CUYAMA BASIN GROUNDWATER SUSTAINABILITY AGENCY

STANDING ADVISORY COMMITTEE

Committee Members

Roberta Jaffe (Chair)
Brenton Kelly (Vice Chair)
Claudia Alvarado
Brad DeBranch
Louise Draucker
Jake Furstenfeld
Joe Haslett
Mike Post
Hilda Leticia Valenzuela

AGENDA

August 30, 2018

Agenda for a meeting of the Cuyama Basin Groundwater Sustainability Agency Standing Advisory Committee to be held on Thursday, August 30, 2018 at 4:00 PM, at the Cuyama Valley Family Resource Center, 4689 CA-166, New Cuyama, CA 93254. To hear the session live, call (888) 222-0475, code: 6375195#.

Teleconference Locations:

Cuyama Valley Family Resource Center
4689 CA-166
New Cuyama, CA 93254

7870 Fairchild Ave
Winnetka, CA 91306

The order in which agenda items are discussed to accommodate scheduling or other needs of the Committee, the public or meeting participants. Members of the public are encouraged to arrive at the commencement of the meeting to ensure that they are present for Committee discussion of all items in which they are interested.

In compliance with the Americans with Disabilities Act, if you need disability-related modifications or accommodations, including auxiliary aids or services, to participate in this meeting, please contact Taylor Blakslee at (661) 477-3385 by 4:00 p.m. on the Friday prior to this meeting. Agenda backup information and any public records provided to the Committee after the posting of the agenda for this meeting will be available for public review at 4689 CA-166, New Cuyama, CA 93254. The Cuyama Basin Groundwater Sustainability Agency reserves the right to limit each speaker to three (3) minutes per subject or topic.

1. Call to Order
2. Roll Call
3. Pledge of Allegiance
4. Approval of Minutes
5. Report of the General Counsel
6. Discussion of Special Session for Public Review
7. Groundwater Sustainability Agency
    a. Report of the Executive Director
        i. Groundwater Sustainability Plan Section Development Strategy and Responsibility
    b. SGMA Educational Items:
        i. How a Model Works – Current and Future Conditions

ii. Management Actions & Projects

c. Board of Directors Agenda Review

8. Groundwater Sustainability Plan

a. Groundwater Sustainability Plan Update

b. Technical Forum Update

c. Hydrogeologic Conceptual Model Update

d. Groundwater Conditions

e. Monitoring Networks

f. Stakeholder Engagement Update

9. Items for Upcoming Sessions

10. Committee Forum

11. Public comment for items not on the Agenda

At this time, the public may address the Committee on any item not appearing on the agenda that is within the subject matter jurisdiction of the Committee. Persons wishing to address the Committee should fill out a comment card and submit it to the Executive Director prior to the meeting.

12. Adjourn

Cuyama Basin Groundwater Sustainability Agency Standing Advisory Committee Meeting

July 26, 2018

Draft Meetings Minutes

Cuyama Valley Family Resource Center, 4689 CA-166, New Cuyama, CA 93254

PRESENT:
Jaffe, Roberta – Chair
Kelly, Brenton – Vice Chair
Alvarado, Claudia
DeBranch, Brad
Draucker, Louise
Furstenfeld, Jake
Haslett, Joe
Post, Mike
Valenzuela, Hilda Leticia
Beck, Jim – Executive Director
Hughes, Joe – Legal Counsel

ABSENT:
None

1. **Call to order**
   Chair Roberta Jaffe called the Standing Advisory Committee (SAC) to order at 4:05 pm.

2. **Roll call**
   Hallmark Group Project Coordinator Taylor Blakslee called roll of the Committee (shown above).

3. **Pledge of Allegiance**
   The pledge of allegiance was led by Chair Jaffe.

4. **Approval of minutes**
   Cuyama Basin Groundwater Sustainability Agency (CBGSA) Executive Director Jim Beck presented the May 31, 2018 SAC minutes. Minor editorial changes were suggested and a motion was made by Vice Chair Brenton Kelly to approve the minutes and seconded by Committee Member Louise Draucker. The motion passed unanimously.

5. **Report of the General Counsel**
   Nothing to report.

6. **Discussion of Study Group Options**
   Chair Jaffe discussed the concept of forming a study group to review the Groundwater Sustainability Plan sections that are being developed by GSP technical consultant Woodard & Curran.

Mr. Beck reminded the SAC that they are a public entity and thus have to comply with the Brown Act, and cautioned that holding an informal review meeting may violate the Brown Act. He stated that the administration of an additional monthly meeting was not budgeted. Mr. Beck suggested the SAC to approach the Board of Directors for approval on the addition of study groups, or expand the monthly SAC meeting and handle the document review there.

Legal Counsel Joe Hughes commented that it is a question of risk and what the CBGSA is overall comfortable with. Mr. Hughes said what commonly occurs is a committee will get off topic and then eventually the committee is attempting to get something done outside of the context of a public meeting, and one purpose of having the Hallmark Group and Klein present at meetings is to provide a sideboard to keep the Committee on topic. Mr. Hughes said that the implementation of study groups would ultimately be the Board's decision and that it is a matter of doing the study groups appropriately and that no one inadvertently violates the Brown Act.

Committee member Joe Haslett said that he believes that study groups are a good idea and recommended at the next workshop there be a breakout workshop to review specific elements of the GSP. Chair Jaffe said that is where the idea of the study groups came from with the intention of needing to review a number of critical documents being released pertaining to the GSP.

Committee member Jake Furstenfeld said he can see the pros and cons of having study groups, but could occasionally use help in understanding certain sections of the GSP. He mentioned that the Committee members do obtain some additional information with the presentation of the SAC educational topics at the SAC meetings.

Committee member Claudia Alvarado said she thinks it would be very helpful to have the study groups to assist in providing accurate translation of the GSP sections.

Committee member Draucker mentioned that a short break between long sessions could be a good idea to allow time for committee members to ask for clarification on the GSP documents in a more relaxed environment.

Vice Chair Kelly said having a separate meeting structured in a way that is quite clear that no action is taking place would be ideal in order to discuss some of these critical GSP items at a lower level. Vice Chair Kelly mentioned that the Brown Act is incredibly important for public transparency and should allow for the facilitation of another discussion to further the educational aspect.

Local resident Sue Blackshear said the Brown Act was not intended to muzzle people and as long as the Committee is following certain agenda items and the public is informed, it should not be a problem. Ms. Blackshear stated that expanding the length of workshops might provide clarity on GSP sections, however that additional time will be billed by the consultants.

Family Resource Center Executive Director Lynn Carlisle said study groups would be a good idea because it is very important to understand the GSP documents that are coming out and she feels like the additional outreach will strengthen the GSP by allowing stakeholders and committee members time to ask questions.

Resident Ann Myhre said that she can see the value of reviewing the documents in a group setting, particularly because most of the residents are novices regarding technical topics.

Committee member Hilda Leticia Valenzuela said the implementation of study groups would be a good idea to help the Hispanic community in understanding the GSP concepts. She also believes study groups would be a great thing to bring back to the community.

Committee member Haslett mentioned that the committee members that do not live in the area full time may be at a disadvantage because it would require an additional trip and some members would not be able to attend. Mr. Haslett noted that it would be better to have an item on the SAC agenda where questions regarding GSP sections can be addressed.

Ms. Blackshear asked what the anticipated length of the study group time is because it might be problematic to extend the SAC meeting.

Committee member Mike Post asked Mr. Hughes to set the minimum parameters for forming a study group. Mr. Post mentioned that people meeting and forming consensus was the reason for the initiation of the Brown Act. He asked how the study groups avoid breaching Brown Act violations. Mr. Hughes replied that it is not a matter of getting around the Brown Act, it is a matter of migrating off the topic and reaching some consensus offline. He stated that the SAC would have to agendize the meeting and address it as it would be an additional SAC meeting. Mr. Hughes mentioned that the agenda item would need to be specific.

Ms. Wooster mentioned that the idea of study groups is a result of how meetings have been agendized. She stated that the agendas have allotted times per topic, and there needs to be enough time to hold these discussions so the SAC and Board do not feel as though they have to be rushed through consensus.

Chair Jaffe said the SAC will table this item for now but is personally an advocate for the study groups. She asked if the SAC could form an Ad hoc committee to develop a proposal. Mr. Hughes confirmed this approach, and Chair Jaffe appointed SAC committee members Louise Draucker, Jake Furstenfeld, Claudia Alvarado, and Vice Chair Brenton Kelly to an Ad hoc to explore the idea of study groups and report back at the next SAC meeting on August 30, 2018.

7. Groundwater Sustainability Agency

a. Report of the Executive Director
Nothing to report.

b. SGMA Educational Items: Calculating a Water Budget and How a Model Works – Historical Calibration
Mr. Beck applauded the level of interest Cuyama residents have taken in Sustainable Groundwater Management Act (SGMA) issues, especially regarding educational topics. He mentioned that he has worked on water issues for over 32 years and reported that this group is more engaged than many he has encountered. He did clarify, however, that the goal of the educational topics is not to make the committee members and stakeholders experts, but for the committee members to receive sufficient information to make informed decisions.

GSP Consultant Woodard & Curran Project Manager Brian Van Lienden provided an update on the educational items entitled "Calculating a Water Budget" and "How a Model Works – Historical Calibration."

Chair Jaffe asked if the water budget informs the model or vice versa. Mr. Van Lienden replied that the Hydrogeologic Conceptual Model (HCM) is a qualitative representation of what the water budget looks like for the Cuyama Basin and accounts for how water moves in the Basin. The information obtained from the water budget is utilized to develop the model, and the model is what produces the water reporting for SGMA.

Committee Member Hilda Leticia Valenzuela left at 4:53 p.m.

Ms. Carlisle asked where the water budgets for the ten recent years will be coming from and when will they will be available. Mr. Van Lienden said the water budgets will be developed by the numerical model and the initial results are anticipated to be available at the September 5, 2018 Workshop meeting. Ms. Carlisle asked if the budget must take climate change into account for SGMA regulations, and Mr. Van Lienden confirmed that it will.

Committee member Haslett asked if the last ten years considers the different precipitation amounts from various part of the region and Mr. Van Lienden confirmed that they will.

Chair Jaffe asked if there will be a separation of the budgets being shown, and Mr. Van Lienden confirmed that there will be. Mr. Van Lienden noted that they will report for different parts of the basin.

Vice Chair Kelly asked how a yearly water budget will be presented. Mr. Van Lienden replied the yearly water budget will report groundwater, surface water, and land surface elements to provide a mass balance.

Ms. Wooster asked how big of an area will be reported on. Mr. Van Lienden said they will report potentially on four areas. Mr. Beck reminded the SAC that the Board will determine this number.

CBGSA Board Director Byron Albano asked if each grid in the model has a water balance and Mr. Van Lienden confirmed that they do.

Ms. Carlisle asked what the typical range on the regional scale is based on. Mr. Van Lienden said it is based on an irrigation efficiency. Chair Jaffe asked if this is a standard range, or specific to Cuyama Valley. Mr. Van Lienden stated that it is a generic range, but the number will be updated in the model to be specific for Cuyama. CBGSA Board Director George Cappello said the newer farming equipment has a higher efficiency in the 90th percentile.

Mr. Albano asked if the key number will be irrigation demand or consumption of water.
Mr. Van Lienden said consumption will be key and Woodard & Curran staff Ali Taghavi mentioned that the consumption of applied water is the numerator in the equation that is calculated, but eventually the demand will be critical in determining pumping.

Resident Karen Adams asked if there will ever be a number on all the wells detailing what is being pumped or will it be estimates. Mr. Beck said that decision will be made as the implementation plan is developed. There are several ways to calculate future use, one way being satellite imagery like evapotranspiration (ET). The California Department of Water Resources (DWR) said that they will accept pump meters and satellite imagery that can calibrate appropriately. If pumping meters are used, they will need to be installed during the implementation period starting in 2020.

Vice Chair Kelly asked in regards to irrigation efficiency factors during the calibration period, can you truth these components, and will these factors have a range or will you come out and check. Mr. Van Lienden said they will mostly rely on communication with the people who manage the systems but will check some of these components.

Committee member Haslett asked how permanent crops are accounted for if they only require irrigation for a short period of time in the calendar year. Mr. Van Lienden replied that W&C has representation from each of the individual crops and land use data for the irrigation calendar to be set appropriately. Mr. Taghavi said satellite imagery and ET are used for values to train the model and then they can use the model to simulate any kind of changes to future conditions.

Ms. Carlisle asked if in five years from now, if the GSP is not being achieved, how precise is the data to point out where we are missing the mark and can it be pinpointed to the 40-acre grid. Mr. Taghavi said the actual ET modeling is on a 30 meter by 30-meter pixel, therefore the cropping pattern should be fairly visible and accurate.

CBGSA Board Director Albano asked if the satellite imagery will distinguish between a full canopy apple tree versus a dwarfing under-irrigated tree in terms of transpiration. Mr. Taghavi said the satellite imagery does have certain contrasts in terms of ET values in the different irrigation methods, but these ET values do not tie-in to the specific irrigation practices or crop age. Mr. Cappello confirmed that the satellite imaginary will not disclose the irrigation system or crop age. Mr. Van Lienden stated that ET will be further explained at the September 5th workshop.

Ms. Carlisle asked if the urban demand will estimate factors in the efficiency and age of the system and Mr. Van Lienden replied that it will.

Vice Chair Kelly asked about septic return and Mr. Van Lienden replied that W&C will need to account for this in the model and water budget.

CBGSA Board Alternate John Coates said the Cuyama Community Services District treated water used to percolate into the ground, but now they are using evaporation ponds unless it is used by Sunridge. He mentioned that they started this process this year. Additionally, he stated that water cannot go on food crops per the California State Water Resources Control Board (SWRCB).

Committee member Post said occasionally his well off highway 166 is used by firefighters to pump thousands of gallons of water to supply fire suppression systems. However, if the firefighters could not pump from the well, it would impact public safety. Mr. Post asked how does this factor into the model. Mr. Van Lienden said they would need to model this for material impacts to the basin, and this is a good example of the need for setting a minimum threshold. Mr. Post said this well is monitored quarterly by Santa Barbara County. Ms. Myhre commented that the firefighters are tapping water for fire suppression in areas that have abundant water. Mr. Van Lienden said that he will contact local fire fighters for more information on this.

Ms. Myhre said she has reviewed a calibration graph similar to the 1980-2013 model at her residency. She mentioned that while her groundwater level varies up to 55 feet, the cumulative deviation actually is 10 feet in the sustainable model.

Committee member Haslett asked how the groundwater model accounts for topography. Mr. Van Lienden said the model will show this.

Ms. Myhre said they GSP is a living document and needs to start somewhere. She spoke highly of Ali Taghavi and the W&C team.

c. Board of Directors Agenda Review
Mr. Beck provided an overview of the August 1, 2018 CBGSA Board of Directors agenda.

8. Groundwater Sustainability Plan

a. Groundwater Sustainability Plan Update
Mr. Van Lienden provided an update on GSP activities, which is included in the SAC packet.

Vice Chair Kelly asked when the SAC will see more regarding Opti (Data Management System software) and Mr. Van Lienden said in the next month or so.

b. Technical Forum Update
Mr. Van Lienden provided an overview of the July 13, 2018 technical forum call. A summary of the issues discussed is provided in the Board packet.

c. Current Basin Water Conditions
Mr. Van Lienden provided an overview of the Current Basin Water Conditions.

Grapevine Capital Ray Shady asked if the data from the 12 wells they provided will be included and Mr. Van Lienden said that W&C will confirm this.

Mr. Shady noted that the Russel and Santa Barbara Canyon faults extend further than the map shows.

Chair Jaffe asked to include the Bulletin 118 boundary and common features on maps for reference.

Mr. Shady noted that they provided water quality data that is not included in the groundwater quality salinity 2011-2018 data map. Mr. Van Lienden said W&C will ensure that data is included.

Committee member Haslett said the groundwater quality salinity 2011-2018 map should be labelled TDS (total dissolved solids) instead of "salinity."

Chair Jaffe said that she has always heard arsenic is an issue in the Cuyama Valley and the Cuyama Community Services District (CCSD) has had to treat for arsenic. Mr. Coates said the shallower wells do not show arsenic. Mr. Van Lienden asked if they have other water quality test and Mr. Coates said they do with the County. Local resident Steve Gliessman suggested W&C show well level information since arsenic occurs at specific intervals.

Mr. Van Lienden reported on subsidence in the Cuyama Valley and Committee member Haslett mentioned that the subsidence measured in the central basin could be due to the extreme groundwater pumping from the high school at one time.

Mr. Gliessman asked that they are going to study storage loss based on subsidence and asked if 11 inches equates to lost storage. He asked if the model incorporates subsidence and Mr. Van Lienden replied that he is not sure.

Ms. Wooster said the high school used to have a great well that they managed to pump dry.

Committee Member Furstenfeld left at 6:29 p.m.

Chair Jaffe asked if data gaps will be addressed in the model. Mr. Van Lienden replied that the groundwater conditions section will address these issues and will be released as an upcoming GSP section for review.

d. Draft Undesirable Results Narrative

Mr. Van Lienden provided an overview of the Draft Undesirable Results Narrative.

Mr. Van Lienden mentioned that the Draft Undesirable Results Narrative will be distributed for review to stakeholders and he will clarify the type of review he is seeking when we send it out for review.

Mr. Cappello mentioned that the "x"s should be changed to "TBD." Committee member Haslett suggested adding "not applicable" to the seawater intrusion section on Item No. 3.

e. Stakeholder Engagement Update

GSP Outreach the Catalyst Group's Mary Currie provided an update on stakeholder engagement activity, including the second Newsletter and September 5th public workshop.

Chair Jaffe asked if there will be model results to show. Mr. Van Lienden confirmed that they will have a draft of the model's historic results.

9. Items for Upcoming Sessions

Nothing to report.

Committee member DeBranch asked if the Committee would like to see how the model grid loops into the monitoring process. Mr. Van Lienden said this is something that can be reviewed at the next SAC meeting on August 30, 2018 as part of the educational update.

10. Committee Forum

Nothing to report.

11. Public comment for items not on the Agenda

Nothing to report.

12. Adjourn

Chair Jaffe adjourned the meeting at 6:59 p.m.

I, Jim Beck, Executive Director of the Cuyama Basin Groundwater Sustainability Agency, do hereby certify that the foregoing is a fair statement of the proceedings of the meeting held on Thursday, July 26, 2018, by the Cuyama Basing Groundwater Sustainability Agency Standing Advisory Committee.

Jim Beck

Dated: August 30**, 2018**

TO: Standing Advisory Committee
Agenda Item No. 6

FROM: Brenton Kelly, Standing Advisory Committee Vice Chair

DATE: August 30, 2018

SUBJECT: Discussion of Special Session for Public Review

Issue
Recommendation by the Standing Advisory Committee in support of holding special sessions for public review of the Groundwater Sustainability Plan sections that are open for public comment.

Recommended Motion
Recommend the Cuyama Basin Groundwater Sustainability Agency Board of Directors allow the Standing Advisory Committee to hold special sessions for public review of Groundwater Sustainability Plan sections.

Discussion
At the July 26, 2018 Standing Advisory Committee (SAC), the Committee discussed the concept of forming a study group to review Groundwater Sustainability Plan (GSP) sections. SAC Chair Roberta Jaffe appointed an ad hoc consisting of SAC committee members Louise Draucker, Jake Furstenfeld, Claudia Alvarado, and Vice Chair Brenton Kelly to explore solutions to this request and a report from Vice Chair Brenton Kelly is provided below.

In recognition of numerous requests made by Cuyama Valley Stakeholders for greater opportunities to engage in the review of the presented documents to gain a deeper understanding of the issues to be decided in the development of the Groundwater Sustainability Plan, and

In recognition that Legal Council has made assurances as to how such a meeting could be held in compliance with the Brown Act for legitimate and legal open public meetings, and

In recognition of the financial restrictions on additional expenditures of staff time from either the Hallmark Group or the Woodard & Curran consultants who have not budgeted for any additional public meetings, and

In recognition that the Guidelines adopted by the GSA for the SAC allows that “Special meetings may be called as needed”, and

In recognition of the need to preserve objective impartiality and respect for the open and inclusive process of hearing viewpoints from various stakeholders in the Cuyama Valley, The Standing Advisory Committee recommends the Cuyama Basin Groundwater Sustainability Agency Board of Directors allow the Standing Advisory Committee to hold Special Sessions for public review of Groundwater Sustainability Plan sections as follows:

The Standing Advisory Committee willingly takes responsibility, with staffing assistance from the Family Resource Center, to fulfill any and all administrative tasks and obligations associated with the scheduling and facilitating of these meetings without incurring any additional unbudgeted expenses by the staff of either the Hallmark Group or Woodard & Curran, and

A legally posted agenda will clearly state that the Special Session is for review and discussion only, no voting will take place at a Special Session for Public Review, and

The agenda will clearly focus the discussion on the GSP Material currently open for public review or SAC approval, and

The sessions will be telephonically facilitated and archived to promote the inclusion of remote attendance by interested parties, and

Minutes will be taken and along with the audio recording, will be made available for posting to the Cuyama Basin website for archival review by any party interested in the GSP Development or the preservation of impartiality, and

The primary function of these Sessions will be to read, review and understand the GSP Materials that are currently open for a public comment period or SAC approval and to gain a greater understanding of the process of developing a GSP that will achieve groundwater sustainability in the Cuyama Valley.

TO: Standing Advisory Committee
Agenda Item No. 7ai

FROM: Jim Beck, Executive Director

DATE: August 30, 2018

SUBJECT: Groundwater Sustainability Plan Section Development Strategy and Responsibility

Issue
Groundwater Sustainability Plan section development strategy and responsibility.

Recommended Motion
None – information only.

Discussion
This is a placeholder and will be distributed once available.

TO: Standing Advisory Committee
Agenda Item No. 7b

FROM: Brian Van Lienden, Woodard & Curran (W&C)

DATE: August 30, 2018

SUBJECT: SGMA Educational Items: How a Model Works – Current and Future Conditions, and Management Actions & Projects

Issue
Educational presentation on how a model works – current and future conditions, and management actions & projects.

Recommended Motion
None – information only.

Discussion
An educational presentation on how a model works – current and future conditions is provided as Attachment 1, and management actions & projects is provided as Attachment 2.

Attachment 1

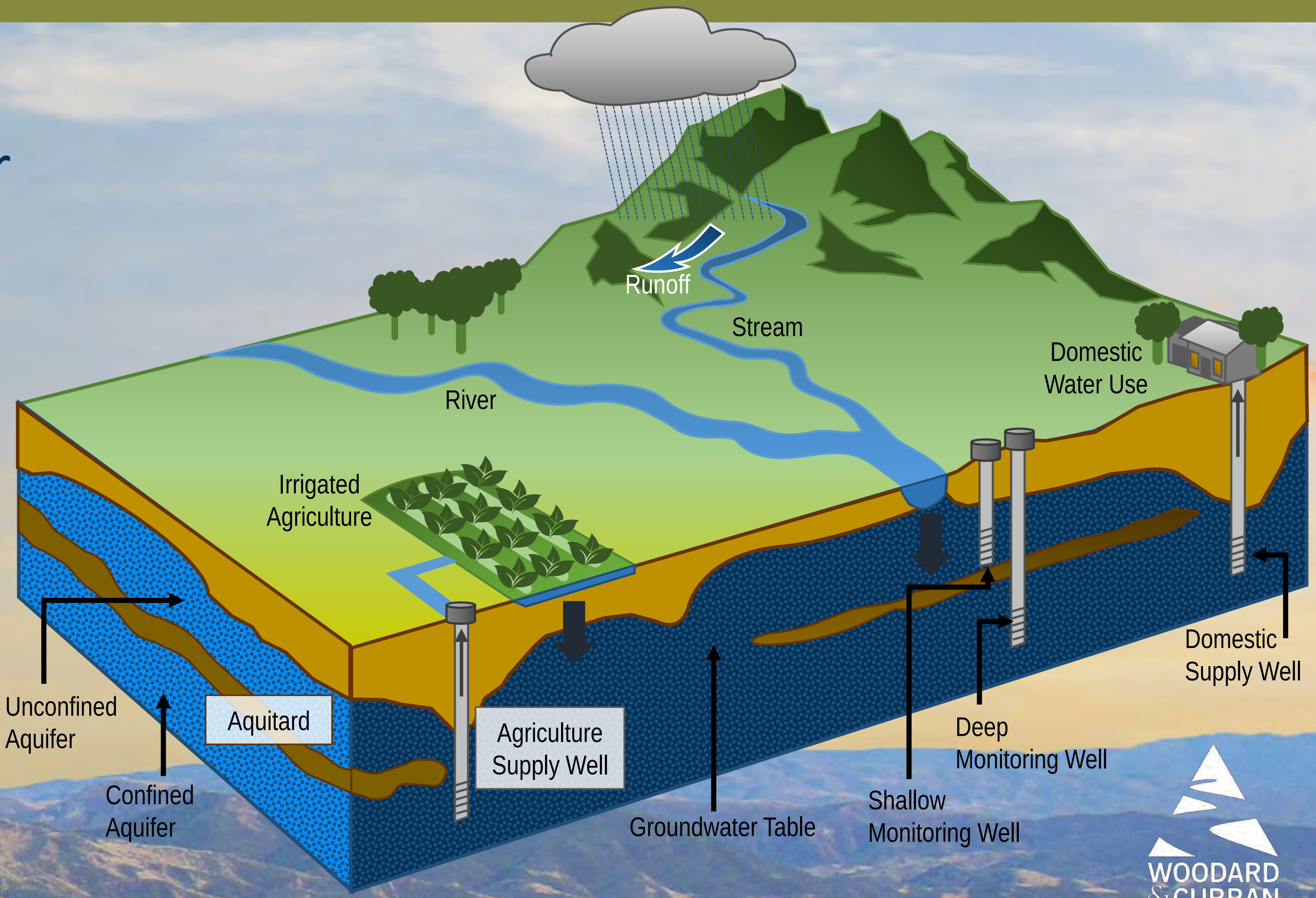
Cuyama Basin Groundwater Sustainability Agency

SGMA Educational Item: How a Model Works – Current and Future Conditions

August 30, 2018

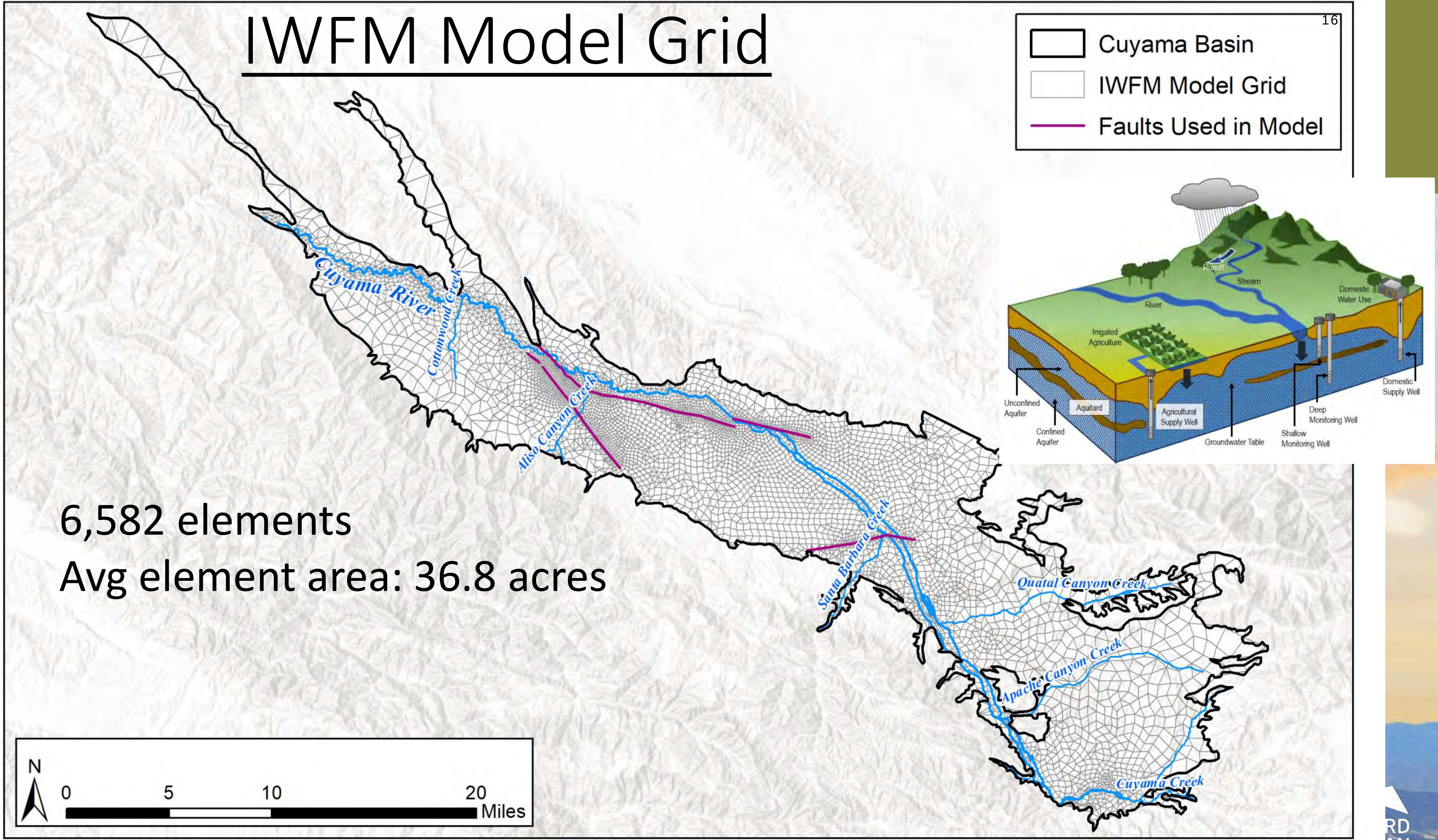
Approach for Cuyama Basin Model Development

- Developing a Robust and Defensible Integrated Water Flow Model (IWFM)
  - Robust Model Grid
  - Agricultural and Municipal Water Demands
  - Simulates physical movement of water



WOODARD & CURRAN

IWFM Model Grid



6,582 elements

Avg element area: 36.8 acres

Water Budgets - Time Frames

Historical Conditions

Historical Land Use and Population

1967 - 2017 historical hydrology

Current Conditions

2017 Land Use and Population

1967- 2017 historical hydrology

Future Conditions

Year 2040 Land Use and Population

1967- 2017 historical hydrology

With and without climate change

Current Conditions Scenario Assumptions

- Land Use and production wells
  - Most recent Bolthouse & Grimmway data (2017, 2018)
  - Use 2016 DWR land use for other parts of the Basin
    - Adjusted for significant recent changes (e.g. Grapevine Capital vineyards)
- Domestic Water Use
  - Population based on recent census information
  - Per person water use (gallons per capita per day) based on historical Cuyama CSD data
- Hydrology – simulate with 1960-2017 data

WOODARD & CURRAN

Future Conditions Scenario Assumptions

- Land Use and production wells – assume no changes from current conditions
- Domestic Water Use:
  - reflect projected changes in population (if available)
  - No change in per capita water use
- Hydrology – simulate with data from 1960-2017
  - Simulate with and without climate change
    - With adjustments to:
      - Temperature
      - Precipitation
      - Evapotranspiration

Attachment 1

Cuyama Basin Groundwater Sustainability Agency

SGMA Educational Item: Management Actions and Projects

August 30, 2018

WOODARD & CURRAN

Projects and Management Actions to Close the Gap Between Water Supplies and Demands

- Water supply projects to increase available supplies
- Management actions to reduce groundwater demands
- Adaptive management to respond to changes in supplies and demands over time

