AGENDA

BIG VALLEY GROUNDWATER BASIN ADVISORY COMMITTEE (BVAC)

Adin Community Center, 605 Highway 299, Adin, CA 96006

[Public participation offered in person and via webinar or conference call]

July 1, 2020, 4:00 p.m.

Lassen County BVAC Members
Aaron Albaugh, Board Representative
Jeff Hemphill, Alt. Board Representative
Kevin Mitchell, Public Representative
Duane Conner, Public Representative

Modoc County BVAC Members
Geri Byrne, Board Representative
Ned Coe, Alt. Board Representative
Jimmy Nunn, Public Representative
John Ohm, Public Representative

BVAC Secretary, Maurice L. Anderson, Director Lassen County Department of Planning and Building Services (or designee)

Committee members and limited staff may be together in one location at the above address. Committee members and staff may also participate remotely to the same extent as if they were present. The public may join in person at the above address, with accommodations made for social distancing. Remote participation by the public, consultants, and committee members will also be available by the following methods:

- To listen to the meeting in real time, please **call the following number at the time indicated on the agenda: +1 (415) 655-0060.** When prompted, enter the following **access code: 709 908 359#**
  NOTE: By dialing this number only (and not connecting by webinar as detailed below), you will be in a "listen only mode" and will not be able to provide comment. You will only be able to participate in the meeting if you have obtained an "Audio PIN" through the webinar, as detailed below.

- **The following is the internet link to register for the GoToWebinar meeting**:
  https://attendee.gotowebinar.com/register/2467782787905278477
  A link to the webinar will be emailed to you after you register. When you join the meeting via this link, you will be given an "Audio PIN" under your GoToWebinar settings menu. If you are using your computer's audio, you will not need to enter the PIN; however, if you dial in by phone as your means of audio, you will be prompted to enter your PIN at the start of the call to allow for identification and participation.

- You may also **submit comment in writing** before or after the meeting on the project website at https://bigvalleygsp.org/ or to the Lassen County Planning and Building Services Department at 707 Nevada Street, Suite 5, Susanville, CA 96130.

- The meeting (audio only) will be recorded and posted on the project website at: https://bigvalleygsp.org/. You may also call the Lassen County Planning and Building Services Department at (530) 251-8269 for information on how to obtain the recorded meeting audio.

- More detailed instructions on how to participate by phone or by webinar ("GoToWebinar Instructions") will be available prior to the meeting on the project website at: https://bigvalleygsp.org/. You may also call the Lassen County Planning and Building Services Department at (530) 251-8269 for further instructions.

Public comments are welcomed and encouraged. The BVAC Chair will invite comments by members of the public in attendance for each applicable agenda item when appropriate.

NOTE: No one shall address the BVAC until they are recognized by the Chairperson. The person addressing the BVAC shall stand before the BVAC at the podium and provide their name before offering remarks or input.

An open public comment period will be offered at the end of the meeting to allow members of the public to speak to non-agenda topics.

Convene in Regular Session (call to order by the Chair)
Flag Salute
Roll Call (by the Secretary)
General Update by Secretary
Matters Initiated by Committee Members
Correspondence (unrelated to a specific agenda item)
Approval of Minutes (May 6, 2020)

SUBJECT #1:

Review of the Big Valley Groundwater Basin Advisory Committee Memorandum of Understanding (MOU) collaborative process agreements, meeting ground rules, goals, roles, responsibilities, and decision-making procedures.

ACTION REQUESTED:

1. Receive report from the BVAC Secretary, Staff, and/or Consultant.
2. Receive public comment.

SUBJECT #2:

Present Revised Draft Chapters 1 (*Introduction*) and 2 (*Agency Information*) of the Groundwater Sustainability Plan (GSP).

ACTION REQUESTED:

1. Receive report from the BVAC Secretary, Staff, and/or Consultant.
2. Receive public comment.
3. Accept and "set aside" Revised Draft Chapters 1 and 2 for future inclusion in Draft GSP.

SUBJECT #3:

Continue discussion on soils data and next steps for soils analysis.

ACTION REQUESTED:

1. Receive report from the BVAC Secretary, Staff, and/or Consultant.
2. Receive public comment.

SUBJECT #4:

Present Revised Draft Chapter 3 (*Description of Plan Area*) of the Groundwater Sustainability Plan (GSP).

ACTION REQUESTED:

1. Receive report from the BVAC Secretary, Staff, and/or Consultant.
2. Receive public comment.
3. Accept and "set aside" Revised Draft Chapter 3 for future inclusion in Draft GSP.

SUBJECT #5:

Introduce and discuss draft text for Public Draft Chapters 4 (*Hydrogeologic Conceptual Model*) and 5 (*Groundwater Conditions*) of the GSP.

ACTION REQUESTED:

1. Receive report from the BVAC Secretary, Staff, and/or Consultant.
2. Receive public comment.

SUBJECT #6:

Follow up on previous meeting topics: historical report on the proposal of constructing the Allen Camp Dam, report on Lassen-Modoc Flood Control Water Conservation District (LMFCWCD) well information.

ACTION REQUESTED:

1. Receive report from the BVAC Secretary, Staff, and/or Consultant.
2. Receive public comment.

Matters Initiated by the General Public (regarding subjects not on the agenda)

NOTE: No one shall address the BVAC until they are recognized by the Chairperson. The person addressing the BVAC shall stand before the BVAC at the podium and provide their name before offering remarks or input.

Establish next meeting date

ADJOURN

For information regarding this agenda, contact the Lassen County Planning and Building Services Department at (530) 251-8269; or the Modoc County Clerk of the Board's Office at (530) 233-6201.
You may also visit the project website at https://bigvalleygsp.org/ where information regarding the above agenda items can be found.

Agenda posting locations:
Adin Community Center, 655 Highway 299, Adin, CA 96009
Lassen County Planning and Building Services, 707 Nevada Street, Suite 5, Susanville, CA 96130
Modoc County Clerk of the Board's Office, 204 S Court St #204, Alturas, CA 96101
Lassen County Clerk's Office, 220 S Lassen Street, Annex Building, Susanville, CA 96130

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Big Valley Groundwater Basin Advisory Committee (BVAC)

Unapproved Meeting Minutes

BVAC Members:
Lassen County BVAC – Aaron Albaugh, Board Representative; Jeff Hemphill, Alt. Board Representative; Kevin Mitchell, Public Representative; Duane Conner, Public Representative
Modoc County BVAC – Geri Byrne, Board Representative; Ned Coe, Alt. Board Representative; Jimmy Nunn, Public Representative; John Ohm, Public Representative

Wednesday, May 6, 2020	4:00 PM Via webinar	Veterans Memorial Hall 657-575 Bridge Street Bieber, CA 96009

BVAC Convene in Special Session.

Present: Committee Members: Albaugh, Mitchell, Conner, Byrne, and Nunn.
Absent: Committee Member: Ohm

Also in attendance: BVAC Secretary Maurice Anderson via webinar
BVAC staff Gaylon Norwood
BVAC staff Tiffany Martinez
BVAC Recorder Brooke Suarez via webinar
Modoc County Counsel Sean Cameron via webinar
Facilitator Judie Talbott

BVAC Chairman Albaugh called the meeting to order at 4:02 p.m.

Flag Salute: Chairman Albaugh requested Duane Conner lead the Pledge of Allegiance.

General Update by Secretary: Secretary Anderson thanked personnel for organizing the webinar meeting.

Matters Initiated by Committee Members: None

Correspondence (unrelated to a specific agenda item): None

Approval of Minutes (March 4, 2020) – (Small changes and include Ehorn's commitment to present on dam proposal.)

A motion was made by Representative Byrne to approve BVAC meeting minutes from March 4, 2020. The motion was seconded by Representative Nunn. The motion was carried by the following vote:

Aye: 5 - Albaugh, Mitchell, Conner, Byrne, Nunn

SUBJECT #1:
Update on monitoring well drilling.

ACTION REQUESTED:

1. Receive report from the BVAC Secretary, Staff, and/or Consultant.
2. Receive public comment

D. Fairman stated we have to move forward at active pace as there has been no extension to GSP due date. He laid out time line plan again.

There have been 5 clusters of wells (20 wells in total) drilled in Big Valley. Water quality samples will be collected after construction is totally completed. These water sample will be used to create a base line. Water will be tested for general minerals, metals, volatile compounds, and organic compounds as well as the boron to sodium ratio for agricultural purposes. By establishing a good water quality base line now, the less constituents that have to be monitored in the future. There will be future water quality testing. A surveyor will also be employed to map well site locations.

The well that was drilled too close to road in Modoc County was addressed. A meeting pertaining to this well was held with GEI Consultants, Maggiora Bros. Drilling, North CalNeva RC&D, UC Cooperative Extension, Modoc County, Modoc County Roads, and DWR in attendance. It was decided that the wells were to be retrofitted so that well heads were moved away from the road. Cal-Neva had the final say as it is their grant that provided the funding for this well. D. Fairman said he put his stamp on the retrofit design and there should be no monitoring issues with them for their estimated life span of 20 years.

Representative concerns and comments: Representatives Albaugh and Mitchell said retrofitting the wells was not good enough and should be redrilled away from the road. It was stated that GEI Consultants did not follow through with the request from the previous meeting to make sure that the wells got redrilled. Representative Nunn asked if any agreement was signed by Maggiora Bros. Drilling that would hold them accountable if this well cluster does not work out for any reason? (D. Fairman answered no to this question.)

Public Comment: None

SUBJECT #2:
Present revised draft chapter 1 and 2 for the Groundwater Sustainability Plan (GSP).

ACTION REQUESTED:

1. Receive report from the BVAC Secretary, Staff, and/or Consultant.
2. Accept and "set aside" revised draft chapter 1 and 2 for future inclusion in Draft GSP.
3. Receive public comment.

Comments pertaining to Chapter 1 and 2 were taken into consideration in the revised draft chapters being present for acceptance.

Representative concerns and comments: The data used by DWR pertaining to how basin was scored is still an issue. Also, the public mapping used by GEI in the chapters is coming from DWR which used an estimate of wells instead of actual. There are generic issues that do not pertain to Big Valley that were used in the initial scoring of the Big Valley basin that need to be recognized in the chapters such as population growth and urban boundaries. Representative Albaugh asked D. Fairman who was the person he should contact at DWR regarding the issues? D. Fairman will send DWR contact to Representative Albaugh. J. Talbott suggested that the better point of contact would be the California Natural Resources Agency to discuss DWR policy issues. Representative Albaugh asked Ian Espinoza of DWR about well criteria used. Ian Espinoza responded that if there were no listing on well completion reports, a well was considered a production well. He also confirmed that DWR used an estimate to include "potential wells" in their data. Even a drilled dry well could be included (as long as it was drilled over 22' and had a 4" casing) if paperwork was not followed up on. I. Espinoza also stated the prioritization of the basin has already been memorialized and cannot be changed until the 5 year update plan. John Ayres stated the GSP could make a recommendation to verify wells.

Representatives want the issues addressed and they want the public to be able to readily comment before they accept the chapters; therefore, the chapters were not accepted.

Public Comment: None

SUBJECT #3

Introduce and discuss draft text for public draft chapter 3 of the GSP.

ACTION REQUESTED:

1. Receive report from the BVAC Secretary, Staff, and/or Consultant.
2. Receive public comment.

D. Fairman presented draft of Chapter 3, Description of Plan Area, in general. It describes the setting, jurisdictions, authorities, and land uses. GEI wrote the draft. The draft was edited by Lassen County staff, Modoc County staff, UC Cooperative Extension, Lassen County Waterworks District #1, and Woodard and Curran. GEI incorporates edits for the "Public Draft". The information came from DWR, SWRCB, NOAA, USGS, GMP, IRWMP, County General Plan, Lassen-Modoc Flood Control and Water Conservation District. In the draft, reviews were made to identify red flags, inaccuracies, missing information, and monitoring networks. Public comments need to be received by June 2, 2020. Comments can be submitted thru the GSP Communication Portal.

Representative concerns and comments:

(1) Page 184 3.4.2 Should domestic wells be lumped in with Ag. Wells? Domestic wells should have their category. How does this play out in the well count and how wells are classified?
(2) Page 190 Strike those sentences out under section 3.6.1.
(3) Page 201 Double check water exported out of the County.
(4) Page 176 lines 23-24 Round Valley separated by ½ mile gap, would like proof fo this cited in the chapter.

(5) Page 181 Table 3-1 Land Use Summary acres. How are these acres irrigated? Is sub-irrigation taken into account? (Answer: Page 183 Table answers this water budget concern.)
(6) Urban description needs to be changed on Table 3-1. Where does the riparian area information come from? (Answer: Comes from aerial remote sensing imagery.)
(7) Page 181 line 115 There are only 2 public supply wells. (Answer: 3rd well is with Forest Service.)
(8) Page 184 line 126 Forest Service well is not a public well.
(9) Page 186 line 170 well count goes up with the 20 new wells, false numbers because they are for monitoring only.
(10) Page 186 line 171 DWR inventory shows 6 public wells and destroyed wells still showing in well count. Well count should be accurate and take out erroneous numbers.
(11) Page 189 shows 6 public wells.
(12) Page 200 line 374-381 What about the Cal Fire camp? (Answer: outside of boundary)
(13) Page 200 line 390 Irrigated Lands Regulatory Program, add that the rate goes up by proclamation and is never voted on.
(14) Page 201 lines 405 and 406 wording of quality of water of recharge, quality of recharge water is not controllable so these lines should be removed. Does Lassen County have a water export ordinance?
(15) Page 202 line 461 should be removed altogether.

Public Comment: Any public wells in Lookout? Would the Road Dept. in Lookout have a public well?

SUBJECT #4
Present existing soils data and discuss next steps for soils analysis.

ACTION REQUESTED:

1. Receive report from the BVAC Secretary, Staff, and/or consultant.
2. Receive public comment.

D. Fairman expects to have Chapter 4 ready for July meeting. Contents will include soils (top 6 feet of subsurface). The types of soil can affect recharge. Public map shows infiltration rates, but more information and identification of areas that may have better infiltration rates is needed. D. Fairman would like feedback from the community on this subject. The whole basin is an old lake bed which is why the whole area infiltration rate is deemed slow and very slow. There are techniques that can be utilized for better water recharge infiltration rates.

Representative concerns and comments: To receive detailed information on soils, a larger map may be needed for orientation purposes. Lookout has slow and very slow infiltration rates.

Public Comment: None

SUBJECT #5
Continue discussion of Sustainability Indicators and Locally Defined Undesirable Results.

ACTION REQUESTED:

1. Receive report from the BVAC Secretary, Staff, and/or consultant (GEI).
2. Receive public comment.

D. Fairman discussed meanings of terms. Key questions to think about: 1. What factors or conditions tell us how water resources are doing (sustainability indicators)? 2. What conditions do we want to see in the future (sustainability goals)? 3. What condition should be avoided (locally defined undesirable results)?

Representative concerns and comments: Conner - nature will take care of itself without the state being involved. Mitchell – take on government because they are just after the water. Byrne – doesn't want this to be cost prohibitive. Albaugh – would like to see the State of Jefferson, thus there would be no SGMA. This GSP needs to satisfy the people of the valley, not the State.

Public Comment: None

Matters Initated by the General Public: Covid issue should allow extension of due date of GSP because public input is limited by poor internet in the Big Valley area. D. Fairman asked if representatives were still interested in having an Allen Camp dam presentation to which T. Martinez responded that she had a file on the subject and could give a presentation on the dam.

Establish next meeting date: 4:00 pm, July 1, 2020, Aiden Community Center

Adjournment: There being no further business, Chairman Albaugh asked for a motion to adjourn.

> **A motion was made by Representative Byrne to adjourn the meeting which was seconded by Representative Conner at 6:35 pm**.

The motion was carried by the following vote:

> **Aye:** 5 - Albaugh, Mitchell, Conner, Byrne, Nunn

Big Valley GSP Comment Matrix Chapters 1-2

Document	Page & Line Number	Comment	Date	Response
Public Draft Chapters 1 and 2	Section 1.2, line 23	Prove description of Lassen County Basin. DWR boundary definitions and the GSP need to be more specific.	3/4/2020	The boundaries of the basin are established by DWR in their Bulletin 118 for SGMA. A basin boundary modification process is allowed under SGMA and can be investigated, but is outside the scope of writing the GSP. A background section has been added to Chap 1 that describes the County's request for basin boundary modification that was denied by DWR.
Public Draft Chapters 1 and 2	Section 1.3	DWR prioritization criteria are subjective. Groundwater irrigated acres need to be differentiated from surface water irrigation. DWR doesn't respond to questions.	3/4/2020	A section was added describing the basin prioritization process and the interaction between the counties and DWR regarding the ranking. DWR's dataset that they used to determine irrigated acres is documented on their website. The acreage irrigated by groundwater will be evaluated in Chapter 6: Water Budget. The extent of lowering groundwater levels in the basin will be evaluated in Chapter 5: Groundwater Conditions. DWR's lack of responsiveness to questions is noted.
Public Draft Chapters 1 and 2	Chap 2 Line 61	Add that GSA was established because we have to, it is not voluntary	3/4/2020	A Background section was added describing the basin prioritization, basin boundary modification request, and correspondence between the counties and DWR. The overarching message of this new text is to document that the counties did not start this process willingly. Wording was changed in Chap 2 to add the word "mandate" when referring to SGMA to emphasize that compliance with this law is not voluntary.
Public Draft Chapters 1 and 2	Page #: 1.1, Line #: 6,7,&8	1.1 Lines 6,7,&8 Should state in the body with verbiage of the fact that the Stake Holders" contested DWR findings and protested the priority ranking.1.3 Line 54 graphWhat is it? Where do these numbers come from?I also think that we should refer to the land owners with wells effected by the basin should be referred to as "Stake Holders"	3/5/2020	A background section has been added to Chap 1 that describes the prioritization and the Counties' responses. DWR provides some of the data it used for prioritization on its website, at the URL shown on Line 53. Use of the term "stakeholders" will be defined and used in future chapters.

