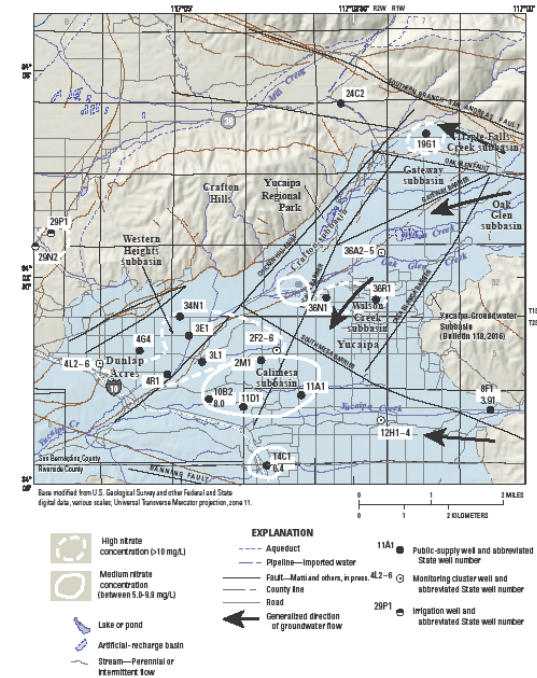


Figure 2. Well and nitrate plume location



Local Studies- cont.

Gravity Study

- Collected measurements at 256 locations with profiles totaling 65 miles to define the alluvial fill of the subbasin
- Create fly-by video of the subbasin floor or basement bedrock elevation

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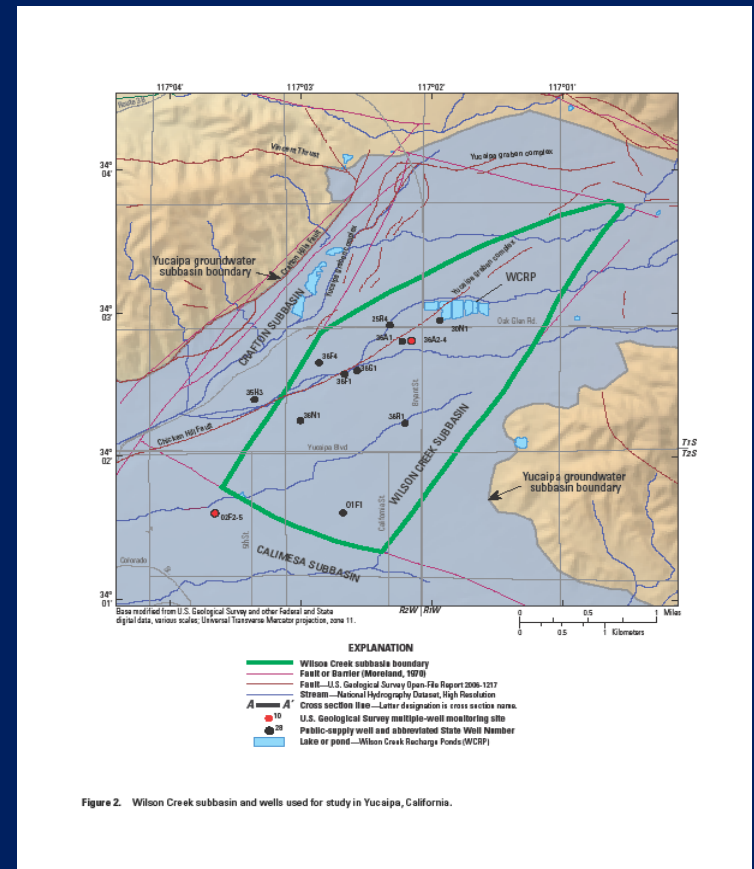
Local Studies- cont.

Wilson Creek Recharge Study

- Collected QW samples from 18 wells and imported recharge water
- Analyzed for chloride, bromide, and stable isotopes
- 5 wells closest to the WCSP can have 100 % imported water coming from their well