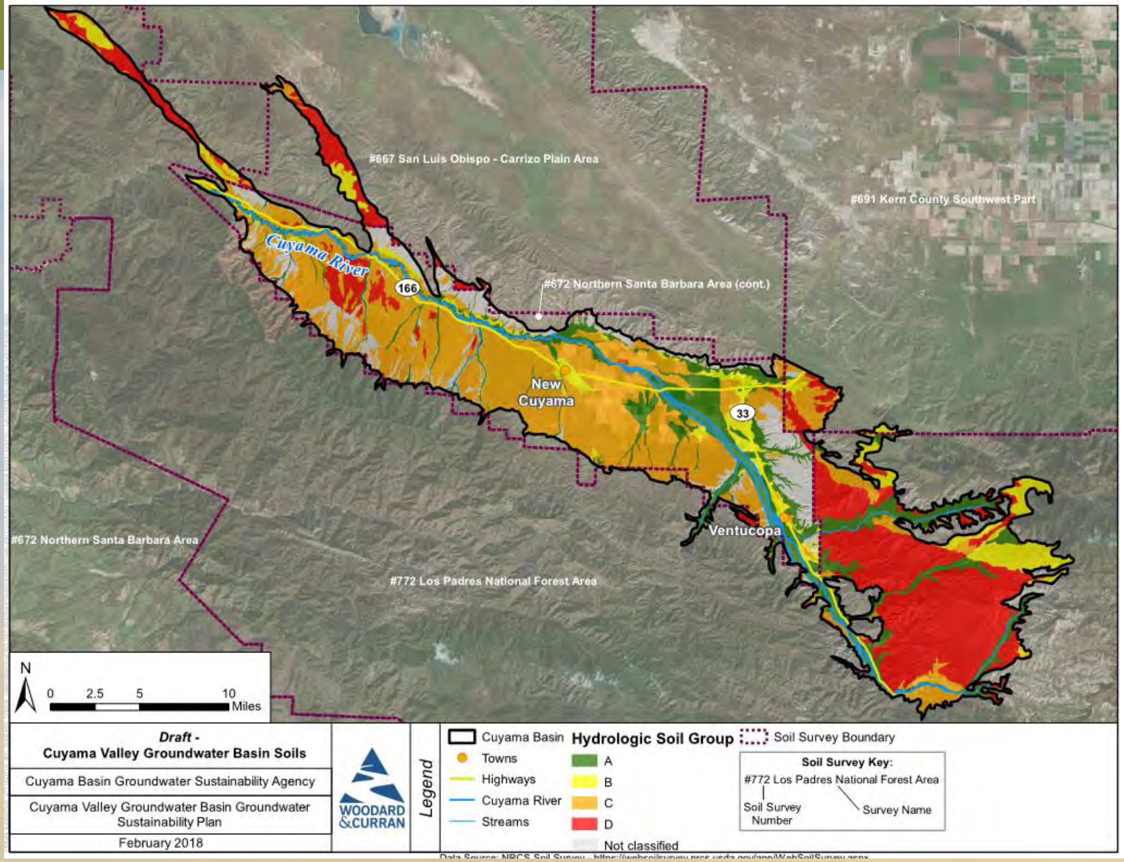
WOODARD & CURRAN

Potential Demand Management Actions

- Potential components of a demand management approach:
  - Pumping restrictions/allocations
    - Water accounting
    - Water metering
  - Water market
  - Fees
    - By pumping amount or acreage
  - Glide path

Potential Water Supply Projects

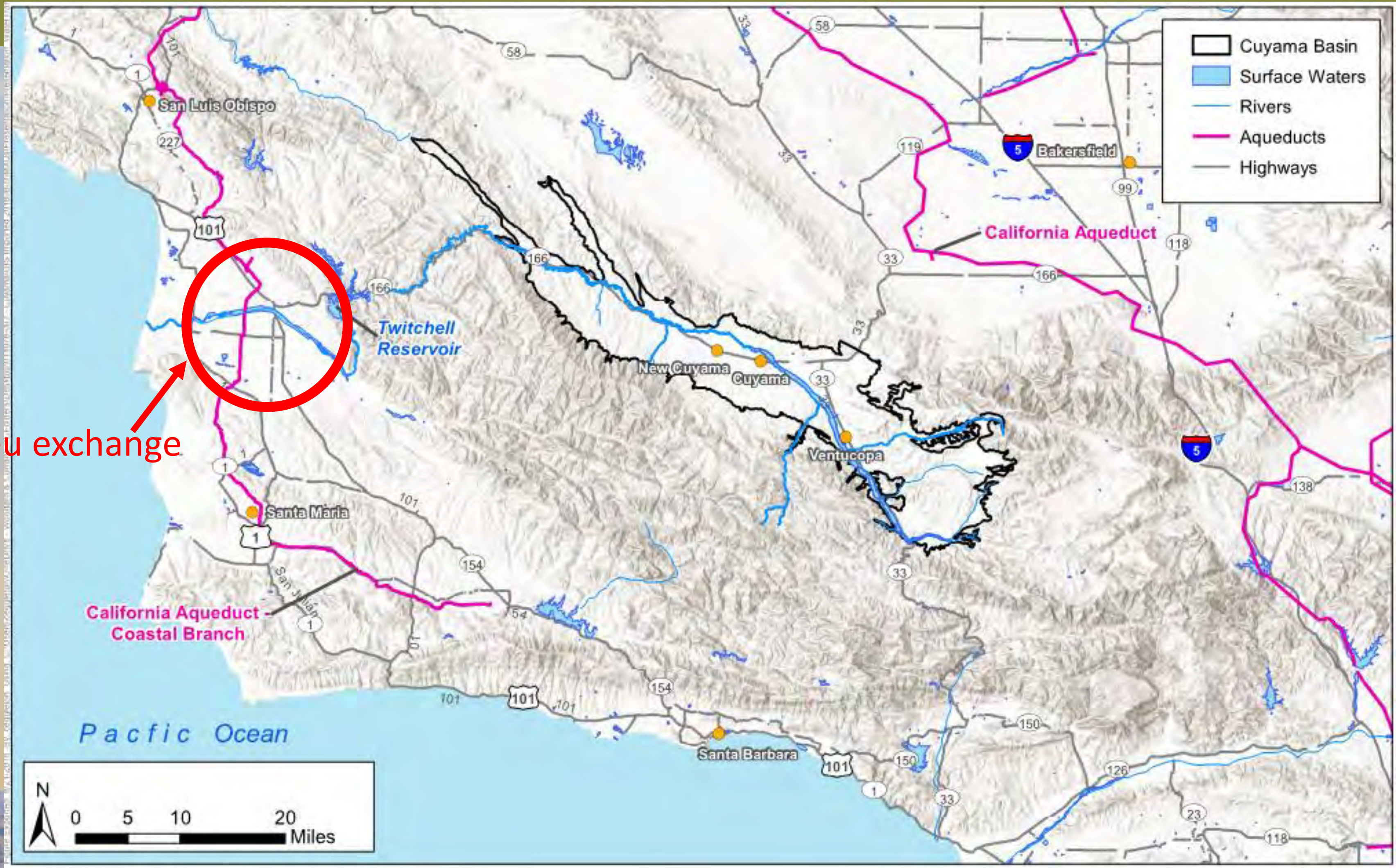
- Storm and Flood Water Capture Projects
  - Capture excess flood flows and recharge into aquifer
  - Select recharge locations selected based:
    - soil properties
    - Current groundwater conditions in local area
  - Available water for recharge limited by downstream water rights



WOODARD &CURRAN

Potential Water Supply Projects

- Water Supply Imports/Exchanges
  - Purchase water & transport in Coastal Aqueduct
  - Exchange at Twitchell to allow for greater floodwater capture upstream
  - Other water import/exchange possibilities?



TO: Standing Advisory Committee
Agenda Item No. 7c

FROM: Jim Beck, Executive Director

DATE: August 30, 2018

SUBJECT: Board of Directors Agenda Review

Issue
Review of the September 5, 2018 Cuyama Basin Groundwater Sustainability Agency Board of Directors agenda.

Recommended Motion
None – information only.

Discussion
The September 5, 2018 Cuyama Basin Groundwater Sustainability Agency Board of Directors agenda is provided as Attachment 1 for review.

Attachment 1

JOINT MEETING OF CUYAMA BASIN GROUNDWATER SUSTAINABILITY AGENCY BOARD OF DIRECTORS AND STANDING ADVISORY COMMITTEE

Board of Directors

Derek Yurosek Chairperson, Cuyama Basin Water District
Lynn Compton Vice Chairperson, County of San Luis Obispo
Das Williams Santa Barbara County Water Agency
Cory Bantilan Santa Barbara County Water Agency
Glenn Shephard County of Ventura
Zack Scrivner County of Kern
Paul Chounet Cuyama Community Services District
George Cappello Cuyama Basin Water District
Byron Albano Cuyama Basin Water District
Jane Wooster Cuyama Basin Water District
Tom Bracken Cuyama Basin Water District

Standing Advisory Committee

Roberta Jaffe Chairperson
Brenton Kelly Vice Chairperson
Claudia Alvarado
Brad DeBranch
Louise Draucker
Jake Furstenfeld
Joe Haslett
Mike Post
Hilda Leticia Valenzuela

AGENDA

September 5, 2018

Agenda for a meeting of the Cuyama Basin Groundwater Sustainability Agency Board of Directors to be held on Wednesday, September 5, 2018 at 4:00 PM, at the Cuyama Valley Family Resource Center, 4689 CA-166, New Cuyama, CA 93254. To hear the session live call (888) 222-0475, code: 6375195#.

Teleconference Locations:

Cuyama Valley Family Resource Center
4689 CA-166
New Cuyama, CA 93254

County Government Center
1055 Monterey Street, Room D361
San Luis Obispo, CA 93408

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1. Call to Order
2. Roll Call
3. Pledge of Allegiance
4. Approval of Minutes

a. August 1, 2018

5. Report of the General Counsel

a. Conflict of Interest Code

6. Report of the Standing Advisory Committee

a. Discussion of Special Session for Public Review

7. Groundwater Sustainability Agency

a. Report of the Executive Director

i. Groundwater Sustainability Plan Section Development Strategy and Responsibility

b. Progress & Next Steps

8. Groundwater Sustainability Plan

a. Groundwater Sustainability Plan Update

b. Technical Forum Update

d. Hydrogeologic Conceptual Model Update

e. Groundwater Conditions

f. Monitoring Networks

g. Stakeholder Engagement Update

9. Financial Report

a. Financial Management Overview

b. Financial Report

c. Payment of Bills

10. Reports of the Ad Hoc Committees

11. Directors' Forum

12. Public comment for items not on the Agenda

At this time, the public may address the Board on any item not appearing on the agenda that is within the subject matter jurisdiction of the Board. Persons wishing to address the Board should fill out a comment card and submit it to the Board Chair prior to the meeting.

13. Public Workshop (6:30 pm) – Cuyama Valley Recreation District, 4885 Primero Street, New Cuyama, CA 93254

14. Adjourn

TO: Standing Advisory Committee
Agenda Item No. 8a

FROM: Brian Van Lienden, Woodard & Curran (W&C)

DATE: August 30, 2018

SUBJECT: Groundwater Sustainability Plan Update

Issue
Update on the Cuyama Basin Groundwater Sustainability Agency Groundwater Sustainability Plan.

Recommended Motion
None – information only.

Discussion
Cuyama Basin Groundwater Sustainability Agency Groundwater Sustainability Plan (GSP) consultant Woodard & Curran's GSP update is provided as Attachment 1.

Attachment 1

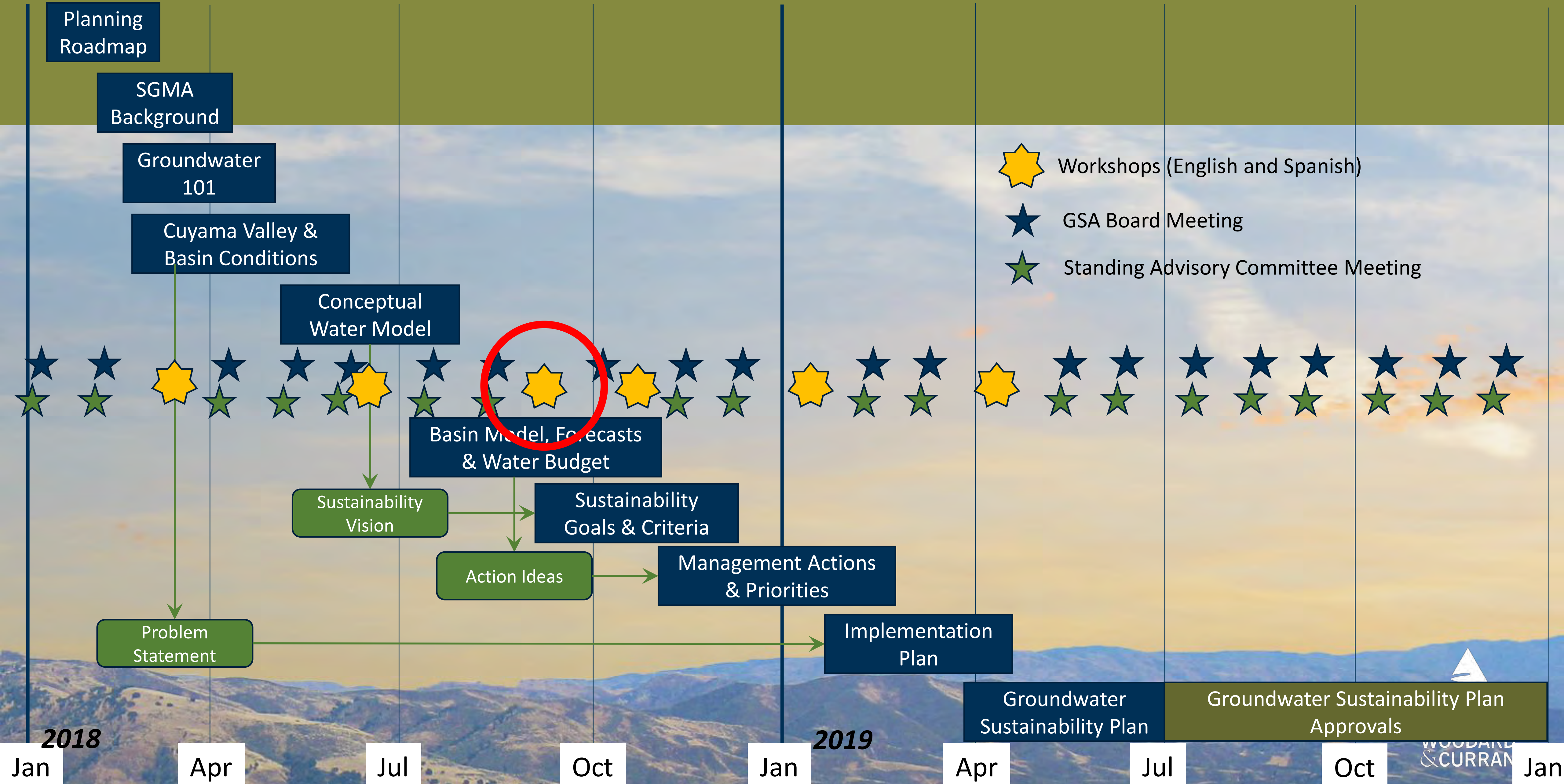
Cuyama Basin Groundwater Sustainability Agency

Groundwater Sustainability Plan Update

August 30, 2018

WOODARD
&CURRAN

Cuyama Basin Groundwater Sustainability Plan – Planning Roadmap



August GSP Accomplishments

- ✓ Updated Hydrogeologic Conceptual Model section in response to comments
- ✓ Distributed draft Groundwater Conditions section
- ✓ Submitted Technical Support Services application to CA DWR
- ✓ Developed draft data management system application
- ✓ Performed initial historical calibration on GSP numerical model

TO: Standing Advisory Committee
Agenda Item No. 8b

FROM: Brian Van Lienden, Woodard & Curran

DATE: August 30, 2018

SUBJECT: Technical Forum Update

Issue
Update on the Technical Forum.

Recommended Motion
None – information only.

Discussion
At the request of Cuyama Valley landowners, Cuyama Basin Groundwater Sustainability Agency Groundwater Sustainability Plan (GSP) consultant Woodard & Curran (W&C) has been meeting monthly with technical consultants representing landowners to discuss W&C's approach and to provide input where appropriate.

A summary of the topics discussed at the August 3, 2018 technical forum meeting is provided as Attachment 1, and the next forum is scheduled for September 7, 2018.

Attachment 1

Cuyama Basin Groundwater Sustainability Agency

Technical Forum Update

August 30, 2018

WOODARD & CURRAN

August 3rd Technical Forum Discussion

- Current Basin Water Conditions
- Numerical Model Development Update
- Next steps

- Next Meeting – September 5th
- Monthly Meetings – first Friday after each Board meeting

WOODARD & CURRAN

Technical Forum Members

- Catherine Martin, San Luis Obispo County
- Matt Young, Santa Barbara County Water Agency
- Matt Scrudato, Santa Barbara County Water Agency
- Matt Klinchuch, Cuyama Basin Water District
- Jeff Shaw, EKI
- Anona Dutton, EKI
- John Fio, EKI
- Dennis Gibbs, Santa Barbara Pistachio Company
- Neil Currie, Cleath-Harris Geologists
- Matt Naftaly, Dudek

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Sacramento, California 95815
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T 916.999.8700

MEETING MEMORANDUM

PROJECT: Cuyama Basin Groundwater Sustainability Plan Development

MEETING DATE: 8/3/2018

MEETING: Technical Forum Conference Call

ATTENDEES: Matt Young (Santa Barbara County Water Agency)
Matt Scrudato (Santa Barbara County Water Agency)
Matt Klinchuch (Cuyama Basin Water District)
Dennis Gibbs (Santa Barbara Pistachio Company)
Neil Currie (Cleath-Harris Geologists)
John Fio (EKI)
Matt Naftaly (Dudek)
Jeff Shaw (EKI)
John Ayres (Woodard & Curran)
Sercan Ceyhan (Woodard & Curran)
Micah Eggleton (Woodard & Curran)

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1. AGENDA

- Current Basin Water Conditions
- Numerical Model Development Update
- Next steps

2. DISCUSSION ITEMS

The following table summarizes comments raised during the conference call and the response and plan for resolution (if appropriate) identified for each item.

Item No.	Comment	Commenter	Response/Plan for Resolution
1	The well at the intersection of the Cuyama River and Cottonwood Canyon Creek may be picking up water from the basin finger just North of the well	Neil Currie	This will be kept in mind when evaluating data from this well.
2	Data may be easier to interpret if wells form a common area are clustered and plotted on the same graph	Jeff Shaw	The W&C team will review the presentation of data and improve where appropriate.

3	Were discontinuities due to faults considered when creating groundwater elevation and depth-to-water maps?	Neil Currie	Due to limitations in the amount and spatial distribution of data and to large changes in elevation in many areas, it is difficult to identify and locate discontinuities that can be attributed to faults.
4	There is potentially more groundwater elevation data out in the west by the Spanish Ranch property.	Neil Currie	The W&C team will incorporate any additional data that is provided.
5	Why is the numerical model's agricultural pumping estimate different from its ETAW estimate?	Jeff Shaw	The agricultural pumping estimate reflects ETAW plus related inefficiencies and losses.
6	What is the time schedule for OPTI to be made available for review?	Jeff Shaw	An initial version of OPTI should be available for review prior to the September Workshop.
7	When will model simulation results be available for review?	Jeff Shaw	Preliminary model simulation results will be presented at the September Workshop and Technical Forum call.
8	Is the agricultural efficiency currently shown by the model reasonable?	John Fio	The model is still undergoing calibration and the data shown were preliminary estimates. It may be refined as the calibration is completed.

TO: Standing Advisory Committee
Agenda Item No. 8c

FROM: Brian Van Lienden, Woodard & Curran

DATE: August 30, 2018

SUBJECT: Hydrogeologic Conceptual Model Update

Issue
Update on the Hydrogeologic Conceptual Model.

Recommended Motion
None – information only.

Discussion
An update on the Hydrogeologic Conceptual Model is provided as Attachment 1.

Attachment 1

Cuyama Basin Groundwater Sustainability Agency

Hydrogeologic Conceptual Model

August 30, 2018

WOODARD & CURRAN

Hydrogeologic Conceptual Model

- GSP Section provided to SAC and Board for review on August 24nd
- 14 sets of comments received from CBGSA Board, SAC, Technical Forum members and public
- Revised draft under development
- Hydrogeological Conceptual Model section describes:
  - Regional Geologic and Structural Setting
  - Geologic History
  - Geologic Formations/Stratigraphy
  - Faults and Structural Features
  - Principal Aquifers and Aquitards
  - Topography, Surface Water and Recharge

WOODARD & CURRAN

TO: Standing Advisory Committee
Agenda Item No. 8d

FROM: Brian Van Lienden, Woodard & Curran

DATE: August 30, 2018

SUBJECT: Groundwater Conditions

Issue
Update on the Groundwater Conditions.

Recommended Motion
None – information only.

Discussion
An update on the groundwater conditions is provided as Attachment 1.

Attachment 1

Cuyama Basin Groundwater Sustainability Agency

Groundwater Conditions

August 30, 2018

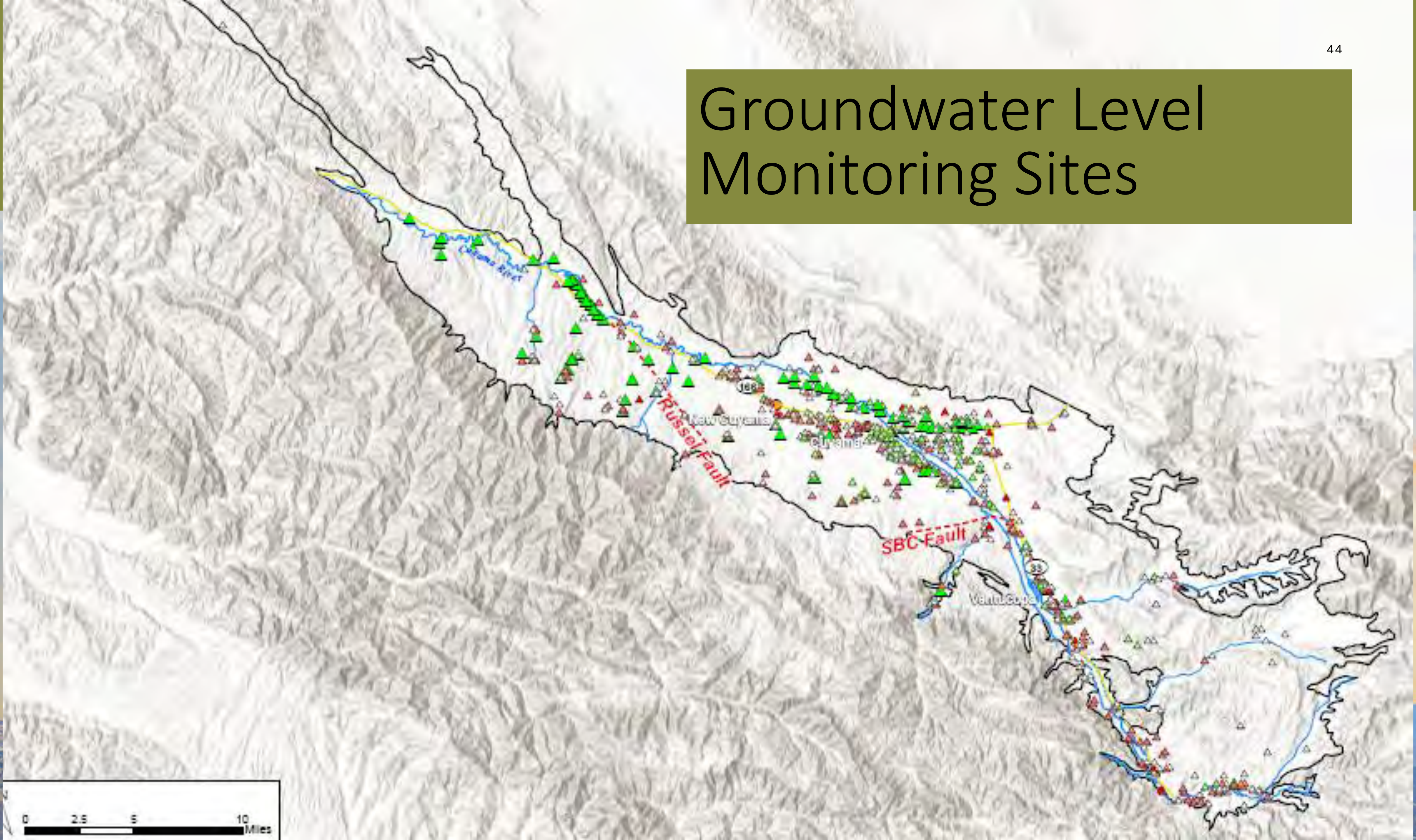
WOODARD & CURRAN

Groundwater Conditions

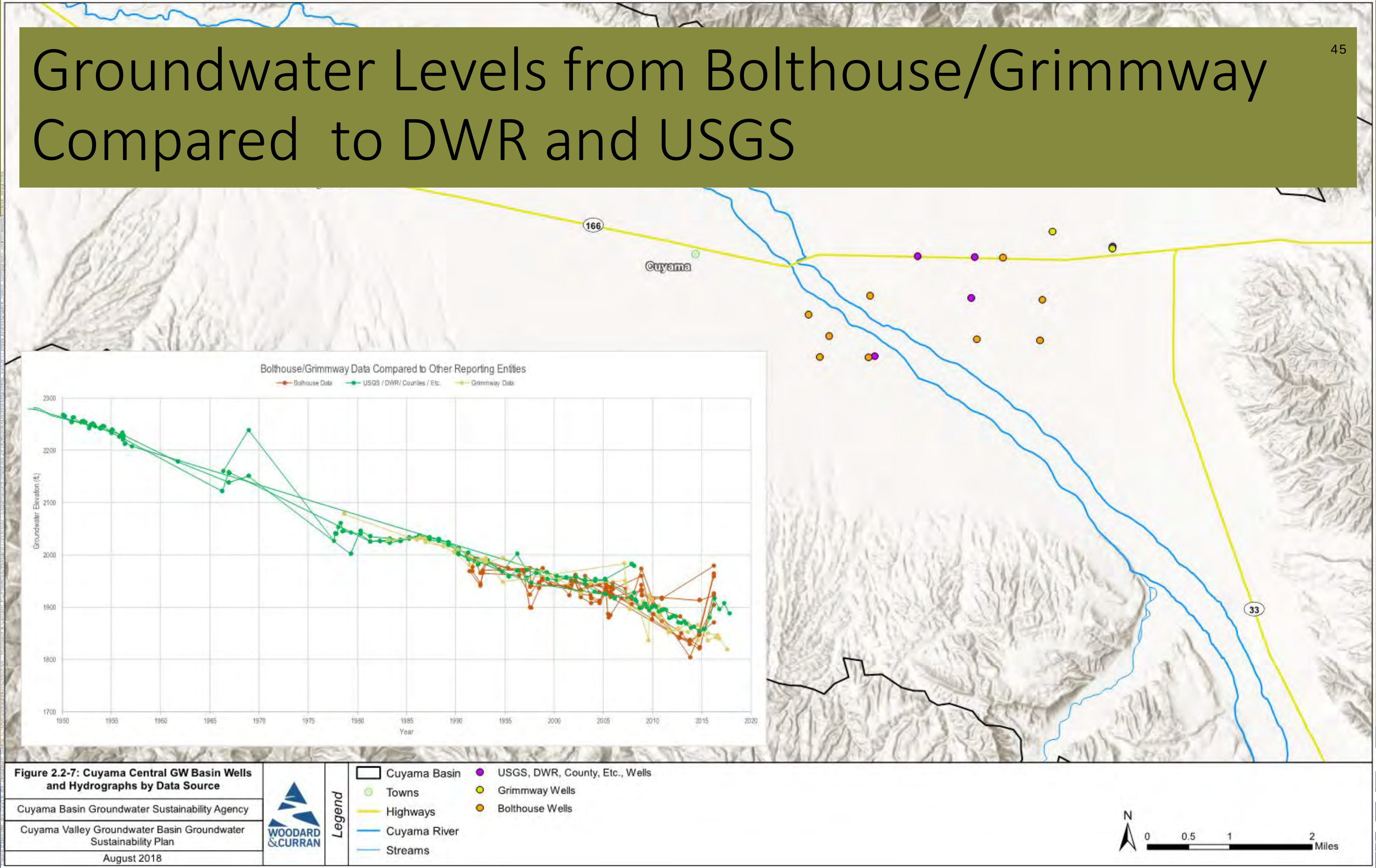
- Draft GSP Section provided to SAC and Board for review as part of Board Packet on August 24th
- Groundwater Conditions section describes:
  - Groundwater trends
  - Changes in groundwater storage (placeholder)
  - Land subsidence
  - Groundwater quality
  - Interconnected surface water systems (placeholder)
  - Groundwater dependent ecosystems (placeholder)
- Comments are due on September 21st

WOODARD & CURRAN

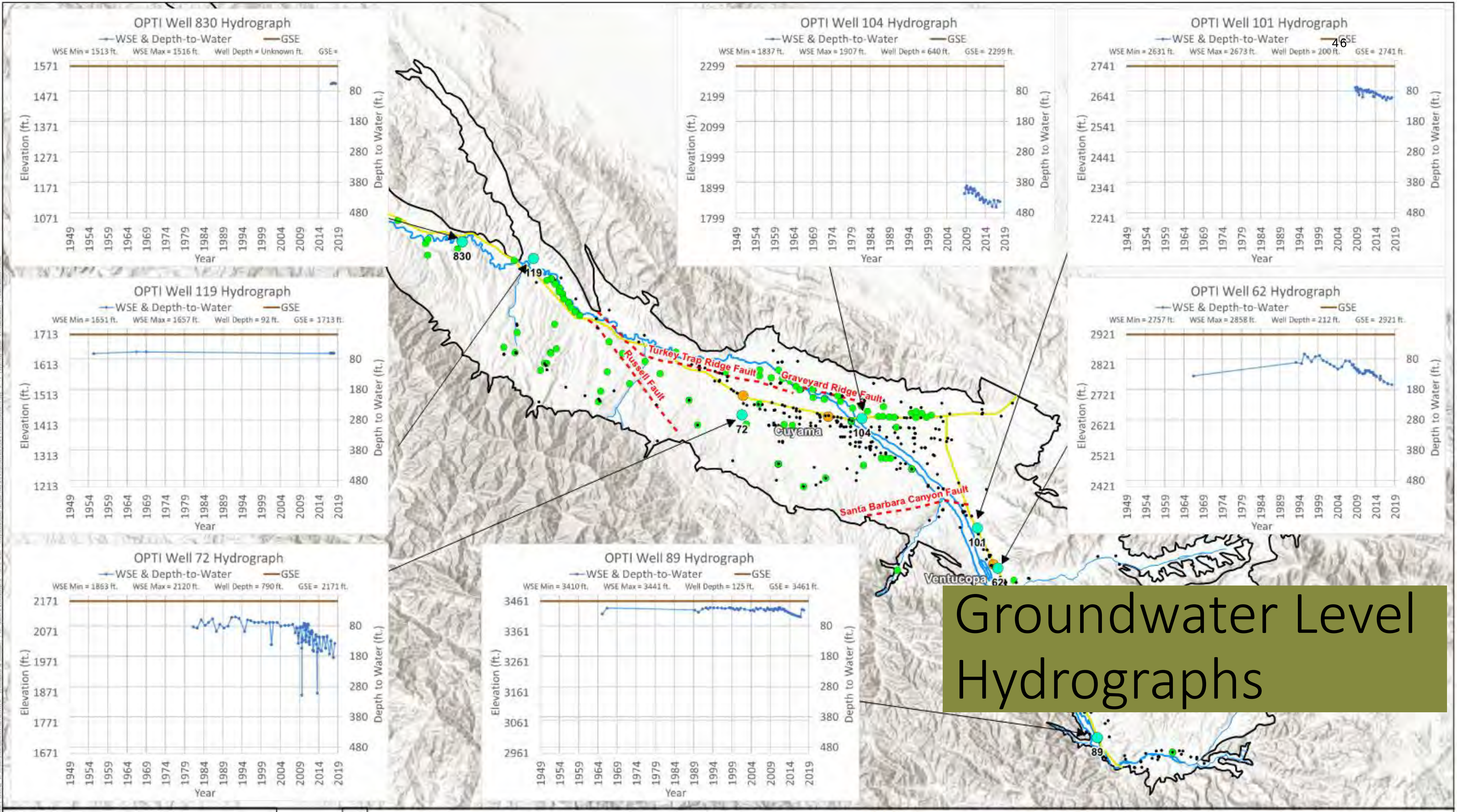
Groundwater Level Monitoring Sites



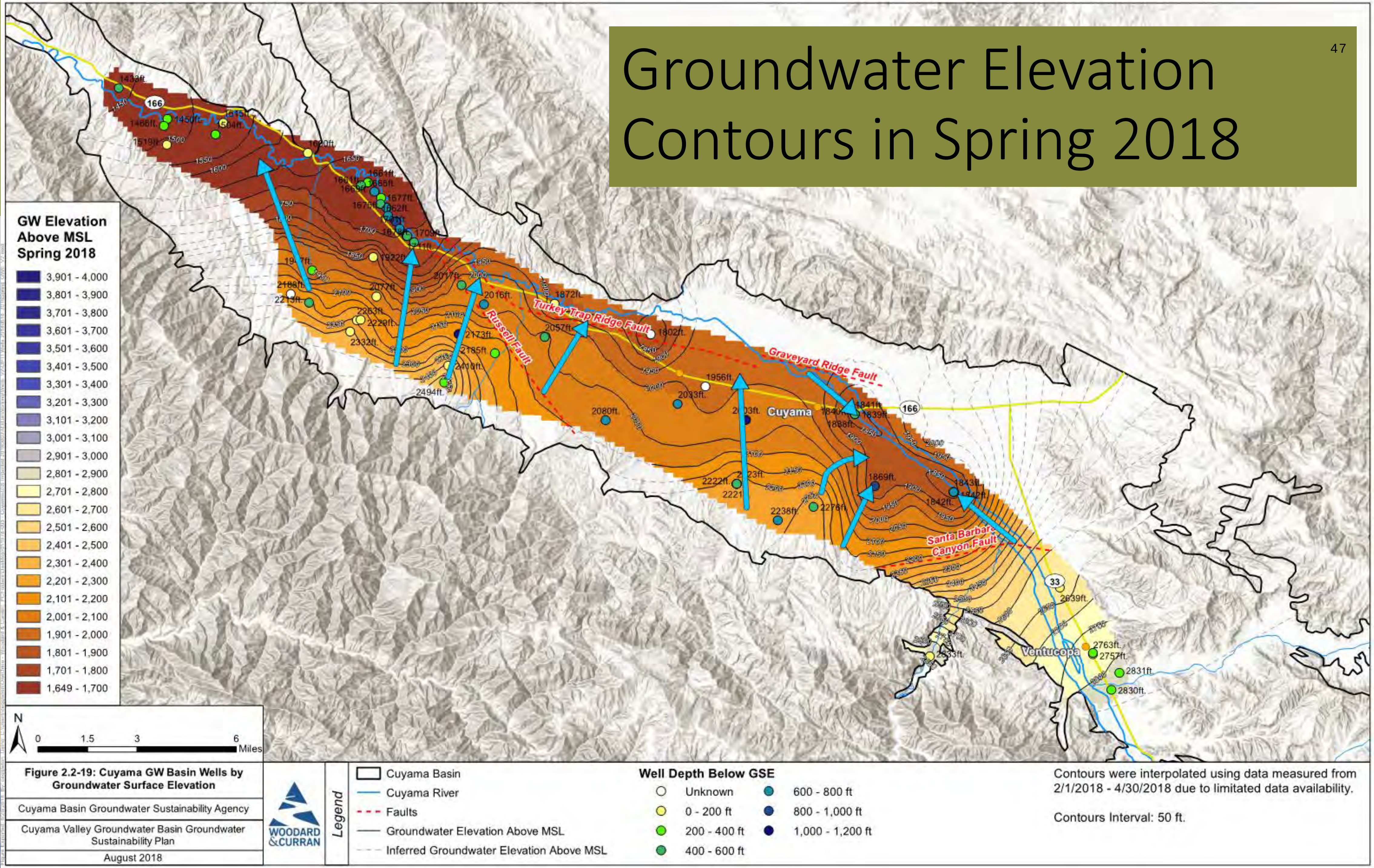
Groundwater Levels from Bolthouse/Grimmway Compared to DWR and USGS