Big Valley GSP Comment Matrix Chapters 1-2

Document	Page & Line Number	Comment	Date	Response
Public Draft Chapters 1 and 2	Page #: 1-2, Line #: 42	I would like to recommend that the description of the boundary of the Big Valley Basin be amended to include the water delivery sources which feed into the water table of the valley. These water sources are varied and include a number of perennial and ephemeral drainages, springs and reservoirs. For example:North: Halls Canyon Creek, Howell Canyon Creek, Fox Draw, Hayes Canyon and seventeen (17) Unnamed ephemeral drainages along Barber and Ryan Ridges.East: Ash Creek, Butte Creek and seven (7) Unnamed Ephemeral drainages.South: Willow Creek, Juniper Creek, Juniper Creek Ã¢Â€Â“ South Fork, Hot Springs Slough, Gobel Slough, Big Valley Canal and twenty (20) Unnamed ephemeral drainages.West: Taylor Reservoir, Kramer Reservoir, Lower Roberts Reservoir, Taylor Creek, Widow Valley Creek, Bull Run Slough, Egg Lake Slough and fifteen (15) Unnamed ephemeral drainages.My reasoning for this recommendation to include these delivery systems is due to the topographic gradients that assist in the recharging of the Big Valley Basin groundwater. The Pit River itself offers limited influence on recharging groundwater levels to the West and southwest areas of the basin. It offers very little to no influence to the north, east and southern areas. The elevation gradient in the basin varies approximately from 4450 feet in the east to 4160 feet in the westÃ¢Â€Â¦ a drop of a few hundred feet. These areas are vital to not only modeling the water budget for the Basin, but provide potential areas for remediation projects. It will make it easier for project planning in the future since we will not have to go through amending the original boundaries at a later date.Although DWR Bulletin 118 determines the boundary based on alluvial deposits, the basin does not exist in an environmental vacuum and is dependent upon all of its water delivery systems.	3/8/2020	A background section has been added to Chap 1 that, in part, describes Lassen County's request for a basin boundary modification that was denied by DWR in 2016. DWR will again accept requests for basin boundary modifications in 2023. The current GSP will need to honor the currently established basin boundary. With that said, the GSP will acknowledge the importance of areas outside the basin on recharge. Projects and management actions described in the Plan are not restricted to being inside the groundwater basin.

Big Valley Groundwater Sustainability Plan GSP Regulations Checklist (Elements Guide) for Chapters 1-2

This checklist of the GSP Elements and indicates where in the GSP each element of the regulations is addressed.

Article 5.			Plan Contents for Big Valley Groundwater Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
§ 354.			**Introduction to Plan Contents**					
			This Article describes the required contents of Plans submitted to the Department for evaluation, including administrative information, a description of the basin setting, sustainable management criteria, description of the monitoring network, and projects and management actions.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
SubArticle 1.			**Administrative Information**					
§ 354.2.			**Introduction to Administrative Information**					
			This Subarticle describes information in the Plan relating to administrative and other general information about the Agency that has adopted the Plan and the area covered by the Plan.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
§ 354.4.			**General Information**					
			Each Plan shall include the following general information:					
(a)			An executive summary written in plain language that provides an overview of the Plan and description of groundwater conditions in the basin.		ES			Executive Summary to be written after compilation of entire Plan
(b)			A list of references and technical studies relied upon by the Agency in developing the Plan. Each Agency shall provide to the Department electronic copies of reports and other documents and materials cited as references that are not generally available to the public.		13			Each draft chapter will have a references list, which will be compiled into a master references list in Chapter 13 when the entire Plan is compiled.
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10733.2 and 10733.4, Water Code.					
§ 354.6.			**Agency Information**					
			When submitting an adopted Plan to the Department, the Agency shall include a copy of the information provided pursuant to Water Code Section 10723.8, with any updates, if necessary, along with the following information:					
(a)			The name and mailing address of the Agency.	X	2.1			
(b)			The organization and management structure of the Agency, identifying persons with management authority for implementation of the Plan.	X	2.2, 2.3			
(c)			The name and contact information, including the phone number, mailing address and electronic mail address, of the plan manager.	X	2.3			
(d)			The legal authority of the Agency, with specific reference to citations setting forth the duties, powers, and responsibilities of the Agency, demonstrating that the Agency has the legal authority to implement the Plan.	X	2.4			
(e)			An estimate of the cost of implementing the Plan and a general description of how the Agency plans to meet those costs.					Will be addressed in Ch 10
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.8, 10727.2, and 10733.2, Water Code.					

"X" indicates that the element has been addressed.

The page number will be filled in once the entire GSP is compiled.

Shaded areas are elements of the regulations that don't have to be addressed in the GSP

Table of Contents

Tables

Figures

Appendices

Abbreviations and Acronyms

Basin	Big Valley Groundwater Basin
BVGB	Big Valley Groundwater Basin
BVAC	Big Valley Groundwater Basin Advisory Committee
CASGEM	California Statewide Groundwater Elevation Monitoring
CCR	California Code of Regulations
DWR	Department of Water Resources
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
MOU	Memorandum of Understanding
SGMA	Sustainable Groundwater Management Act of 2014

1. Introduction to Big Valley Groundwater Sustainability Plan (§ 354.2-4)

1.1 Background

1.1.1 *Overview*

The Big Valley Groundwater Sustainability Agencies (GSAs) are developing this Groundwater Sustainability Plan (GSP) after exhausting its administrative challenges to the California Department of Water Resources (DWR) determination that Big Valley qualifies as a medium-priority basin. The Big Valley GSAs recognize and appreciate the scoring revisions made by DWR for Component 8.b, "Other Information Deemed Relevant by the Department." However, the GSAs continue to firmly believe that the all-or-nothing scoring for Component 7.a, regarding documented declining groundwater levels, is inconsistent with the premise of SGMA: that prioritization levels recognize different levels of impact and conditions across basins. DWR's adherence to treating all declines the same, assigning a fixed 7.5 points for any amount of documented groundwater level decline, renders meaningless the degrees of groundwater decline and penalizes those basins experiencing minor levels of decline. (provide reference)

Additionally, the GSAs recognize the adjustments made to Component 7.d, overall total water quality degradation. Noting that degradation implies a lowering from natural conditions, the Big Valley GSAs urges DWR to further refine the groundwater quality scoring process for Secondary Maximum Contamination Levels (MCLs) - which are not tied to public health concerns, but rather issues, taste and odor. Secondary MCLs which are due to naturally occurring minerals should not be factored into the scoring process. Here, the water quality conditions reflect the natural baseline and are not indicative of degradation and cannot be substantially improved through better groundwater management.

The GSAs also submitted a request to DWR for basin boundary modifications, to integrate planning at the watershed level and leverage a wider array of multi-benefit water management options and strategies within the basin and larger watershed. DWR's denial of the boundary request greatly hampers jurisdictional opportunities to protect groundwater recharge areas in higher elevations. The final boundary significantly curtails management options to increase supply through upland recharge, necessarily requiring that groundwater levels be addressed primarily through demand restrictions. See **Appendix 1A** for communications with DWR regarding basin prioritization ranking and boundary.

Development of this GSP by the GSAs, in partnership with the Big Valley Advisory Committee and members of the community, does not constitute agreement with DWR's classification as a medium-priority basin – nor does it preclude the possibility of other actions by the GSAs or by individuals within the basin seeking regulatory relief.

1.1.2 *Timeline*

In September 2014, the State of California enacted the Sustainable Groundwater Management Act (SGMA). This law requires medium- and high-priority groundwater basins in California to take actions to ensure they are managed sustainably. The California Department of Water Resources (DWR) is tasked with prioritizing all 515 defined groundwater basins in the state as high, medium, low, and very low priority. Prioritization establishes which basins need to go through the process of developing a Groundwater Sustainability Plan (GSP). When SGMA was passed, basins had already been prioritized under the state's CASGEM program, and that existing ranking process was used as the initial priority baseline for SGMA.

DWR was required to develop its rankings for SGMA based on the first seven criteria listed in **Table 1**. For the final SGMA scoring process (2019), groundwater basins with a score of greater than 14 (up to a score of 21) ranked as medium priority basins. The 2014 ranking put the Big Valley Groundwater Basin (BVGB or Basin) in the Medium category as the lowest ranked basin in the state required to develop a GSP. Lassen County reviewed the 2014 ranking process and criteria that were used and found some potentially erroneous data. They made a request to DWR for the raw data that was used, which they were eventually provided, and verified the error that would have put the BVGB into the Low category. However, because the comment period for these rankings had already expired in 2014 (prior to the passage of SGMA), DWR would not revise their ranking. ~~A letter from DWR regarding this issue is included in **Appendix A**.~~

Table 1-1 Big Valley Groundwater Basin Prioritization

Criteria	2014	2018	2019	Comment
2010 Population	1	1	1	
Population Growth	0	0	0	
Public Supply Wells	1	1	1	
Total # of Wells	1.5	2	2	
Irrigated Acreage	4	3	3	
Groundwater Reliance	3	3.5	3.5	
Impacts	3	3	2	Declining water levels, water quality
Other Information	0	7	2	Streamflow, habitat, and "other information determined to be relevant"
Total Score	**13.5**	**20.5**	**14.5**	**Medium priority each year**

In 2016, Lassen County submitted a request for a basin boundary modification as allowed under SGMA. The request was to extend the boundaries of the BVGB to the boundary of the watershed. The purpose of the proposed modification was to enhance management by including the volcanic areas surrounding the valley sediments, including federally managed timberlands and rangelands, that have an impact on groundwater recharge. The modification was proposed on

a scientific basis but was denied by DWR because the request "…did not include sufficient detail and/or required components necessary…and evidence was not provided to substantiate the connection [of volcanic rock] to the porous permeable alluvial basin, nor were conditions presented that could potentially support radial groundwater flow as observed in alluvial basins." ~~Lassen County's basin boundary modification request and DWR's denial are included in **Appendix A.**~~

In 2018, DWR released an updated draft basin prioritization based on the eight components shown in **Table 1** using slightly different data and methodology than previously used. For this prioritization, Big Valley's score increased from 13.5 to 20.5, primarily because of an addition of 5 ranking points awarded under the category of "other information determined to be relevant" by DWR. DWR's justification for the five points was poorly substantiated as "Headwaters for Pit River/Central Valley Project – Lake Shasta". Lassen and Modoc Counties sent a joint comment letter questioning DWR's justification and inconsistent assessment of these five points as well as their methodology for awarding the same number of points for water level and water quality impacts to basins throughout the state regardless of the severity of the impacts. ~~The letter is included in **Appendix A.**~~

In 2019, DWR released their final prioritization with the BVGB score reduced to 14.5, but still ranked as Medium priority and subject to the development of a GSP. DWR's documentation of the 2019 prioritization ~~is included in **Appendix A.** Additional information~~ can be viewed on their website (DWR 2019).

Meanwhile, throughout this time, Lassen and Modoc Counties began moving forward to comply with the SGMA mandate through a public process that established them as the Groundwater Sustainability Agencies (GSAs) in 2017. The establishing resolutions forming the GSAs adopted findings that it was in the public interest of both counties to maintain local control by declaring themselves the GSA for the respective portion of the basin. The Water Resources Control Board would become the regulating agency if the counties did not agree to be the GSAs since there were no other local agencies in a position or qualified to assume GSA responsibility. The Counties obtained state grant funding to develop the GSP in 2018 and began the GSP development process and associated public outreach in 2019.

1.2 Purpose of the Groundwater Sustainability Plan

Satisfying the requirements of SGMA generally requires four activities:

1. Formation of at least one GSA to fully cover a basin. Multiple GSAs are acceptable and Big Valley has two GSAs.
2. Development of a GSP that fully covers the basin.
3. Implementation of the GSP and management to achieve quantifiable objectives.
4. Regular reporting to DWR.

Two GSAs were established in the Basin: County of Modoc GSA and County of Lassen GSA, each covering the portion of the Basin in their respective jurisdictions. This document is a single GSP, developed jointly by both GSAs for the entire Basin. This GSP describes the Big Valley Groundwater Basin, develops quantifiable management criteria that accounts for the interests of the Basin's beneficial groundwater uses and users, and identifies projects and management actions to ensure sustainability.

1.3 Description of Big Valley Groundwater Basin

The Big Valley Groundwater Basin is identified by DWR in Bulletin 118 as Basin No. 5-004 (DWR, 2016). The Basin is one of many small, isolated basins in the north-eastern region of California. The boundary between Lassen and Modoc Counties runs across the Basin. Each county formed a GSA for its respective portion of the Basin and the counties are working together to manage the Basin under a single GSP.

The Basin, shown on **Figure 1-1**, encompasses an area of approximately 144 square miles with Modoc County comprising 40 square miles (28%) on the north and Lassen County comprising 104 square miles (72%) on the south. The Basin includes the towns of Adin and Lookout in Modoc County and the towns of Bieber and Nubieber in Lassen County. The Ash Creek State Wildlife Area is located in both counties and occupies 22.5 square miles in the center of the basin in the marshy/swampy areas along Ash Creek.

The BVGB is isolated and does not share a boundary with another groundwater basin. However, Ash Creek flows into Big Valley from the Round Valley Groundwater Basin at the town of Adin. The two basins are separated by about a half-mile gap.

The surface expression of the Basin boundary is defined as the contact of the valley sedimentary deposits with the surrounding volcanic rocks. The sediments in the Basin are comprised of mostly Plio-Pleistocene alluvial deposits and Quaternary lake deposits eroded from the volcanic highlands and some volcanic layers interbedded within the alluvial and lake deposits. The Basin is surrounded by Tertiary- and Miocene-age volcanic rocks of andesitic, basaltic and pyroclastic composition. The boundary between the BVGB and the surrounding volcanic rocks generally correlates with a relatively steep change in topography along the margin of the valley.

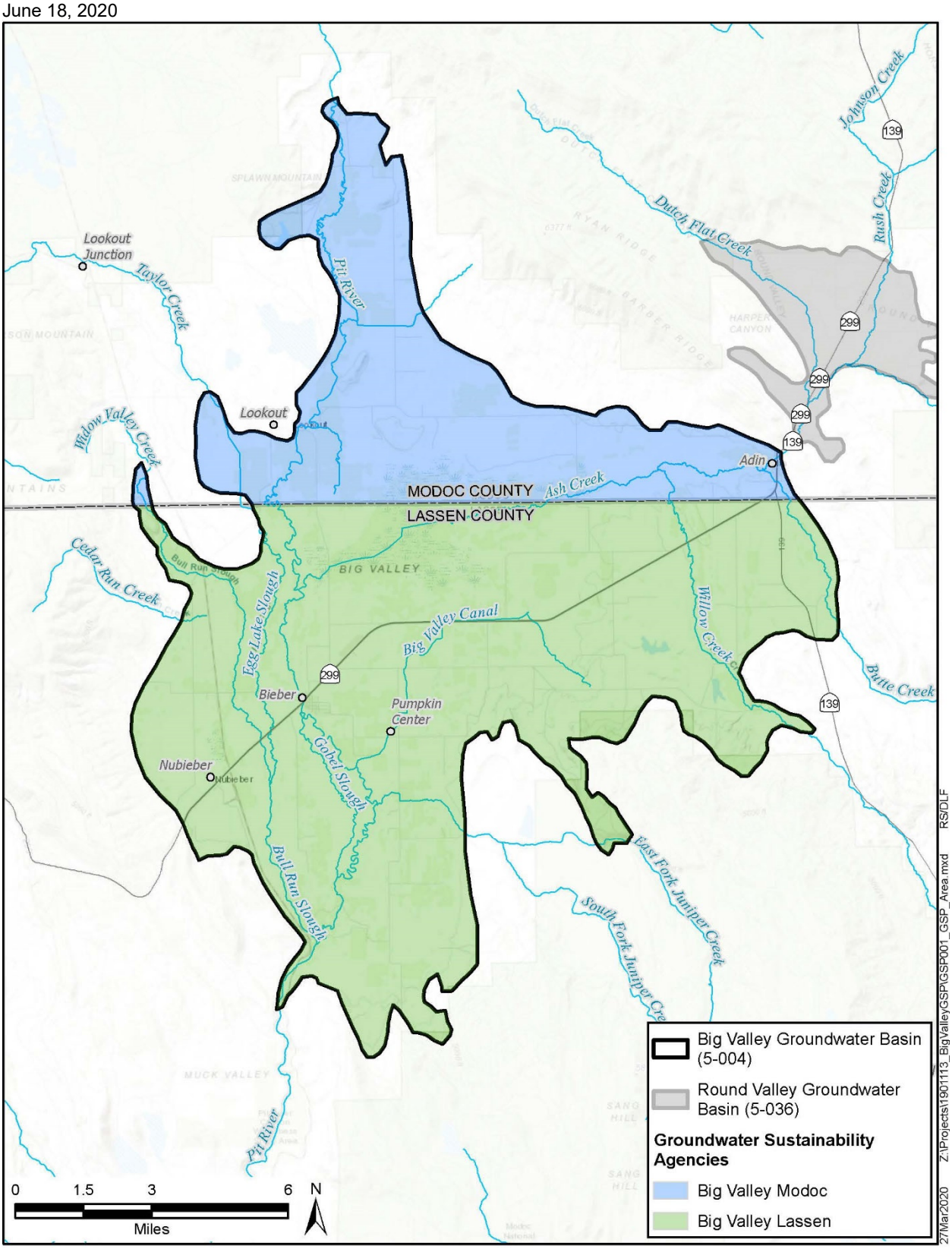

Figure 1-1 Big Valley Groundwater Basin, Surrounding Basins, and GSAs

2. Agency Information (§ 354.6)

The two Big Valley GSAs were established for the entire Big Valley Groundwater Basin to jointly develop, adopt, and implement a single mandated GSP for the BVGB pursuant to SGMA and other applicable provisions of law.