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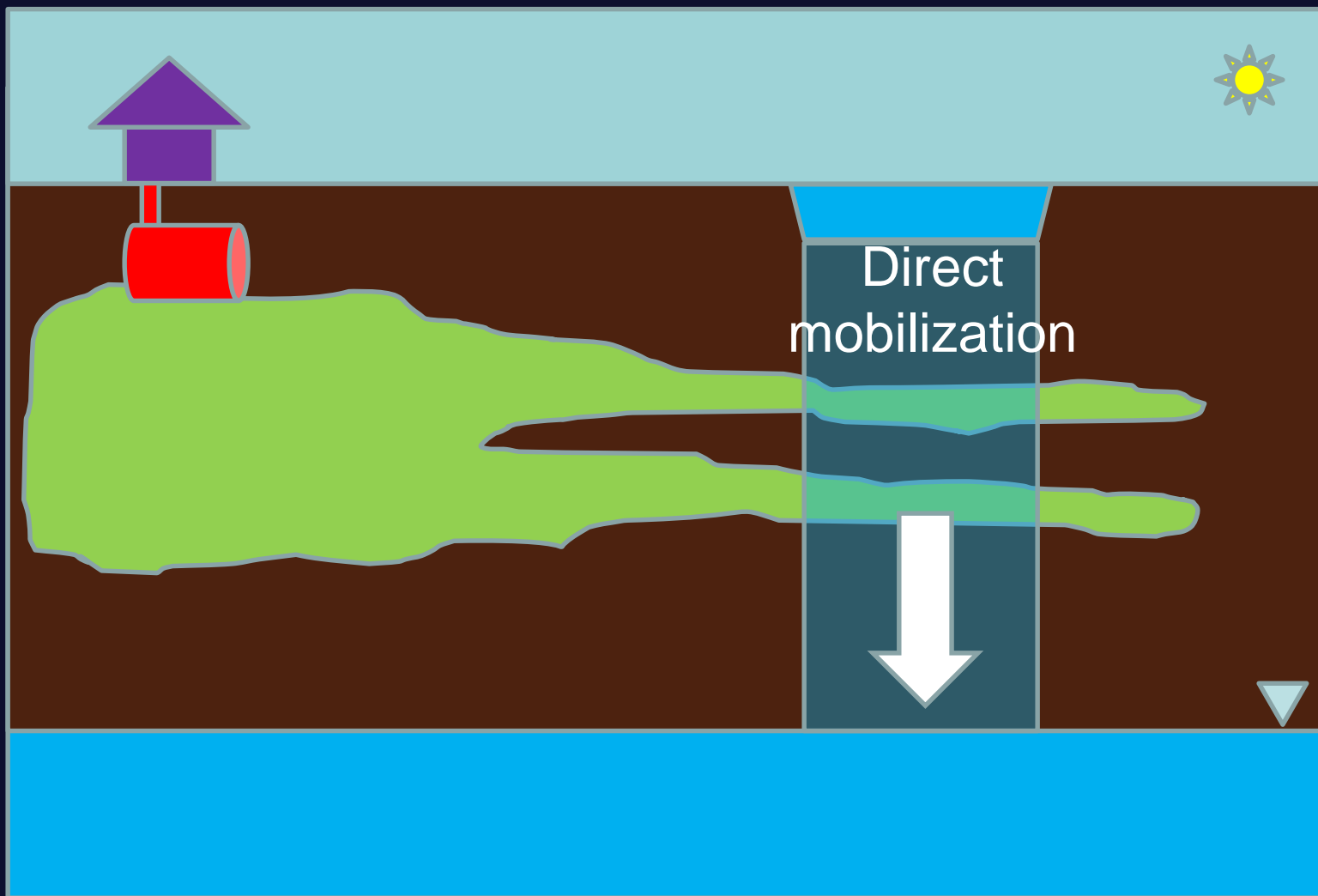
% Recharge in Well 53 Using deuterium isotope