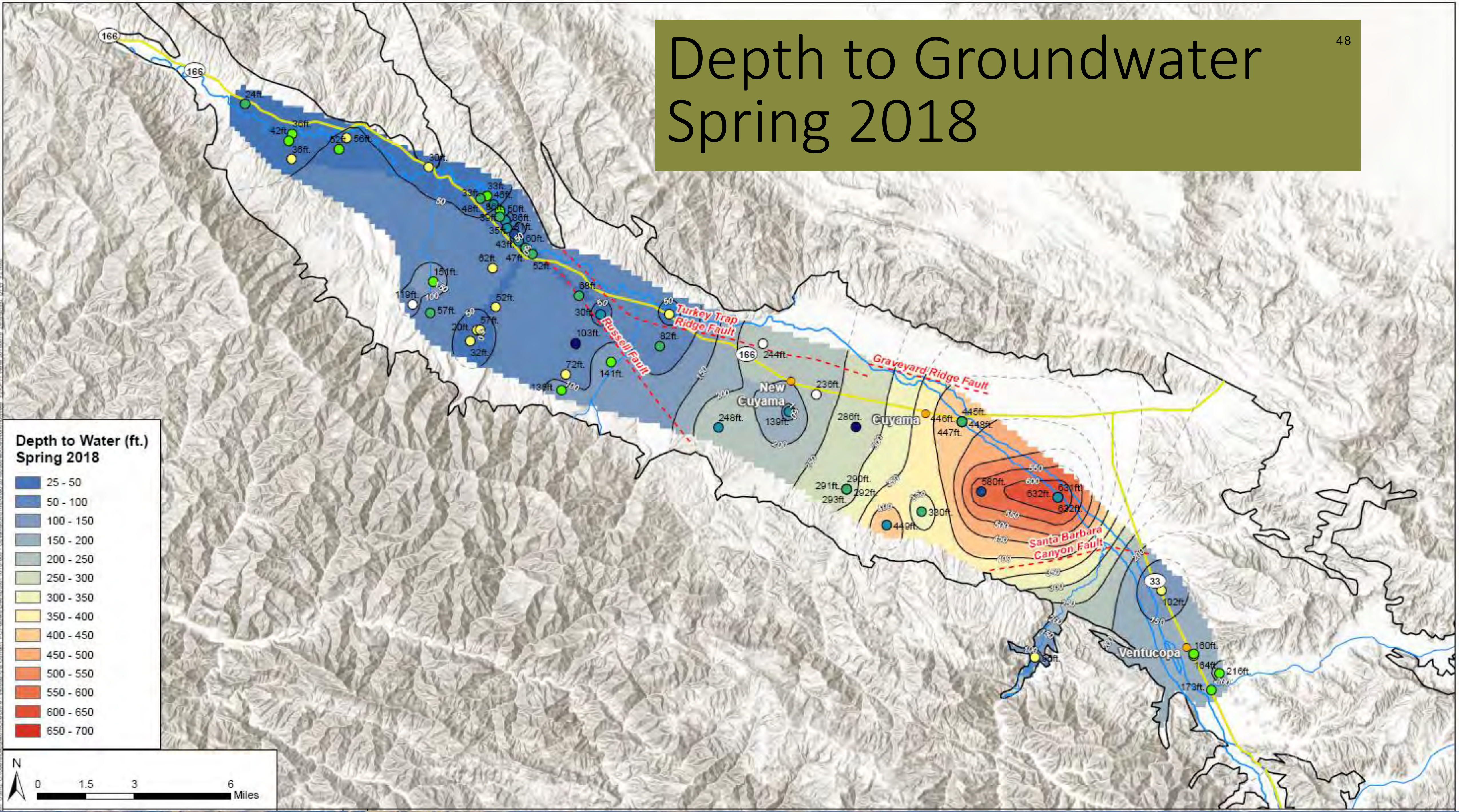
Groundwater Level Hydrographs



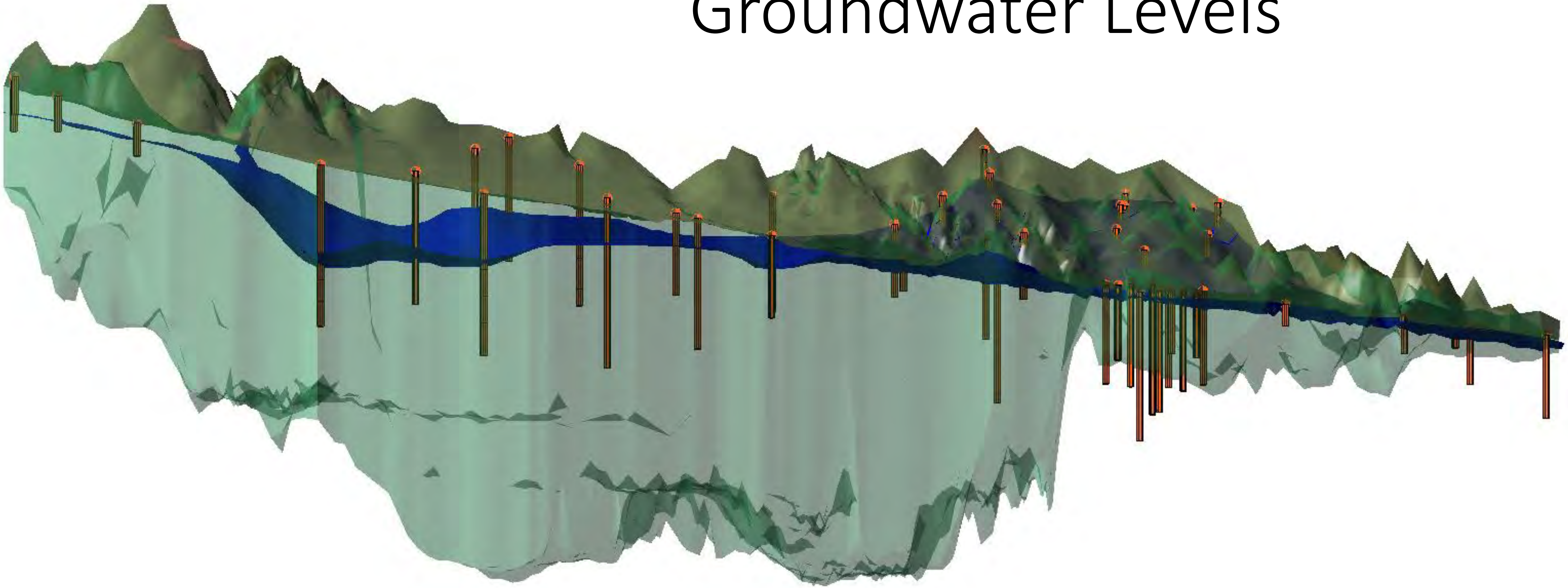
Groundwater Elevation Contours in Spring 2018



Depth to Groundwater Spring 2018



Spring 2018 Groundwater Levels



Cuyama Valley Groundwater Basin Groundwater Sustainability Plan Groundwater Conditions Draft

Prepared by:

August 2018

Table of Contents

List of Figures

Chapter 2.2 Groundwater Conditions

This document includes the Groundwater Conditions Section will be included as part of a report section in the Cuyama Basin Groundwater Sustainability Plan that satisfies § 354.8 of the Sustainable Groundwater Management Act Regulations. Water budget components will be included in the upcoming Groundwater Sustainability Plan (GSP) Section titled "Water Budgets". The amounts of water moving through the basin, consumptive uses, and inflows and outflows of the basin, comparisons of extractions to recharge, and other components, will be presented in the water budget section.

The majority of published information about groundwater in the Cuyama Valley Groundwater Basin has been focused on the central part of the basin, roughly from an area a few miles west of New Cuyama to roughly Ventucopa. The eastern uplands and western portion of the basin has been studied less, and consequentially, fewer publications have been written about those areas, and less historical information is available in those areas.

There are a small number of sub-sections that are not complete at this time, due to requiring either groundwater modeling results or field work to complete the sub-section. These subsection titles are highlighted yellow and a list of the subsections intended contents is listed.

Acronyms

Basin	Cuyama Valley Groundwater Basin
bgs	below ground surface
CUVHM	Cuyama Valley Hydrologic Model
DWR	Department of Water Resources
ft.	feet
ft/day	feet per day
GAMA	Groundwater Ambient Monitoring and Assessment
GPS	global positioning system
GSP	Groundwater Sustainability Plan
InSAR	Interferometric Synthetic-Aperture Radar
MCL	Maximum Contaminant Level
RWQCB	Regional Water Quality Control Board
SBCF	Santa Barbara Canyon Fault
SBCWA	Santa Barbara County Water Agency
SGMA	Sustainable Groundwater Management Act
TDS	Total Dissolved Solids
UNAVCO	University NAVSTAR Consortium
USGS	United States Geological Survey

2.2 Groundwater Conditions

This section describes the historical and current groundwater conditions in the Cuyama Valley Groundwater Basin (Basin). As defined by the GSP regulations promulgated by the Department of Resources (DWR), the groundwater conditions section is intended to:

- Define current groundwater conditions in the Basin
- Describe historical groundwater conditions in the Basin
- Describe the distribution, availability, and quality of groundwater
- Identify interactions between groundwater, surface water, dependent ecosystems, and subsidence
- Establish a baseline of quality and quantity conditions that will be used to monitor changes in the groundwater conditions relative to measurable objectives and minimum thresholds
- Define measurable objectives to maintain or improve specified groundwater conditions
- Support monitoring to demonstrate that the GSP is achieving sustainability goals of the Basin

The groundwater conditions described in this section are intended to convey the present and historical availability, quality, and distribution of groundwater and are used elsewhere in the GSP to define measurable objectives, identify sustainability indicators, and establish undesirable results. Groundwater conditions in the Basin vary by location. To assist in discussion of the location of specific groundwater conditions, Figure 2.2-1 shows selected landmarks in the Basin to assist discussion of the location of specific groundwater conditions. Figure 2.2-1 shows major faults in the basin in red, highways in yellow, towns as orange dots, and canyons and Bitter Creek in purple lines that show their location.

2.2.1 Useful Terminology

The groundwater conditions section includes descriptions of the amounts, quality, and movement of groundwater, among other related components. A list of technical terms and a description of the terms are listed below. The terms and their descriptions are identified here to guide readers through the section and are not a definitive definition of each term:

- **Historical high groundwater elevations** – This is the highest measurement of groundwater elevation (closest to the ground surface) in a monitoring well that was recorded. Measurements of groundwater elevation are used to indicate the elevation of groundwater levels in the area near the monitored well.
- **Historical low groundwater elevations** – This is the lowest measurement of groundwater elevation (furthest from the ground surface) in a monitoring well that was recorded. Measurements of groundwater elevation are used to indicate the elevation of groundwater levels in the area near the monitored well.
- **Depth to Groundwater –** This is the distance from the ground surface to groundwater, typically reported at a well.
- **Horizontal gradient** – The gradient is the slope of groundwater from one location to another when one location is higher, or lower than the other. The gradient is shown on maps with an arrow showing the direction of groundwater flow in a horizontal direction.
- **Vertical gradient** – A vertical gradient describes the movement of groundwater perpendicular to the ground surface. Vertical gradient is measured by comparing the elevations of groundwater in wells that are of different depths. A downward gradient is one where groundwater is moving down into the ground, and an upward gradient is one where groundwater is upwelling towards the surface.

- **Contour Map –** A contour map shows changes in groundwater elevations by interpolating groundwater elevations between monitoring sites. The elevations are shown on the map with the use of a contour line, which indicates that at all locations that line is drawn, it represents groundwater being at the elevation indicated. There are two versions of contour maps used in this section, one which shows the elevation of groundwater above mean sea level (msl), which is useful because it can be used to identify the horizontal gradients of groundwater, and one which shows contours of depth to water, the distance from the ground surface to groundwater, which is useful because it can identify areas of shallow or deep groundwater.
- **Hydrograph –** A hydrograph is a graph that shows the changes in groundwater elevation over time for each monitoring well. Hydrographs show how groundwater elevations change over the years and indicate whether groundwater is rising or descending over time.
- **MCL –** Maximum Contaminant Levels (MCLs) are standards that are set by the State of California for drinking water quality. An MCL is the legal threshold limit on the amount of a substance that is allowed in public water systems. The MCL is different for different constituents.
- **Elastic Land Subsidence -** is the reversible and temporary fluctuation in the earth's surface in response to seasonal periods of groundwater extraction and recharge.
- **Inelastic Land Subsidence** – is the irreversible and permanent decline in the earth's surface resulting from the collapse or compaction of the pore structure within the fine-grained portions of an aquifer system

2.2.2 Groundwater Elevation Data Processing

Groundwater well information and groundwater level monitoring data were collected from eight major sources, and a small number of additional data were collected from local stakeholders. Well and groundwater elevation data were collected from:

- United States Geologic Survey (USGS)
- Department of Water Resources (DWR)
- Santa Barbara County
- San Luis Obispo County
- Grimmway Farms
- Bolthouse Farms
- Grapevine Capital Partners
- Santa Barbara County Water Agency (SBCWA)

Data collected included well information such as location, well construction, owner, ground surface elevation and other related components. Data collected also included groundwater elevation data including information such as date measured, depth to water, groundwater surface elevation, questionable measurement code, and comments. Groundwater elevation data was available covering the time period from 1949 to 2018. Many monitoring wells were monitored in the past, but were not monitored recently, while a small number of monitoring wells have been monitored for over 50 years. Figure 2.2-2 through Figure 2.2-5 show the locations of monitoring well data collected by each entity. The figures also show in a larger, darker symbol if the monitoring well has been measured in 2017 or 2018.

Figure 2.2-2 shows the locations of well data received from the DWR database. Roughly half of the wells from DWR's database were monitored in 2017-18, and half were not measured in 2017-18. Wells in DWR's database are concentrated in the central portion of the basin, east of Bitter Creek and north of the Santa Barbara Canyon Fault (SBCF). Data collected from DWR has been typically measured bi-annually, with one measurement in the spring, and one measurement in the fall.

Figure 2.2-3 shows the locations of well data received from the USGS database. The majority of wells from the USGS database were not monitored in 2017-18. Wells that were monitored in 2017-18 are concentrated in the western portion of the basin, west of New Cuyama, with a small number of monitoring wells in the central portion of the basin and near Ventucopa. Data collected from USGS has been typically measured bi-annually, with one measurement in the spring, and one measurement in the fall.

Figure 2.2-4 shows the locations of well data received from the Santa Barbara and San Luis Obispo Counties. The wells from both counties were monitored in 2017-18. Santa Barbara wells are concentrated in the western portion of the basin west of Bitter Creek. The two San Luis Obispo wells are located in the central portion of the basin and also appeared in the USGS database. Data collected from the counties has been typically measured bi-annually, with one measurement in the spring, and one measurement in the fall.

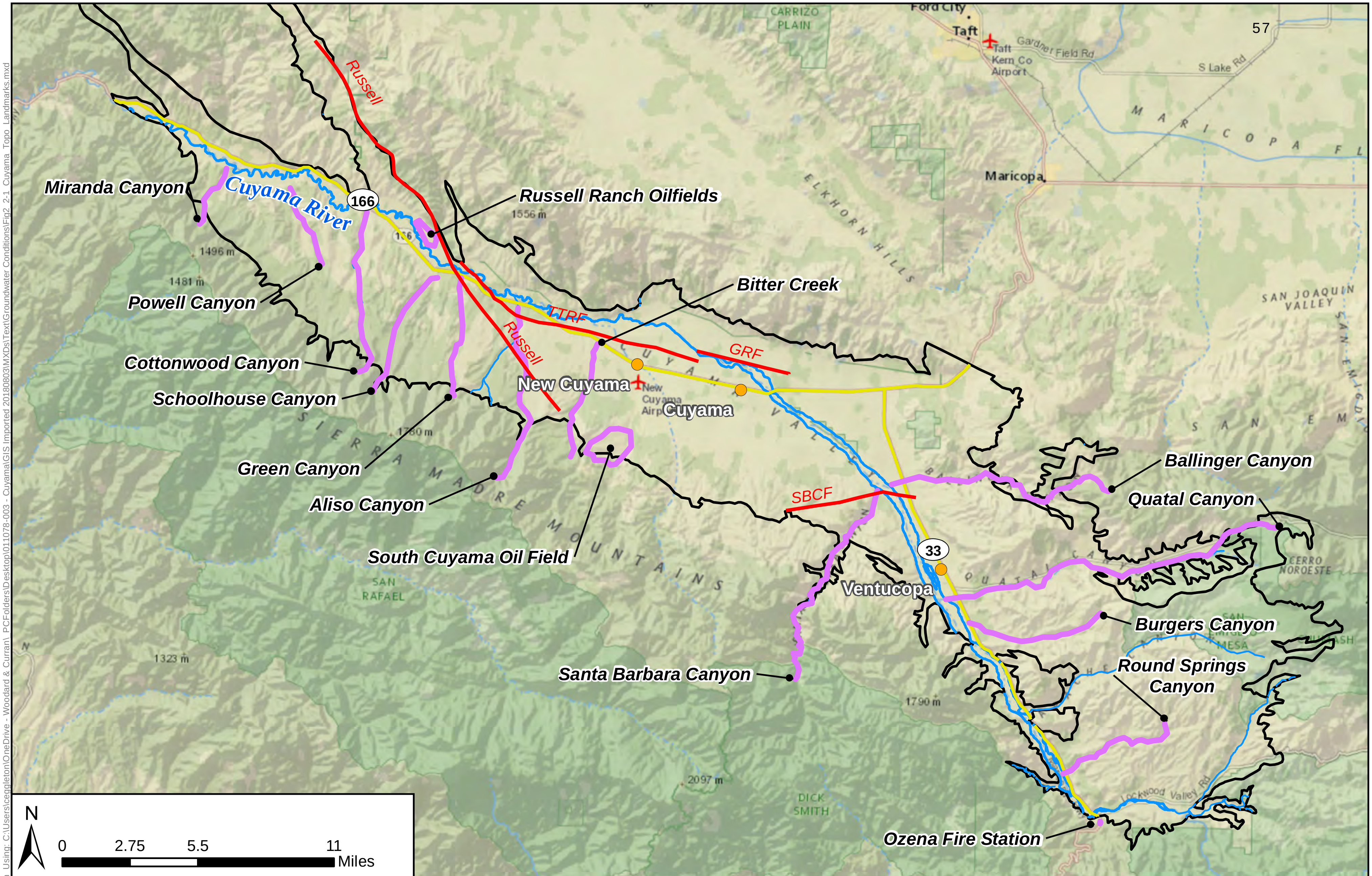


Figure 2.2-1 - Cuyama Basin Landmarks

Cuyama Basin Groundwater Sustainability Agency

Cuyama Valley Groundwater Basin Groundwater Sustainability Plan

August 2018

WOODARD & CURRAN

Legend

- Cuyama Basin
- Towns
- Highways
- Cuyama River
- Streams
- Landmarks
- Faults

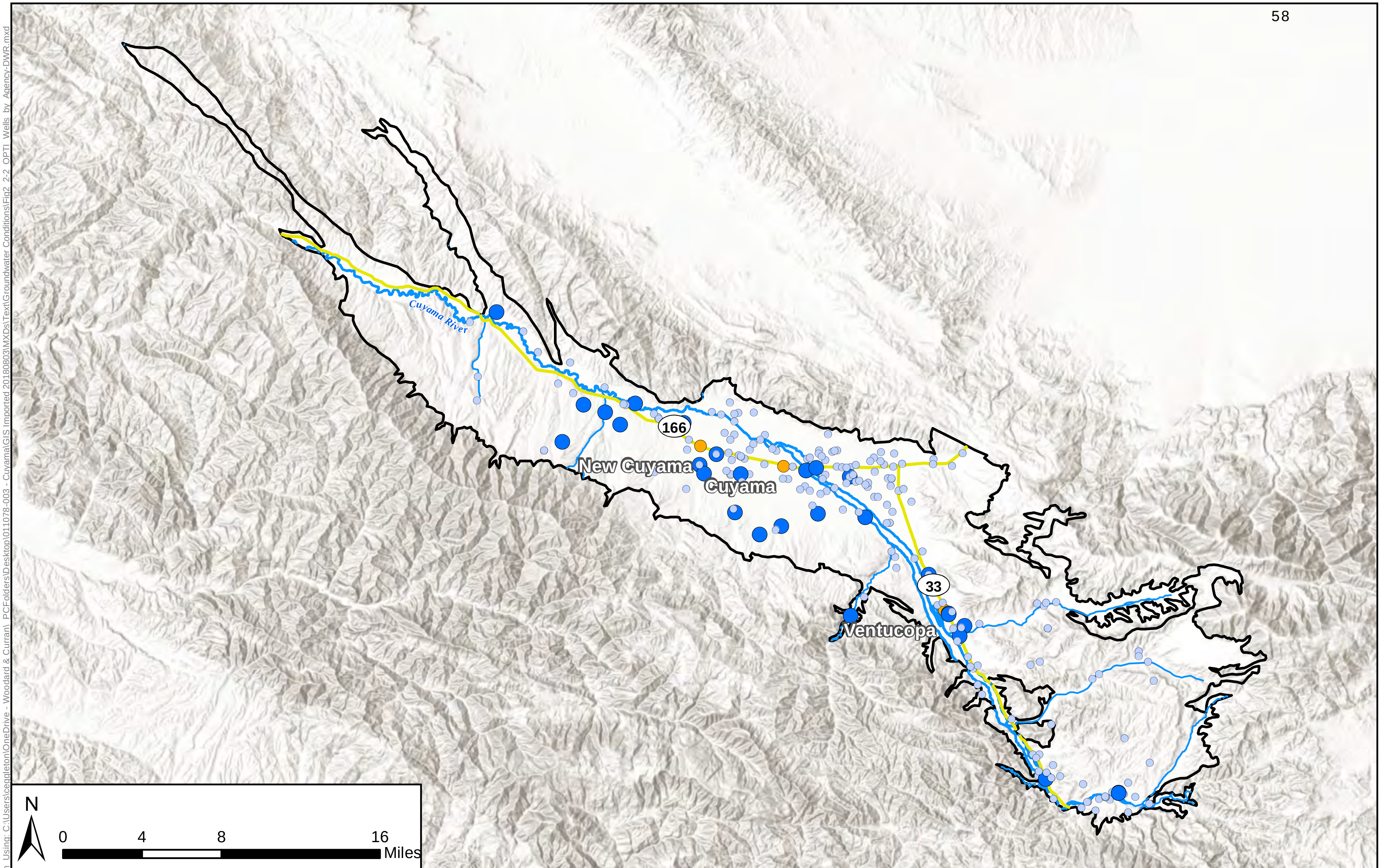


Figure 2.2-2: Cuyama GW Basin DWR Wells

Cuyama Basin Groundwater Sustainability Agency

Cuyama Valley Groundwater Basin Groundwater Sustainability Plan

August 2018

WOODARD & CURRAN

Legend

- Cuyama Basin
- Towns
- Highways
- Cuyama River
- Streams
- DWR Database Wells Last Measured in 2017-2018
- DWR Database Wells Last Measured 2016 and Earlier

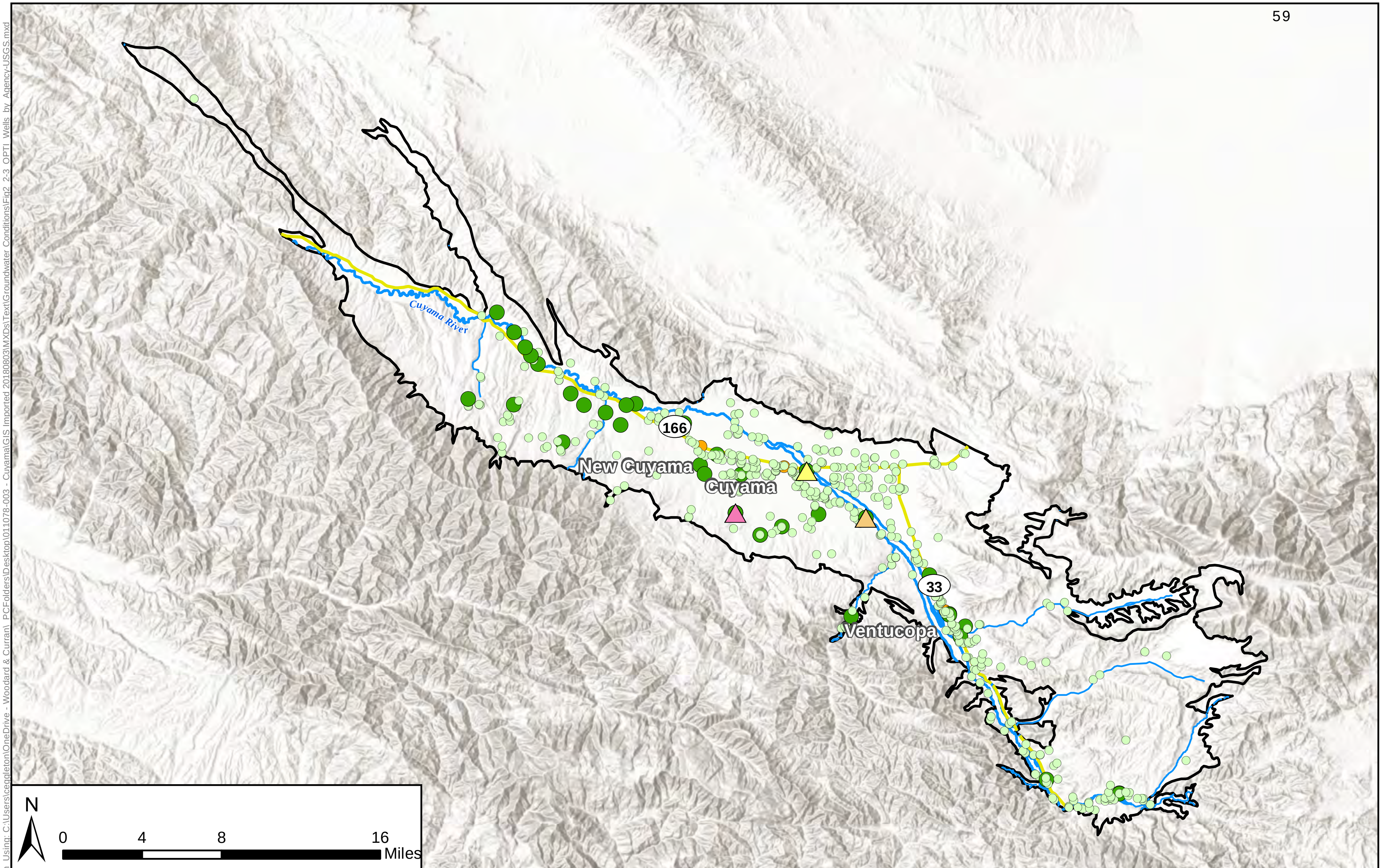


Figure 2.2-3: Cuyama GW Basin USGS Wells

Cuyama Basin Groundwater Sustainability Agency

Cuyama Valley Groundwater Basin Groundwater Sustainability Plan

August 2018

WOODARD & CURRAN

Legend

- Cuyama Basin
- Towns
- Highways
- Cuyama River
- Streams
- USGS Database Wells Last Measured in 2017-2018
- USGS Database Wells Last Measured 2016 or Earlier
- CVBR Multi-Completion Well
- CVFR Multi-Completion Well
- CVKR Multi-Completion Well

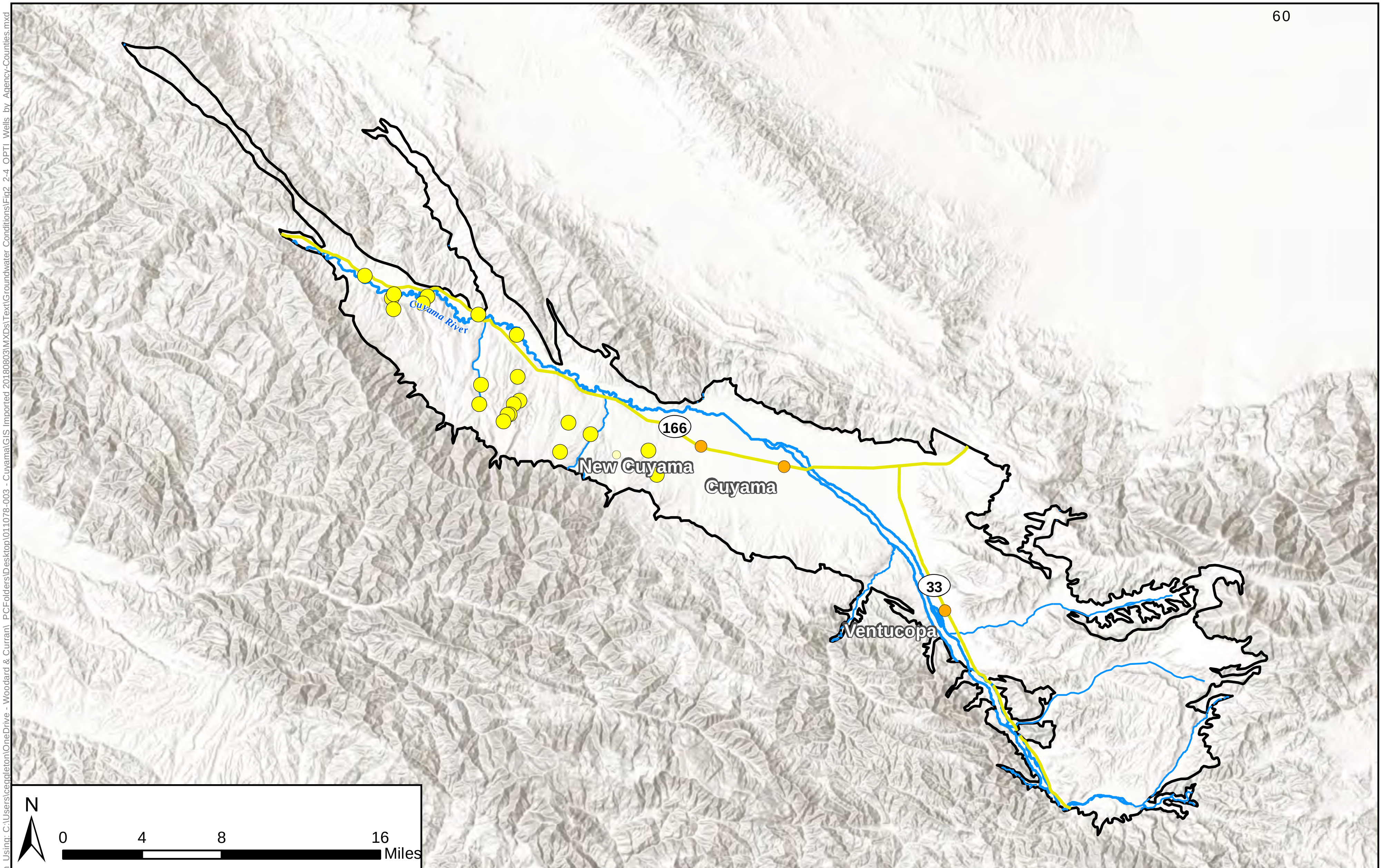


Figure 2.2-4: Cuyama GW Basin County Wells

Cuyama Basin Groundwater Sustainability Agency

Cuyama Valley Groundwater Basin Groundwater Sustainability Plan

August 2018

WOODARD & CURRAN

Legend

- Cuyama Basin
- Towns
- Highways
- Cuyama River
- Streams
- County Database Wells Last Measured in 2017-2018
- County Database Wells Last Measured 2016 or Earlier

Figure 2.2-5 shows the locations of well data received from Grimmway Farms, Bolthouse Farms, Grapevine Capital Partners, and SBCWA. The locations of Grimmway and Bolthouse Farms well data are located in the central portion of the basin, between the Cuyama River and Highway 33, generally running along Highway 166. The locations of Grapevine Capital Partners well data are located along the Cuyama River and Highway 166, near the Russell Ranch Oilfields. The locations of SBCWA well data are located west of Cottonwood Canyon. Data collected from Grimmway and Bolthouse farms has been measured once per year, in conjunction with their well maintenance program. The date of measurement varies significantly by year. Data provided by Grapevine Capital Partners and SBCWA is bi-annual, with one measurement in the spring, and one measurement in the fall.