2.1 Agency Names and Mailing Addresses

The following contact information is provided for each GSA pursuant to California Water Code §10723.8.

Modoc County
204 S. Court Street
Alturas, CA 96101
(530) 233-6201
tiffanymartinez@co.modoc.ca.us

Lassen County
Department of Planning and Building Services
707 Nevada Street, Suite 5
Susanville, CA 96130
(530) 251-8269
landuse@co.lassen.ca.us

2.2 Agency Organization and Management Structure

The two GSAs, Lassen and Modoc Counties, were established in 2017 to comply with the SGMA, mandated legislation. **Appendix ~~B~~2A** contains the resolutions forming the two agencies. Each GSA is governed by a five-member Board of Supervisors. In 2019, the two GSAs established the Big Valley Groundwater Basin Advisory Committee (BVAC) through a Memorandum of Understanding (MOU), included as **Appendix ~~C~~2B**. The membership of the BVAC is comprised of:

- One member of the Lassen County Board of Supervisors selected by said Board
- One alternate member of the Lassen County Board of Supervisors selected by said Board
- One member of the Modoc County Board of Supervisors selected by said Board
- One alternate member of the Modoc County Board of Supervisors selected by said Board
- Two public members selected by the Lassen County Board of Supervisors. Said members must either reside or own property within the Lassen County portion of the Big Valley Groundwater Basin
- Two public members selected by the Modoc County Board of Supervisors. Said members must either reside or own property within the Modoc County portion of the Big Valley Groundwater Basin

The decisions made by the BVAC are not binding, but the committee serves the important role of providing formalized, local stakeholder input and guidance to the GSA governing bodies, GSA staff, and consultants in developing and implementing the GSP.

2.3 Contact Information for Plan Manager

The plan manager is from Lassen County and can be contacted at:

Gaylon Norwood
Assistant Director
Lassen County Department of Planning and Building Services
707 Nevada Street, Suite 5
Susanville, CA 96130
(530) 251-8269
gnorwood@co.lassen.ca.us

2.4 Authority of Agencies

The GSAs were formed in accordance with the requirements of California Water Code §10723 *et seq*. Both GSAs are local public agencies organized as general law counties under the State Constitution and have land use responsibility for their respective portions of the Basin. The resolutions of formation for the GSAs are included in **Appendix B**.

2.4.1 *Memorandum of Understanding*

In addition to the MOU establishing the BVAC, the two GSAs may to enter into an agreement to jointly implement the GSP for the Basin. However, this agreement is not a requirement of the SGMA.

2.5 References

California Department of Water Resources (DWR), 2019. Basin Prioritization Website. Available at: https://water.ca.gov/Programs/Groundwater-Management/Basin-Prioritization.

Appendix 1A

Background Information

- Letter from DWR re: 2014 basin prioritization adjustment denial
- Letter to DWR re:Basin Boundary Modification – Big Valley, Bulletin 118 Basin 5-4
- DWR Table 1. 2016 Final Basin Boundary Modifications
- Correspondence with DWR re: 2018 basin prioritization

STATE OF CALIFORNIA – CALIFORNIA NATURAL RESOURCES AGENCY
EDMUND G. BROWN JR., *Governor*

DEPARTMENT OF WATER RESOURCES
NORTHERN REGION OFFICE
2440 MAIN STREET
RED BLUFF, CA 96080-2356

April 15, 2016

Mr. Richard Egan, Administrative Officer
County of Lassen
Administrative Services
221 S. Roop Street, Suite 4
Susanville, California 96130

Dear Mr. Egan

This letter is in response to your request for information regarding the number of irrigated acres reported in the Big Valley Basin prioritization dataset.

As part of the California Statewide Groundwater Elevation Monitoring (CASGEM) Program legislation, and pursuant to the California Water Code, Section 10933, the Department of Water Resources (DWR) is required to prioritize California's 515 groundwater basins. CASGEM directs DWR to consider, to the extent available, all of the data components listed below:

1. The population overlying the basin
2. The rate of current and projected growth of the population overlying the basin
3. The number of public supply wells that draw from the basin
4. The total number of wells that draw from the basin
5. The irrigated acreage overlying the basin
6. The degree to which persons overlying the basin rely on groundwater as their primary source of water
7. Any documented impacts on the groundwater within the basin, including overdraft, subsidence, saline intrusion, and other water quality degradation
8. Any other information determined to be relevant by DWR (subsequently modified in 2014 to included adverse impacts on local habitat and local streamflow)

In response to the CASGEM legislation, each groundwater basin was prioritized with the best available data and statistically given one of the following rankings: very low, low, medium, or high. To calculate the total irrigated acreage for the initial prioritization, DWR relied on a land survey using detailed analysis units (DAU). Because the DAUs cover a different area than the groundwater basin, DWR estimated the proportion of overlap. For the Big Valley Basin, DWR estimated the irrigated acres for Big Valley groundwater basin based on the proportional amount of irrigated lands in the DAU and additional information gleaned from satellite imagery, ultimately arriving at a figure of 34,129 acres. Recognizing this method was an estimate, all of the groundwater basins were further analyzed by using their actual basin areas for the ranking. This step would have reduced the estimated value of irrigated acreage for the Big Valley basin to 25,545 acres but, for some reason, that did not occur and the value remained at 34,129 acres based on the estimated proportion from the DAU.

On the other hand, the portion of land in the basin identified as partially irrigated land or meadow pasture, which should have been included in the irrigated acreage calculation, was inadvertently omitted. Including this additional area of 26,260 acres brings the total irrigated acreage for the basin to over 51,800 acres.

DWR completed the initial draft basin prioritization in December of 2013. Public outreach for the draft basin prioritization consisted of three public workshops throughout the State and a statewide Webinar where DWR explained the basin prioritization process and requested feedback and comments. The public outreach for basin prioritization was followed by a three-month window where local agencies and water resource managers were encouraged to provide comments and information. During this time, DWR received and addressed a number of comments and data, and made adjustments to the basin prioritizations accordingly, but DWR did not receive any comments regarding the irrigated lands estimate for the Big Valley Basin. The basin prioritization was finalized in June 2014.

In September 2014, the Sustainable Groundwater Management Act (SGMA) was passed requiring all CASGEM medium and high priority basins to comply with the new SGMA law. SGMA also directed DWR to develop regulations to allow local agencies to revise their groundwater basin boundaries to help improve sustainable groundwater management, to update the basin prioritization once the basin boundaries have been modified, and to consider a new SGMA requirements for data component number eight on the previous page that includes adverse groundwater impacts on local habitat and local stream flows during the next basin prioritization update. (See the list of data components shown on the previous page.) The basin boundary regulation was adopted on October 21, 2015, and the solicitation for groundwater basin boundary changes ended in March 31, 2016. The 2016 basin boundary modifications will change basin areas and the number of basins, which could result in ranking changes for some basins. In addition, DWR is currently working with agencies and local water managers to identify the best available data, to gather and update many of the individual basin prioritization data components, and to improve the overall quality of the basin prioritization. Improvements to the basin prioritization data will include the following updated information:

1. Population and population growth will be recalculated for each of the modified basins, with new ranking breakpoints as necessary.
2. Public Supply Wells will be reprocessed for all basins with the assistance of California State Water Resources Control Board, Division of Drinking Water, employing additional selection criteria, with new ranking breakpoints as necessary.
3. The number of Total Wells will be reprocessed for all basins using DWR 's Online System for Well Completion Reports (OSWCR), employing production well selection criteria, with new ranking breakpoints as necessary;
4. Groundwater Reliance (Groundwater Use and percent of total supply) and Irrigated Acreage will be updated for all basins using the latest land use surveys (possibly 2015 statewide) and 2014 water year information.
5. Existing groundwater-related impacts will be reviewed and updated.
6. Potential adverse impacts to local habitat and streamflow due to groundwater extraction will be identified, and a process will be established for ranking these impacts.

DWR plans to begin public outreach for the updated draft basin prioritization in fall 2016, with the final basin prioritization update occurring between December 2016 and February 2017. Unfortunately, it is not possible to reprioritize individual basins outside of this process. Because the individual basin priority is dependent on the relative statewide distribution of each data component, there is no way to predict how the updated prioritization would affect the ranking of any particular basin. Even for those basins where it is known that individual data components have been changed due to improved data, the overall basin priority may remain the same, or even increase due to new SGMA requirements for data component number eight and improvements to the other seven data components. DWR is using new data to estimate irrigated acreage in the Big Valley Basin and, as noted above, the newer data, which was provided to Lassen County Administrative Office, supports a higher value (approximately 51,000 acres).

In closing, I encourage you to visit DWR's basin prioritization website at the following address: http://www.water.ca.gov/groundwater/casgem/basin_prioritization.cfm. The website contains all of the groundwater basin ranking results, as well as the methodology used in the statistical analysis. If you have additional question concerning basin prioritization or if you might possibly have additional data associated with components one through eight (shown on the first page of this letter) that you would like DWR to consider during the next basin prioritization update, please contact Roy Hull, Engineering Geologist, at (530) 529-7337.

If you have any questions or need additional information, please contact me at (530) 528-7403.

Sincerely,

William Ehorn, Chief
Regional Planning Branch

cc: Scott Morgan, DWR Legal

County of Lassen
ADMINISTRATIVE SERVICES

ROBERT F. PYLE
District 1
JIM CHAPMAN
District 2
JEFF HEMPHILL
District 3
AARON ALBAUGH
District 4
TOM HAMMOND
District 5

Richard Egan
County Administrative Officer
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Regina Schaap
Administrative Assistant
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Susanville, CA 96130
Phone: 530-251-8333
Fax: 530-251-2663

CERTIFIED MAIL/ RETURN RECEIPT
7015 0640 0005 0681 0168; 7015 0640 0005 0681 0175

March 18, 2016

Regional Planning Branch
Department of Water Resources
901 P Street, Room 213
Sacramento, CA 94236

Department of Water Resources
P.O. Box 942836
Sacramento, CA 94236

RE: Basin Boundary Modification - Big Valley, Bulletin 118 Basin 5-4

To Whom It May Concern:

This letter is intended to supplement a request by Lassen County to modify Bulletin 118 Basin 5-4 (Big Valley) as permitted under water code, section 340. The adjustment request is External and Scientific and primarily correlates to unmanaged (in terms of contemplating groundwater recharge) portions of the watershed directly impacting recharge in Big Valley.

Summary

The proposed boundary adjustment does not examine, or seek to alter, the extent of water-bearing formations identified in the Bulletin 118 Hydrogeologic analysis. Fundamentally (because Big Valley has been designated as medium priority by the Department of Water Resources), this request is an attempt by Lassen County to ensure management of Big Valley, as required by the Sustainable Groundwater Management Act (SGMA), is successful. Lassen County considers the proposed boundary adjustment to be a critical step toward effective and sustainable management because it empowers the Groundwater Sustainability Agency (GSA) with the ability to identify, consider, and mitigate potential impacts to basin recharge, originating in the basins watershed.

Description

Watershed and subwatershed hydrologic unit boundaries created by the Natural Resource Conservation Service (NRCS) form the proposed perimeter of the basin, after the adjustment. This data set was designed by the NRCS to be used as a tool for water-resource management and planning activities. The original dataset boundaries were adjusted by Lassen County at two

points to exclude subwatershed boundaries providing recharge for two or more Bulletin 118 basins.

The NRCS data (table 1 below) assign 9 subwatershed basins to Big Valley totaling approximately 380 square miles. However, an adjustment of roughly 200 acres was applied to the Butte Creek subwatershed polygon, in order to include a portion of the Big Valley basin that had been assigned to the Bulletin 118 Basin 5-36 (Round Valley) watershed.

Table 1: Watershed data

OBJECTID	ACRES	HU_10_NAME	HU_12_NAME	HU_12_TYPE	STATES	SHAPE_Length	SHAPE_Area	
99800	31362	Blacks Canyon-Pit River	Roberts Reservoir-Pit River	S	CA	0.663846	0.013641	1
99589	11815	Juniper Creek	Deer Spring-Juniper Creek	S	CA	0.534262	0.005124	1
99607	9327	Butte Creek-Ash Creek	Hot Springs Slough	U	CA	0.284423	0.004047	1
99624	51531	Widow Valley Creek-Pit River	Bull Run Slough-Pit River	S	CA	0.878017	0.022349	1
99640	24868	Butte Creek-Ash Creek	Butte Creek	S	CA	0.594983	0.01079	1
99641	26769	Willow Creek	Lower Willow Creek	S	CA	0.682247	0.011607	1
99681	20256	Widow Valley Creek-Pit River	Widow Valley Creek	S	CA	0.493075	0.008799	1
99704	43355	Butte Creek-Ash Creek	Big Swamp-Ash Creek	S	CA	0.883789	0.018833	1
99746	24340	Taylor Reservoir	Taylor Creek	S	CA	0.723431	0.010581	1

The proposed boundary will include roughly 50,000 acres of federally managed timberland, 40,000 acres of privately managed timberland, and 60,000 acres of private and public range/grassland currently outside of the Big Valley (Bulletin 118) perimeter. Presently, management of these lands encompassing the Big Valley watershed does not actively consider implications to groundwater recharge. Lassen County contends that effective management of a groundwater basin must consider connectivity of groundwater/ surface water systems. The most basic form of combined groundwater surface water management seeks to ensure sustainable groundwater supplies, by managing and maintaining watersheds and thereby promoting desirable streamflow.

Watershed development to enhance groundwater would promote the use of natural resources, while mitigating the detrimental impacts of land-use activities on soil and water. This proposed adjustment and management approach recognizes that soil, water, and land use occurring in the upland watersheds, are all fundamentally connected to groundwater basins. Some components of watershed development and its role to groundwater are listed in Table 2 below.

Table 2 Common Components of watershed development and its role.

Activity	Objective	Impact
Check dams	Stop/slow down water runoff in gullies	Recharge of groundwater and nearby wells. Creations of open water bodies
Ponds	Groundwater recharge water for cattle	Recharge of groundwater. Creation of big open water bodies
Gully plugs, Gabions	Primarily to trap sediment/silt in gullies and to stabilize	Keeps sediment out of downstream areas. Increased water infiltration due to slowing down water

The intended impact of this proposal, to adjust the Big Valley basin boundary, is to ensure that watershed development is a function of the GSA through an adopted Groundwater Sustainability Plan (GSP). A coordinated management approach, which includes watershed development aimed at increasing groundwater recharge and overall water resource availability, will be necessary to ensure successful implementation of a GSP.

Lassen County has been in contact with Modoc County, the only other Local Agency with jurisdiction over Big Valley, and they are aware of this request. Please contact the Department of Planning and Building Services at (530) 251-8269, if there are any questions.

Sincerely,

FOI:

Richard Egan
County Administrative Officer

RE:MLA:mm

Cc: Supervisor Chapman, Chairman District 2; Supervisor Pyle, District 1; Supervisor Hemphill, District 3; Supervisor Albaugh, District 4; Supervisor Hammond, District 5; Bob Burns, County Counsel; Richard Egan, County Administrative Officer.