Possible concerns

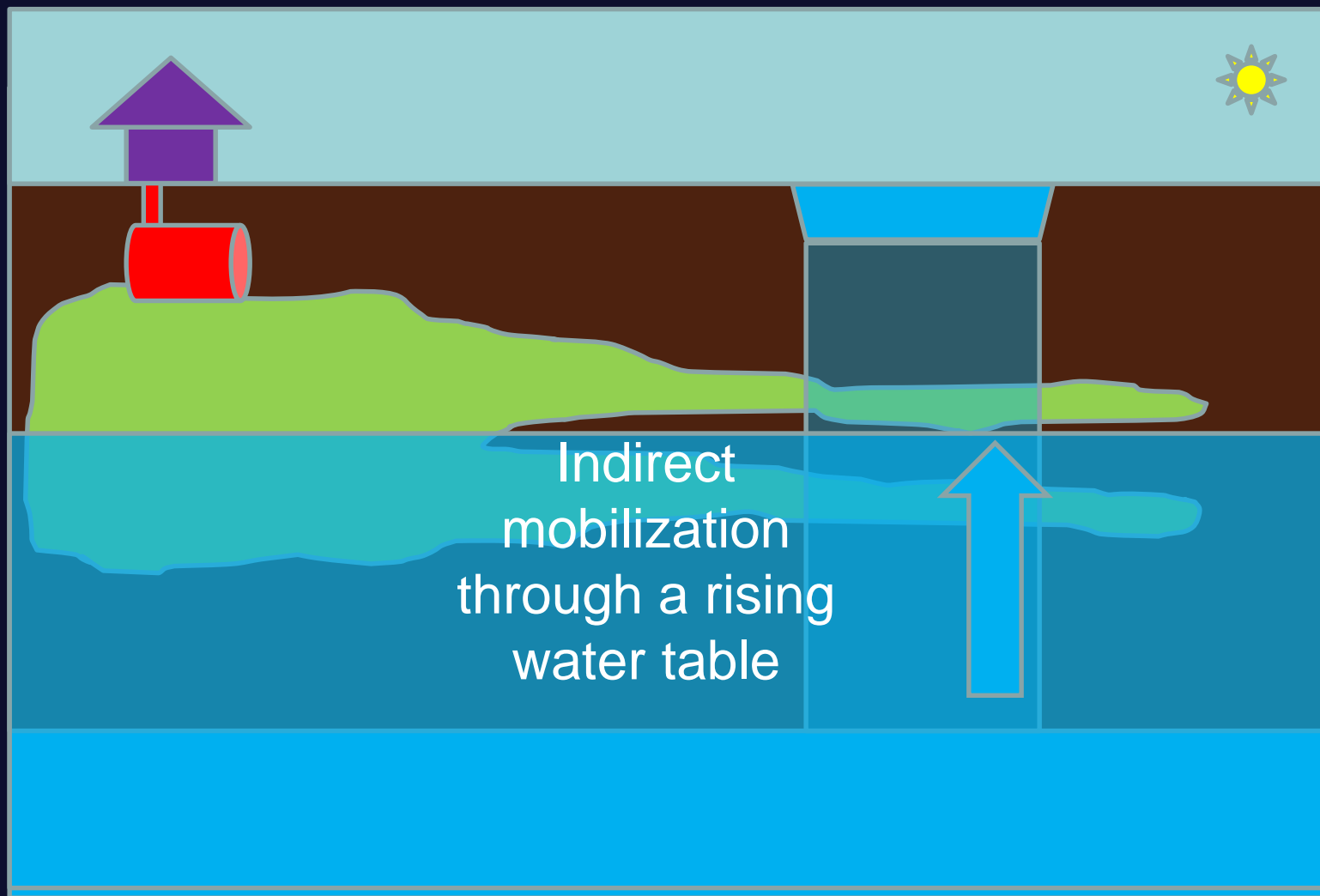
- Where is the recharge to Western Heights subbasin coming from?
- Surface water flow in the Subbasin
 - Need verifiable surfacewater flow in and out of the Yucaipa Subbasin
- Nitrate mobilization
 - Due to surface recharge

Artificial recharge through thick unsaturated zones



ers, 2013

Artificial recharge through thick unsaturated zones



Yucaipa Groundwater Flow Model

- Provides a quantitative tool to manage the groundwater resources in the Yucaipa Subbasin and to identify future mitigating issues
- Completion date - 2019
 - USGS will present model in January 2019

Published Reports

Link from the Yucaipa Project web page to all reports and data at <https://ca.water.usgs.gov/yucaipa/>

Surface and groundwater Quality in the Yucaipa area

<https://pubs.usgs.gov/wri/wri004269/>

Geologic structure of the Yucaipa area inferred from gravity data

<https://pubs.er.usgs.gov/publication/ofr20161127>



Prepared in cooperation with the San Bernardino Valley Municipal Water District

Geologic, Hydrologic, and Water-Quality Data From Multiple-Well Monitoring Sites in the Bunker Hill and Yucaipa Groundwater Subbasins, San Bernardino County, California, 1974–2016



Data Series 1096

U.S. Department of the Interior
U.S. Geological Survey



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Reports in progress

- Tracking artificial recharge using chloride/bromide ratios and stable isotopes in the Wilson Creek subbasin.
- Stratigraphy and hydrogeology of the Yucaipa groundwater subbasin as defined in a three-dimensional geologic framework model
- Integrated groundwater flow model and analysis of water availability in Yucaipa

Questions?