Figure 2.2-6 shows the locations of collected data by their last measured date. Wells monitored in 2017-2018 are shown in bright green triangles. Recent measurements are near the Cuyama river in the eastern uplands and near Ventucopa and are concentrated in the central portion of the basin, north of Highway 166. Recent monitoring also occurs throughout the central basin, is spread out in the western portion of the basin east of Aliso Canyon. An additional concentration of recent monitoring points is present along the Cuyama River near the Russell Ranch Oilfields.

Figure 2.2-7 shows a comparison of data collected from Bolthouse and Grimmway farms and data collected from DWR and the USGS. The figure shows the location of compared wells, and the measurements on those wells by source. The measurements of groundwater elevation among the measured wells indicate that the monitoring by the farms and agencies match in tracking historical trends and are accurate measurements.

Figure 2.2-8 shows a comparison of data collected from Grapevine Capital Partners, and data collected from Santa Barbara County. The figure shows the location of compared wells, and the measurements on those wells by source. A long-term comparison is not possible due to the shorter measurement period of the Santa Barbara County wells, but the measurements of groundwater elevation among the measured wells indicate that the monitoring by Grapevine Capital Partners and the county are similar in elevation, with the county’s data showing slightly higher elevations.

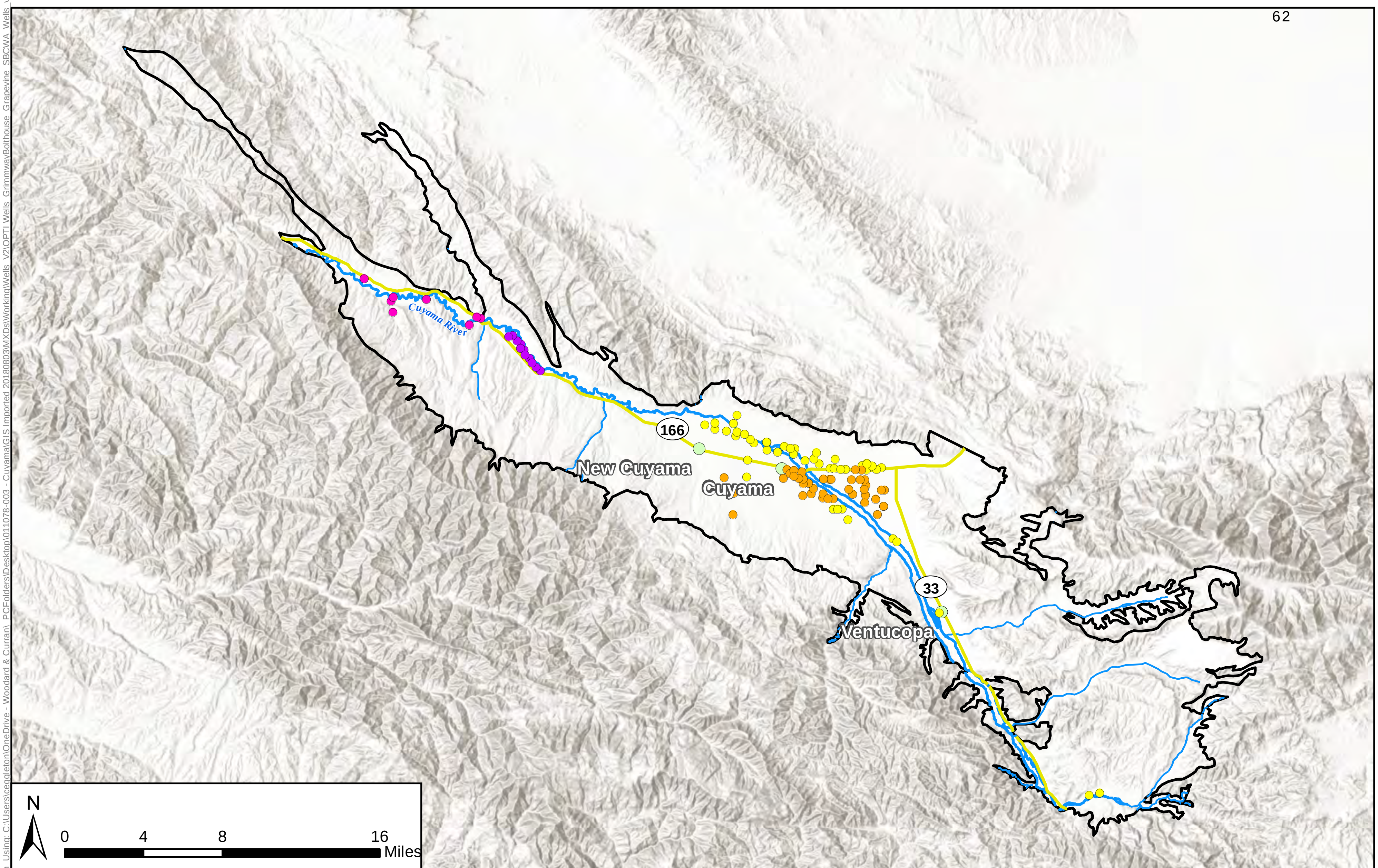


Figure 2.2-5: Cuyama Wells by Owners & Operating Entities

Cuyama Basin Groundwater Sustainability Agency

Cuyama Valley Groundwater Basin Groundwater Sustainability Plan

August 2018

WOODARD & CURRAN

Legend

- Cuyama Basin
- Towns
- Highways
- Cuyama River
- Streams
- Bolthouse Farms
- Grimmway Farms
- Grapevine Capital Partners
- Santa Barbara County Water Agency

Figure Exported: 8/16/2018 By: ceggleton Using: C:\Users\ceggleton\OneDrive - Woodard & Curran_PCFolders\Desktop\011078-003 - Cuyama\GIS imported 20180803\MXDs\WorkingWells_V2\OPTI Wells_GrimmwayBolthouse_Grapevine_SBCWA_Wells_v2.mxd

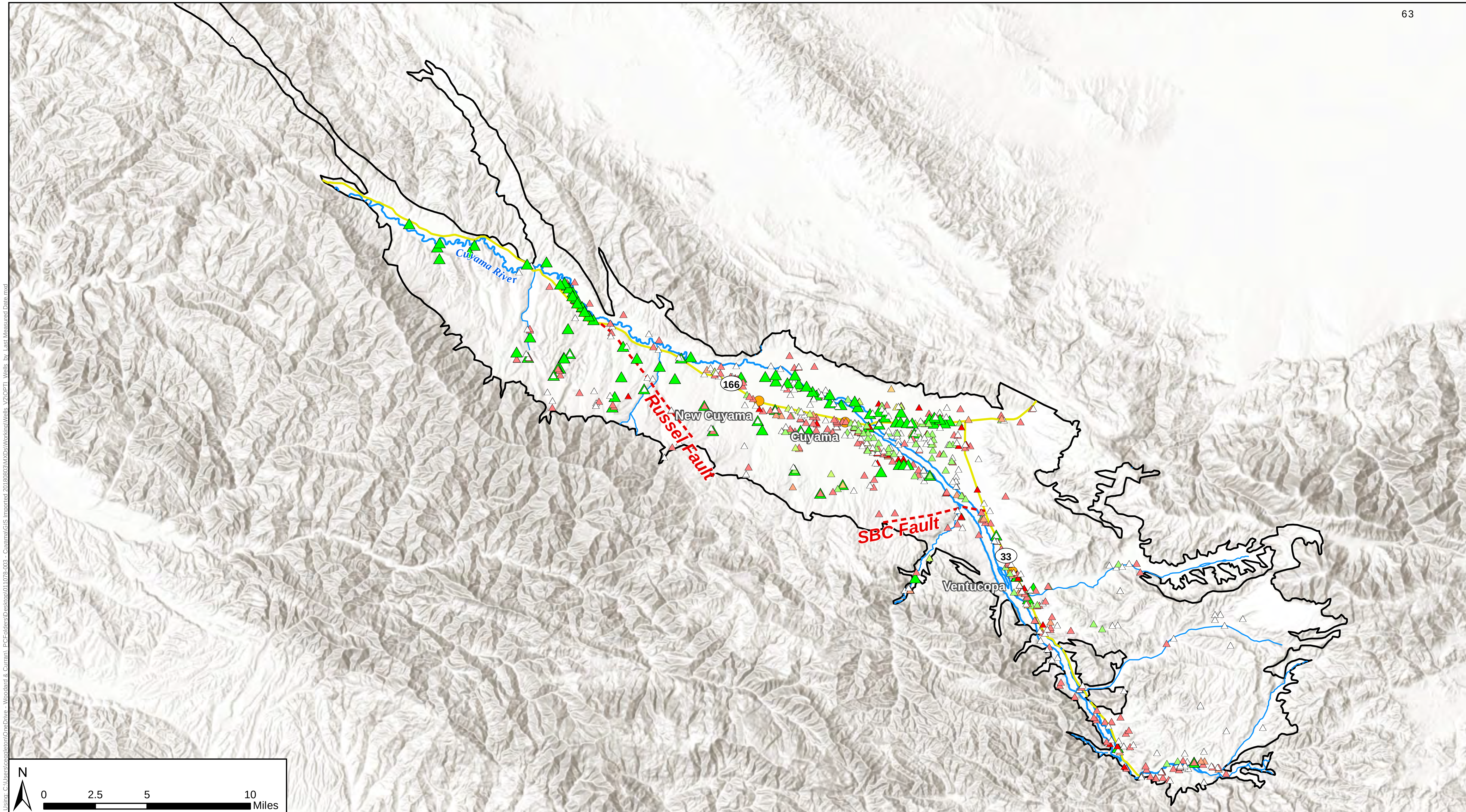


Figure 2.2-6: Cuyama GW Basin Wells by Last Measurement Date

Cuyama Basin Groundwater Sustainability Agency

Cuyama Valley Groundwater Basin Groundwater Sustainability Plan

August 2018

WOODARD & CURRAN

Legend

Most Recent Year with Measurements

- Cuyama Basin
- Towns
- Highways
- Cuyama River
- Streams
- Fault
- 2017 - 2018
- 2010 - 2016
- 2000 - 2009
- 1990 - 1999
- 1980 - 1989
- 1970 - 1979
- 1960 - 1969
- 1950 - 1959
- Pre-1950
- No Measurment Data

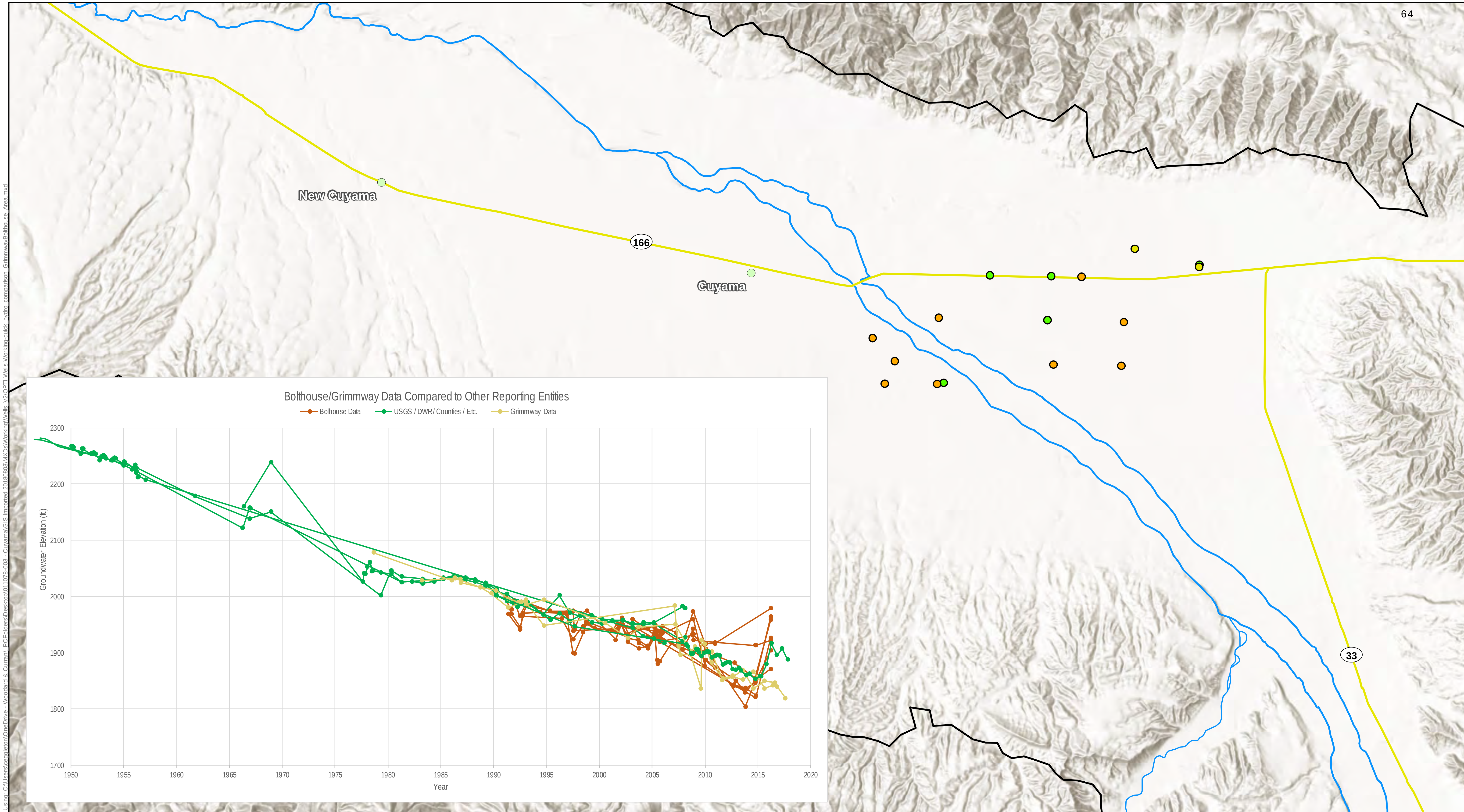


Figure 2.2-7: Cuyama Central GW Basin Wells and Hydrographs by Data Source

Cuyama Basin Groundwater Sustainability Agency

Cuyama Valley Groundwater Basin Groundwater Sustainability Plan

August 2018

WOODARD & CURRAN

Legend

- Cuyama Basin
- Towns
- Highways
- Cuyama River
- Streams
- USGS, DWR, County, Etc., Wells
- Grimmway Wells
- Bolthouse Wells

N

0 0.5 1 2 Miles

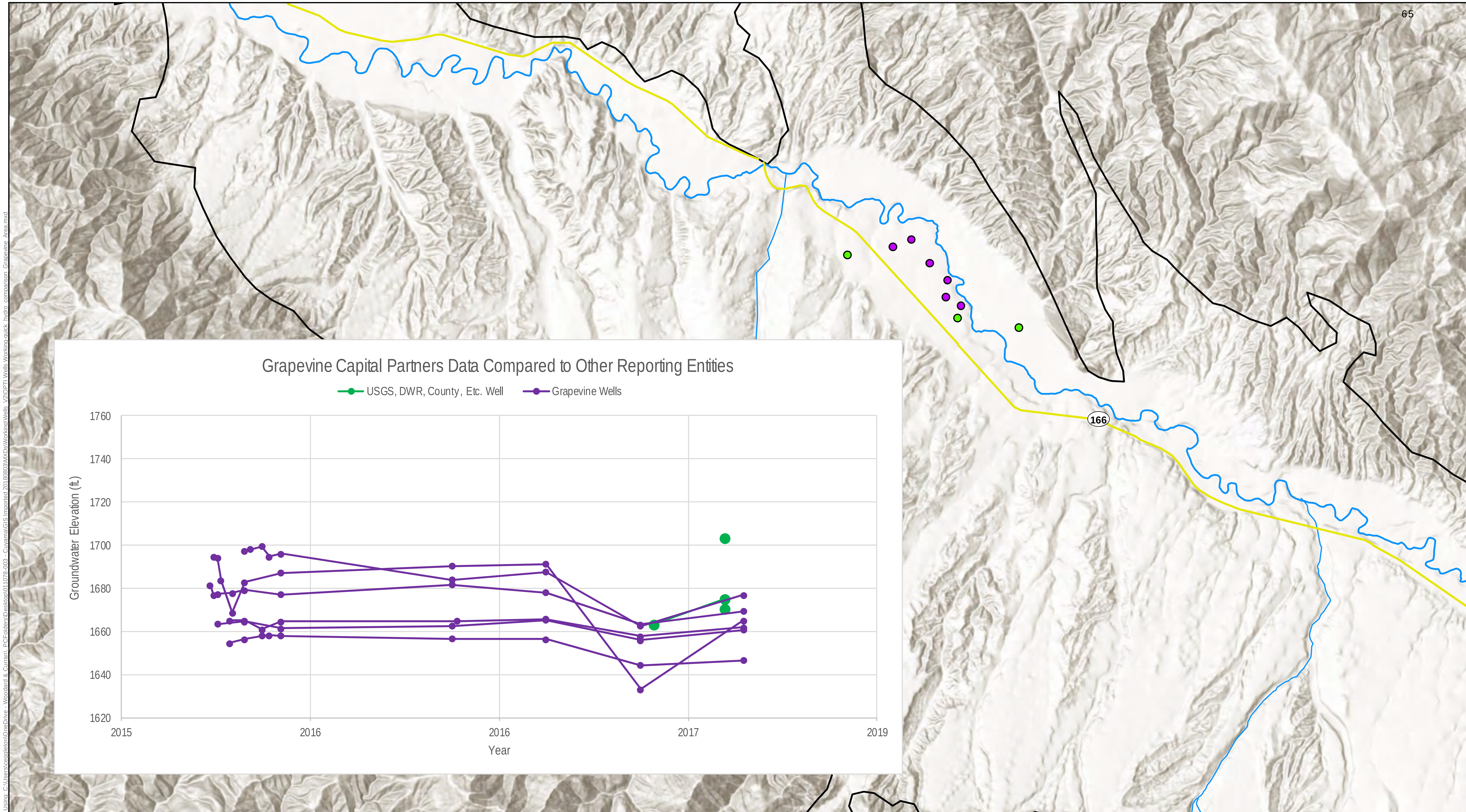


Figure 2.2-8: Cuyama GW Basin Wells by Groundwater Surface Elevation

Cuyama Basin Groundwater Sustainability Agency

Cuyama Valley Groundwater Basin Groundwater Sustainability Plan

August 2018

WOODARD & CURRAN

Legend

- Cuyama Basin
- Highways
- Cuyama River
- Streams
- USGS, DWR, County, Etc. Wells
- Grapevine Wells

N

0 0.5 1 2 Miles

2.2.3 Groundwater Trends

This section describes groundwater trends in the basin generally from the oldest available studies and data to the most recent. Groundwater conditions vary widely across the Basin. Groundwater conditions were evaluated and summarized for this section based on historical reports and groundwater level monitoring.

1947 to 1966 Groundwater Trends

Information about groundwater conditions in the basin are limited to reports that discuss the central portion of the basin and scattered groundwater elevation measurements in monitoring wells. This section discusses published reports about conditions from 1947 to 1966.

The report *Water Levels in Observation Wells in Santa Barbara County, California* (USGS 1956) discussed groundwater elevation monitoring in the Cuyama Valley Groundwater Basin. The report states that prior to 1946, there was no electric power in the valley, which restricted intensive irrigation, and that groundwater levels in the central portion of the basin remained fairly static until 1946. The report states that:

"Declines in groundwater began after 1946" (USGS 1956). Groundwater declined "as much as 8.8 feet from the spring of 1955 to 1956; the average decline was 5.2 feet. The decline of water levels at the lower and upper ends of the valley during this period was not so great as in the middle portion and averaged 1.7 and 2.2 feet respectively. Since 1946, water levels in observation wells have decline on the average about 27 feet."

The report *Hydrologic Models and Analysis of Water Availability in the Cuyama Valley, California* (USGS 2015) presents two maps generated by the Cuyama Valley Hydrologic Model (CUVHM) simulated data. Figure 2.2-9 shows the estimated drawdown in the central portion of the basin from 1947 to 1966. Figure 2.2-9 shows that estimated drawdown ranged from zero at the edges of the central basin to over 160 feet in the southeastern portion of the central basin. Figure 2.2-10 shows the estimated contours of groundwater elevation for September 1966. These contours show a low area in the central portion of the central basin, and a steep groundwater gradient in the southeast near Ventucopa and in the highlands. A gentle groundwater gradient occurs in the southwestern portion of the central basin, generally matching topography.

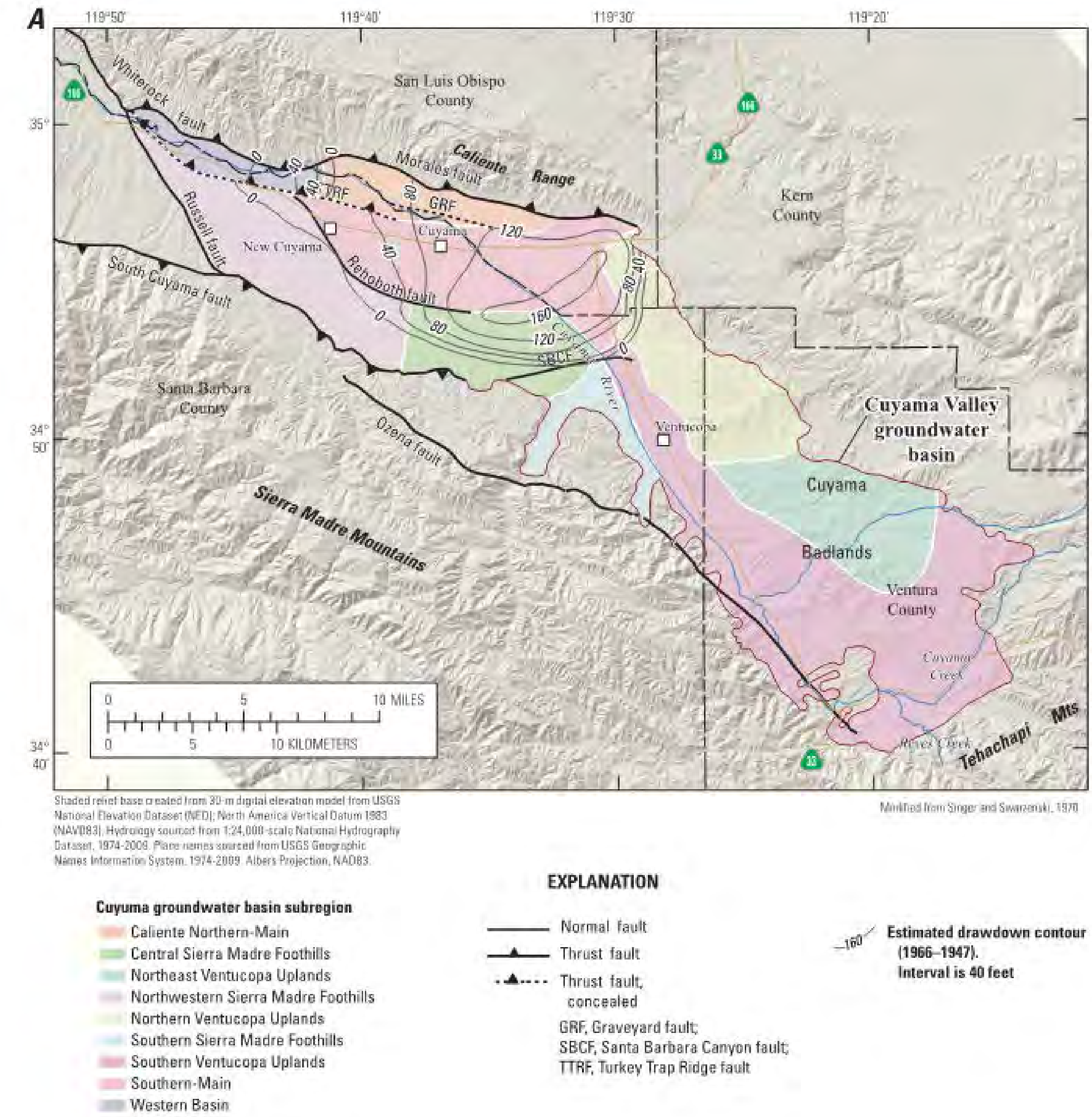


Figure 2.2-9: USGS 2015 – Water Level Drawdown Contours 1966 - 1947

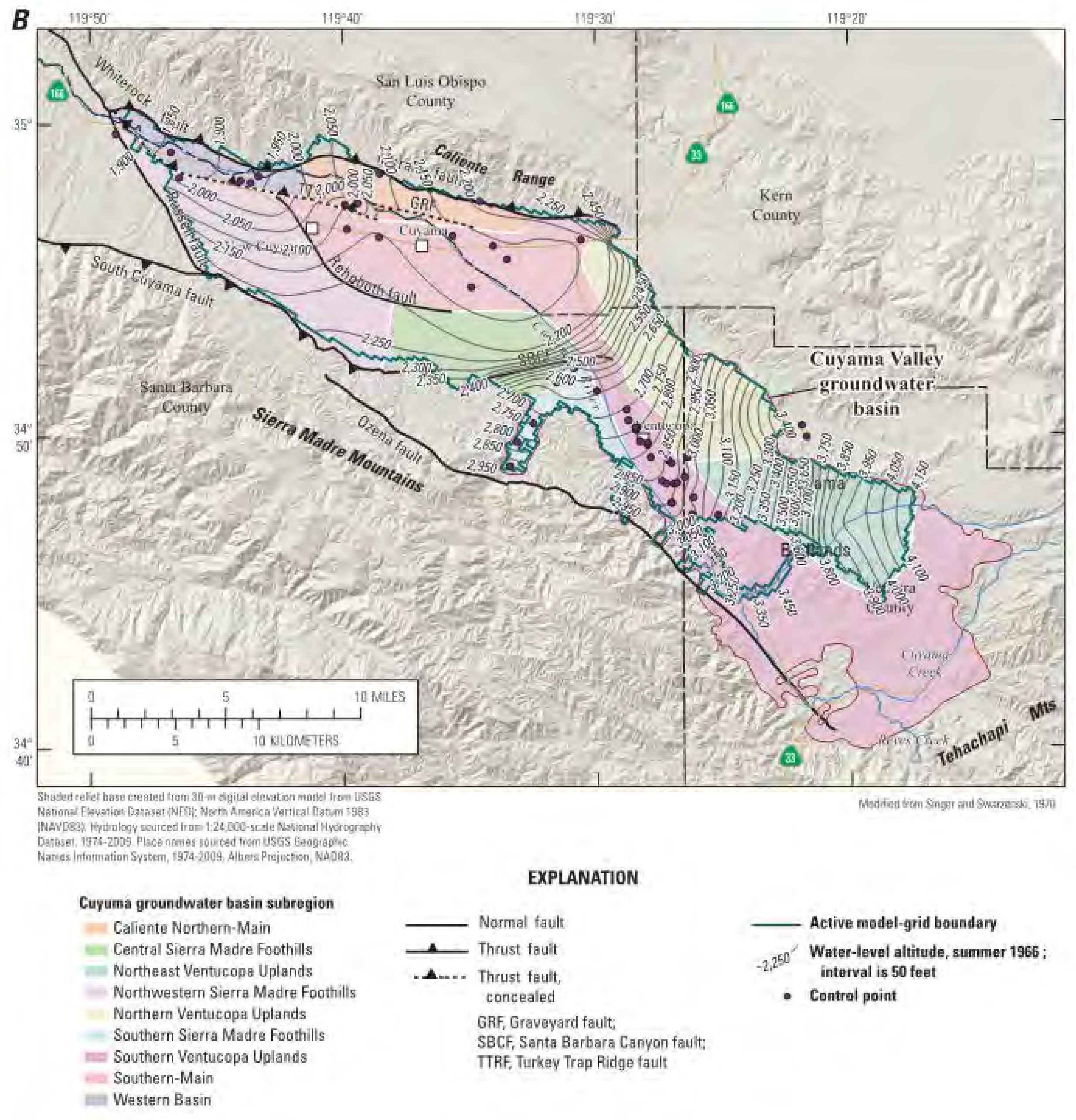


Figure 2.2-10: USGS 2015 – Water Level Contours 1966

Groundwater Hydrographs

Groundwater hydrographs were developed to provide indicators of groundwater trends throughout the Basin. Measurements from each monitoring well were compiled into one hydrograph for each well. Hydrographs for all monitoring wells with elevation data that were collected are presented in Appendix X.