S:\PLA\Admin\FILES\1252\Response to denial of Big Valley boundary adjustment

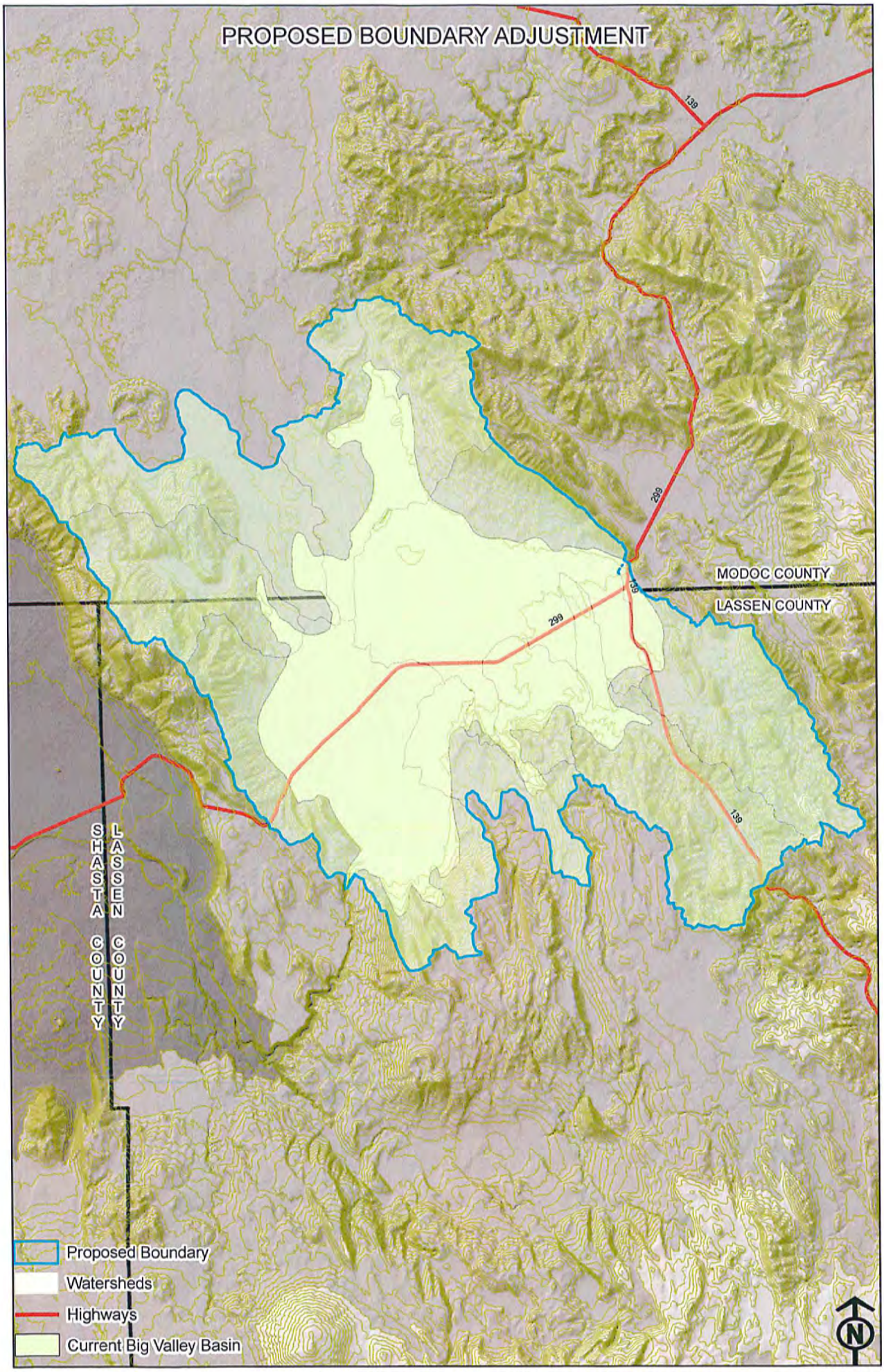
PROPOSED BOUNDARY ADJUSTMENT
139
299
MODOC COUNTY
LASSEN COUNTY
299
139
139
SHASTA COUNTY
LASSEN COUNTY
Proposed Boundary
Watersheds
Highways
Current Big Valley Basin
N
0 1.75 3.5 7 Miles

Table 1. 2016 Final Basin Boundary Modifications

Basin/Subbasin	Request Agency	Lead Region Office	Short Description	Modification Type	Recommendation	Regulatory Basis for Denial Article 6	Summary Draft Decisions
1-02.01 KLAMATH RIVER VALLEY - TULELAKE	Tulelake Irrigation District	NRO	Tulelake Irrigation District (TID) is exploring a modification to the Tule Lake...	Scientific External	**Approved**		This request was approved because it met the technical requirements of the regulation and provided the necessary supporting documentation, technical studies, local outreach and/or notification.
5-04 BIG VALLEY	Lassen County	NRO	Watershed and subwatershed hydrologic unit boundaries form the proposed perimeter...	Scientific External	**Denied**	345.2(c) and (d)	This request did not include sufficient detail and/or required components necessary to support approval of the request. The proposed modification included volcanic rock geologic units (not alluvial basin material) and evidence was not provided to substantiate the connection to the porous permeable alluvial basin, nor were conditions presented that could potentially support radial groundwater flow as observed in alluvial basins.
5-21.52 SACRAMENTO VALLEY - COLUSA, 5-21.51 SACRAMENTO VALLEY - CORNING	Tehama County Flood Control & Water Conservation District	NRO	Jurisdictional Consolidation of the Tehama County portion of the Colusa Subbasin...	Jurisdiction Consolidation	**Approved**		This request was approved because it met the technical requirements of the regulation and provided the necessary supporting documentation, technical studies, local outreach and/or notification.
2-9.04 SANTA CLARA VALLEY - EAST BAY PLAIN, 2-9.01 SANTA CLARA VALLEY - NILES CONE	Alameda County Water District	NCRO	Request to correct the boundary of the Niles Cone Groundwater Basin (Niles Cone...	Jurisdiction Internal	**Approved, as modified**		This request was approved with minor modifications to the eastern boundary to align with the lateral extent of alluvium. The request for jurisdictional modification was supported by sufficient technical information and necessary affected local agencies provided letters in support of the modification.
3-03.01 GILROY-HOLLISTER VALLEY - LLAGAS AREA	Santa Clara Valley Water District	NCRO	Modify eastern Llagas Subbasin boundary to match extent of water-bearing sediment...	Scientific External	**Approved**		This request was approved because it met the technical requirements of the regulation and provided the necessary supporting documentation, technical studies, local outreach and/or notification.
5-21.60 SACRAMENTO VALLEY - NORTH YUBA	Yuba County Water Agency	NCRO	Subdivision of the North Yuba Subbasin along the Butte-Yuba county line	Jurisdiction Subdivision	**Approved, as modified**		The modification request was originally submitted as a jurisdictional subdivision, however, during the review of the request it was revealed that the Department introduced a significant error in the basin boundary sometime between 2003 and 2014, resulting in a portion of Butte County being applied to the North Yuba subbasin. The Department corrected the error during this modification submission period.
5-21.61 SACRAMENTO VALLEY - SOUTH YUBA, 5-21.64 SACRAMENTO VALLEY - NORTH AMERICAN	Placer County	NCRO	Request to adjust the subbasin boundary to align with the Yuba / Placer county ...	Jurisdiction Internal	**Approved**		This request was approved because it met the technical requirements of the regulation and provided the necessary supporting documentation, technical studies, local outreach and/or notification.
5-21.67 SACRAMENTO VALLEY - YOLO, 5-21.52 SACRAMENTO VALLEY - COLUSA, 5-21.68 SACRAMENTO VALLEY - CAPAY VALLEY, 5-21.66 SACRAMENTO VALLEY - SOLANO	Yolo County Flood Control And Water Conservation District	NCRO	County Basin Consolidation of four subbasins within Yolo County to existing County...	Jurisdiction Internal, Jurisdiction Consolidation	**Approved, as modified**		The request was approved as a county consolidation of basins within Yolo County with additional internal jurisdictional modifications. The internal jurisdictional modifications included exclusion of some local agency areas within Yolo County which remained in the Solano subbasin. There were also minor jurisdictional modifications applied to the eastern edge of the proposed subbasin and coincident boundaries of Sutter, North American and South American subbasins to align the boundary along county boundaries rather than along hydrologic features.
5-22.01 SAN JOAQUIN VALLEY - EASTERN SAN JOAQUIN, 5-22.16 SAN JOAQUIN VALLEY - COSUMNES	Eastern San Joaquin County Groundwater Basin Authority	NCRO	A boundary modification to merge a portion of the Cosumnes Subbasin into the Ea...	Jurisdiction Internal	**Approved**		This request was approved because it met the technical requirements of the regulation and provided the necessary supporting documentation, technical studies, local outreach and/or notification.

County of Lassen

OFFICE OF COUNTY COUNSEL

ROBERT M. BURNS
Lassen County Counsel

221 SOUTH ROOP STREET, SUITE 2
SUSANVILLE, CA 96130-4339

☎ (530) 251-8334
FAX: (530) 251-2665

January 3, 2019

Trevor Joseph
Department of Water Resources
Sustainable Groundwater Management Office
P.O. Box 942836
Sacramento, CA 94236-0001

Re: 2018 SGMA Basin Prioritization Process and Results

Dear Mr. Joseph:

On August 8, 2018, a letter (attached) was sent to the Department of Water Resources (DWR) from both the Lassen County and Modoc County Board of Supervisors regarding the 2018 priority rankings for California groundwater basins. The letter was also submitted through the 2018 SGMA Basin Prioritization Public Comment Portal. The letter requested reconsideration of scores given to the Big Valley Groundwater Basin for Components 7 and 8, as well as further justification and clarification of the methodologies used.

In emails dated November 2, 2018 (attached), Ian Espinoza, DWR Engineering Geologist, informed Gaylon Norwood, Lassen County Assistant Planning Director, that all comments received would be considered and that he was not aware of any response to the Boards' comments prepared by DWR. Mr. Espinoza also informed Mr. Norwood that DWR is not obligated to respond to comments, but that an updated process will be applied to all basins if comments concerning the process used in the 2018 SGMA Basin Prioritization are determined to be appropriate.

If it has been determined as appropriate by DWR to apply any updated processes to basin rankings based on comments received, please inform Lassen County on how to obtain information on these changes and their results. However, regardless of any change to process, Lassen County is still requesting justification and/or clarification as to methods used to arrive at the priority rankings. As considerable time was spent evaluating the 2018 ranking system and preparing comments and questions for DWR, it is Lassen County's position that a response by DWR addressing said questions is warranted.

Therefore, in accordance with and pursuant to the California Public Records Act, please consider this letter as a request for all documents prepared by DWR related to the prioritization of the Big Valley Groundwater Basin as a medium priority basin, as well as any documents related to subsequent reconsideration or affirmation of this decision. We look forward to your response within the next ten days.

Sincerely,

Robert M. Burns
County Counsel

cc: Lassen County Board of Supervisors
Modoc County Board of Supervisors
Ian Espinoza, Department of Water Resources

County of Lassen
ADMINISTRATIVE SERVICES

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Julie Morgan
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Regina Schaap
Executive Assistant to the CAO
email: [redacted]

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Susanville, CA 96130
Phone: 530-251-8333
Fax: 530-251-2663

August 14, 2018

Trevor Joseph
Department of Water Resources
Sustainable Groundwater Management Office
P.O. Box 942836
Sacramento CA 94236-0001

Dear Mr. Joseph:

This letter is in regard to the proposed ranking of the Big Valley Groundwater Basin as a medium priority basin pursuant to the Sustainable Groundwater Management Act (Part 2.74 of the California Water Code). The Lassen County Board of Supervisors has elected to be the Groundwater Sustainability Agency for the Lassen County portion of the basin and the Modoc County Board of Supervisors has elected to be the Groundwater Sustainability Agency for the Modoc County portion of the basin pursuant to said Act and has been designated as such. Lassen and Modoc County are working in a coordinated effort to comply with the Sustainable Groundwater Management Act by retaining local control for the benefit of our constituents.

This letter is to provide comments regarding the above ranking and present justification for consideration to reduce the 2018 Big Valley Groundwater Basin prioritization score.

The 2018 ranking considered the following additional criteria that were not previously considered for the 2014 prioritization (2018 SGMA Basin Prioritization Process and Results):

- The updated SGMA provision in component 8 that requires consideration of "*...adverse impacts on local habitat and local stream flows*";
- Other information from a sustainable groundwater management perspective in accordance with the provision "*Any other information determined to be relevant by the Department...*";
- Use of updated datasets and information in accordance with the provision "*...to the extent data are available*".

Based on the SGMA updates to component 8, the 2018 SGMA Basin Prioritization considered the following four new sub-components:

- Adverse impacts on local habitat and local streamflows

- Adjudicated areas
- Critically overdrafted basins
- Groundwater related transfers

Lassen and Modoc County have carefully evaluated the information and data provided to establish the 2018 SGMA Basin Prioritization results. The datasets, methodologies, and documentation provided for this process are an improvement over the previous prioritization, and DWR made efforts to standardize the datasets and criteria used for nearly all the components including Component 7: Impacts. However, DWR did not make adequate consideration of the severity of the impacts for Component 7 and did not apply consistent methodologies and justification for Component 8. Particular inadequacies related to Big Valley's prioritization include:

Component 7 Impacts: Declining Groundwater Levels

Groundwater levels in Big Valley have remained stable in some areas and declined in others over the last 10 years. Declines have been as much as 30 feet, but have been rising since 2016. Prioritization points for declining groundwater level are appropriate in this basin, however the identical score was given to all basins in the state with documented water level declines. This includes critically overdrafted basins where water levels have declined hundreds of feet, chronically over the course of many decades. Evaluating Big Valley's water level declines on par with these basins does not adequately represent Big Valley's priority in the state and therefore we would like to request DWR reconsider the points associated with this portion of the scoring criteria.

Component 7 Impacts: Water Quality

This scoring appears to be based on 14 measurements that exceeded the Secondary MCL (maximum contaminant level) for iron and manganese at the two wells used to supply water to the town of Bieber. Although secondary MCLs are enforceable standards in California, they are *not* due to public health concerns but, due to nuisance and aesthetics such as taste, color, and odor. Iron and manganese are not typically concerns for agricultural use, which is the primary beneficial use in Big Valley. Iron and manganese are naturally occurring minerals that are prevalent in volcanic areas such as Big Valley. These water quality issues are therefore not due to mismanagement of the resource and conversely cannot be substantially addressed through better management. Again, DWR did not make adequate consideration of the severity of this issue, with Big Valley receiving the same number of points as areas of the state that have significant issues with salinity, nitrate, and toxic metals that have a much greater impact on beneficial uses and human health and have the potential to be better managed under SGMA.

Further we ask that DWR consider methodologies for Component 7 to account for the severity of each impact. If those methodologies cannot be developed, we ask that DWR use their discretion to adjust points in consideration of the low level of severity of these impacts for Big Valley.

Component 8b: Other Information Deemed Relevant by the Department

While DWR did apply their methodologies consistently for Components 1 through 7, they were not consistent with Component 8 and provided little justification in applying five (5) points to Big Valley Basin for:

1. "Headwaters for Pit River/Central Valley Project - Lake Shasta"
2. "Extensive restoration project at Ash Creek State Wildlife Area has improved groundwater levels in immediate vicinity of project but declining groundwater levels over past 10 years persist outside of project area which includes numerous wetlands and tributaries to the Pit River."

This limited information about the application of DWR's discretion on these points begs numerous questions such as:

1. What headwaters does this refer to? Headwaters of the Pit River? Headwaters of the CVP? Headwaters of Lake Shasta?
2. What are DWR's concerns relative to Big Valley's position within the watershed?
3. What concerns does DWR have specific to Big Valley, given that there are numerous other groundwater basins within the Pit River, Lake Shasta, CVP and State Water Project watersheds that were not awarded these points?
4. Why are water levels in the vicinity of Ash Creek and other wetlands considered "other information deemed relevant"? Wasn't this information already considered in Component 7: Declining Groundwater Levels and Component 8a: Streamflow and Habitat?

Due to the need for further clarification on the preceeding questions regarding component 8b, both Lassen and Modoc GSAs would like to request the points associated with this portion of the scoring criteria be reconsidered.

Lassen and Modoc County understand the vast complexity of evaluating each basins data and information, however, we feel a further assessment of the 2018 SGMA Basin Prioritization score is desired by both GSAs. For the above reasons, Lassen and Modoc County GSAs would like to request an assessment of the questions regarding the basins data, detailed in this letter, to be reviewed for a potential lowering of the overall basin score. We appreciate the consideration of our comments and look forward to hearing from you.

Sincerely,

Chris Gallagher, Chairman
Lassen County Board of Supervisors

Patricia Cullins, Chair
Modoc County Board of Supervisors

Gaylon Norwood

From: Espinoza, Ian@DWR <Ian.Espinoza@water.ca.gov>
Sent: Friday, November 02, 2018 1:58 PM
To: Gaylon Norwood
Cc: Boyt, Jessica@DWR; Ehorn, Bill@DWR
Subject: RE: comments on Big Valley prioritization

Hi Gaylon,

- DWR will consider all comments received, including comments submitted by Lassen County.
- I am not aware of a response from DWR regarding comments received on basin prioritization by Lassen County.