Groundwater conditions in the Basin generally vary by general area in the basin. Figure 2.2-11 shows Hydrographs in different portions of the basin. Generally speaking:

- In the area southeast of Round Springs Canyon, near Ozena Fire Station - Groundwater levels have stayed relatively stable with a small decline in the 2012-2015 drought and quick recovery.
- In the vicinity of Ventucopa - Groundwater levels followed climactic patterns and have generally been declining since 1995.
- Just south of the SBCF – Groundwater levels have been fairly stable and are closer to the surface than levels in Ventucopa.
- North of the SBCF and east of Bitter Creek in the central portion of the basin - Groundwater levels have been declining consistently since 1947.
- In the western area west of Bitter Creek are near the surface near the Cuyama river, and deeper below ground to the south, uphill from the river, and have been generally stable since 1966.

Figure 2.2-12 shows selected hydrographs in the areas near Ventucopa. In the area southeast of Round Springs Canyon, near Ozena Fire Station, the hydrograph for Well 89 is representative of monitoring wells in this area, and groundwater levels have stayed relatively stable with a small decline in the 2012-2015 drought and quick recovery. Near Ventucopa, hydrographs for Wells 85 and 62 show the same patterns and conditions from 1995 to the present and show that groundwater levels in this area respond to climactic patterns, but also have been in decline since 1995 and are currently at historic low elevations. Prior to 1995, the hydrograph for Well 85 shows that groundwater levels responded to drought conditions but recovered during wetter years. The hydrograph for Well 40 is located just south of the SBCF and indicates that groundwater levels in this location have remained stable from 1951 to 2013, when monitoring ceased. Hydrographs for wells 91, 316, and 620 are north of the SBCF and show more recent conditions, where depth to water has declined consistently and is below 580 below ground surface (bgs).

Figure 2.2-13 shows hydrographs of discontinued monitoring wells in the central portion of the basin, north of the SBCF and east of Bitter Creek. The hydrographs in this area show consistent declines of groundwater levels and little to no responses to either droughts or wetter periods. The hydrograph for Well 35 shows a consistent decline from 1955 to 2008, from 30 feet bgs to approximately 150 feet bgs. Well 472 shows a decline from approximately 5 feet bgs in 1949 to approximately 85 feet bgs in 1978.

Figure 2.2-14 shows hydrographs of recently monitored wells in the central portion of the basin, north of the SBCF and east of Bitter Creek. In general, hydrographs in this area show that groundwater levels are decreasing, with the lowest levels in the southeast portion of the area just northwest of the SBCF, as shown in the Well 610 hydrograph, where groundwater levels were below 600 feet bgs. Levels remain lowered along the Cuyama River, as shown in the hydrographs for Wells 604 and 640, which are currently approximately 500 feet bgs. Groundwater levels are higher to the west (Well 72) and towards the southern end of the area (Well 96), however all monitoring wells in this area show consistent declines in elevation.

Figure 2.2-15 shows hydrographs of monitoring wells in the western portion of the basin, west of Bitter Creek. Hydrographs in this area show that generally, groundwater levels are near the surface near the Cuyama River, and further from the surface to the south, which is uphill from the river. The hydrograph for Well 119 shows a few measurements from 1953-1969, as well as three recent measurements, all measurements on this well show a depth to water of 60 feet bgs. The hydrograph for Well 846 shows that in 2015 depth to water was slightly above 40 feet and is slightly below 40 feet in 2018. The hydrograph for Well 840 shows a groundwater level near ground surface in 2015, and a decline to 40 feet bgs in 2018. Hydrographs for wells uphill from the river (Wells 573 and 121) show that groundwater is roughly 70 feet bgs in this area. Hydrographs for wells 571 and 108, at the edge of the basin only have recent measurements, show groundwater levels that range from 120 to 140 feet bgs.

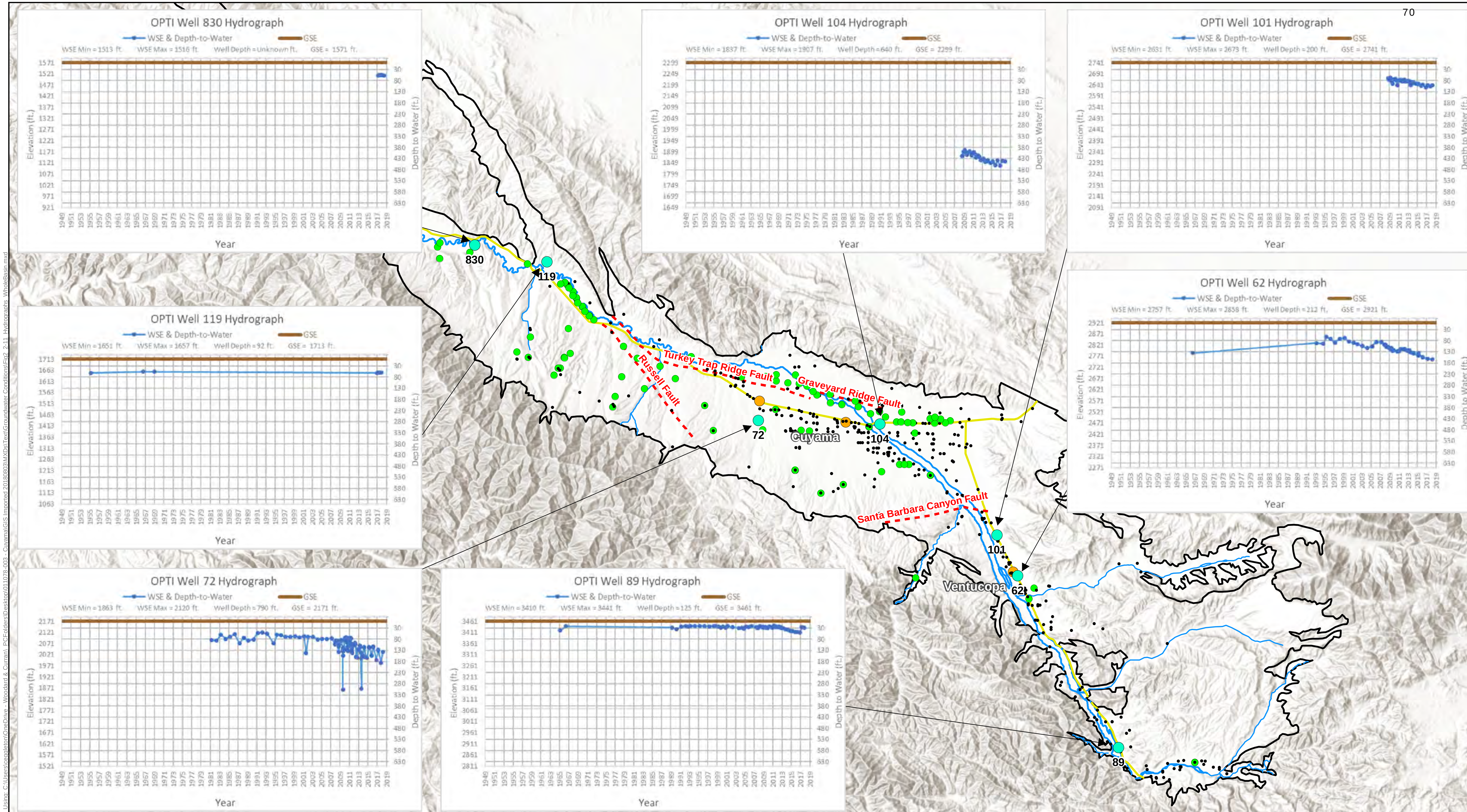


Figure 2.2-11: Cuyama GW Basin Hydrographs

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Legend

- Cuyama Basin
- Towns
- Highways
- Cuyama River
- Streams
- Faults
- Hydrographed Wells
- Currently Monitored Wells
- Not Currently Monitored

N

0 2.5 5 10 Miles

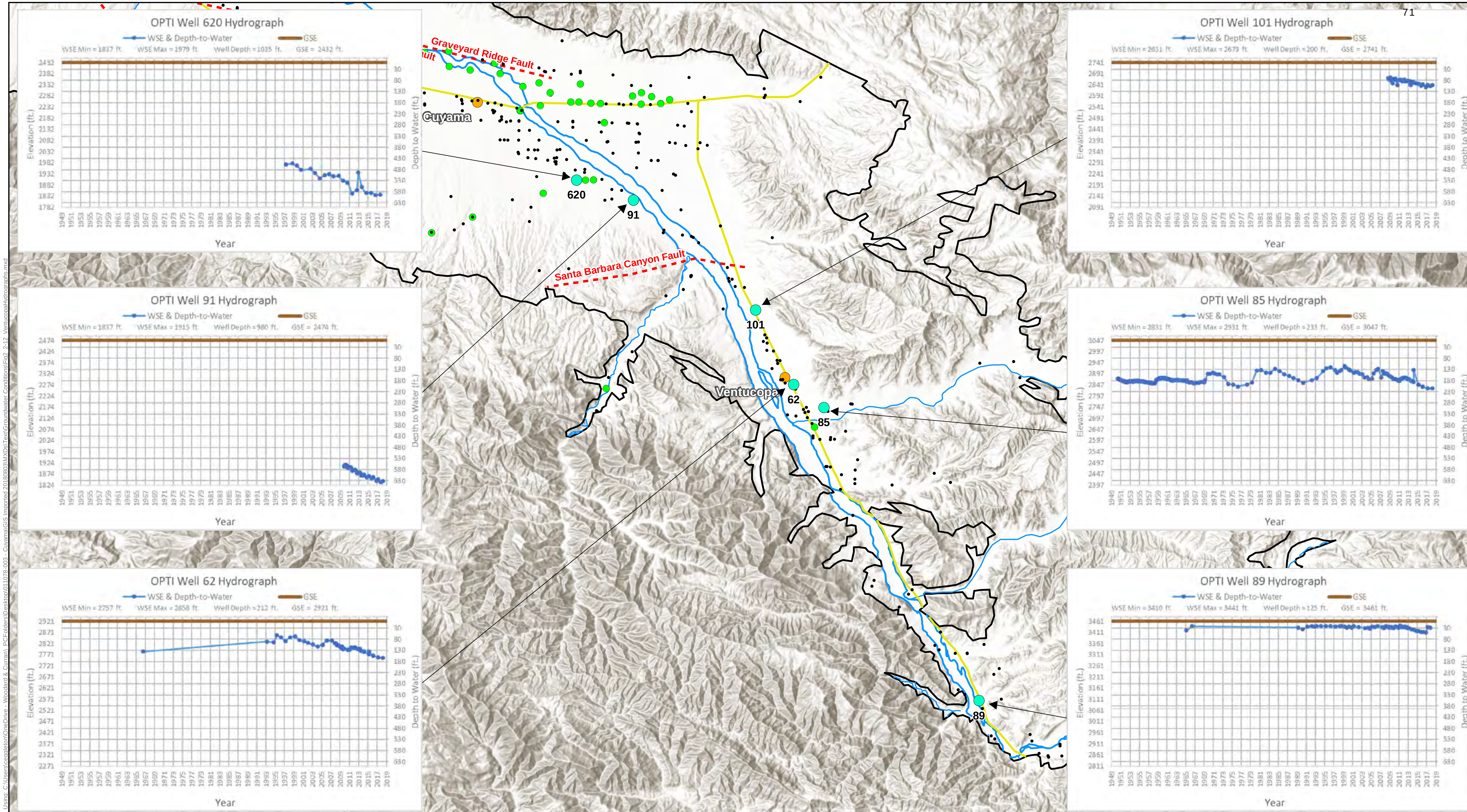

Figure 2.2-12: Cuyama GW Basin Hydrographs for the Ventucopa Area of the Basin

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Legend

- Cuyama Basin
- Towns
- Highways
- Cuyama River
- Streams
- Faults
- Hydrographed Wells
- Currently Monitored Wells
- Not Currently Monitored

N

0 1.25 2.5 5 Miles

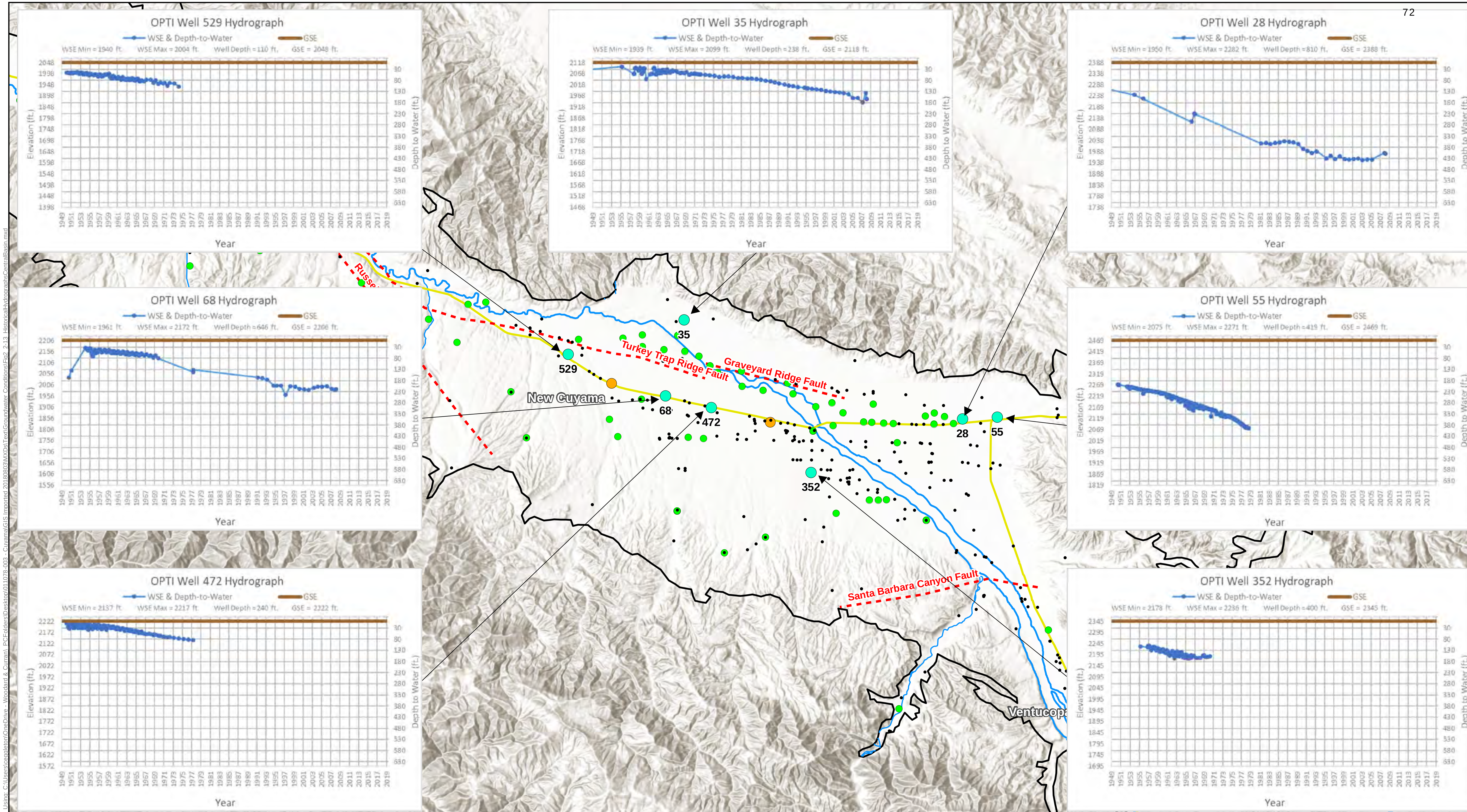

Figure 2.2-13: Cuyama GW Basin Hsitorical Hydrographs in the Central Basin

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Legend

- Cuyama Basin
- Towns
- Highways
- Cuyama River
- Streams
- Faults
- Hydrographed Wells
- Currently Monitored Wells
- Not Currently Monitored

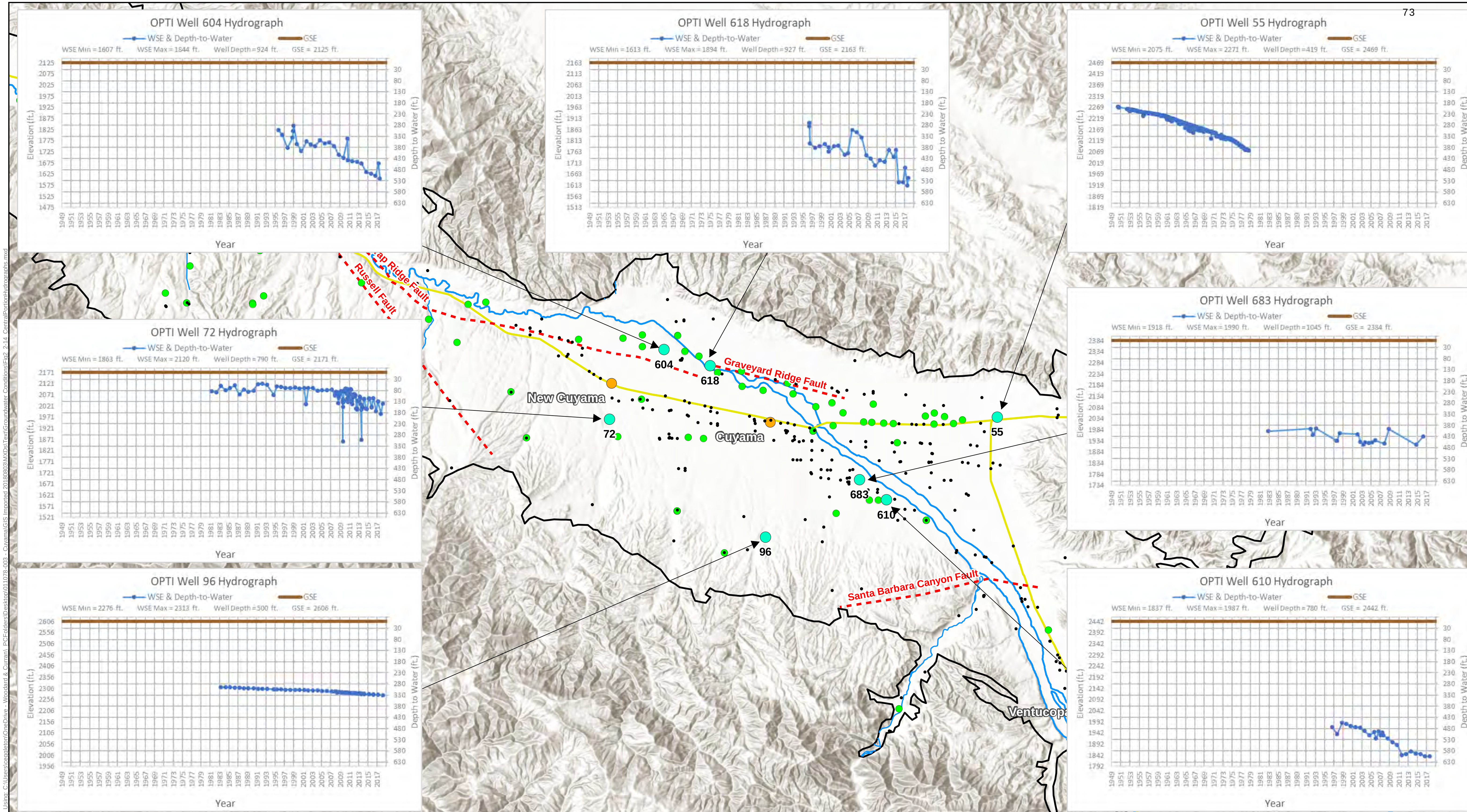

Figure 2.2-14: Cuyama GW Basin Hydrographs for the Central Portion of the Basin

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Legend

- Cuyama Basin
- Towns
- Highways
- Cuyama River
- Streams
- Faults
- Hydrographed Wells
- Currently Monitored Wells
- Not Currently Monitored

N

0 1.25 2.5 5 Miles

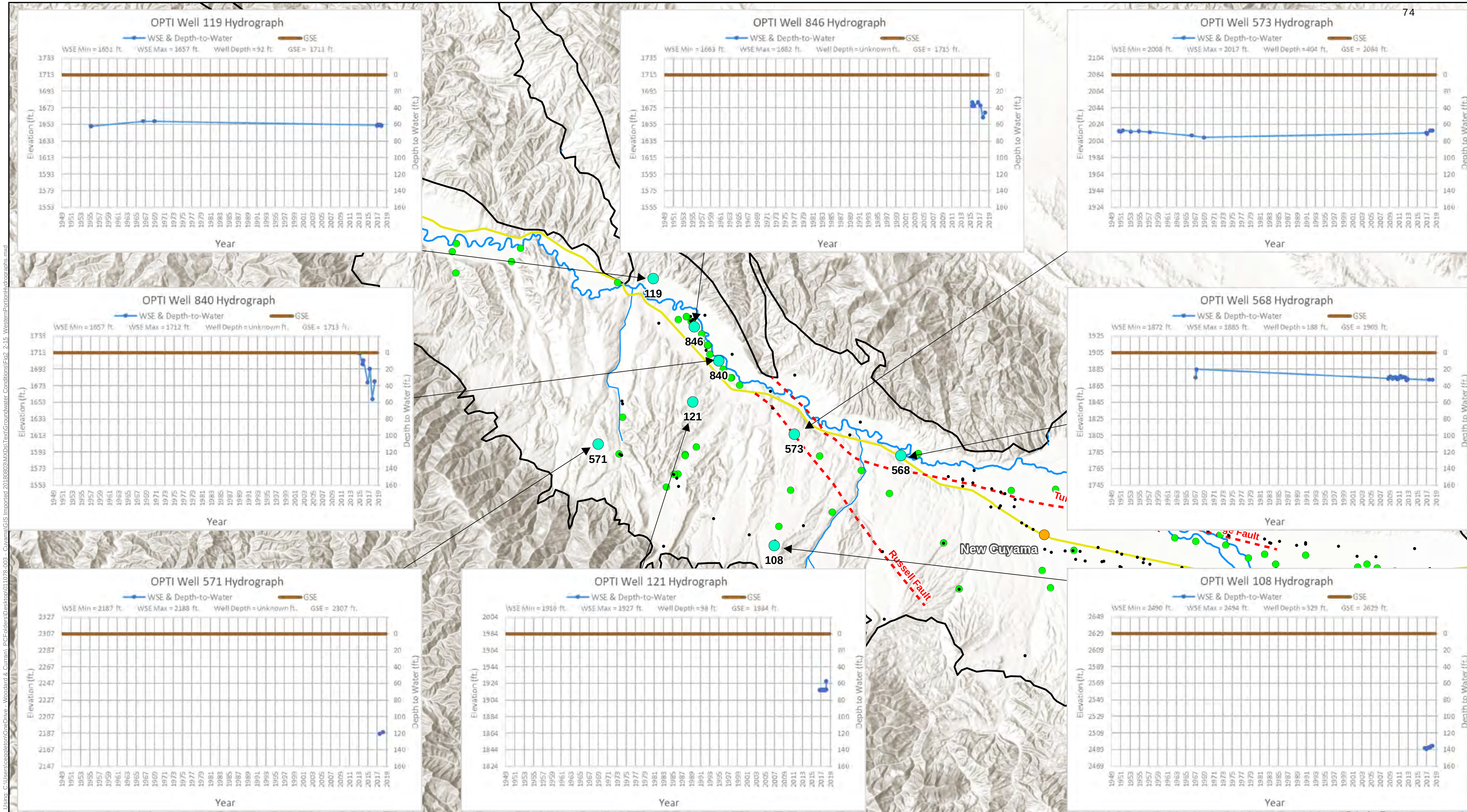

Figure 2.2-15: Cuyama GW Basin Hydrographs for the Westside Area of the Basin

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Legend

- Cuyama Basin
- Towns
- Highways
- Cuyama River
- Streams
- Faults
- Hydrographed Wells
- Currently Monitored Wells
- Not Currently Monitored

N

0 1.25 2.5 5 Miles

Vertical Gradients

A vertical gradient describes the movement of groundwater perpendicular to the ground surface. Vertical gradient is typically measured by comparing the elevations of groundwater in a well with multiple completions that are of different depths. If groundwater elevations in the shallower completions are higher than in the deeper completions, the gradient is identified as a downward gradient. A downward gradient is one where groundwater is moving down into the ground. If groundwater elevations in the shallower completions are lower than in the deeper completions, the gradient is identified as an upward gradient. An upward gradient is one where groundwater is upwelling towards the surface. If groundwater elevations are similar throughout the completions, there is no vertical gradient to identify. Knowledge about vertical gradients is required by regulation and is useful for understanding how groundwater moves in the Basin.

There are three multiple completion wells in the Basin. The locations of the multiple completion wells are shown in Figure 2.2-3 Monitoring Well Data Received From USGS. The three multiple completion wells are located in the central portion of the basin, north of the SBCF and east of Bitter Creek.

Figure 2.2-16 shows the combined hydrograph the multiple completion well CVFR, which was installed by the USGS. CVFR is comprised of four completions, each at different depths:

- CVFR-1 is the deepest completion with a screened interval from 960 to 980 feet bgs
- CVFR-2 is the second deepest completion with a screened interval from 810 to 830 feet bgs
- CVFR-3 is the third deepest completion with a screened interval from 680 to 700 feet bgs
- CVFR-4 is the shallowest completion with a screened interval from 590 to 610 feet bgs

The hydrograph of the four completions shows that they are at the same elevation at each completion, and therefore there is no vertical gradient at this location.

Figure 2.2-17 shows the combined hydrograph the multiple completion well CVBR, which was installed by the USGS. CVBR is comprised of four completions, each at different depths:

- CVBR-1 is the deepest completion with a screened interval from 830 to 850 feet bgs
- CVBR-2 is the second deepest completion with a screened interval from 730 to 750 feet bgs
- CVBR-3 is the third deepest completion with a screened interval from 540 to 560 feet bgs
- CVBR-4 is the shallowest completion with a screened interval from 360 to 380 feet bgs

The hydrograph of the four completions shows that at the deeper completions are slightly lower than the shallower completions in the spring at each completion, and deeper completions are generally lower in the summer and fall. This likely indicates that during the irrigation season, the deeper portions of the aquifer are where pumping occurs, which removes water from the deeper portion of the aquifer, creating a vertical gradient during the summer and fall. By the spring, enough water has moved down to replace removed water, and the vertical gradient is significantly smaller at this location in the spring measurements.

Figure 2.2-18 shows the combined hydrograph the multiple completion well CVKR, which was installed by the USGS. CVKR is comprised of four completions, each at different depths:

- CVKR-1 is the deepest completion with a screened interval from 960 to 980 feet bgs
- CVKR-2 is the second deepest completion with a screened interval from 760 to 780 feet bgs
- CVKR-3 is the third deepest completion with a screened interval from 600 to 620 feet bgs
- CVKR-4 is the shallowest completion with a screened interval from 440 to 460 feet bgs

The hydrograph of the four completions shows that at the deeper completions are slightly lower than the shallower completions in the spring at each completion, and deeper completions are generally lower in the summer and fall. This likely indicates that during the irrigation season, the deeper portions of the aquifer are where pumping occurs, which removes water from the deeper portion of the aquifer, creating a vertical gradient during the summer and fall. By the spring, enough water has moved down to replace removed water, and the vertical gradient is significantly smaller at this location in the spring measurements.

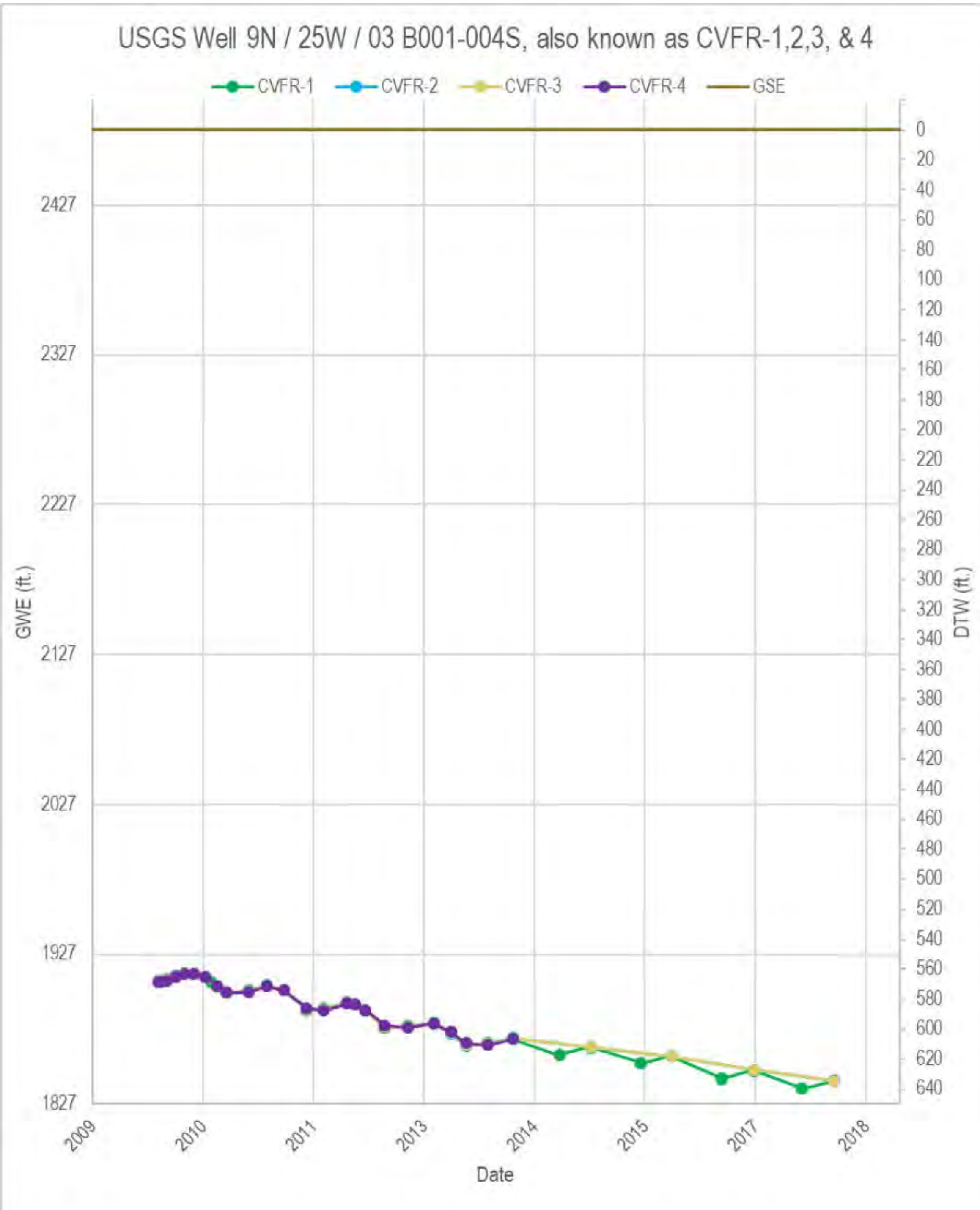

Figure 2.2-16: Hydrographs of CVFR1-4

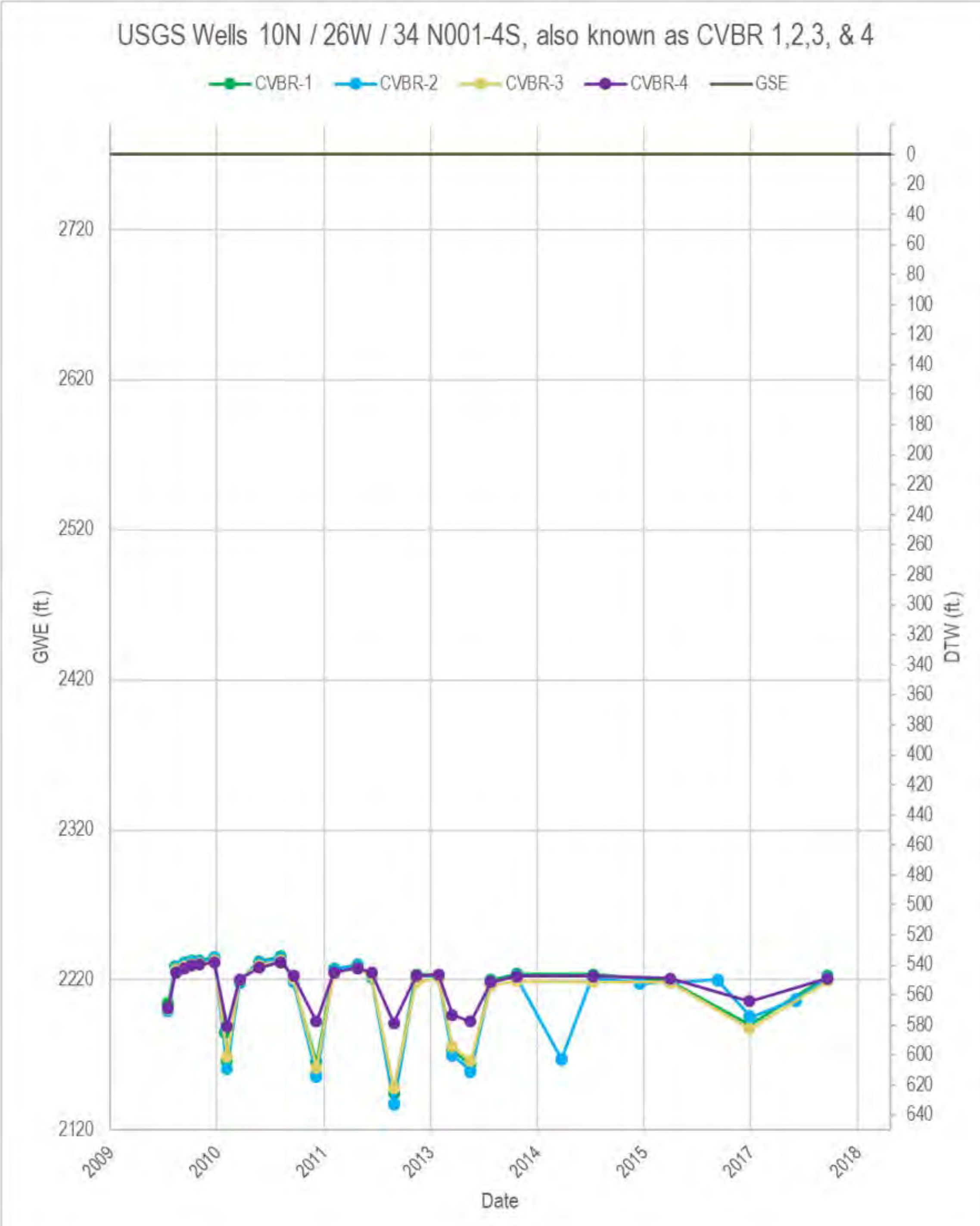

Figure 2.2-17: Hydrographs of CVBR1-4

Figure 2.2-18: Hydrographs of CVKR1-4

Groundwater Contours

Groundwater contour maps were prepared to improve understanding of recent groundwater trends in the basin. Data collected in Section 2.2.2 was used to develop the contour maps. A contour map shows changes in groundwater elevations by interpolating groundwater elevations between monitoring sites. The elevations are shown on the map with the use of a contour line, which indicates that at all locations that line is drawn, it represents groundwater being at the elevation indicated. There are two versions of contour maps used in this section, one which shows the elevation of groundwater above msl, which is useful because it can be used to identify the horizontal gradients of groundwater, and one which shows contours of depth to water, the distance from the ground surface to groundwater, which is useful because it can identify areas of shallow or deep groundwater.

Groundwater contour maps were prepared for both groundwater elevation and depth to water for the following periods and are described below: Spring 2018, Fall 2017, Spring 2017, Spring 2015, and Fall 2014. These years were selected for contours to provide analysis of current conditions, and to identify conditions near January 1, 2015, which is a key date in Sustainable Groundwater Management Act (SGMA) legislation.

Each contour map follows the same general format. Each contour map is contoured at a 50 foot contour interval, with contour elevations indicated in white numeric labels, and measurements at individual monitoring points indicated in black numeric labels. Areas where the contours are dashed and not colored in are inferred contours that extend elevations beyond data availability and are included for reference only. The groundwater contours prepared for this section were based on several assumptions in order to accumulate enough data points to generate useful contour maps:

- Measurements from wells of different depths are representative of conditions at that location and there are no vertical gradients. Due to the limited spatial amount of monitoring points, data from wells of a wide variety of depths were used to generate the contours.
- Measurements from dates that may be as far apart temporally as three months are representative of conditions during the spring or fall season, and conditions have not changed substantially from the time of the earliest measurement used to the latest. Due to the limited temporal amount of measurements in the basin, data from a wide variety of measurement dates were used to generate the contours.

These assumptions make the contours useful at the planning level to understand groundwater levels across the basin, and to identify general horizontal gradients and regional groundwater level trends. The contour maps are not indicative of exact values across the basin because groundwater contour maps approximate conditions between measurement points, and do not account for topography. Therefore, a well on a ridge may be farther from groundwater than one in a canyon, and the contour map will not reflect that level of detail.

Expansion and improvement of the monitoring network in order to generate more accurate understandings of groundwater trends in the basin is discussed in Section Z: Monitoring Networks

Figure 2.2-19 shows groundwater elevation contours for spring of 2018. In the southeastern portion of the basin near Ventucopa, groundwater has a horizontal gradient to the northwest. The gradient increases in the vicinity of the SBCF and flows to an area of lowered groundwater elevation southeast of the town of Cuyama. From the town of New Cuyama to the west, groundwater has a horizontal gradient that generally flows to the northeast, from areas with higher elevation topography towards areas with lower elevation topography where the Cuyama River is located.

Figure 2.2-20 shows depth to groundwater contours for spring of 2018. In the southeastern portion of the basin near Ventucopa, groundwater is mostly between 100 and 150 feet bgs. Just south the SBCF, groundwater is near 100 feet bgs. North of the SBCF, depth to groundwater declines rapidly and is over 600 feet bgs. Depth to groundwater reduces to the west towards New Cuyama, where groundwater is around 150 feet bgs. West of Bitter Creek, groundwater is shallower than 100 feet bgs in most locations, and is shallower than 50 feet bgs in the far west and along the Cuyama River.

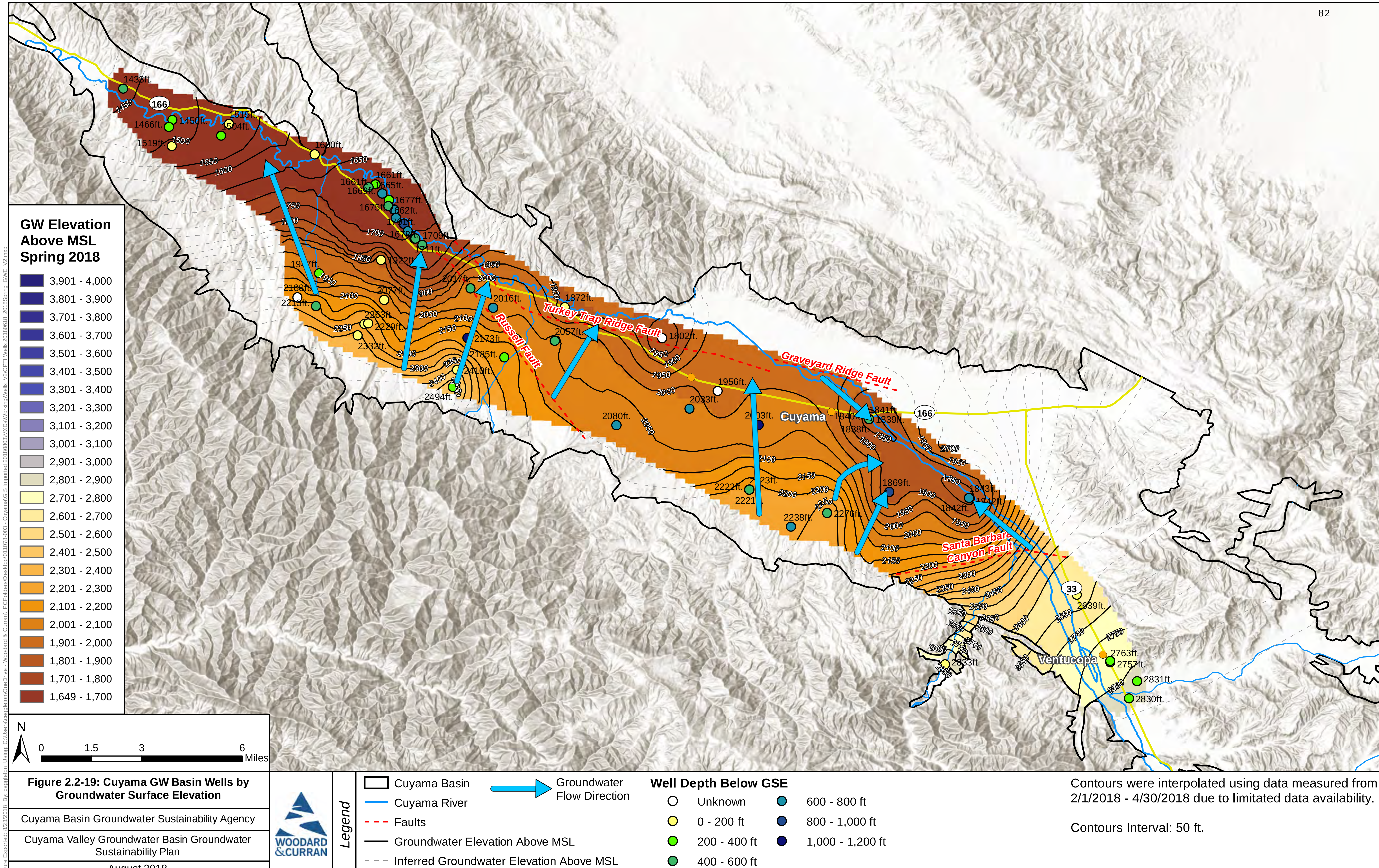

Figure 2.2-19: Cuyama GW Basin Wells by Groundwater Surface Elevation

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Cuyama Valley Groundwater Basin Groundwater Sustainability Plan

August 2018

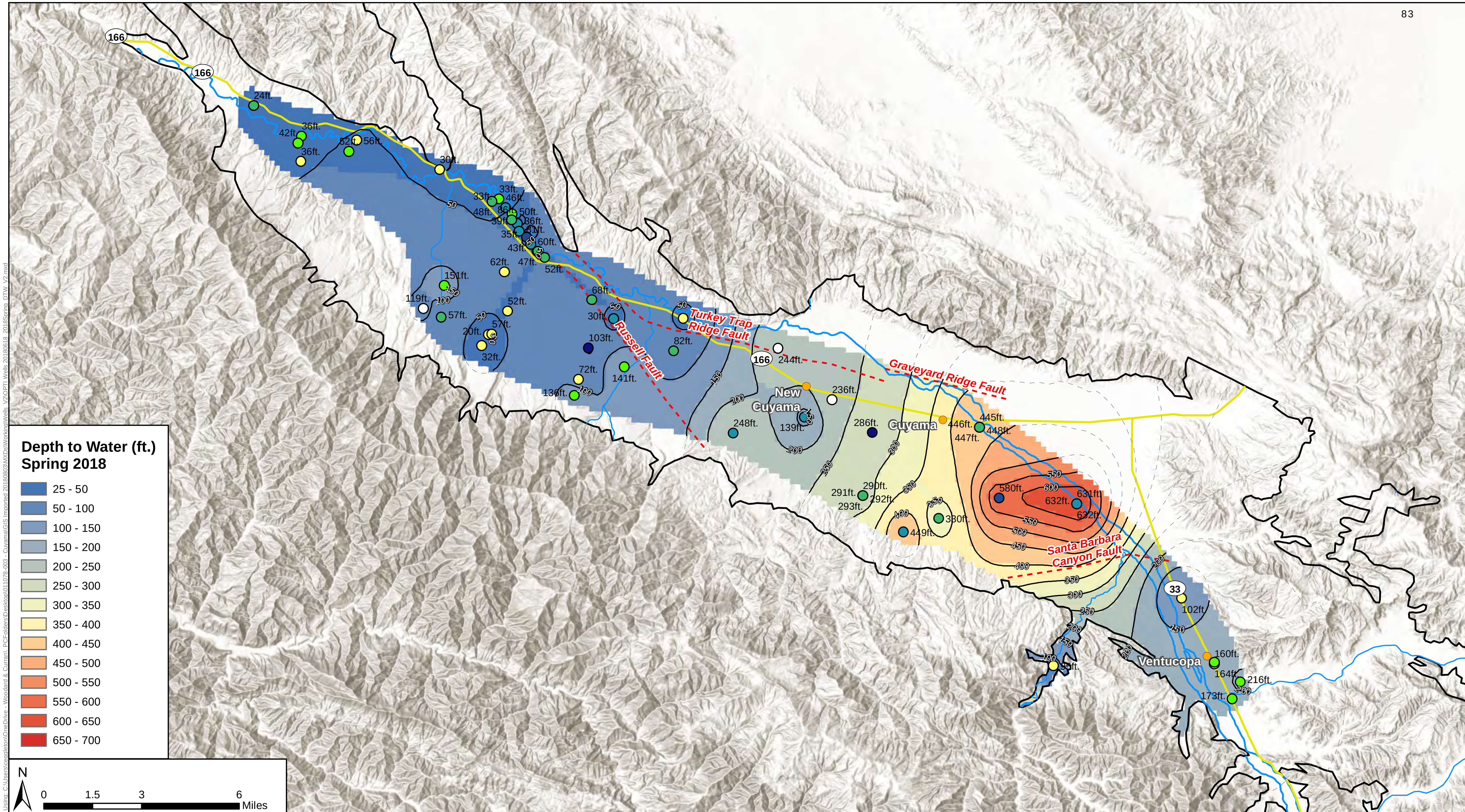

Figure 2.2-20: Cuyama GW Basin Wells by Groundwater Surface Elevation

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August 2018

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Legend

- Cuyama Basin
- Cuyama River
- Faults
- Groundwater Depth-to-Water Contours below Groundsurface
- Inferred Groundwater Depth-to-Water Contours below Groundsurface

Well Depth Below GSE

- Unknown
- 0 - 200 ft
- 200 - 400 ft
- 400 - 600 ft
- 600 - 800 ft
- 800 - 1,000 ft
- 1,000 - 1,200 ft

Contours were interpolated using data measured from 2/1/2018 - 4/30/2018 due to limitated data availability.

Contours Interval: 50 ft.

Contour maps for spring 2017, fall 2017, spring 2015, and fall 2014 are included in Appendix Y. Each contour map is described in this section.

Figure Y-1 shows groundwater elevation contours for fall of 2017. Because more data was available in this time frame, the contour map has increased detail in some areas. In the southeastern portion of the basin near the Ozena fire station, groundwater gradients appear to indicate flows that follow the Cuyama River. The contour map shows a steep gradient north of the SBCF and flows to an area of lowered groundwater elevation northeast of the town of Cuyama. From the town of New Cuyama to the west, groundwater has a horizontal gradient that generally flows to the northeast, from areas with higher elevation topography towards areas with lower elevation topography where the Cuyama River is located.

Figure Y-2 shows depth to water contours for fall of 2017. Because more data was available in this time frame, the contour map has increased detail in some areas. In the southeastern portion of the basin near the Ozena fire station, depth to water is under 50 feet bgs. There is a steep gradient near the SBCF, and groundwater is below 600 feet bgs immediately northwest of the SBCF. The central portion of the basin generally has a depth to water between 400 and 500 feet bgs, with groundwater levels rising to the west of New Cuyama. West of Bitter Creek, groundwater is generally shallower than 100 feet below bgs, and is shallower than 50 feet bgs along the Cuyama River in most cases.

Figure Y-3 shows groundwater elevation contours for spring of 2017. Because more data was available in this time frame, the contour map has increased detail in some areas. In the southeastern portion of the basin near the Ozena fire station, groundwater gradients appear to indicate flows that follow the Cuyama River. The contour map shows a steep gradient north of the SBCF and flows to an area of lowered groundwater elevation northeast of the town of Cuyama. From the town of New Cuyama to the west, groundwater has a horizontal gradient that generally flows to the northeast, from areas with higher elevation topography towards areas with lower elevation topography where the Cuyama River is located.

Figure Y-4 shows depth to water contours for spring of 2017. In the southeastern portion of the basin near the Ozena fire station, depth to water is under 50 feet bgs. Depth to groundwater near Ventucopa is between 150 and 200 feet bgs. There is a steep gradient near the SBCF, and groundwater is below 600 feet bgs immediately northwest of the SBCF. The central portion of the basin generally has a depth to water between 350 and 500 feet bgs, with groundwater levels rising to the west of New Cuyama. West of Bitter Creek, groundwater is generally shallower than 100 feet below bgs, and is shallower than 50 feet bgs along the Cuyama River in most cases.

Figure Y-5 shows groundwater elevation contours for spring of 2015. In the southeastern portion of the basin near the Ozena fire station, groundwater gradients appear to indicate flows that follow the Cuyama River. The contour map shows a steep gradient north of the SBCF and flows to an area of lowered groundwater elevation northeast of the town of Cuyama. From the town of New Cuyama to the west, the limited number of data points restrict strong interpretation of the gradient, which is to the northwest.

Figure Y-6 shows depth to water contours for spring of 2015. In the southeastern portion of the basin near the Ozena fire station, depth to water is under 50 feet bgs. Depth to groundwater near Ventucopa is between 150 and 200 feet bgs. There is a steep gradient near the SBCF, and groundwater is below 600 feet bgs immediately northwest of the SBCF. The central portion of the basin generally has a depth to water between 350 and 450 feet bgs, with groundwater levels rising to the west of New Cuyama. Interpretation from New Cuyama to monitoring points in the northwest is hampered by a limited set of data points.

Figure Y-7 shows groundwater elevation contours for fall of 2014. In the southeastern portion of the basin near the Ozena fire station, groundwater gradients appear to indicate flows that follow the Cuyama River.

The contour map shows a steep gradient north of the SBCF and flows to an area of lowered groundwater elevation northeast of the town of Cuyama.

Figure Y-8 shows depth to water contours for fall of 2014. In the southeastern portion of the basin near the Ozena fire station, depth to water is under 50 feet bgs. There is a steep gradient near the SBCF, and groundwater is below 600 feet bgs immediately northwest of the SBCF. The central portion of the basin generally has a depth to water between 350 and 500 feet bgs, with groundwater levels rising to the west of New Cuyama. Interpretation from New Cuyama to monitoring points in the northwest is hampered by a limited set of data points.

2.2.4 Change in Groundwater Storage

This section is under development and will feature outputs from model development. This section will include the following:

- *Change in groundwater storage for the last 10 years*
- *How change in storage was calculated*
- *Estimates of annual use*
- *Water year types and their relationship to changes in storage*
- *Cover conditions at Jan 1 2015, or as close as possible*

2.2.5 Seawater Intrusion

Seawater intrusion is not an applicable sustainability indicator, because seawater intrusion is not present in the Basin and is not likely to occur due to the distance between the Basin and the Pacific Ocean, bays, deltas, or inlets.

2.2.6 Land subsidence

The USGS measured land subsidence as part of its technical analysis of the Cuyama Valley in 2015. The USGS used two continuous global positioning systems (GPS) sites and five reference point interferometric synthetic-aperture radar (InSAR) sites, shown in Figure 2.2-21 (USGS, 2015). There are 308 monthly observations from 2000 to 2010, and total subsidence over the 2000 to 2010 period ranged from 0.0 to 0.2 feet. The CUVHM's simulated subsidence estimates inelastic subsidence was initiated in the late 1970s (USGS, 2015).

Subsidence data was collected from the University NAVSTAR Consortium (UNAVCO) database. UNAVCO maintains data on five GPS monitoring stations in the area in and around the basin. Figure 2.2-22: Subsidence Monitoring Locations shows the monitoring stations and their measurements since 1999. Three stations (P521, OZST, and BCWR) are located just outside the basin. The three stations' measurements show ground surface level as either staying constant or slightly increasing. The increase is potentially due to tectonic activity in the region. Two stations (VCST and CUHS) are located within the basin. Station VCST is located near Ventucopa and indicates that subsidence is not occurring in that area. Station CUHS indicates that 300 millimeters (approximately 12 inches) of subsidence have occurred in the vicinity of New Cuyama over the 19 years that were monitored. The subsidence at this station increases in magnitude following 2010, and generally follows a seasonal pattern. The seasonal pattern is possibly related to water level drawdowns during the summer, and elastic rebound occurring during winter periods.

A white paper that provides information about subsidence and subsidence monitoring techniques is included in Appendix Z.

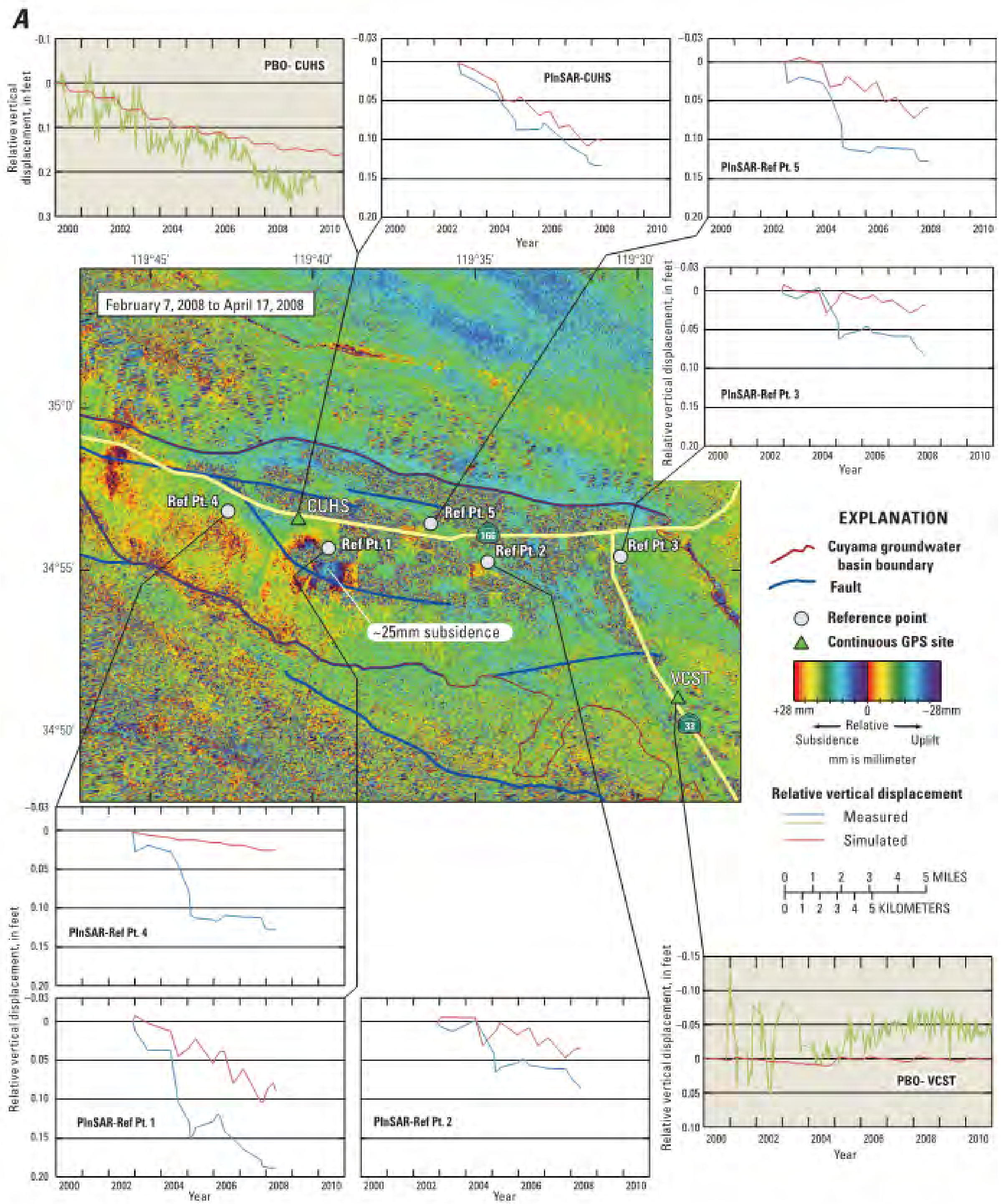

Figure 29. Historical subsidence as *A*, map of seasonal InSAR with graphs of simulated and measured time series for selected locations of relative land-surface deformation from Plate-Boundary Observation (PBO) sites and Point InSAR targets, and *B*, simulated total subsidence 1950–2010 for the calibrated hydrologic flow model, Cuyama Valley, California.

Source: USGS, 2015

Figure 2.2-21: Locations of Continuous GPS and Reference InSAR Sites in the Cuyama Valley

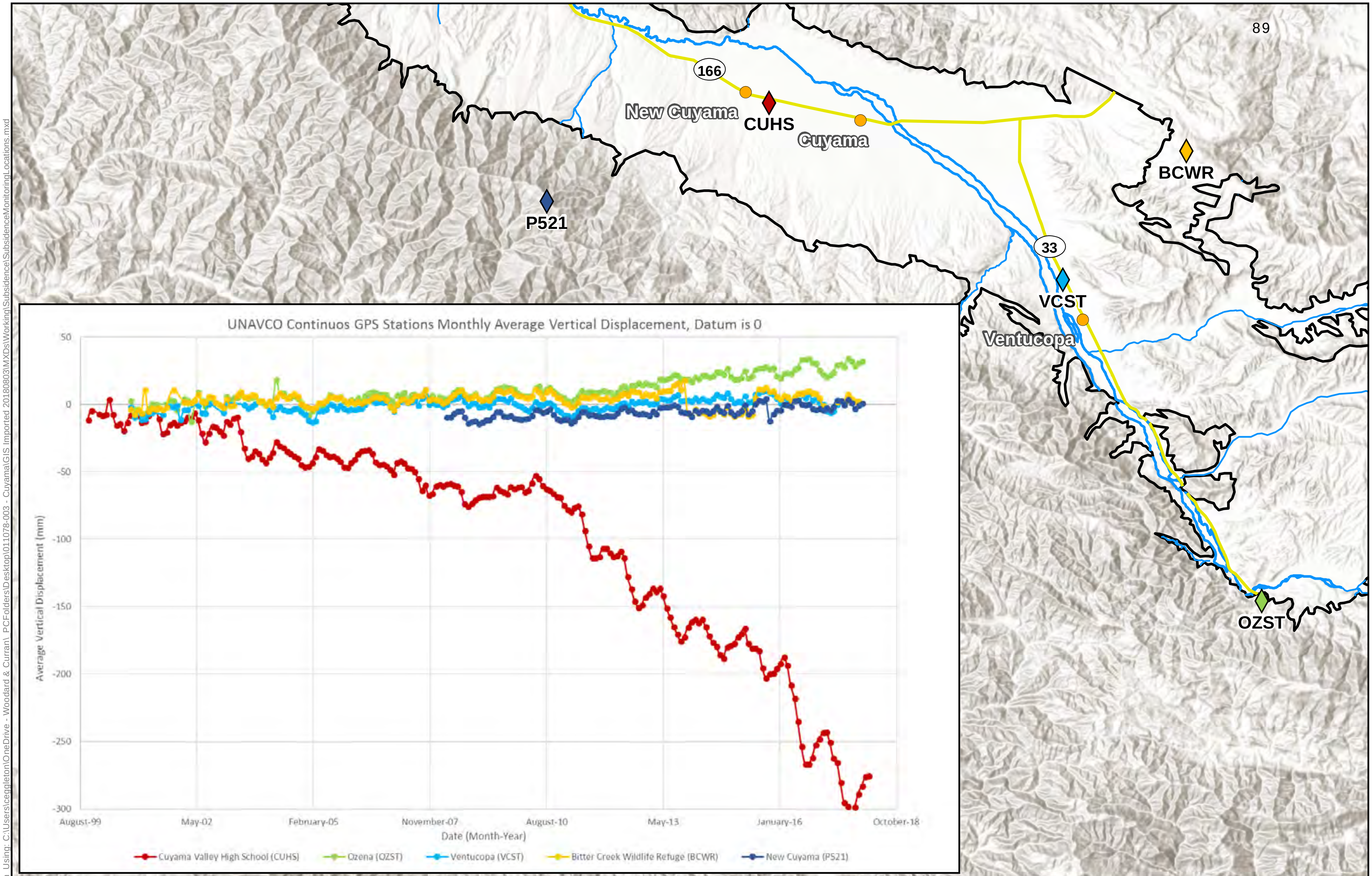

Figure 2.2-22: Subsidence Monitoring Locations

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Legend

- Cuyama Basin
- Towns
- Highways
- Cuyama River
- Streams

2.2.7 Groundwater Quality

This section presents groundwater quality information in the basin.

Reference and Data Collection

References and data related to groundwater quality were collected from a variety of sources. Data was collected from:

- National Water Quality Monitoring Council (USGS)- Downloaded 6/1/2018 from https://www.waterqualitydata.us/portal/
- GeoTracker GAMA (DWR)- Downloaded 6/5/2018, for each county, from http://geotracker.waterboards.ca.gov/gama/datadownload
- California Natural Resources Agency (DWR) downloaded 6/14/2018 from http://geotracker.waterboards.ca.gov/gama/datadownload
- County of Ventura
- Grapevine Capitol Partners

Data was compiled into a database for analysis.

References containing groundwater quality information were also collected. Data used in reference studies was not generally available for incorporation into the database. Therefore, references cite conditions that are not represented in collected data but are used to enhance understanding of groundwater quality conditions beyond available data. References used in this section include:

- Singer and Swarzensky, 1970 – *Pumpage and Ground-Water Storage Depletion in Cuyama Valley, 1947-1966.* This report focused on groundwater depletion, but also included information about groundwater quality.
- USGS, 2008 - *Groundwater-Quality Data in the South Coast Interior Basins Study Unit, 2008: Results from the California Groundwater Ambient Monitoring and Assessment (GAMA) Program.* This study performed water quality testing on 12 wells in the Cuyama Valley and tested for a variety of constituents.
- SBCWA 2011 – *Santa Barbara County 2011 Groundwater Report.* This report provided groundwater conditions throughout the County, and provided water quality information for the Cuyama Valley.
- USGS 2013c – Geology, Water-Quality, Hydrology, and Geomechanics of the Cuyama Valley Groundwater Basin, California, 2008-12. This report investigated a wide variety of groundwater components including water quality.

Data Analysis

Collected data was analyzed for Total Dissolved Solids (TDS), nitrate, and arsenic.

Figure 2.2-23 shows TDS of groundwater measured in wells in 1966. Figure 2.2-23 In 1966, TDS was above the MCL of 1,500 micrograms per liter (mg/L) in over 50% of measurements. TDS was over 2,000 mg/L near the Cuyama River in the southeast portion of the basin near the Ozena Fire Station, Santa Barbara Canyon, and upper Quatal Canyon, indicating that high TDS water was entering the basin from the watershed above these measurement points. TDS measurements were over the Maximum Contaminant Level (MCL) throughout the central portion of the basin where irrigated agriculture was operating, and near the towns of Cuyama and New Cuyama, and along the Cuyama River to the northwest of New Cuyama. TDS was less than 500 mg/L in a number of measurements between Bitter Creek and Cottonwood Canyon, indicating that lower TDS water was entering the basin from the watersheds in this area.

Figure 2.2-24 shows TDS of groundwater measured in wells between 2011 and 2018. Multiple years of collected data were used to generate enough mapped data density for comparison to 1966 data. In the 2011-2018 period, TDS was above the MCL in over 50% of measurements. TDS was over 1,500 mg/L near the Cuyama River in the southeast portion of the basin near the Ozena Fire Station, and in Santa Barbara Canyon, indicating that high TDS water was entering the basin from the watershed above these measurement points. TDS measurements were over the MCL throughout the central portion of the basin where irrigated agriculture was operating. A number of 500-1,000 mg/L TDS measurements were measured near New Cuyama and in upper Quatal Canyon, and along the Cuyama River between Cottonwood Canyon and Schoolhouse Canyon.

Figure 2.2-25 shows measurements of TDS for selected monitoring points over time. Monitoring points were selected by the number of measurements, with higher counts of measurements selected to be plotted. The charts indicate that TDS in the vicinity of New Cuyama has been over 800 mg/L TDS throughout the period of record, and that TDS has either slightly increased or stayed stable over the period of record. TDS in the central portion of the basin. The chart for Well 85 at the intersection of Quatal Canyon and the Cuyama River I generally below 800 mg/L TDS with spikes of TDS increases. The spikes of TDS increases correspond with Cuyama River flow events, indicating a connection between rainfall and stream flow and an increase in TDS. This is the only location where this trend was detected.

Figure 2.2-26 shows measurements of nitrate in 1966. Figure 2.2-26 shows that data collected in 1966 was below the MCL of 5 mg/L throughout the basin, with some measurements above the MCL in the central portion of the basin where irrigated agriculture was operating.