-Ian

From: Gaylon Norwood [mailto:GNorwood@co.lassen.ca.us]
Sent: Friday, November 2, 2018 1:13 PM
To: Espinoza, Ian@DWR <Ian.Espinoza@water.ca.gov>
Cc: Boyt, Jessica@DWR <Jessica.Boyt@water.ca.gov>; Ehorn, Bill@DWR <Bill.Ehorn@water.ca.gov>
Subject: RE: comments on Big Valley prioritization

Ian:

I want to confirm that I understand you correctly. I understand you to say that DWR did (is) consider(ing) all the comments, including the comments submitted by Lassen County. However, DWR is not obligated to respond to specific comments and did not prepare a specific written response to the comments submitted by Lassen County. Is this correct?

In simple language, I just need to know if there is a written response to our comments or not, I understand that you are not required to respond. If there is not a response, I will the Board know that. If there is a response, I would like to see it.

Thank you.

Sincerely,

Gaylon F. Norwood
Assistant Director of Planning
and Building Services
Lassen County
707 Nevada Street Suite 5
Susanville, CA 96130
(530) 251-8269
Fax: (530) 251-8373

From: Espinoza, Ian@DWR [mailto:Ian.Espinoza@water.ca.gov]
Sent: Friday, November 02, 2018 12:51 PM
To: Gaylon Norwood <GNorwood@co.lassen.ca.us>
Cc: Boyt, Jessica@DWR <Jessica.Boyt@water.ca.gov>; Ehorn, Bill@DWR <Bill.Ehorn@water.ca.gov>
Subject: RE: comments on Big Valley prioritization

Hello Gaylon,

DWR will consider comments received but is not obligated to respond to them. Please see the below excerpt from DWR's Basin Prioritization FAQ for more info on this process:

'DWR will consider all comments received during the public comment period while finalizing the 2018 SGMA Basin Prioritization results. DWR will evaluate any data provided during the public comment period to determine whether it is consistent with processes and datasets used in the evaluation, and may use the data received to enhance the prioritization analysis. Comments concerning the processes or scope of the datasets used in the 2018 SGMA Basin Prioritization will also be evaluated and if the suggested changes are determined to be appropriate, then the updated process or datasets will be applied to all basins."

Please let me know if you have any questions,

Best,
Ian

Ian Espinoza
Engineering Geologist
Groundwater & Geologic Investigations Section
Department of Water Resources
2440 Main St.
Red Bluff, CA 96080
Phone: (530) 529-7330
Email: ian.espinoza@water.ca.gov

From: Boyt, Jessica@DWR
Sent: Friday, November 2, 2018 11:36 AM
To: Gaylon Norwood <gnorwood@co.lassen.ca.us>
Cc: Espinoza, Ian@DWR <Ian.Espinoza@water.ca.gov>
Subject: Re: comments on Big Valley prioritization

Ian,

Can you direct or help Gaylon on this.

Thanks

Get Outlook for Android

From: Gaylon Norwood <GNorwood@co.lassen.ca.us>
Sent: Friday, November 2, 2018 10:46:04 AM
To: Boyt, Jessica@DWR
Subject: comments on Big Valley prioritization

Jessica:

I'm hoping that you can help me or direct me to the appropriate person. I am being asked about comments the Lassen County Board of Supervisors submitted on the recent basin prioritization for Big Valley (basically it was already and it stayed a medium priority basin). I am being asked if there has been a response from DWR to the comments that Lassen

County submitted on the ranking. It does not appear that DWR has commented. If DWR is not going to comment, I just need to confirm this so I can let the Board know.

Thanks you and I really appreciate it.

Sincerely,

Gaylon F. Norwood
Assistant Director of Planning
and Building Services
Lassen County
707 Nevada Street Suite 5
Susanville, CA 96130
(530) 251-8269
Fax: (530) 251-8373

R000019-011519 - Public Records Request

Message History (3)

On 2/6/2019 1:24:31 PM, CALIFORNIADWR Support wrote:

RE: PUBLIC RECORDS REQUEST of January 15, 2019, Reference # R000019-011519.

Dear Mr./Ms. Burns:

This is in response to your January 15, 2019 request, pursuant to the California Public Records Act, Government Code Section 6250 et seq. to the Department of Water Resources (DWR) regarding:

"Requesting all documents prepared by DWR related to the prioritization of Big Valley GW Basin as a medium priority basin, as well as any related to subsequent reconsideration or affirmation of this decision."

Please sign into the Public Records Request Portal to access your account. Use the reference number you were provided to retrieve the records which DWR has determined are fully responsive to your request.

Sincerely,

Public Records Act Team
Department of Water Resources

On 1/23/2019 2:14:59 PM, CALIFORNIADWR Support wrote:

RE: PUBLIC RECORDS REQUEST of January 15, 2019., Reference # R000019-011519.

Dear Mr./Ms. Burns,

This is in response to your January 15, 2019 request pursuant to the California Public Records Act, Government Code Section 6250 et seq. to the Department of Water Resources (DWR) regarding:

"Requesting all documents prepared by DWR related to the prioritization of Big Valley GW Basin as a medium priority basin, as well as any related to subsequent reconsideration or affirmation of this decision."

It has been determined that DWR maintains records responsive to your request, however, DWR anticipates these records may require a significant amount of time to locate, assemble and review. DWR is presently collecting and reviewing these records and estimates that these materials can be made available by February 22, 2019.

Please note that every effort will be made to provide you with responsive records as soon as feasible.

Sincerely,

Public Records Act Team
Department of Water Resources

Comment ID	Comment summary	Final Project Comments
60a	See the attached letter from the Lassen County Board of Supervisors, who serve as the GSA for the Lassen County portion of the basin, and the Modoc County Board of Supervisors, who serve as the GSA for the Modoc County portion of the basin.	No Action, Not an actionable sub-comment
60b	Groundwater levels in Big Valley have remained stable in some areas and declined in others over the last 10 years. Declines have been as much as 30 feet, but have been rising since 2016. Prioritization points for declining groundwater level are appropriate in this basin, however the identical score was given to all basins in the state with documented water level declines. This includes critically overdrafted basins where water levels have declined hundreds of feet, chronically over the course of many decades. Evaluating Big Valley's water level declines on par with these basins does not adequately represent Big Valley's priority in the state and therefore we would like to request DWR reconsider the points associated with this portion of the scoring criteria.	Action - Used the same process used in the 2014 CASGEM BP; all declines are treated the same. No changes for basin.
60c	DWR did not make adequate consideration of the severity of this issue, with Big Valley receiving the same number of points as areas of the state that have significant issues with salinity, nitrate, and toxic metals that have a much greater impact on beneficial uses and human health and have the potential to be better managed under SGMA.	No Action - Process already accounts for differences between basins. All MCL levels are calibrated by the Waterboard to be equal. The BP process used different scores or points to represent magnitude and unique public wells (distribution) and are totaled. Component 7.d points assigned to the basin are based on total For more detailed information, please see reference document "Process and Results Document ccovering the SGMA 2018 Basin Prioritization" covering component 7.d (WQ) See commnet 99b for more details on WQ
60d	1)What headwaters does this refer to? Headwaters of the Pit River? Headwaters of the CVP? Headwaters of Lake Shasta? 2) What are DWR's concerns relative to Big Valley's position within the watershed? 3) What concerns does DWR have specific to Big Valley, given that there are numerous other groundwater basins within the Pit River, Lake Shasta, CVP and State Water Project watersheds that were not awarded these points? 4) Why are water levels in the vicinity of Ash Creek and other wetlands considered "other information deemed relevant"? Wasn't this information already considered in Component 7: Declining Groundwater Levels and Component 8a: Streamflow and Habitat? Due to the need for further clarification on the preceeding questions regarding component 8b, both Lassen and Modac GSAs would like to request the points associated with this portion of the scoring criteria be reconsidered.	Action - Removed the comment and points. See also 99c
99a	Groundwater levels in Big Valley have remained stable in some areas and declined in others over the last 10 years. Declines have been as much as 30 feet, but have been rising since 2016. Prioritization points for declining groundwater level are appropriate in this basin, however the identical score was given to all basins in the state with documented water level declines. This includes critically overdrafted basins where water levels have declined hundreds of feet, chronically over the comse of many decades. Evaluating Big Valley's water level declines on par with these basins does not adequately represent Big Valley's priority in the state and thet-efore we would like to request DWR reconsider the points associated with this portion of the scoring criteria.	Action - Used the same process used in the 2014 CASGEM BP; all declines are treated the same. No changes for basin.
99b	This scoring appears to be based on 14 measurements that exceeded the Secondary MCL (maximum contaminant level) for iron and manganese at the two wells used to supply water to the town of Bieber. Although secondary MCLs are enforceable standards in California, they are not due to public health concerns but, due to nuisance and aesthetics such as taste, color, and odor. Iron and manganese are not typically concerns for agricultural use, which is the primary beneficial use in Big Valley.	Process 7.d was modified in Phase 1 to: 1) reduce the total WQ points a basin can earn from 5 down to 3 2) Must have GREATER THAN 3 points after adding 7.a + b + c + d to be assigned one component 7 priority point. 3) For those basin between 2,000 and 9,500 AF, WQ alone will not be enough to trigger document impacts and thus causing the basin to potentially be a medium or high priority. Other basins has the potential to reduce their component 7 priority points by one.
99c	While DWR did apply their methodologies consistently for Components I through 7, they were not consistent with Component 8 and provided little justification in applying five (5) points to Big Valley Basin	Action - Removed the comment and points.

[Response to Lassen County's 1/15/19 Public Records Request - Received from the California Department of Water Resources on 2/6/19 through the DWR "Public Records Request Portal"]

Comment ID	Comment summary	Final Project Comments
60a	See the attached letter from the Lassen County Board of Supervisors, who serve as the GSA for the Lassen County portion of the basin, and the Modoc County Board of Supervisors, who serve as the GSA for the Modoc County portion of the basin.	No Action, Not an actionable sub-comment
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60c	DWR did not make adequate consideration of the severity of this issue, with Big Valley receiving the same number of points as areas of the state that have significant issues with salinity, nitrate, and toxic metals that have a much greater impact on beneficial uses and human health and have the potential to be better managed under SGMA.	No Action - Process already accounts for differences between basins. All MCL levels are calibrated by the Waterboard to be equal. The BP process used different scores or points to represent magnitude and unique public wells (distribution) and are totaled. Component 7.d points assigned to the basin are based on total For more detailed information, please see reference document "Process and Results Document ccovering the SGMA 2018 Basin Prioritization" covering component 7.d (WQ) See commnet 99b for more details on WQ
60d	1)What headwaters does this refer to? Headwaters of the Pit River? Headwaters of the CVP? Headwaters of Lake Shasta? 2) What are DWR's concerns relative to Big Valley's position within the watershed? 3) What concerns does DWR have specific to Big Valley, given that there are numerous other groundwater basins within the Pit River, Lake Shasta, CVP and State Water Project watersheds that were not awarded these points? 4) Why are water levels in the vicinity of Ash Creek and other wetlands considered "other information deemed relevant"? Wasn't this information already considered in Component 7: Declining Groundwater Levels and Component 8a: Streamflow and Habitat? Due to the need for further clarification on the preceeding questions regarding component 8b, both Lassen and Modac GSAs would like to request the points associated with this portion of the scoring criteria be reconsidered.	Action - Removed the comment and points. See also 99c
99a	Groundwater levels in Big Valley have remained stable in some areas and declined in others over the last 10 years. Declines have been as much as 30 feet, but have been rising since 2016. Prioritization points for declining groundwater level are appropriate in this basin, however the identical score was given to all basins in the state with documented water level declines. This includes critically overdrafted basins where water levels have declined hundreds of feet, chronically over the comse of many decades. Evaluating Big Valley's water level declines on par with these basins does not adequately represent Big Valley's priority in the state and thet-efore we would like to request DWR reconsider the points associated with this portion of the scoring criteria.	Action - Used the same process used in the 2014 CASGEM BP; all declines are treated the same. No changes for basin.
99b	This scoring appears to be based on 14 measurements that exceeded the Secondary MCL (maximum contaminant level) for iron and manganese at the two wells used to supply water to the town of Bieber. Although secondary MCLs are enforceable standards in California, they are not due to public health concerns but, due to nuisance and aesthetics such as taste, color, and odor. Iron and manganese are not typically concerns for agricultural use, which is the primary beneficial use in Big Valley.	Process 7.d was modified in Phase 1 to: 1) reduce the total WQ points a basin can earn from 5 down to 3 2) Must have GREATER THAN 3 points after adding 7.a + b+c + d to be assigned one component 7 priority point. 3) For those basin between 2,000 and 9,500 AF, WQ alone will not be enough to trigger document impacts and thus causing the basin to potentially be a medium or high priority. Other basins has the potential to reduce their component 7 priority points by one.
99c	While DWR did apply their methodologies consistently for Components I through 7, they were not consistent with Component 8 and provided little justification in applying five (5) points to Big Valley Basin	Action - Removed the comment and points.

[Response to Lassen County's 1/15/19 Public Records Request - Received from the California Department of Water Resources on 2/6/19 through the DWR "Public Records Request Portal"]

Appendix 2A

Resolutions Establishing Lassen and Modoc Counties as the GSAs for the BVGB

RESOLUTION NO. 17-013

A RESOLUTION OF THE BOARD OF SUPERVISORS OF LASSEN COUNTY ELECTING TO BE THE GROUNDWATER SUSTAINABILITY AGENCY FOR ALL PORTIONS OF THE BIG VALLEY (BASIN NUMBER 5-004) GROUNDWATER BASIN LOCATED WITHIN LASSEN COUNTY, PURSUANT TO THE SUSTAINABLE GROUNDWATER MANAGEMENT ACT OF 2014

WHEREAS, the Legislature has adopted, and the Governor has signed into law, Senate Bills 1168 and 1319 and Assembly Bill 1739, known collectively as the Sustainable Groundwater Management Act of 2014 (SGMA); and

WHEREAS, the Sustainable Groundwater Management Act of 2014 went into effect on January 1, 2015; and

WHEREAS, the legislative intent of SGMA is to, among other goals, provide for sustainable management of groundwater basins and sub-basins defined by the California Department of Water Resources (DWR), to enhance local management of groundwater, to establish minimum standards for sustainable groundwater management, and to provide specified local agencies with authority and technical and financial assistance necessary to sustainably manage groundwater; and

WHEREAS, the Sustainable Groundwater Management Act of 2014 enables the State Water Resources Control Board to intervene in groundwater basins unless a local public agency or combination of local public agencies form a groundwater sustainability agency (GSA) or agencies by June 30, 2017; and

WHEREAS, retaining local jurisdiction over water management and land use is essential to sustainably manage groundwater and to the vitality of Lassen County's economy, communities and environment, and

WHEREAS, any local public agency that has water supply, water management or land use responsibilities within a groundwater basin may elect to be the groundwater sustainability agency for that basin; and

WHEREAS, Lassen County is a local public agency organized as a general law County under the State Constitution; and

WHEREAS, in 1995 the California Supreme Court declined to review an appeal of a lower court decision, *Baldwin v. County of Tehama* (1994), that holds that State law does not occupy the field of groundwater management and does not prevent cities and counties from adopting ordinances to manage groundwater under their police powers; and

WHEREAS, in 1999 the Lassen County Board of Supervisors adopted Ordinance Number 539 (codified at Chapter 17.01 of County Code), requiring a permit to export any groundwater from Lassen County; and

WHEREAS in 2007, the Lassen County Board of Supervisors adopted a *Groundwater*

Management Plan; as authorized by California Water Code Section 10753(a); and

WHEREAS, in 2012 the Lassen County Board of Supervisors adopted Ordinance Number 2012-001 (codified at Chapter 17.02 of County Code), which in part adopts a basin management objective program to facilitate the understanding and public dissemination of groundwater information in Lassen County; and

WHEREAS, in December of 2015, the Lassen County Board of Supervisors adopted the *Groundwater Monitoring Plan for Lassen County*, which was in turn approved by the California Department of Water Resources, making Lassen County the designated monitoring entity pursuant to the California Statewide Groundwater Elevation Monitoring (CASGEM) program; and

WHEREAS, the County overlies those portions of the Big Valley (Basin 5-004) Groundwater Basin located within Lassen County; and

WHEREAS, Section 10723.2 of the Sustainable Groundwater Management Act of 2014 requires that a GSA consider the interests of all beneficial uses and users of groundwater, as well as those responsible for implementing groundwater sustainability plans; and

WHEREAS, Section 10723.8 of the Sustainable Groundwater Management Act of 2014 requires that a local agency electing to be a GSA notify the California Department of Water Resources of its election and its intent to undertake sustainable groundwater management within a basin; and

WHEREAS, On January 26, 2017, the Lassen County Planning and Building Services Department conducted a public meeting within the affected basin, in the community of Bieber, to solicit comment as to whether the Board of Supervisors should or should not be the sustainable groundwater agency for the Big Valley Basin. Notice of said public meeting was published in the Lassen County Times, Mountain Echo, and Modoc County Record; mailed to the list of interested parties; and posted at various places around the basin where announcements are posted; and

WHEREAS, The January 26, 2017, meeting resulted in the identification of additional "interested parties", that were added to the previously compiled list of interested parties.