Figure 2.2-27 shows measurements of nitrate of groundwater measured in wells between 2011 and 2018. Multiple years of collected data were used to generate enough mapped data density for comparison to 1966 data. Figure 2.2-27 shows that data collected over this period was generally below the MCL, with two measurements that were over 20 mg/L.

Figure 2.2-28 shows arsenic measurements from 2008-2018. Data was not available prior to this time period in significant amounts. Figure 2.2-28 shows arsenic measurements were below the MCL of 10 ug/L where data was available.

Figure 2.2-29: Known Contamination Sites shows the results of a query with the Regional Water Quality Control Board (RWQCB)'s Geotracker website. Geotracker documents contaminant concerns that the RWQCB is or has been working with site owners to clean up. Figure 2.2-29 shows that most of these sites are for fuels.

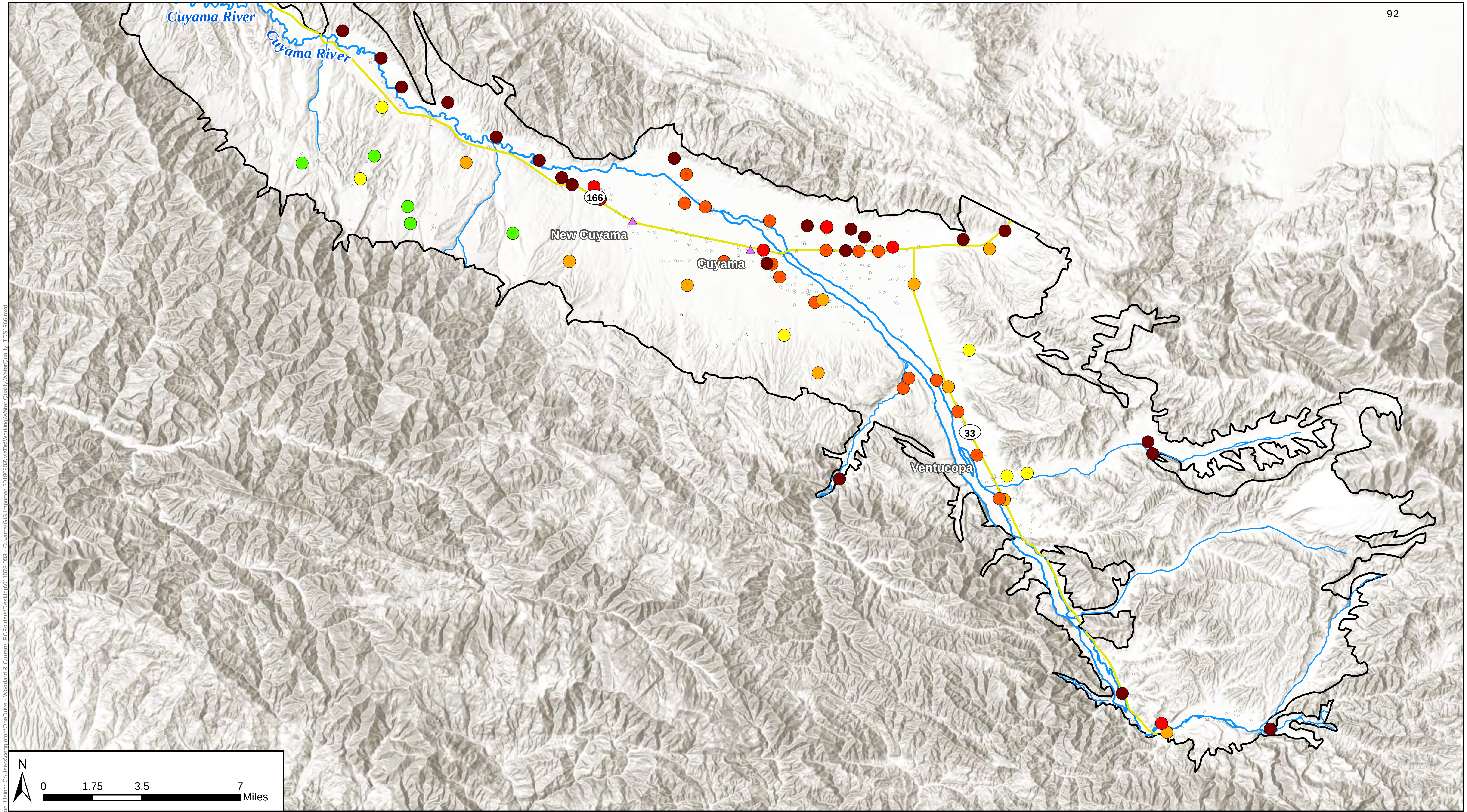

Figure 2.2-23: 1966 Average Well Measurements of Total Disolved Solids, mg/L

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Legend

TDS, mg/L

- No Measurements
- < 500 mg/L
- 500 - 1,000 mg/L
- 1,000 - 1,500 mg/L
- 1,500 - 1,750 mg/L
- 1,750 - 2,000 mg/L
- >2,000 mg/L

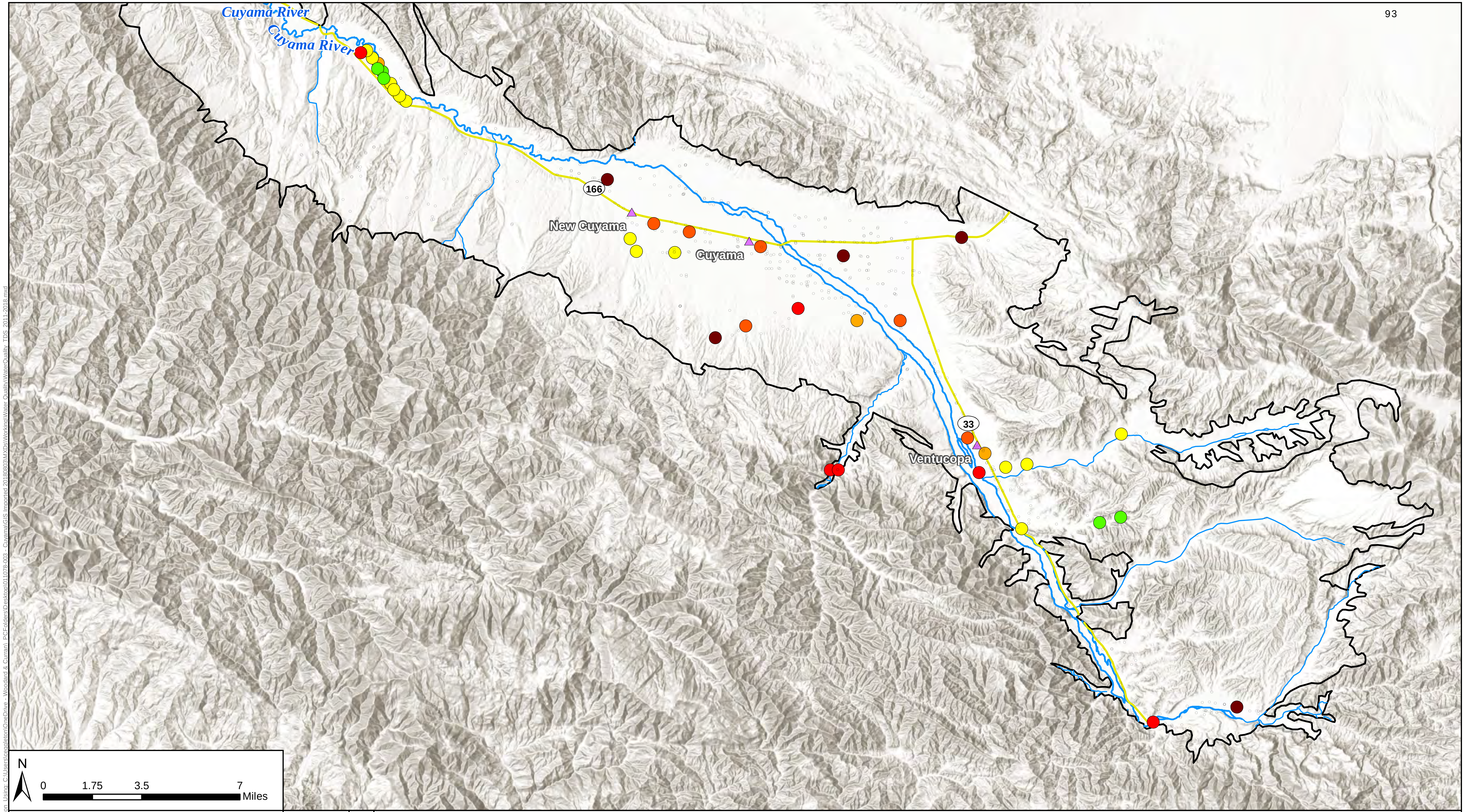

Figure 2.2-24:2011-2018 Average Well Measurements of Total Disolved Solids, mg/L

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Legend

TDS, mg/L

- No Measurements
- < 500 mg/L
- 500 - 1,000 mg/L
- 1,000 - 1,500 mg/L
- 1,500 - 1,750 mg/L
- 1,750 - 2,000 mg/L
- >2,000 mg/L

Figure Exported: 8/20/2018 By: ceggleton Using: C:\Users\ceggleton\OneDrive - Woodard & Curran_PCFolders\Desktop\011078-003 - Cuyama\GIS Imported 20180803\MXDs\Working\Water Quality\WaterQuality_TDS_2011-2018.mxd

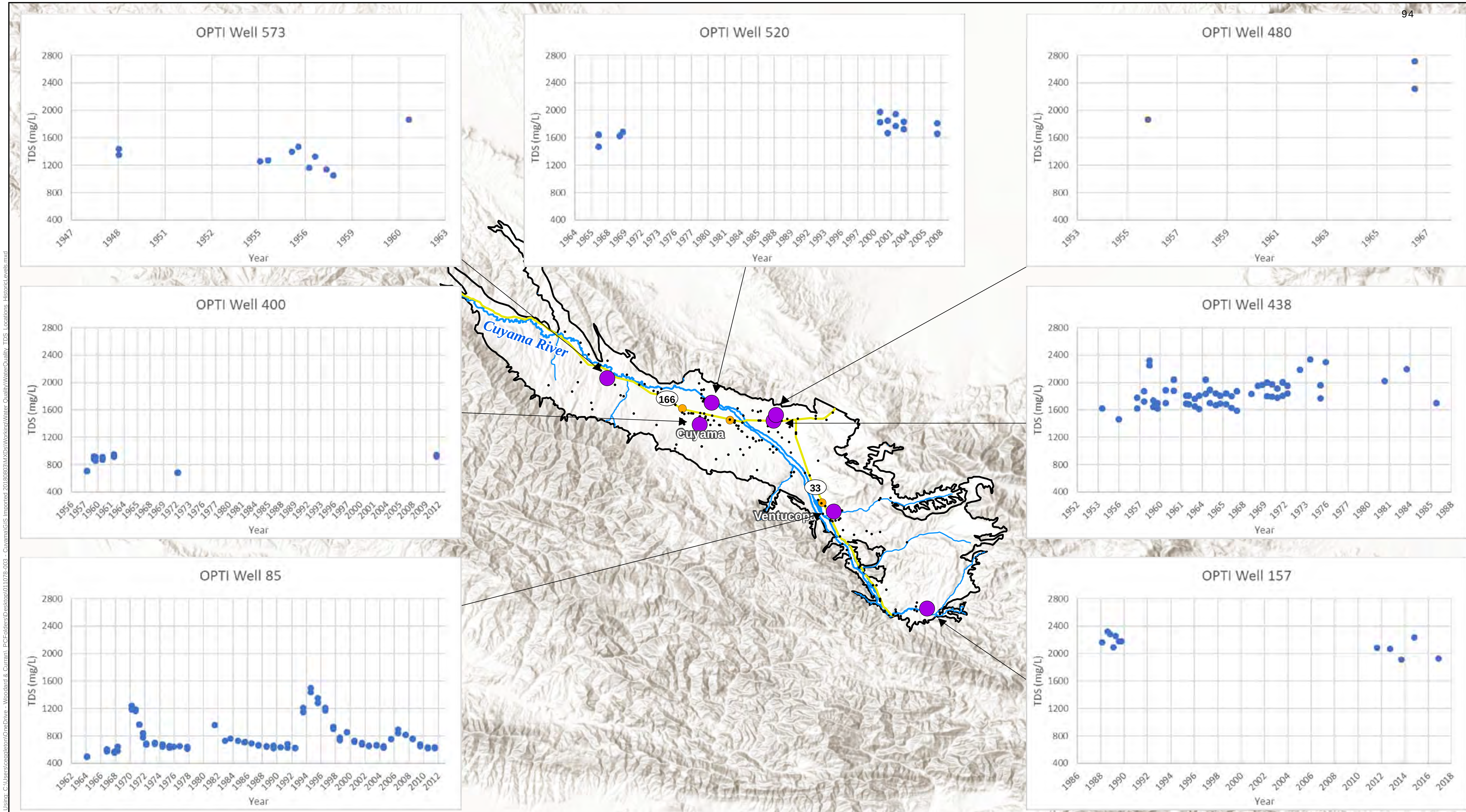

Figure 2.2-25: Cuyama Groundwater Basin Historic TDS Levels in Certain Wells

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Legend

Cuyama Basin
Towns
Highways
Cuyama River
Streams
Wells with Graphed Data
Location of TDS WQ Measurements

N

0 4.5 9 18 Miles

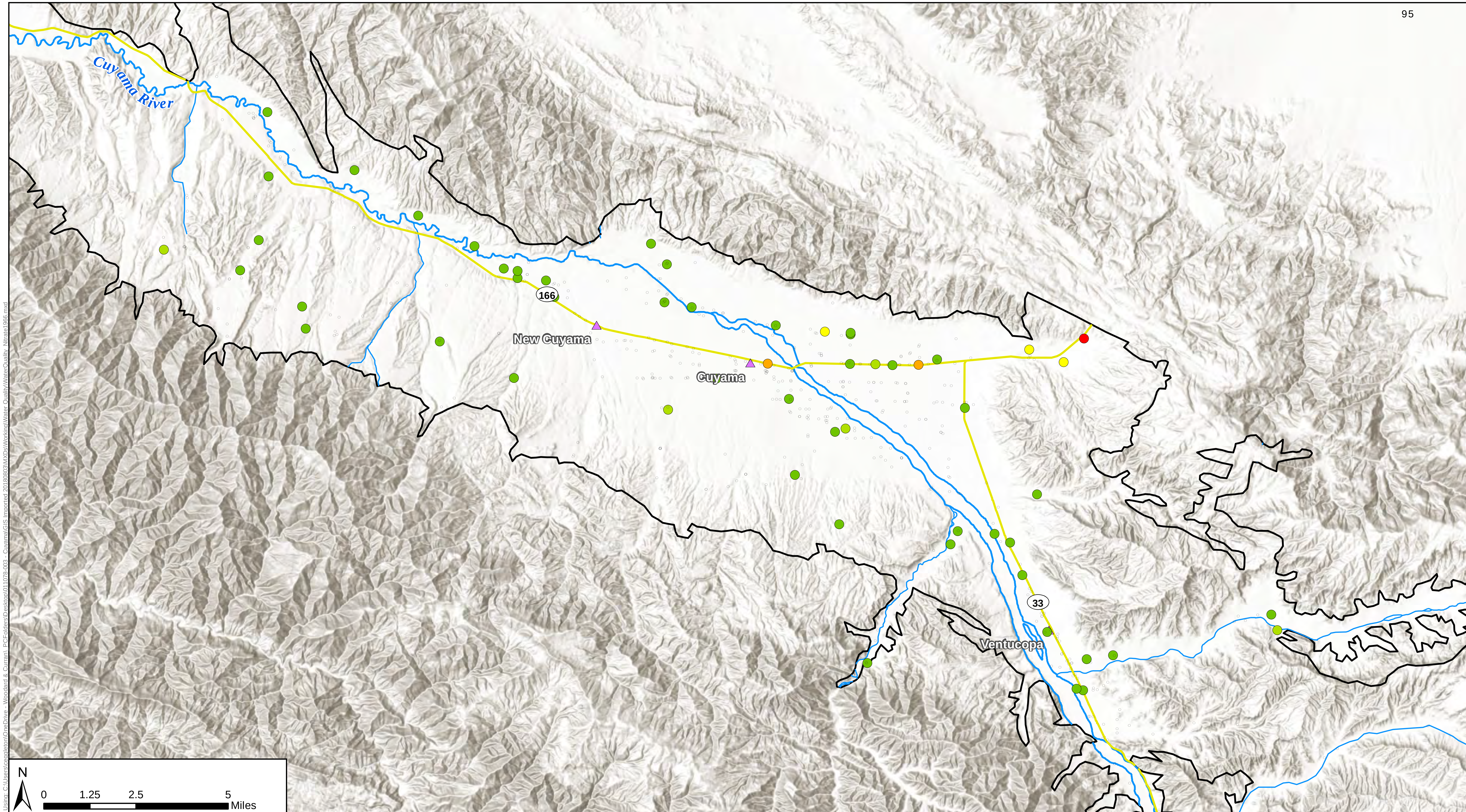

Figure 2.2-26: 1966 Average Well Measurements of Nitrate (NO3) as Nitrogen

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Legend

Nitrate (NO3) as N, mg/L

- No Measurements
- < 5 mg/L
- 5 - 8 mg/L
- 8 - 10 mg/L
- 10 - 15 mg/L
- 15 - 20 mg/L
- > 20 mg/L

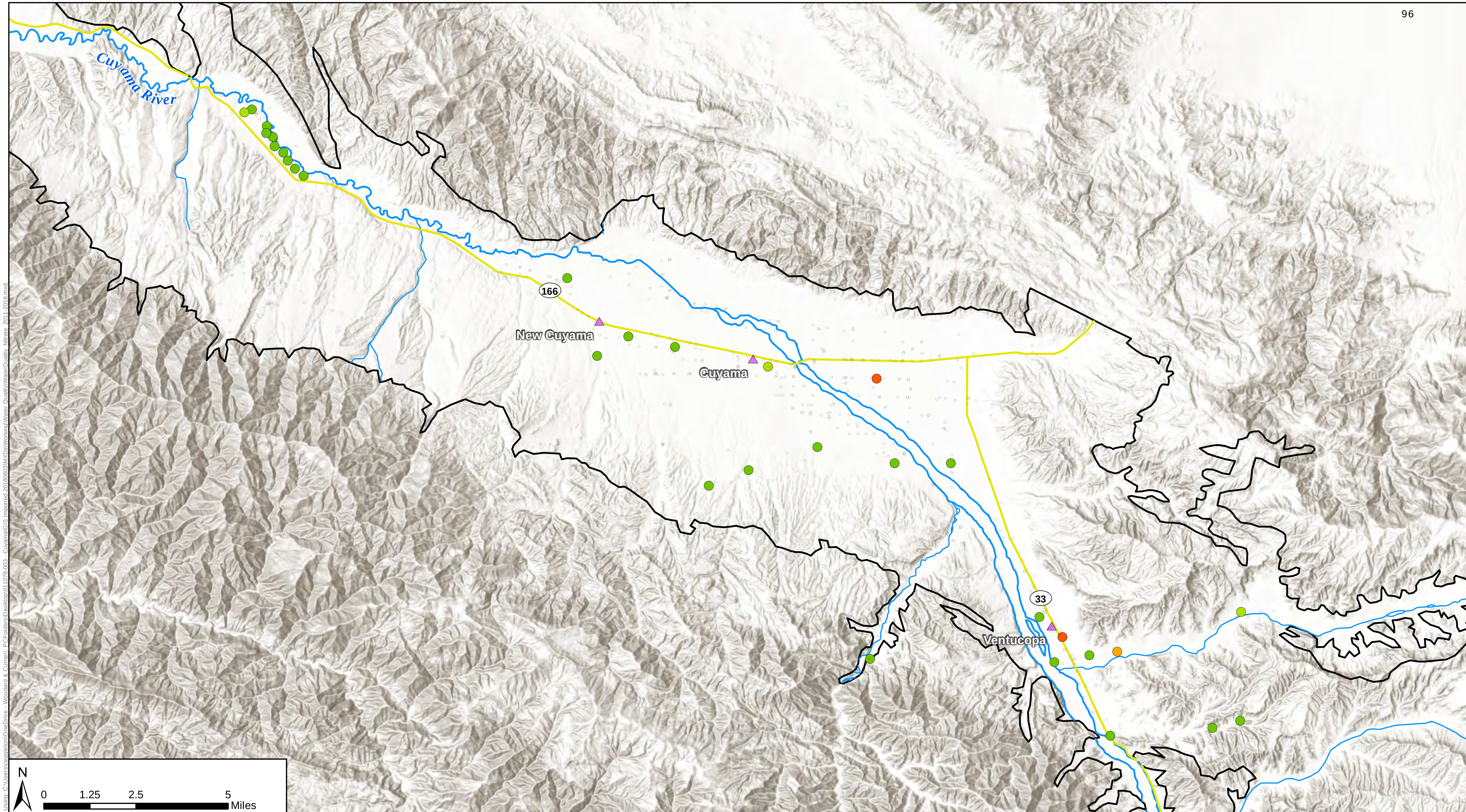

Figure 2.2-27: 2011-2018 Average Well Measurements of Nitrate (NO3) as Nitrogen

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Legend

Nitrate (NO3) as N, mg/L

- No Measurements
- < 5 mg/L
- 5 - 8 mg/L
- 8 - 10 mg/L
- 10 - 15 mg/L
- 15 - 20 mg/L
- > 20 mg/L

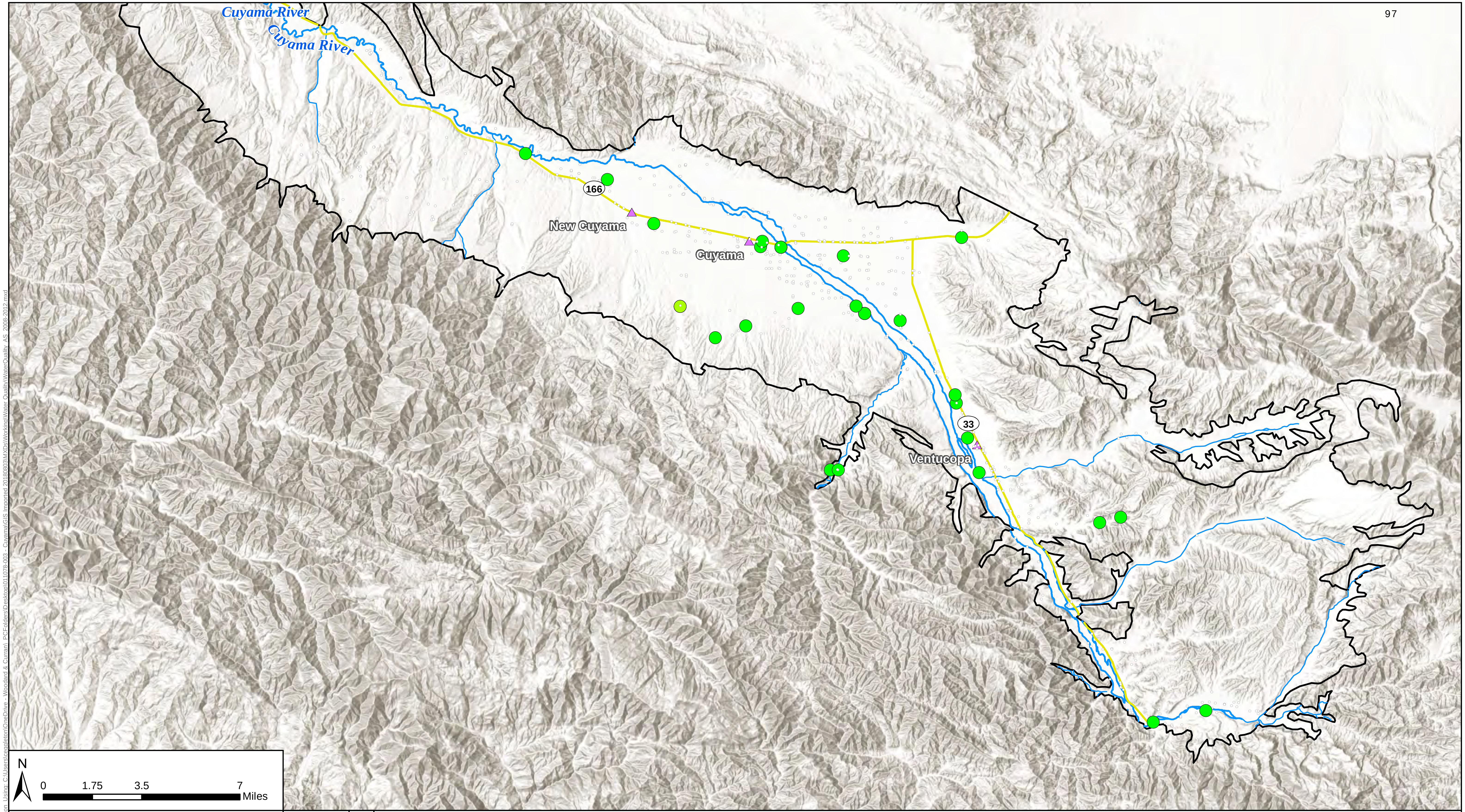

Figure 2.2-28: 2008-2018 Average Well Measurements of Arsenic, ug/L

Cuyama Basin Groundwater Sustainability Agency

Cuyama Valley Groundwater Basin Groundwater Sustainability Plan

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Legend

Aresenic (As), ug/L

- No Measurements
- < 5 ug/L
- 5 - 10 ug/L
- 10 - 20 ug/L
- > 20 ug/L

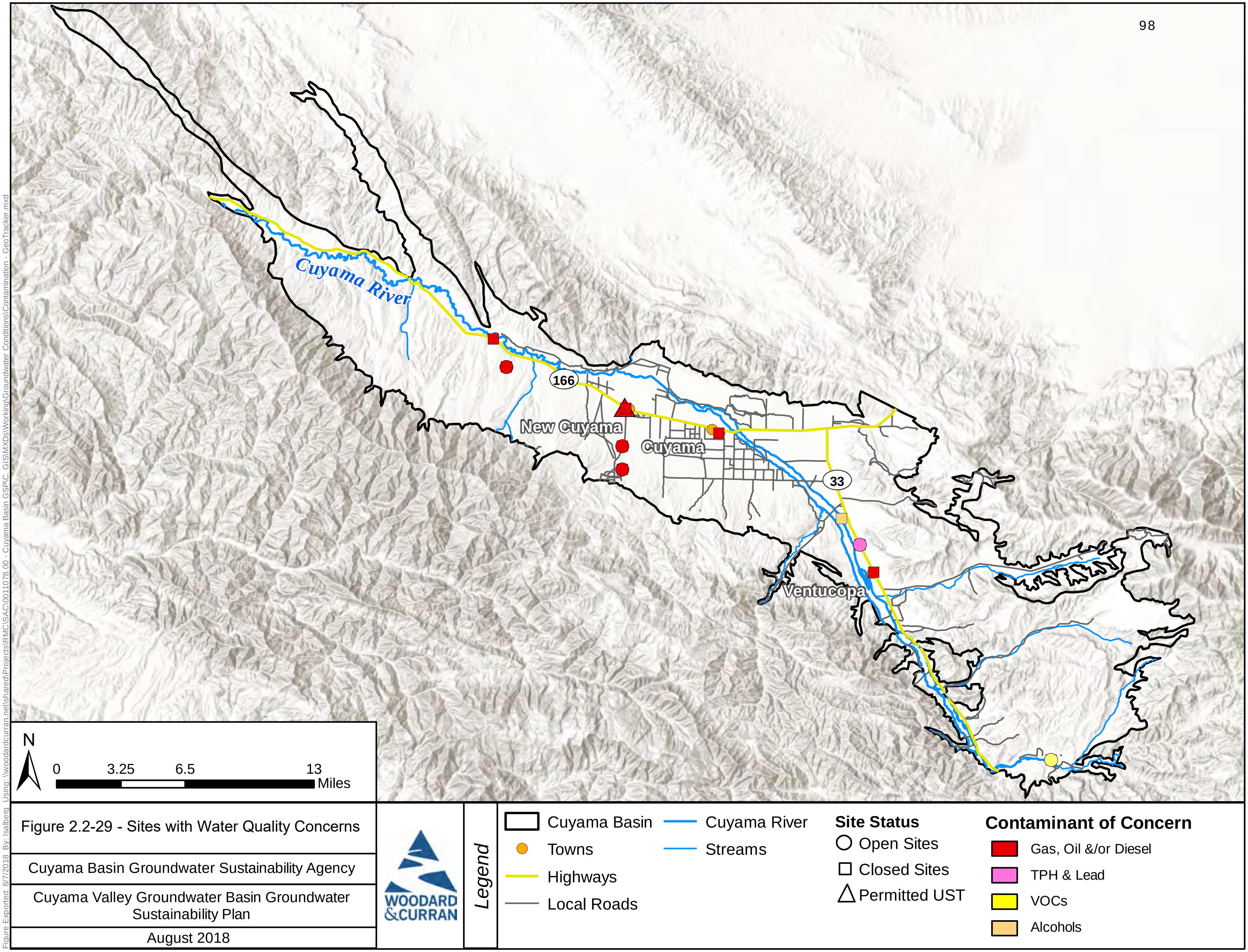

Figure 2.2-29 - Sites with Water Quality Concerns

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Literature Review

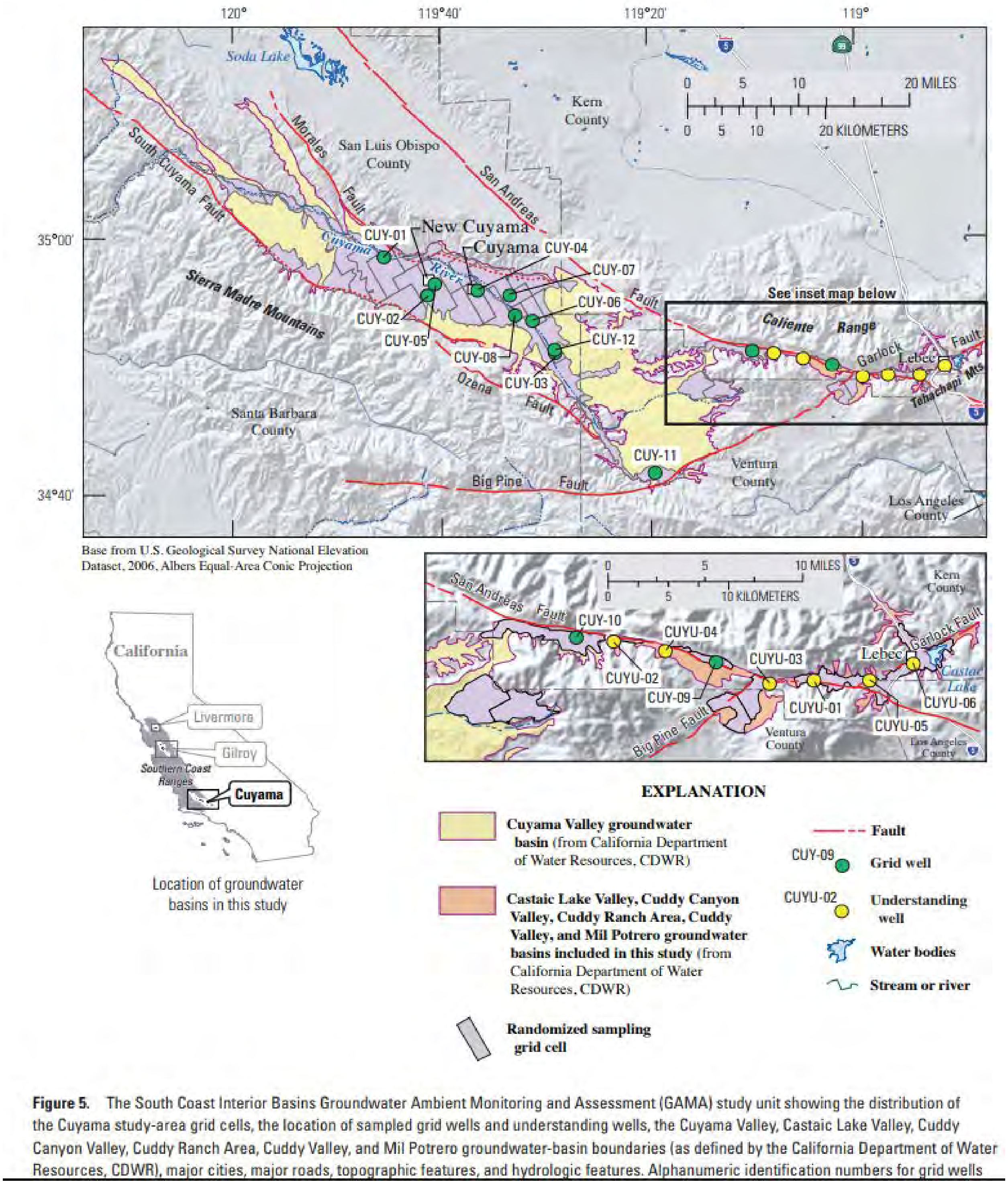
In 1970, Singer and Swarzenski reported that TDS was as high as 1,500 to 1,800 mg/L TDS, and that the cations that contributed to the TDS and the amount of TDS varied by location in the basin. They reported that TDS was lower (400 to 700 mg/L) in areas downstream from the Sierra Madre Mountains where TDS was made up of sodium or calcium bicarbonate, and higher (3,000-6,000 mg/L) in wells close to the Caliente Range and in the northeastern part of the valley. They state that the high TDS is generated by mixing of water from marine rocks with more recent water from alluvium. They determined that groundwater movement favors movement of brackish water from the north of the Cuyama River towards areas of groundwater depletion, and that return of some water applied during irrigation and needed for leaching the soil carries dissolved salts with it to the water table (Singer and Swarzensky, 1970).