WHEREAS, the County held a public hearing on this date after publication of notice pursuant to Government Code section 6066 to consider adoption of this Resolution. Notice, as provided for at Government Code Section 6066 was published in the Lassen County Times, Mountain Echo, and Modoc County Record; mailed to the list of interested parties; and posted at various places around the basin where announcements are posted; and

WHEREAS, it would be in the public interest of the people of Lassen County for the County to become the groundwater sustainability agency for all those portions of the Big Valley (Basin 5-004) Groundwater Basin located within Lassen County; and

WHEREAS, the County and other local public agencies have a long history of coordination and cooperation on water management; and

WHEREAS, it is the intent of the County to work cooperatively with other local agencies and Counties to manage the aforementioned groundwater basin in a sustainable fashion; and

WHEREAS, The Environmental Review Officer of Lassen County has determined that the action taken under this Resolution is exempt from the California Environmental Quality Act (Public Resources Code §21000, et seq.) ("CEQA") Under the Class 7 and Class 8, CEQA Guidelines Exemptions §§15307, 15308, and 15320 because the formation of a GSA, as provided for under state law, is meant to assure the maintenance, restoration, or enhancement of a natural resource and the regulatory process involves procedures for the protection of the environment.

NOW, THEREFORE BE IT RESOLVED AS FOLLOWS:

1. The foregoing recitals are true and correct.

2. The Board of Supervisors further finds that:

    a. The Board of Supervisors hereby concurs with the Lassen County Environmental Review Officer that adoption of this Resolution is exempt from the California Environmental Quality Act under CEQA Guidelines Exemptions §§15307, 15308, and 15320. The Environmental Review Officer is hereby directed to file a Notice of Exemption with the Lassen County Clerk for the actions taken in this Resolution.

    b. The proposed boundaries of the basin that the County intends to manage under the Sustainable Groundwater Management Act of 2014 shall be the entirety of the boundaries for the aforementioned groundwater basin, as set forth in California Department of Water Resources Bulletin 118 (updated in 2003), that lie within the County of Lassen; provided that the Board of Supervisors is authorized and directed to evaluate whether basin boundaries should be adjusted in a manner that will improve the likelihood of achieving sustainable groundwater management.

    c. Lassen County hereby elects to become the groundwater sustainability agency, as defined at Section 10721 of the California Water Code, for all those portions of the Big Valley (Basin 5-004) Groundwater Basin located within Lassen County.

    d. Within thirty days of the date of this Resolution, the Director of the Planning and Building Services Department is directed to provide notice of this election to the California Department of Water Resources in the manner required by law. Such notification shall include a map of the portion of the basin that the County intends to manage under the Sustainable Groundwater Management Act of 2014, a copy of this resolution, a list of interested parties developed pursuant to Section 10723.2 of the Act, and an explanation of how their interests will be considered in the development and operation of the groundwater sustainability agency and the development and implementation of the agency's groundwater sustainability plan.

    e. The Director of the Planning and Building Services Department and legal counsel are hereby directed to promptly prepare a Memorandum of Understanding with Modoc County to collaboratively develop a groundwater sustainability plan for

the Big Valley (Basin 5-004) Groundwater Basin for Board consideration.

f. The Director of the Planning and Building Services Department shall begin discussions with other local agencies in this basin in order to begin the process of developing a groundwater sustainability plan for the basin, in consultation and close coordination with other local agencies, as contemplated by the Act.

g. The Director of the Planning and Building Services Department be directed to report back to the Board at least quarterly on the progress toward developing the groundwater sustainability plan.

The foregoing resolution was adopted at a regular meeting of the Lassen County Board of Supervisors of the County of Lassen, State of California, held on the 14th day of March, 2017 by the following vote:

AYES: Supervisors Gallagher,Teeter,Hemphill,Albaugh and Hammond

NOES: NONE

ABSTAIN: NONE

ABSENT: NONE

Chairman of the Board of Supervisors
County of Lassen, State of California

ATTEST:
JULIE BUSTAMANTE
Clerk of the Board

BY ~~SUSAN OSGOOD~~ Crystle Henderson, Deputy Clerk of the Board

Crystle Henderson

I, ~~SUSAN OSGOOD~~, Deputy Clerk of the Board of the Board of Supervisors, County of Lassen, do hereby certify that the foregoing resolution was adopted by the said Board of Supervisors at a regular meeting thereof held on the 14 th day of March, 2017.

Deputy Clerk of the County of Lassen Board of Supervisors

s/pla/admin/files/1252.02/3-14-17 resolution

RESOLUTION # 2017-09

A RESOLUTION OF THE BOARD OF SUPERVISORS OF THE COUNTY OF MODOC ELECTING TO BE THE GROUNDWATER SUSTAINABILITY AGENCY FOR PORTIONS OF THE BIG VALLEY GROUNDWATER BASIN (BASIN NUMBER 5-004) WITHIN MODOC COUNTY

WHEREAS, the Legislature has adopted, and the Governor has signed into law, Senate Bills 1168 and 1319 and Assembly Bill 1739, known collectively as the Sustainable Groundwater Management Act of 2014; and

WHEREAS, the Sustainable Groundwater Management Act of 2014 went into effect on January 1, 2015; and

WHEREAS, the Sustainable Groundwater Management Act of 2014 enables the State Water Resources Control Board to intervene in groundwater basins unless a local public agency or combination of local public agencies form a Groundwater Sustainability Agency or Agencies (GSA) by June 30, 2017; and

WHEREAS, retaining local jurisdiction over water management and land use is essential to sustainably manage groundwater and to the vitality of Modoc County's economy, communities, and environment, and

WHEREAS, any local public agency that has water supply, water management, or land use responsibilities within a groundwater basin may elect to be the Groundwater Sustainability Agency for that basin; and

WHEREAS, Modoc County is a public agency as defined by 10721 of the Water Code; and

WHEREAS, under Section 10723(a), the County is responsible for portions of the Big Valley Groundwater Basin as shown on the map hereto in "Exhibit A"; and

WHEREAS, the County overlies those portions of the Big Valley 5-004 located within Modoc County; and

WHEREAS, Section 10723.2 of the Sustainable Groundwater Management Act of 2014 requires that a GSA consider the interests of all beneficial uses and users of groundwater, as well as those responsible for implementing groundwater sustainability plans; and

WHEREAS, Section 10723.8 of the Sustainable Groundwater Management Act of 2014 requires that a local agency electing to be a GSA notify the Department of Water Resources of its election and its intent to undertake sustainable groundwater management within a basin; and

WHEREAS, the County held a public hearing on this date after publication of notice in the Modoc Record pursuant to Government Code section 6066 to consider adoption of this Resolution; and

WHEREAS, it would be in the public interest of the people of Modoc County for the County to become the groundwater sustainability agency for all those portions of the Big Valley 5-004 Groundwater Basin located within Modoc County; and

WHEREAS, the County and other local public agencies have a long history of coordination and cooperation on water management; and

WHEREAS, it is the intent of the County to work cooperatively with other local agencies and Counties to manage the aforementioned groundwater basins in a sustainable fashion;

NOW, THEREFORE, BE IT RESOLVED, that Modoc County hereby elects to become the Groundwater Sustainability Agency for all those portions of the Big Valley 5-004 Groundwater Basin located within Modoc County.

BE IT FURTHER RESOLVED that the proposed boundaries of the basin that the County intends to manage under the Sustainable Groundwater Management Act of 2014 shall be the entirety of the boundaries for the aforementioned basin, as set forth in California Department of Water Resources Bulletin 118 (updated in 2003), that lie within the County of Modoc; provided that the Board of Supervisors is authorized and directed to evaluate whether basin boundaries should be adjusted in a manner that will improve the likelihood of achieving sustainable groundwater management.

BE IT FURTHER RESOLVED that within thirty days of the date of this Resolution, the designated Staff Liaison to the Groundwater Resources Advisory Committee ("GRAC") is directed to provide notice of this election to the California Department of Water Resources in the manner required by law. Such notification shall include a map of the portion of the basin that the County intends to manage under the Sustainable Groundwater Management Act of 2014, a copy of this resolution, a list of interested parties developed pursuant to Section 10723.2 of the Act, and an explanation of how their interests will be considered in the development and operation of the groundwater sustainability agency and the development and implementation of the agency's groundwater sustainability plan.

BE IT FURTHER RESOLVED that the designated Staff Liaison to the GRAC and County Counsel are hereby directed to promptly prepare a Memorandum of Understanding with Lassen County to collaboratively develop a Groundwater Sustainability Plan for the Big Valley 5-04 Groundwater Basin for Board consideration.

BE IT FURTHER RESOLVED that the designated Staff Liaison to the GRAC shall begin discussions with other local agencies in this basin in order to begin the process of developing groundwater sustainability plans for the basin, in consultation and close coordination with other local agencies, as contemplated by the Act.

BE IT FURTHER RESOLVED that that the designated Staff Liaison to the GRAC or the Chairman of the GRAC be directed to report back to the Board at least quarterly on the progress toward developing the groundwater sustainability plans.

PASSED AND ADOPTED by the Board of Supervisors of the County of Modoc, State of California, on the 28th day of February, 2017 by the following vote:

Motion Approved:
RESULT: **APPROVED [UNANIMOUS]**
MOVER: David Allan, Supervisor District I
SECONDER: Patricia Cullins, Supervisor District II
AYES: David Allan, Supervisor District I, Patricia Cullins, Supervisor District II, Kathie Rhoads, Supervisor District III, Geri Byrne, Supervisor District V
ABSENT: Elizabeth Cavasso, Supervisor District IV

BOARD OF SUPERVISORS
OF THE COUNTY OF MODOC

Geri Byrne

Geri Byrne, Chair
Modoc County Board of Supervisors

ATTEST:

Tiffany Martinez

Tiffany Martinez
Deputy Clerk of the Board

Appendix 2B

MOU Establishing the Big Valley Advisory Committee

CONTRACT
19-09

MEMORANDUM OF UNDERSTANDING FORMING THE BIG VALLEY GROUNDWATER BASIN ADVISORY COMMITTEE (BVAC) TO ADVISE THE LASSEN AND MODOC GROUNDWATER SUSTAINABILITY AGENCIES DURING THE DEVELOPMENT OF THE GROUNDWATER SUSTAINABILITY PLAN REQUIRED UNDER THE 2014 SUSTAINABLE GROUNDWATER MANAGEMENT ACT FOR THE BIG VALLEY GROUNDWATER BASIN

1. Background

The Sustainable Groundwater Management Act (SGMA) is codified as Part 2.74 of the California Water Code (Section 10720 et seq). The regulations adopted to enforce the provisions of the Act are found in Section 350 et seq, Division 2, Chapter 1.5, Subchapter 2 of Title 23 of the California Code of Regulations. The Sustainable Groundwater Management Act (SGMA) became effective January 1, 2015.

This memorandum of understanding pertains to the Big Valley Groundwater Basin (BVGB), which has been designated as a "medium priority" basin by the California Department of Water Resources (DWR). This designation as a medium priority basin requires preparation of a Groundwater Sustainability Plan (GSP) under the Act.

The SGMA was created to ensure groundwater basins throughout the state are managed to reliably meet the needs of all users, while mitigating changes in the quality and quantity of groundwater. The intent of the Act as described in section 10720.1 of the Water Code is to:

- Provide for the sustainable management of groundwater basins.
- Enhance local management of groundwater consistent with rights to use or store groundwater.
- Establish minimum standards for sustainable groundwater management.
- Provide local groundwater agencies with the authority and the technical and financial assistance necessary to sustainably manage groundwater.
- Avoid or minimize subsidence.
- Improve data collection and understanding about groundwater.
- Increase groundwater storage and remove impediments to recharge.
- Manage groundwater basins through the action of local governmental agencies to the greatest extent feasible, while minimizing state intervention to only when necessary to ensure that local agencies manage groundwater in a sustainable manner.

The role of the Groundwater Sustainability Agency (GSA) is to create a GSP and then to implement and enforce that plan. The plan must include measurable objectives that can be used to demonstrate the basin is sustainably managed within twenty (20) years of implementation.

2. Purpose

The purpose of this memorandum is to:

a. Establish the Big Valley Groundwater Basin Advisory Committee (BVAC) and its responsibilities.
b. Establish the membership of the BVAC.
c. Describe how meetings of the BVAC will be conducted and how information, findings, conclusions, decisions, etc. of the BVAC will be conveyed to the Lassen County Groundwater Sustainability Agency (GSA) and to the Modoc County Groundwater Sustainability Agency (GSA).

3. Recitals

a. In September 2014, the Governor signed into law a legislative package (three bills), collectively known as the Sustainable Groundwater Management Act (SGMA), which requires local agencies with land use and/or water management or water supply authority to do certain things to reach sustainability of medium and high priority groundwater basins as designated by the State of California Department of Water Resources (DWR). SGMA became effective on January 1, 2015.

b. The Big Valley Groundwater Basin has been designated a medium priority basin by the DWR.

c. This MOU is dedicated to the Big Valley Groundwater Basin, not any other basin in either Lassen or Modoc Counties.

d. The Lassen and Modoc County Board of Supervisors have adopted resolutions (17-013 and 2017-09 respectively) declaring themselves to be the Groundwater Sustainability Agency (GSA) for the portion of the Big Valley Groundwater Basin within their respective jurisdictions.

e. No other agency pursued GSA status and therefore Lassen and Modoc Counties were awarded exclusive GSA status by DWR for the portion of the Big Valley Groundwater Basin within their respective jurisdictions.

f. GSAs are required to develop Groundwater Sustainability Plans (GSP) for all medium and high priority basins, and said GSP for the BVGB is to be submitted to the DWR by January 31, 2022.

g. Absent a qualified planning process which produces a Groundwater Sustainability Plan, the State Water Resources Control Board (State Board) is authorized to declare that the subbasins are out of compliance and thereby they will intervene and place the subbasins on probation with regard to SGMA.

h. Lassen County has been awarded a grant (Grant Number 4600012669) to provide funding for the preparation of a GSP for the BVGB.

i. Lassen and Modoc Counties intend to work cooperatively in the preparation of a GSP for the BVGB and prepare one GSP that covers the entirety of the basin.

j. Lassen and Modoc Counties see the value of stakeholder input into the development and implementation of a Groundwater Sustainability Plan for the Big Valley Groundwater Basin.

k. It is the intent of this MOU to form an advisory committee that would advise both Lassen and Modoc Counties on the preparation of a GSP for the basin.

4. Goals of the BVAC are as follows:

a. Work collaboratively and transparently with other members to identify common goals, foster mutual understanding, and develop a GSP that all members and their constituents can live with and support;
b. Develop a common understanding of existing groundwater resources, including groundwater dependent habitats, public trust resources and the current and future needs of all beneficial uses and users in the Big Valley groundwater basin, as well as current and future water needs;
c. Solicit and incorporate community and stakeholder interests into committee discussions and emerging committee agreements in order to develop a locally-informed and broadly supported GSP;
d. Consider and integrate science, to the best of its ability and with support from qualified scientific consultants, during GSP development and implementation;
e. Support implementation efforts guided by GSP goals to use, monitor, and manage water resources in a sustainable manner, ensure local control, address current and future local water needs, and support the agricultural economy, Adin, Bieber, Nubieber, Lookout, and outlying communities, tourist visitation and fish and wildlife habitat in the basin;
f. Negotiate in good faith to achieve consensus on management of groundwater resources in the Big Valley groundwater basin into the future;
g. Advise the Lassen and Modoc GSAs on the preparation of a Groundwater Sustainability Plan (GSP);
h. Provide a forum for the public to comment during the preparation of the GSP;
i. Provide recommendations to the Lassen and Modoc GSAs that would result in actions which have as minimal impact as possible on the residents of Big Valley groundwater basin;
j. Advise the Lassen and Modoc GSAs on the preparation of a GSP to produce the lowest possible future costs to the residents of Big Valley; and
k. Ensure local control of the Big Valley Groundwater Basin be maintained by the Lassen and Modoc GSAs.

As a standing committee of the Lassen and Modoc GSA's, the Advisory Committee will operate in compliance with the Ralph M. Brown Act (Brown Act). Committee meetings will be noticed and agendas posted according to the Brown Act. All meetings will be open to the public and allow public comment. Speakers will generally be limited to three minutes, but time may be adjusted based upon meeting circumstances. As needed, the Chair may place time limits on public comments to ensure that the committee is reasonably able to address all agenda items

during the course of a meeting. The Lassen GSA will announce committee meetings on its website and through its regular communication channels. Recommendations and advice from the committee will be presented to the Lassen and Modoc GSA's through their staff.

5. BVAC Membership Composition

1. One (1) member of the Lassen County Board of Supervisors selected by said Board.
2. One (1) alternate member of the Lassen County Board of Supervisors selected by said Board
3. One (1) member of the Modoc County Board of Supervisors selected by said Board.
4. One (1) alternate member of the Modoc County Board of Supervisors selected by said Board
5. Two (2) public members selected by the Lassen County Board of Supervisors. Said members must either reside or own property within the Lassen County portion of the Big Valley Groundwater Basin.
6. Two (2) public members selected by the Modoc County Board of Supervisors. Said members must either reside or own property within the Modoc County portion of the Big Valley Groundwater Basin.