In 2008, the USGS reported the results of the GAMA study, which sampled 12 wells for a wide variety of constituents. The locations of the wells provided in the GAMA study are shown in Figure 2.2-30. The study identified that specific conductance ranged from 637 to 2,380 uS/cm across the study's 12 wells. The GAMA study reported that the following constituents were not detected at levels above the MCL for each constituent in any samples for the following constituents:

- Pesticides or pesticide degradates
- Gasoline and refrigerants
- Aluminum, antimony, barium, beryllium, boron, cadmium, copper, iron, and lead
- Ammonia and phosphate
- Lithium, Molybdenum, Nickel, Selenium, Strontium, Thallium, Tungsten, Uranium, Vanadium, and Zinc
- Bromide, Calcium, Chloride, Fluoride, Iodide, Magnesium, Potassium, Silica, and Sodium

The GAMA study reported that there were detections at levels above the MCL for the following constituents:

- Manganese exceeded its SMCL in two wells.
- Arsenic exceeded the MCL in one well.
- Nitrate exceeded the MCL in two wells
- Sulfate exceeded its MCL in eight wells
- TDS exceeded its MCL in 7wells
- VOCs detected in one well.



Source: USGS, 2008

Figure 2.2-30: Locations of GAMA Sample Locations

In 2011, SBCWA reported that TDS in the basin typically ranges from 1,500 to 1,800 mg/L in the main part of the basin, while the Cuyama Badlands in the eastern part where Ballinger, Quatal, and Apache Canyons are has better water quality with TDS typically ranging rom 400 to 700mg/L. SBCWA noted spikes in TDS on the Badlands Well which followed wet rainfall years of 1969 and 1994 and state that the spikes are attributable to overland flow from rainfall which is flushing the upper part of the basin after dry periods.

SBCWA reported that boron is generally higher in the upper part of the basin and is of higher concentration in the uplands than in the deeper wells in the central part of the basin. Toward the northeast end of the basin at extreme depth there exists poor quality water, perhaps connate (trapped in rocks during deposition) from rocks of marine origin.

SBCWA also reported: "There was little change in TDS, calcium, magnesium, nitrates and sulfates during the 2009- 2011 period. In some cases, concentrations of these nutrients actually fell during the period, most likely due to a lack of rainfall, recharge and flushing of the watershed. As the Cuyama watershed is mostly dry, water quality data must be examined with caution as sometimes overland flow from rainfall events "flushes" the watershed and inorganic mineral concentrations actually peak during storm flows. Typically, in other areas of Santa Barbara County mineral concentrations are diluted during widespread storm runoff out of natural watersheds."

In 2013, USGS reported that they collected groundwater quality samples at 12 monitoring wells, 27 domestic wells, and 2 springs for 53 constituents including: field parameters (water temperature, specific conductance, pH, DO, alkalinity), major & minor ions, nitrate, trace elements, stable isotopes of hydrogen and oxygen, tritium and carbon-14 activities, arsenic, iron, and chromium. The USGS sampling locations are presented in a figure from the report in Figure 2.2-31. The USGS reported the results of the sampling as:

- Groundwater in the alluvial aquifer system has high concentrations of TDS and sulfate
- 97% of samples had concentrations greater than 500 mg/L for TDS
- 95% of samples had concentrations greater than 250 mg./L for sulfate
- 13% of samples had concentrations greater than 10 mg/L for nitrate
- 12% of samples had concentrations greater than 10 ug/L for arsenic
- 1 sample had concentrations greater than the MCL for fluoride
- 5 samples had concentrations greater than 50 mg/L for manganese
- 1 sample had concentration of iron greater than 300 mg/L for iron
- 1 sample had concentration of aluminum greater than 50 mg/L

The USGS reported the following about nitrate as nitrogen in the basin. Nitrate was detected in five locations above the MCL of 10 mg/L. Four wells where nitrate levels were greater than the MCL were in the vicinity of the center of agricultural land-use area. Irrigation return flows are possible source of high nitrate concentrations. There was a decrease in concentrations with depth in the agricultural land use area which indicated the source of higher nitrate concentrations likely to be near the surface. The lowest nitrate levels were outside the agricultural use area, and low concentrations of nitrate (less than 0.02 mg/L) in surface water samples indicated surface water recharge was not a source of high nitrate

The USGS reported that arsenic was found in greater concentration than the MCL of 10 ug/L in 4 of the 33 wells sampled, and samples of total chromium ranged from no detections to 2.2 ug/L, which is less than the MCL of 50 ug/L. Hexavalent chromium ranged from 0.1 to 1.7 ug/L which is less than the MCL of 50 ug/L.

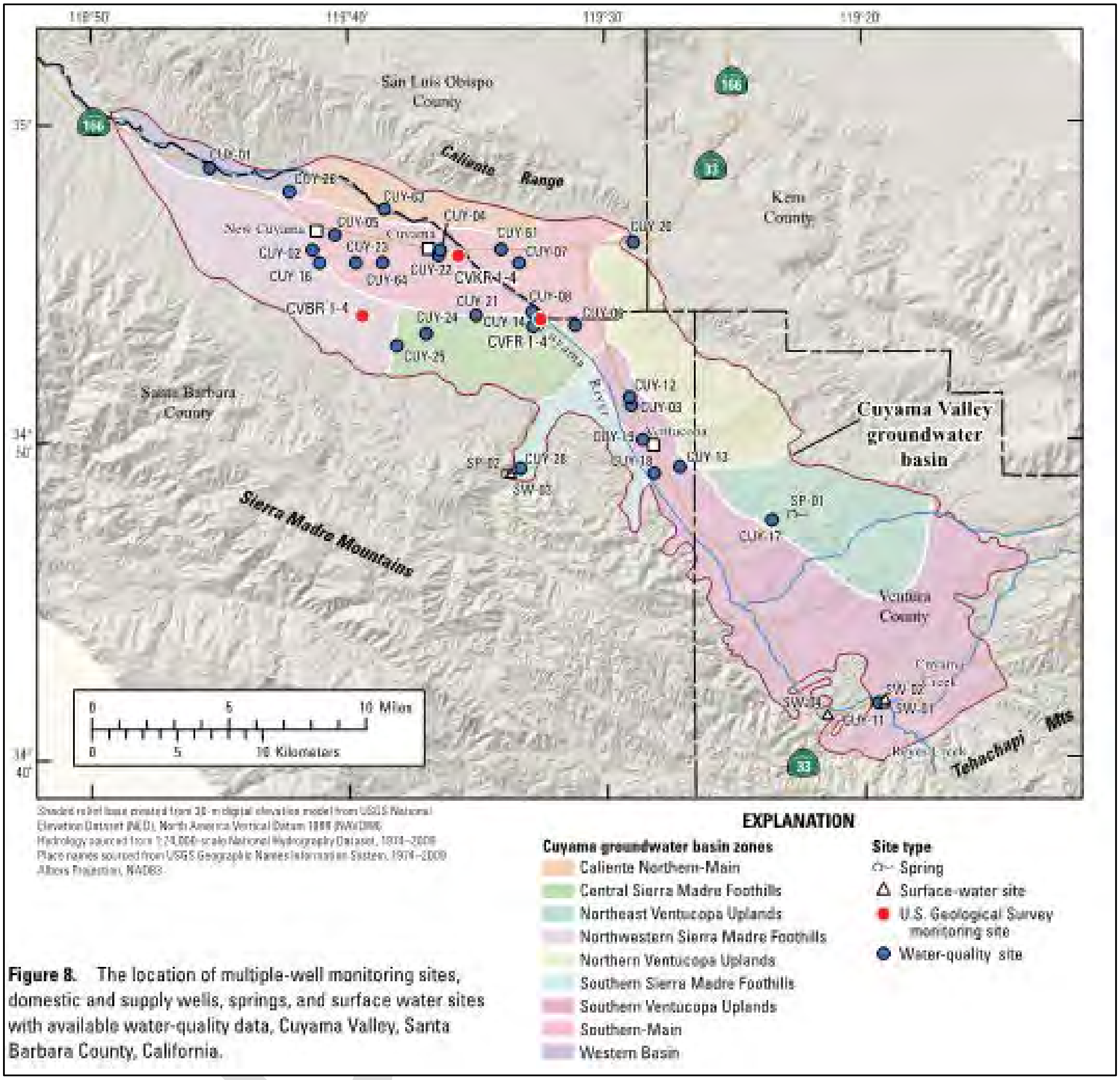


Figure 8. The location of multiple-well monitoring sites, domestic and supply wells, springs, and surface water sites with available water-quality data, Cuyama Valley, Santa Barbara County, California.

USGS 2013c

Figure 2.2-31: USGS 2013c Water Quality Monitoring Sites

2.2.8 Interconnected Surface Water Systems

This section is under development and will feature outputs from model development. This section will include the following:

- *Identification of interconnected surface water systems*
- *Estimates of timing and quantity of depletions*
- *Map of interconnected surface water systems*
- *Consideration of ephemeral and intermittent streams, and where they may cease to flow if applicable*

2.2.9 Groundwater Dependent Ecosystems

This section is under development and study is being performed by a biologist. This section will include the following:

- *Summary of Groundwater Dependent Ecosystem (GDE) analysis*
- *Describe locations and types of GDEs*
- *Map of GDEs*

2.2.10 Data Gaps

This subsection will be used to document identified data gaps in the groundwater conditions section of the GSP. Feedback from stakeholders is essential in identifying data gaps.

2.2.11 References

Cleath-Harris. 2016. Groundwater Investigations and Development, North Fork Ranch, Cuyama, California. Santa Barbara, California.

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DWR, 2018. https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Data-and-Tools/Files/Statewide-Reports/Natural-Communities-Dataset-Summary-Document.pdf

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Appendix X - Hydrographs

This appendix presents hydrographs of every monitoring well with groundwater elevation data that was collected during development of the GSP. Each hydrograph has been assigned a database number, and the maps at the front of this section should be used to find the location of hydrographs of interest to the reader. The beginning of this appendix presents a map showing the locations of four detailed maps with the well identification numbers. The four location maps are intended to facilitate identifying the location of a specific hydrograph.

Appendix Y - Groundwater Contours

This appendix includes groundwater elevation and depth to water contour maps for the following periods:

- Figure Y-1: Fall 2017 Groundwater Elevation
- Figure Y-2: Fall 2017 Depth to Water
- Figure Y-3: Spring 2017 Groundwater Elevation
- Figure Y-4: Spring 2017 Depth to Water
- Figure Y-5: Spring 2015 Groundwater Elevation
- Figure Y-6: Spring 2015 Depth to Water
- Figure Y-7: Fall 2014 Groundwater Elevation
- Figure Y-8: Fall 2014 Depth to Water

Descriptions of each contour map are included in 2.2.3 Groundwater Trends.

Appendix Z - Subsidence Information White Paper

TO:	Standing Advisory Committee Agenda Item No. 8e
FROM:	Brian Van Lienden, Woodard & Curran
DATE:	August 30, 2018
SUBJECT:	Monitoring Networks

Issue
Update on the monitoring networks.

Recommended Motion
None – information only.

Discussion
An update on the monitoring networks is provided as Attachment 1.

Cuyama Basin Groundwater Sustainability Agency

Monitoring Networks

August 30, 2018

WOODARD & CURRAN

What is a Monitoring Network?

- Established for each sustainability indicator:
  - Groundwater levels and quality
  - Subsidence
  - Surface water-groundwater interaction
- Includes monitoring wells, stream gauges, subsidence measurements
- Will have spatial and temporal components:
  - How many wells and how spread out are they?
  - How frequently are they measured?
- Able to provide data relative to undesirable results

What Makes a Good Monitoring Network?

- Need to Consider Total Cost
  - Cost for installation of equipment
  - Annual cost of data collection, analysis, and management
- Representative Monitoring
  - Use monitoring sites to be representative of basin conditions.

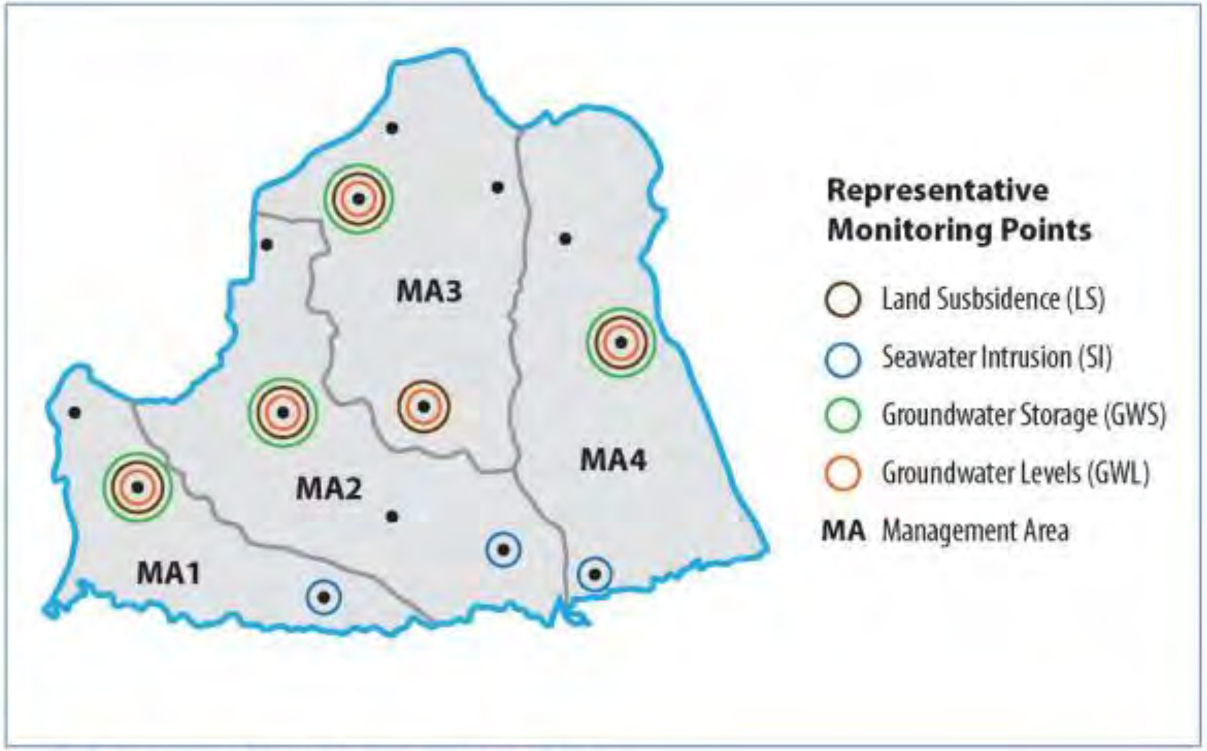

Figure 3: Representative Monitoring Points

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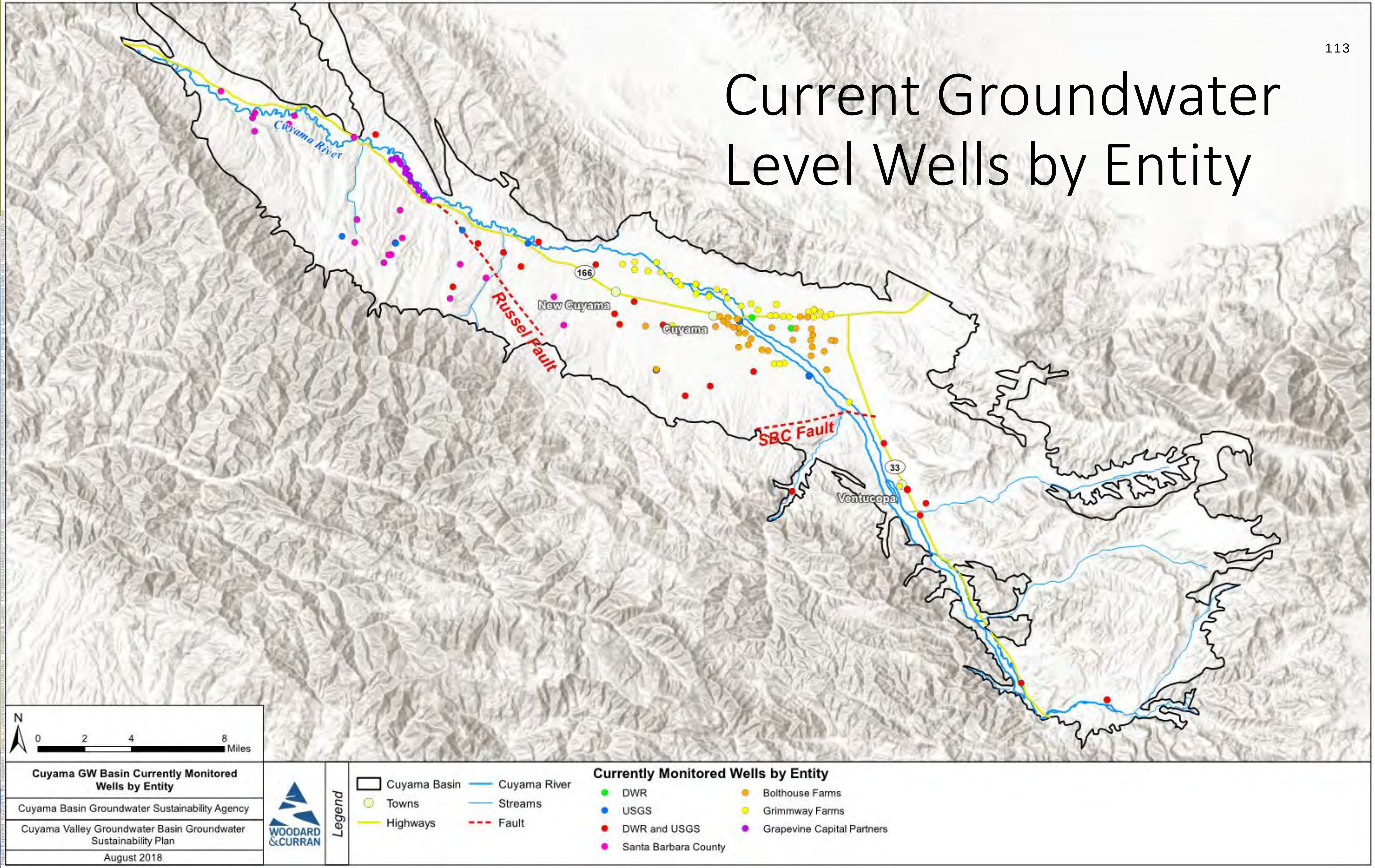
Current Groundwater Level Wells by Entity



Groundwater Quality Thresholds Conceptual Discussion

Draft Undesirable Result

"The Undesirable Result for degraded water quality is a result stemming from a causal nexus between SGMA-related groundwater quantity management activities and groundwater quality that causes significant and unreasonable reduction in the long-term viability of domestic, agricultural, municipal, or environmental uses over the planning and implementation horizon of this GSP."

Water Quality Thresholds Conceptual Discussion

- Set only for constituents with a **causal nexus** between SGMA-related management and groundwater quality
- Coordinate with existing regulatory programs (IRLP, RWQCB) to cover other constituents
- Proposed thresholds for salinity only
- Other major water quality parameters to be summarized in the GSP and annual reports, but will not have thresholds

TO: Standing Advisory Committee
Agenda Item No. 8f

FROM: Mary Currie, Catalyst Group

DATE: August 30, 2018

SUBJECT: Stakeholder Engagement Update

Issue
Update on the Cuyama Basin Groundwater Sustainability Agency Groundwater Sustainability Plan stakeholder engagement.

Recommended Motion
None – information only.

Discussion
Cuyama Basin Groundwater Sustainability Agency Groundwater Sustainability Plan (GSP) outreach consultant the Catalyst Group's stakeholder engagement update is provided as Attachment 1 and an updated matrix that matches GSP sections with corresponding educational topics is provided as Attachment 2.

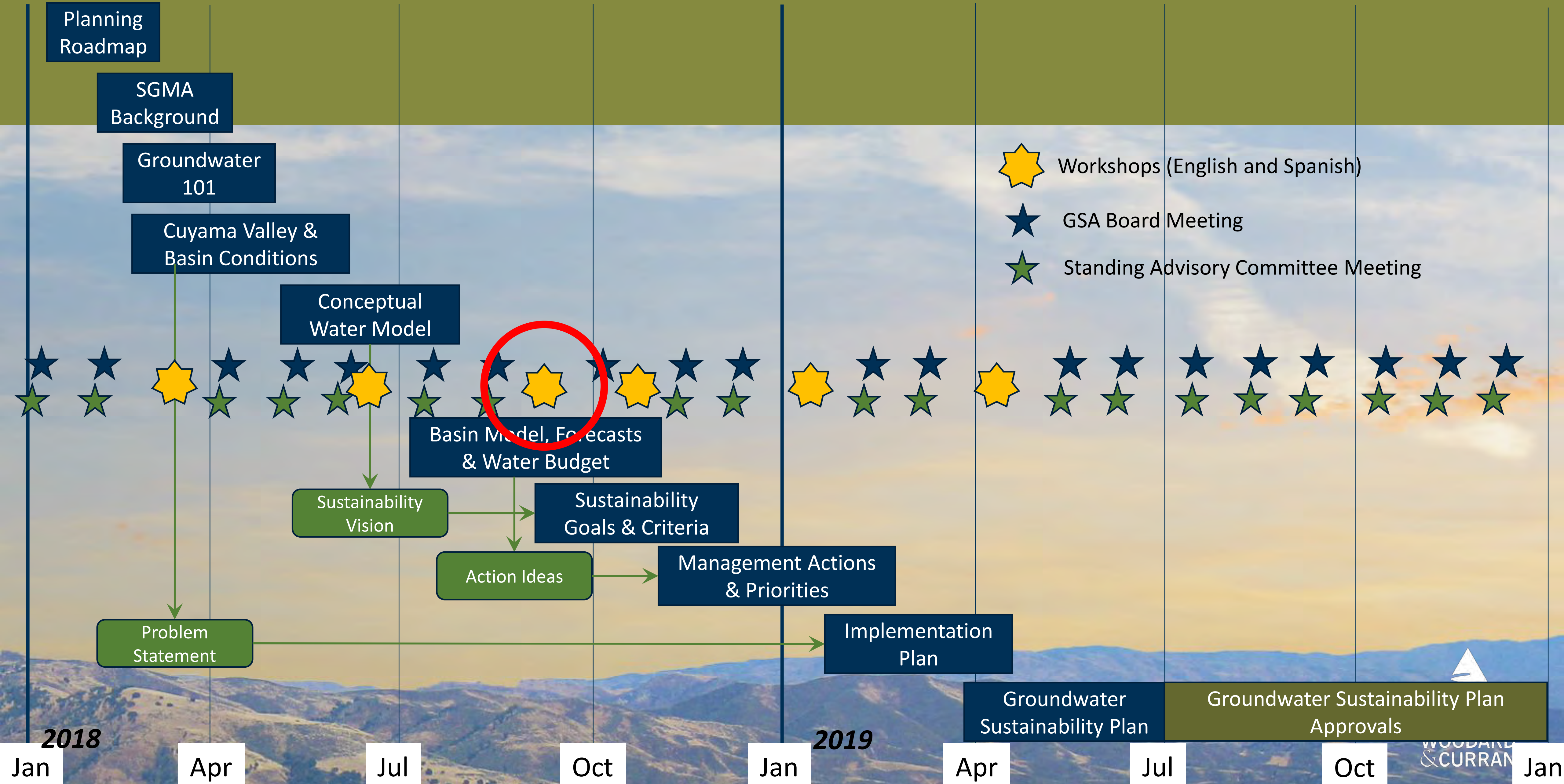
Cuyama Basin Groundwater Sustainability Agency

Groundwater Sustainability Plan Stakeholder Engagement Update

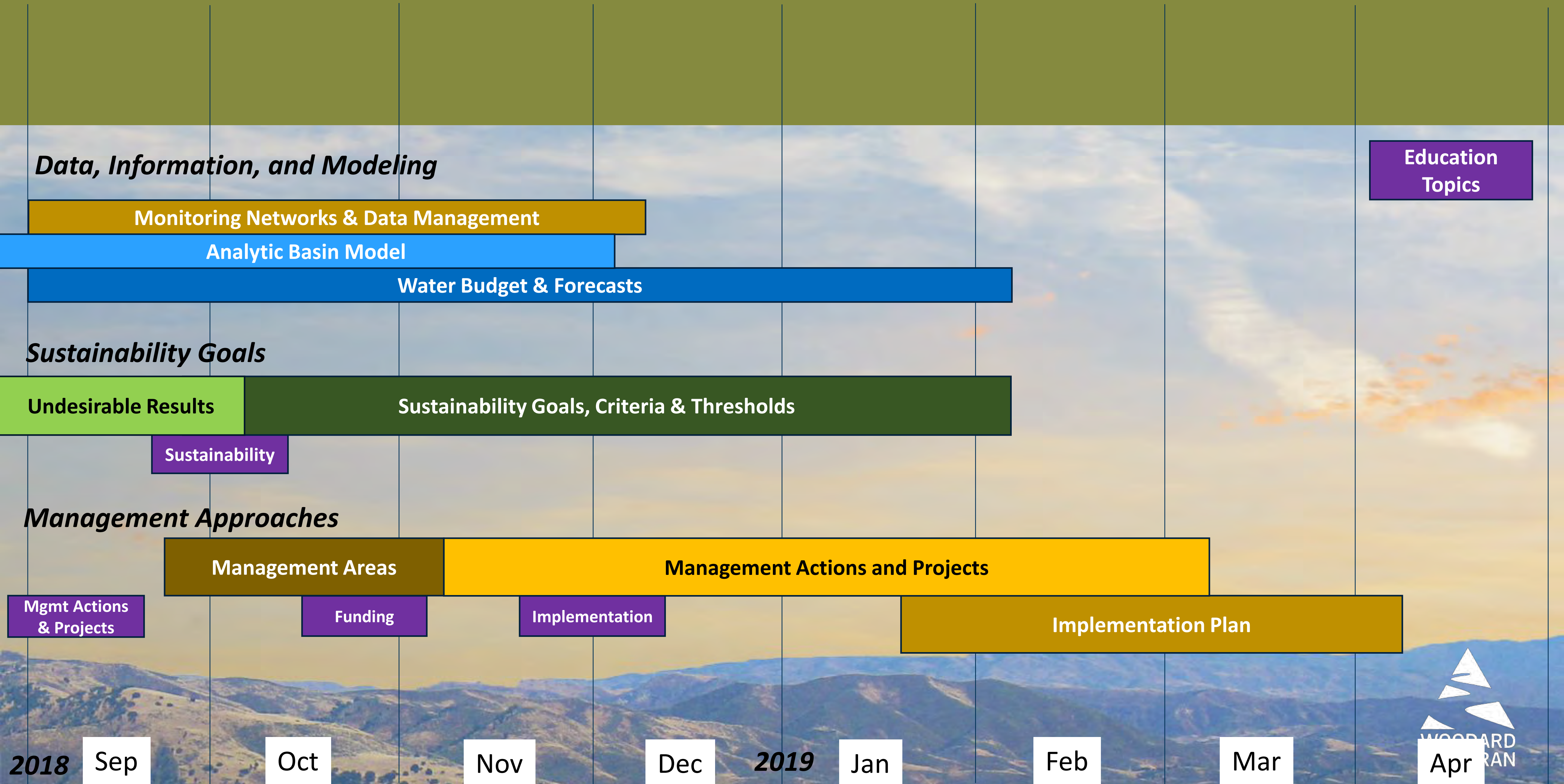
August 30, 2018

WOODARD &CURRAN

Cuyama Basin Groundwater Sustainability Plan – Planning Roadmap



Cuyama Basin Groundwater Sustainability Plan – Discussion Topics



Outreach Activities

- Community Workshops, Cuyama Valley Recreation District
  - Email to GSP contact list
  - Postcard to property owners
  - Cuyama Valley Recreation District Newsletter
- Community Workshops Topics
  - Initial Modeling of Historical Use and Assumptions for Current and Future Conditions
  - Conceptual Management Areas and Introduction to Management Actions and Projects
- Coming Up
  - Newsletter #3 – November 1, 2018
  - Workshop #4 – November 7, 2018

WOODARD & CURRAN

Plan for Meeting Topics and GSP Section Submittals
Posted to cuyamabasin.org August 24, 2018

(*NOTE: Information Subject to Change*)

Key: GSA Board adoptions and approvals   Community Workshops

SAC/Board Mtg Dates	SAC Educational Topics	GSP Board/SAC Topics	Workshop Topics	GSP Section Submittals
June 28 July 11	• Monitoring of GW levels & quality, SW flows • What does SGMA require for water quality? • Management Areas	• Land and Water Use • Sustainability (workshop results)		• Plan Area (approval) • HCM (review)
July 26 August 1	• Calculating a Water Budget • How a Model Works – Historical Calibration	• Current Basin Water Conditions (GW levels & quality, SW flows) • Sustainability (draft Undesirable Results narrative)		• Undesirable Results Narrative (review)
August 30 September 5 Workshop	• How a Model Works – Current and Future Conditions • Management Actions & Projects	• Additional Info on Current Basin Water Conditions (GW levels & quality) • Monitoring Networks	• Initial Model Results – Historical • Assumptions for Current and Future Conditions • Conceptual Management Areas • Management Actions & Projects	• GW Conditions (review)
September 27 October 3	• Sustainability Refresher	• Management Areas (discussion) • Sustainability Thresholds (discussion)		• HCM (approval) • Monitoring Networks (review) • Data Management (review)

SAC/Board Mtg Dates	SAC Educational Topics	GSP Board/SAC Topics	Workshop Topics	GSP Section Submittals
November 1 November 7 Workshop	• Funding Sources and Mechanisms	• Management Areas (approval)	• Initial Model Results – Current and Future Conditions • Sustainability Goals and Criteria	• GW Conditions (approval)
November 29 December 5	• Implementation Plan	• Sustainability Thresholds (proposed) • Management Actions and Projects (discussion)		• Undesirable Results Narrative (approval) • Monitoring Networks (approval) • Data Management (approval) • Sustainability Thresholds (review)
December 27? January 2		• Sustainability Thresholds (approval) • Implementation Plan (discussion)		• Water Budget (review) • Projects & Management Actions (draft)
January 31 February 6 Workshop		• Management Actions and Alternatives Evaluations	• Management Actions and Alternatives Evaluations	• Sustainability Thresholds (approval) • Implementation Plan (draft)
February 28 March 6		• Management Actions & Projects (approval) • Implementation Plan (proposed)		• Water Budget (approval) • Management Actions & Projects (approval)
March 28 April 3 Workshop		• Implementation Plan (approval) • GSP Public Draft	• GSP Public Draft	• Implementation Plan (approval) • GSP Public Draft (review)
April 25 May 1		• GSP Public Draft response to comments		
May 30 June 5		• GSP Final Draft		• GSP Final Draft (approval)