Member vacancies
If a vacancy occurs, the respective GSA will select a new committee member. Applications or letter of intent for all members of the committee must be kept on file with the respective GSA. An appointing GSA must notify the other GSA in writing if a member of the BVAC has been replaced.

Committee Member Terms

- Committee members serve four (4) year terms starting from the date of their appointment. If any committee member decides, for any reason, to terminate his or her role, he/she will notify GSA staff as soon as possible after making such a determination. Committee members interested in serving beyond four (4) years must re-apply through the GSA's application process.
- The chair and vice-chair will serve one a (1) year term. At the culmination of the term of a chair or vice-chair, the committee will use its decision-making procedures to nominate and confirm a new chair and vice-chair. Any interested chair or vice chair may be nominated for a second term, however, no chair or vice-chair shall serve more than two (2) consecutive terms.

6. BVAC Roles and Responsibilities

This section describes roles and responsibilities that the Big Valley Advisory Committee Members commit to during development and implementation of the Big Valley groundwater basin GSP.

Convener
The Lassen and Modoc GSA's, are the final decision maker in the GSP process. The GSA's will:

- Provide guidance, evaluation and feedback that directs GSA staff and Advisory Committee members to build and implement an effective GSP;

- Work collaboratively with GSA staff, Advisory Committee members, consultants, and constituents;
- Receive, evaluate, and decide on all GSP and SGMA related actions that come in the form of advice and recommendations from the Big Valley Advisory Committee;
- Welcome feedback that pertains to the GSP from all diverse stakeholder interests in each groundwater basin; and
- Serve as a representative for the basin, making decisions in the best interest of achieving and maintaining long-term groundwater sustainability for all beneficial uses and users of water in the basin.

Advisory Committee Members
Members of the Advisory Committee ("members") collectively represent the diversity of beneficial groundwater uses and users in the Big Valley groundwater basin. Committee members commit to:

- Serve as strong, effective advocates and educators for the interest group (constituency) represented;
- Nominate and confirm a committee chair and vice chair every year;
- Arrive at each meeting fully prepared to discuss all agenda items and relevant issues. Preparation may include, but is not limited to, reviewing previous meeting summaries, draft and final GSP chapters, and other information distributed in advance of each meeting;
- Develop an innovative problem-solving approach in which the interests and viewpoints of all members are considered;
- Explore all options to resolve disagreements, including, as needed, one-on-one discussions with GSA staff, or, at Advisory Committee meetings, interest-based caucuses or small group discussions;
- Act as liaisons throughout the GSP development and implementation process to educate, inform and solicit input from the wider local community and interested constituencies not represented on the committee;
- Present constituent views on the issues being discussed and commit to engage in civil, respectful and constructive dialogue with other members, as well as GSA staff, technical team members and potentially a facilitator;
- Ensure accuracy of information dissemination during or outside meetings, and correct false information as needed or appropriate;
- Avoid representing individual viewpoints as those of the committee and respect confidential conversations;
- Work collaboratively to ensure broad constituent understanding and support for any advice and recommendations that the committee shares with the Lassen and Modoc GSA Boards;
- Coordinate with Lassen and Modoc GSA staff regarding recommendations for any additional committee tasks that should be undertaken by the committee, and which items shall be presented to the GSA Boards for its review and approval;
- Operate at all times in compliance with the Brown Act;
- Attend meetings consistently – participation in 75% of the meetings is the minimum expectation. (*Given the volume of information to be considered and discussed, it is*

essential that members actively participate in committee meetings on a consistent basis. It is understood that professional and personal commitments may at times prevent members from attending committee meetings. In such cases, members shall notify Lassen GSA staff no less than 24 hours in advance to be excused from attending any given committee meeting. As needed, staff will reach out to members who are not actively participating to give them the opportunity to explain their absence and reaffirm their interest to participate on the committee, and thus not lose their seat. Members who do not meet the threshold for active participation, and have not expressed an interest to continue participating, will, at the recommendation of Lassen and Modoc GSA staff, be automatically removed by the appropriate GSA Board from the committee. Alternates may attend in the absence of a committee member but must alert the Lassen and Modoc GSA staff prior to the meeting.); and

- Recuse him/herself from discussion and voting if he/she has a personal interest or stake in the outcome [BVAC members are subject to recusal due to conflicts of interest (as that term is defined by the Political Reform Act) in accordance with *Government Code Title 9, Political Reform; Chapter 7, Conflicts of Interest*].

Through its public meetings, the committee shall serve as an additional forum for public dialogue on SGMA and GSP development. Finally, with approval by the Lassen and Modoc GSA's, committee tasks may be amended, repealed, or additionally added at any time with the intent to comply with SGMA related activities provided said activities comply under the authorities granted by SGMA law. Alternates may vote on all matters before the BVAC in the absence of the appointed member. Each alternate shall be informed of the business of the BVAC and the actions to be taken when acting on behalf of a member.

The following are desired attributes for BVAC members:

a. Have knowledge and experience in water resources management.
b. Represent an agency, organization, tribe, academia, or interest that is under-represented in the region (e.g., disadvantaged communities or unincorporated areas).
c. Have the ability and desire to objectively articulate the perspective of his/her BVAC seat and caucus at a level beyond that of his/her individual interest.
d. Provide recommendations with the best interests of the entire Big Valley region in mind.

7. Appointment

Members of the BVAC shall be appointed by the respective Board of Supervisors acting as the GSA. Members will serve at the pleasure of said Boards and may be terminated at any time without cause. Persons interested in serving on the BVAC shall submit a letter of interest or application to the pertinent Clerk of the Board of Supervisors which includes the following:

a. Current level of SGMA knowledge;
b. Knowledge of groundwater in the Big Valley Groundwater Basin;
c. Their ability to commit to attending meetings of the Advisory Committee
d. Committee members should have demonstrated ability to work collaboratively with others of differing viewpoints and achieve good faith compromise.

8. BVAC Chair and Vice Chair Roles

The BVAC Chair and Vice Chair must be BVAC members. The Chair and Vice Chair will be determined by a majority vote of the BVAC. The Chair and Vice Chair shall serve for one (1) year term (multiple terms may be held, not to exceed two (2) years).

Although not required, the following attributes are desirable for the Chair and Vice Chair:

- Chair: prior experience working in the role of a Chair of a committee.
- Vice Chair: attributes and ability to assume Chair role and responsibilities, but not necessarily as much experience as the Chair.
- Chair and Vice Chair should come from different GSAs.
- Familiar with the purpose, structure, and content of meetings.
- Willing and able to attend each BVAC meeting until the GSP is drafted. The GSP must be submitted to the DWR by January 31, 2022.
- Ability to even-handedly articulate all interests.
- Consensus-builder.

The role of the Chair and Vice Chair will vary between BVAC meetings; however, the Vice Chair's primary role is to take on Chair responsibilities in the absence of the Chair and/or at the discretion of the Chair. General responsibilities for the Chair are as follows:

a. Review BVAC agenda prior to finalization and distribution to stakeholders (one week prior to BVAC meetings);
b. Meet with staff prior to each BVAC meeting to go over the BVAC agenda and presentation(s) so that the BVAC meeting runs smoothly and without interruption;
c. Manage the BVAC agenda, select members to speak in turn, and keep the BVAC on task and on time;
d. Convene each BVAC meeting and initiate introductions;
e. Organize and call on public speakers during appropriate agenda items (if applicable) and determine public comment procedures;
f. Identify when the BVAC has reached an impasse and needs to move forward with formal voting to resolve an issue;
g. Summarize key decisions and action items at the end of each BVAC meeting.
h. Close meetings;
i. Ensure that notes are prepared summarizing discussion, agreements, and decisions; and
j. Review and provide comments on BVAC meeting notes.

9. Meetings

Meetings will be conducted on a monthly basis or as often as is needed during preparation of the Big Valley Groundwater Basin GSP. Meetings shall be noticed in accordance with the Brown Act. The Lassen County Department of Planning and Building Services will coordinate Brown Act noticing and any other noticing that is executed. The Lassen County Department of Planning and Building Services will prepare and disseminate packets in advance of all meetings, if applicable. Said Department shall serve as staff to the BVAC, and be the repository of all associated records, with a copy of all records sent to the Modoc County Clerk of the Board. The

Director of the Lassen County Planning and Building Services Department or his or her designee shall serve as secretary of the BVAC and may comment on any item but does not have a vote. The designated Modoc County GSA groundwater staff member may comment on any item but does not have a vote. Legal counsel shall be provided by the Modoc County Counsel.

Meetings shall be conducted in accordance with this MOU, SGMA and any other applicable rules or regulations. A quorum is required to convene. The BVAC Chair or Vice Chair will determine if a quorum exists at any BVAC meeting. Formal voting may not occur without a quorum of BVAC members; however, presentations and discussion of agenda topics may occur. A quorum shall be defined as having at least four BVAC representatives, present at every meeting.

Meeting Location
All meetings of the Big Valley Groundwater Advisory Committee must be held within the boundary of the Big Valley Groundwater basin. Lassen GSA staff will work collaboratively with the Chair to determine a location which will encourage the most participation from all stakeholders. Meeting locations shall remain consistent to prevent reduced participation from all stakeholders.

10. Public Comments at BVAC Meetings

BVAC meetings are open to the public, and public comments are welcomed and encouraged. To ensure that members of the public have an adequate chance to provide comments, the BVAC Chair will invite public comments by members of the public in attendance on any agenda item in which the BVAC is making a decision or formulating a recommendation. An open public comment period will be offered at the end of BVAC meetings to allow members of the public to speak to non-agenda topics.

If there is substantial public interest or comment on a topic, the BVAC Chair or Vice Chair may implement the following procedures to ensure that such comments are received in a timely manner:

- Members of the public will be asked to fill out a speaker card to indicate their name, affiliation, contact, and the specific agenda item they wish to speak to (if applicable).
- Speaker cards will be limited to one per person per agenda item. Participants may submit multiple speaker cards to address multiple agenda items.
- The BVAC Chair or Vice Chair will invite those who submitted speaker cards to address the agenda item prior to calling for a consensus decision and/or vote on that item.
- Speaker cards will generally allow three minutes of public speaking time per speaker. However, in the event that there are a large number of public speaker comments, it will be up to the discretion of the BVAC Chair or Vice Chair to reduce the time for each public speaker to ensure that all agenda items are addressed and that the BVAC meeting closes on time.

11. Decision-making Procedures

In order to hold a meeting and conduct its work, a quorum of the Big Valley GSA Advisory Committee must be present.

1) **Consensus as the Fundamental Principle:** The advisory committee shall strive for consensus (agreement among all participants) in all of its decision-making. Working toward consensus is a fundamental principle which will guide group efforts, particularly when crafting any draft or final advisory committee proposals, reports or recommendations for GSA Boards consideration. If the committee is unable to reach consensus, the range of opinions provided, including areas of agreement and disagreement, will be documented in meeting summaries or otherwise communicated in written reports when advisory committee work is shared with the GSA Boards.

2) **Definition of Consensus:** Consensus means all committee members either fully support or can live with a particular decision and believe that their constituents can as well. In reaching consensus, some committee members may strongly endorse a particular proposal, report or recommendation while others may simply accept it as "workable." Others may only be able to "live with it" as less than desired but still acceptable. Still others may choose to "stand aside" by verbally noting disagreement, yet allowing the group to reach consensus without them, or by abstaining altogether. Any of these actions constitutes consensus.

3) **Types of Decision-Making:**
   a. Administrative: Decisions about the daily administrative activities of the committee—including, but not limited to meeting logistics, meeting dates and times, agenda revisions and schedules. A*dministrative decisions* will typically be put forward to the group by Lassen County Department of Planning and Building Services staff. As needed, staff will consult with the committee. Any administrative decisions by the committee will be made on a simple majority vote of all members present at a meeting. The committee will defer to the decision-making procedures outlined in this section of the MOU in circumstances where it is unclear if a committee decision is *administrative* in nature, or represents a more substantive *GSP/SGMA* decision (described below).

   b. Groundwater Sustainability Planning/SGMA Advice and Recommendations: Advice and recommendations about the Big Valley GSP—including but not limited to topics mandated by SGMA and other groundwater related topics that the committee chooses to address. All *GSP/SGMA advice and recommendation decisions* will be made by the decision-making procedures outlined in this section of the MOU.

4) **Consensus with Accountability:** Consensus seeking efforts recognize that a convened group such as Big Valley Advisory Committee makes recommendations, but is not a formal decision-making body like the Lassen or Modoc GSA's. That said, achieving consensus is the goal, as this allows all stakeholder interests represented on the committee to communicate a unified group perspective to the GSA Boards as it considers public policy decisions and actions which may affect the constituencies that members represent, and the wider community. Using a model of consensus with accountability, all committee members shall commit to two principles:
   a. All members are expected to routinely express their interests and analyze conditions to ensure they have clarity on how their interests and those of others may shift over time;

b. All members shall negotiate agreements in a manner that serves their interests, and offers either neutral impact to others, or ideally provides benefit to others' interests as well as their own.

Operating by consensus with accountability will encourage multi-interest solutions based on shared member interests. Such solutions are in turn more sustainable and durable as they represent shared agreements rather than majority/minority dynamics. Most consensus building during the course of GSP development and SGMA implementation will be based on verbal dialogue, deliberation and iterative development of group ideas. The Chair may commonly ask, when it appears consensus or near consensus agreement has emerged or is emerging, if any member cannot live with said agreement. For any final decisions, committee members will demonstrate consensus, or lack thereof, in the following manner:

Nay:	*I do not support the proposal.*
Aye:	*I support the proposal.*
Stand Aside:	*Member verbally notes he/she is willing to stand aside and allow group consensus*
Abstention:	*At times, a pending decision may be infeasible for a participant to weigh in on. Member verbally notes he/she abstains. Abstentions do not prevent group consensus.*

Any member that stands aside or abstains from a decision is encouraged to explain why his/her choice is in his/her best interest.

5) **Less than 100% Consensus Decision Making:** The advisory committee is consensus seeking but shall not limit itself to strict consensus if 100% agreement among all participants cannot be reached after all interests and options have been thoroughly identified, explored and discussed. Less-than-consensus decision-making shall not be undertaken lightly. If the committee cannot come to 100% agreement, it could set aside the particular issue while it continues work on other issues, then revisit the disagreement later in the process. Finally, the committee recognizes that certain deadlines must be met during the collaborative process to ensure completion of all SGMA opportunities and requirements on time.

If, after thoroughly exploring all ideas and options, consensus is absent or otherwise not forthcoming, the committee, with assistance from the GSA staff, will clearly document majority and minority viewpoints. The Chair and Vice-Chair will then work with GSA staff to incorporate all viewpoints into the meeting summary, and, as warranted, prepare a committee report to the GSA Boards. The chair, in coordination with GSA staff, will then present the report to the GSA Boards, ensuring that all majority and minority viewpoints are clearly communicated and accurately represent the outcomes of committee discussions. Any committee member holding minority viewpoints will have the opportunity, if he/she is not comfortable with the process, to present his/her viewpoints directly to the GSA Boards at the

time the report is presented. Members wishing to do this will express their interest and minority viewpoints with GSA staff in advance of said GSA Board meetings.

6) **Decision Outcomes:** Advisory committee decisions will be made at appropriate meetings and, in accordance with the Brown Act, will be publicly noticed in advance and shared via the Lassen County GSA's website and SGMA interested parties email list. As described above, all committee proposals, reports and recommendations will reflect the outcomes of collaborative member discussions. All consensus agreements and other negotiated outcomes during GSP development and implementation, as well as discussion outcomes when consensus is not forthcoming, will be documented, as described above, and shared with the GSA Boards.

12. Collaborative Process Agreements and Meeting Ground Rules

Members commit to the following process agreements during discussion, deliberation and attempts to find consensus-based solutions to sustainable groundwater management in the Big Valley groundwater basin. Moreover, members also agree to abide by meeting ground rules in order to intentionally and consistently engage each other in civil and constructive dialogue during the collaborative process.

Process Agreements

- **Strive to focus on interests versus positions.** A focus on interests instead of positions will help reveal the needs, hopes or concerns behind any member's words. By extension this can help identify shared interests among committee members and, based on those shared interests, multiple options for mutually beneficial agreements.

- **Foster mutual understanding and attempt to address the interests and concerns of all participants.** For the collaborative process to be successful, all members must seek to understand the interests and concerns of other members, then strive to reach agreements that take all member interests under consideration.

- **Inform, educate and seek input from community constituents.** To the extent possible, members will share information and solicit input from their constituents, scientific advisors, and others about ongoing committee discussions and potential agreements or recommendations as they emerge.

- **View challenges as problems to be solved rather than battles to be won.** Challenges will at times arise during discussion of issues. Remember to focus on the challenge versus on each other. Search for multi-interest solutions, rather than win/lose agreements.

- **Be creative and innovative problem solvers.** Creative thinking and problem solving are essential to success in any collaboration. Get beyond the past, climb out of the perceived "box" and attempt to think about the problem, and potential solutions, in new ways.

- **Negotiate in good faith.** All members agree to candidly and honestly participate in decision making, to act in good faith in all aspects of this effort, and to communicate their interests in

group meetings. Good faith also requires that parties not make commitments for which they cannot or do not intend to honor.

- **Consider the long-term view.** SGMA requires submission and approval of a Big Valley GSP by January 31st, 2022. Taking a long-term view of the planning horizon, may help inform collaborative discussions, reduce conflict and thereby ensure long-term sustainability of groundwater resources.

Ground rules

- **Use common conversational courtesy and treat each other with respect.** Civil and respectful dialogue tends to foster a constructive, thorough and solutions-oriented environment within multi-stakeholder groups.

- **Remember that all ideas and points of view linked to the committee's charge have value.** All ideas have value in this setting. Simply listen, you do not have to agree. If you hear something you do not agree with or you think is silly or wrong, please remember that a fundamental purpose of this forum is to encourage diverse ideas.

- **Be candid, listen actively and seek to understand others.** This promotes genuine dialogue and mutual understanding. Mutual understanding in turn helps parties identify shared interests. Shared interests set the foundation to finding and developing mutually acceptable agreements.

- **Be concise and share the air.** Keep in mind that time is limited at meetings. Be concise when sharing your perspective so that all members can participate in the discussion. And remember, people's time is precious, treat it with respect.

- **Avoid editorial comments.** At times it will be tempting to try and interpret the intentions or motivations of others. Please avoid this temptation and instead speak to your own interests and the motivation behind them.

- **Stay focused on the meeting agenda.** The committee is a Brown Act compliant body. As such it is important to stay focused on the posted agenda for any given meeting.

- **Welcome levity and humor to the discussions.** Work around water can at times be daunting and filled with challenges. Levity and humor is both welcome and helpful at times, as long as it does not come at the expense of others.

- **Turn cell phones off or to vibrate.** Help the group avoid distractions by turning cell phones to vibrate, not checking email during meetings and, if you must take a call, taking it outside the room.

13. Communications/Media Relations

Members are asked to speak only for themselves or the constituency they represent when asked by external parties, including the media, about the committee's work, unless there has been a formal adoption of a statement, report or recommendations by the committee. Members will refer media inquiries to GSA staff while also having the freedom to express their own opinions to the

media. Members should inform media and external parties that they only speak for themselves and do not represent other members or the committee as a whole. The temptation to discuss someone else's statements or positions should be avoided.

14. Indemnification/Defense

Claims Arising from Acts or Omissions.

No GSA, nor any officer or employee of a GSA, shall be responsible for any damage or liability occurring by reason of anything done or omitted to be done by another GSA under or in connection with this MOU. The GSA's further agree, pursuant to California Government Code section 895.4, that each GSA shall fully indemnify and hold harmless each other GSA and its agents, officers, employees and contractors from and against all claims, damages, losses, judgements, liabilities, expenses, and other costs, including litigation costs and attorney fees, arising out of, resulting from, or in connection with any work delegated to or action taken or omitted to be taken by such GSA under this MOU.

15. Litigation

In the event that any lawsuit is brought by a third party against any Party based upon or arising out of the terms of this MOU, the Parties shall cooperate in the defense of the action. Each Party shall bear its own legal costs associated with such litigation.

16. Books and Records

Each Governing Body will be entitled to receive copies of documents, records, historical data, data compiled through consultants and any and all information related to groundwater within the Big Valley Groundwater basin developed pursuant to this MOU; provided that nothing in this paragraph shall be construed to operate as a waiver of any right to assert any privilege that might apply to protect the disclosure to information or materials subject to the attorney-client privilege, attorney work product privilege, or other applicable privilege or exception to disclosure.

17. Miscellaneous

A. Term of Agreement.

This MOU shall remain in full force and effect until the date upon which all Parties have executed a document terminating the provisions of this MOU.

B. No Third-Party Beneficiaries.

This MOU is not intended and will not be construed to confer a benefit or create any right on any third party, or the power or right to bring an action to implement any of its terms.

C. Amendments.

This MOU may be amended only by written instrument duly signed and executed by all Parties.

D. Compliance with Law.

In performing their respective obligations under this MOU, the Parties shall comply with and conform to all applicable laws, rules, regulations and ordinances.

E. Construction of Agreement.

This MOU shall be construed and enforced in accordance with the laws of the United States and the State of California.

18. All notice required by this MOU will be deemed to have been given when made in writing and delivered or mailed to the respective representatives of the Parties at their respective addresses as follows:

For the County of Modoc:
Clerk of the Board
204 South Court Street
Alturas, CA 96101

For the County of Lassen:
Lassen County Planning and Building Services
707 Nevada Street, Suite 5
Susanville, CA 96130

19. Signature

The parties hereto have executed this Memorandum of Understanding as of the dates shown below.

The effective date of this MOU is the latest signature date affixed to this page. This MOU may be executed in multiple originals or counterparts. A complete original of this MOU shall be maintained in the records of each of the parties.

COUNTY OF LASSEN

By: _____ Date: _____
Chairman, Lassen County Board of Supervisors

ATTEST:

By: _____ Date: _____
Clerk of the Board

APPROVED AS TO FORM:

_____ Date: _____
Lassen County Counsel

COUNTY OF MODOC

By: Kachie Rhoades Date: MAY 2 1 2019
Chairman, Modoc County Board of Supervisors

ATTEST:

By: Tiffany A. Martinez Date: MAY 2 1 2019
Clerk of the Board

APPROVED AS TO FORM:

_____ Date: MAY 2 8 2019
Modoc County Counsel

19. Signature

The parties hereto have executed this Memorandum of Understanding as of the dates shown below.

The effective date of this MOU is the latest signature date affixed to this page. This MOU may be executed in multiple originals or counterparts. A complete original of this MOU shall be maintained in the records of each of the parties.

COUNTY OF LASSEN

By: _____ Date: 6-11-19
Chairman, Lassen County Board of Supervisors

ATTEST:

By: _____ Date: 6/11/2019
Clerk of the Board

APPROVED AS TO FORM:

_____ Date: _____
Lassen County Counsel

COUNTY OF MODOC

By: _____ Date: MAY 21 2019
Chairman, Modoc County Board of Supervisors

ATTEST:

By: _____ Date: MAY 21 2019
Clerk of the Board

APPROVED AS TO FORM:

_____ Date: MAY 23 2019
Modoc County Counsel

204 S. Court St Alturas, CA, 96101 (530) 233-6201

Modoc County Board of Supervisors

MINUTE ORDER

The following action was taken by the Modoc County Board of Supervisors on May 14, 2019:

13.a. Consideration/Action: Requesting approval and authorization for the Chair of the Board to sign an agreement between the County of Modoc and the North Cal Neva Resource Conservation and Development Council, Inc. not to exceed $33,920, effective December 5, 2018 through April 30, 2022. (Administrative Services)

Motion by Supervisor Byrne, seconded by Supervisor Coe approve and authorize the Chair of the Board to sign an agreement between the County of Modoc and the North Cal Neva Resource Conservation and Development Council, Inc. not to exceed $33,920, effective December 5, 2018 through April 30, 2022 with approval to work with County Counsel on the amendment of the insurance provisions of the contract. (Administrative Services)

Motion Approved:
RESULT: **APPROVED [UNANIMOUS]**
MOVER: Geri Byrne, Supervisor District V
SECONDER: Ned Coe, Supervisor District I
AYES: Ned Coe, Supervisor District I, Patricia Cullins, Supervisor District II, Kathie Rhoads, Supervisor District III, Elizabeth Cavasso, Supervisor District IV, Geri Byrne, Supervisor District V

STATE OF CALIFORNIA

COUNTY OF MODOC

I, Tiffany Martinez, Clerk to the Board of Supervisors in and for the County of Modoc, State of California, do hereby certify that the above and foregoing is a full, true and correct copy of an ORDER as appears on the Minutes of said Board of Supervisors dated May 14, 2019 on file in my office.

WITNESS my hand and the seal of the Board of Supervisors this 15th day of May 2019.

Tiffany A. Martinez
Clerk of the Board

Big Valley GSP Comment Matrix Chapter 3

Document	Section	Comment	Date	Response
Public Draft Chapter 3	Sec. 3.1 lines (23-26)	Says that Round Valley is separated from the basin by a 1/2 mile gap. What is the proof of that?	5/6/20	Text revised to say that DWR does not consider Round Valley to be connected to Big Valley.
Public Draft Chapter 3	Sec. 3.3.7 (71-73)	Restate ownership, so that Modoc County and Lassen County are identified individually (rather than collectively)	5/6/20	Text revised accordingly
Public Draft Chapter 3	Section 3.4	Is it known how many acres are associated with surface water rights? Is it know how many acres are pump irrigated, surface irrigated or sub-irrigated	5/6/20	A general sense of scale is provided in Figure 3-4 regarding the extent of surface water irrigations and pumped groundwater irrigation. It may be possible to refine the map with additional information on surface water rights and if additional details on sub-irrigated crops are available.
Public Draft Chapter 3	Section 3.4 pp. 6, 7	How was information obtained for Table 3-1 (page 6) and Figure 3-3 (page 7)? What is the definition of riparian vegetation? When was survey conducted?	5/6/20	A footnote has been added to Table 3-1 explaining that data was obtained through aerial surveys. We are also looking to find the specific definition used by DWR for "riparian vegetation" to create this map, as well as the time of the year when the survey was conducted. The text will be updated as we get this information.
Public Draft Chapter 3	Section 3.4.1 (19)	Disagree with USGS being represented as a public supply well.	5/6/20	The SWRCB defines what constitutes a public water supply system, which the text reflects. New text has been added to page 12, (lines revised lines 201-205) to clearly describe the active and inactive wells.
Public Draft Chapter 3	Section 3.4.2 (145-152)	Concern expressed that domestic well is being combined with agricultural use.	5/6/20	Text has been updated and domestic categorized as a separate use from agriculture

Big Valley GSP Comment Matrix Chapter 3

Document	Section	Comment	Date	Response
Public Draft Chapter 3	Section 3.5	This section actually has two sections: one describes the well inventory which describes the total number of wells in the basin; the other describes the density of production, domestic and water supply wells. The number of monitoring, test, other, unknown and destroyed wells does not affect well density.	5/6/20	Text revised accordingly.
Public Draft Chapter 3	Section 3.5	The addition of monitoring wells into the well inventory increases the well density per square mile. This is not right. There is some confusion on the public supply wells, with 6 on the maps, but only 2 public water supply systems.	5/6/20	The well inventory is based on drillers' well completion reports of well designation at production, domestic, and public supply. Some of the public supply wells on the map are inactive. The map has been updated to indicate inactive public supply wells.
Public Draft Chapter 3	Section 3.6.1	Information on wells monitored by LMFCWCD says information is not readily available. This information should be public.	5/6/20	Text was revised, see Revised Draft Ch. 3 as follows: Page 16, lines 234-235 Page 16, lines 247-248 Page 18, lines 244-255
Public Draft Chapter 3	Sec. 3.6.7 p. 25 (395-396) p. 25 (389-390)	This should say that the Modoc County ordinance prohibits extraction of groundwater for use outside the County (rather than outside the basin) Also, Lassen County has an ordinance about groundwater export.	5/6/20	Chapter 20.04 (Modoc County) states that groundwater cannot be exported outside of the basin. Text added: In 1999, Lassen County adopted an ordinance requiring a permit for export of groundwater outside the County (Lassen County Code 17.01).
Public Draft Chapter 3	Sec. 3.6.7 p. 26 (429-435)	Section on Irrigated Lands should be deleted, since there are no MRP wells in the basin.	5/6/20	Deleted.
Public Draft Chapter 3	Sec. 3.6.9 p.26 (441-451)	This needs to be rewritten in a way that maximizes local control.	5/6/20	While "Limits to Operational Flexibility" is a required element for a GSP, the text has been revised.

Big Valley Groundwater Sustainability Plan GSP Regulations Checklist (Elements Guide) for Chapter 3

This checklist of the GSP Elements and indicates where in the GSP each element of the regulations is addressed.

Article 5.			Plan Contents for Big Valley Groundwater Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
§ 354.8.			**Description of Plan Area**					
			Each Plan shall include a description of the geographic areas covered, including the following information:					
(a)			One or more maps of the basin that depict the following, as applicable:					
	(1)		The area covered by the Plan, delineating areas managed by the Agency as an exclusive Agency and any areas for which the Agency is not an exclusive Agency, and the name and location of any adjacent basins.	X	3.1	3-1		
	(2)		Adjudicated areas, other Agencies within the basin, and areas covered by an Alternative.	N/A	3.2			There are no no adjudicated areas or areas covered by an Alternative.
	(3)		Jurisdictional boundaries of federal or state land (including the identity of the agency with jurisdiction over that land), tribal land, cities, counties, agencies with water management responsibilities, and areas covered by relevant general plans.	X	3.3	3-2		
	(4)		Existing land use designations and the identification of water use sector and water source type.	X	3.4	3-3, 3-4	3-1	
	(5)		The density of wells per square mile, by dasymetric or similar mapping techniques, showing the general distribution of agricultural, industrial, and domestic water supply wells in the basin, including de minimis extractors, and the location and extent of communities dependent upon groundwater, utilizing data provided by the Department, as specified in Section 353.2, or the best available information.	X	3.5	3-5, 3-6, 3-7, 3-8	3-2	
(b)			A written description of the Plan area, including a summary of the jurisdictional areas and other features depicted on the map.	X	3.1, 3.2, 3.3	3-1 , 3-2		
(c)			Identification of existing water resource monitoring and management programs, and description of any such programs the Agency plans to incorporate in its monitoring network or in development of its Plan. The Agency may coordinate with existing water resource monitoring and management programs to incorporate and adopt that program as part of the Plan.	X	3.6	3-9, 3-10, 3-11, 3-12	3-3, 3-4	
(d)			A description of how existing water resource monitoring or management programs may limit operational flexibility in the basin, and how the Plan has been developed to adapt to those limits.	X	3.6.8			
(e)			A description of conjunctive use programs in the basin.	X	3.7			No formally established conjunctive use programs are operating in the Basin
(f)			A plain language description of the land use elements or topic categories of applicable general plans that includes the following:					
	(1)		A summary of general plans and other land use plans governing the basin.	X	3.8.1, 3.8.2			
	(2)		A general description of how implementation of existing land use plans may change water demands within the basin or affect the ability of the Agency to achieve sustainable groundwater management over the planning and implementation horizon, and how the Plan addresses those potential effects	X	3.8.3, 3.8.4			
	(3)		A general description of how implementation of the Plan may affect the water supply assumptions of relevant land use plans over the planning and implementation horizon.	X	3.8.3			

"X" indicates that the element has been addressed.

Shaded areas are elements of the regulations that don't have to be addressed in the GSP

The page number will be filled in once the entire GSP is compiled.

Article 5.			Plan Contents for Big Valley Groundwater Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(4)		A summary of the process for permitting new or replacement wells in the basin, including adopted standards in local well ordinances, zoning codes, and policies contained in adopted land use plans.	X	3.8.5			
	(5)		To the extent known, the Agency may include information regarding the implementation of land use plans outside the basin that could affect the ability of the Agency to achieve sustainable groundwater management.	X	3.8.6			
(g)			A description of any of the additional Plan elements included in Water Code Section 10727.4 that the Agency determines to be appropriate.	X	3.10		3-5	
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10720.3, 10727.2, 10727.4, 10733, and 10733.2, Water Code.					

"X" indicates that the element has been addressed.
The page number will be filled in once the entire GSP is compiled.

Shaded areas are elements of the regulations that don't have to be addressed in the GSP

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Abbreviations and Acronyms

Basin	Big Valley Groundwater Basin
bgs	below ground surface
BVGB	Big Valley Groundwater Basin
BVAC	Big Valley Groundwater Basin Advisory Committee
BVWUA	Big Valley Water Users Association
CASGEM	California Statewide Groundwater Elevation Monitoring
CCR	California Code of Regulations
CDP	Census Designated Place
CEDEN	California Environmental Data Exchange Network
CIMIS	California Irrigation Management Information System

CWC	California Water Code
DDW	Division of Drinking Water, State Water Resources Control Board
DWR	Department of Water Resources
ETo	Evapotranspiration
°F	degrees Fahrenheit
ft	feet
GAMA	Groundwater Ambient Monitoring and Assessment Program
GP	General Plan
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
IRWMP	Integrated Regional Water Management Plan
LMFCWCD	Lassen-Modoc Flood Control and Water Conservation District
MCL	Maximum Contaminant Level
MOU	Memorandum of Understanding
NASA	National Aeronautics and Space Administration
NCNRCDC	North Cal-Neva Resource Conservation and Development Council
NOAA	National Oceanic and Atmospheric Administration
PG&E	Pacific Gas and Electric
PRWA	Pit River Watershed Alliance
RWMG	Regional Water Management Group
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SGMA	Sustainable Groundwater Management Act of 2014
SWRCB	California State Water Resources Control Board
SWQL	Secondary Water Quality Limits
UPIRWMP	Upper Pit Integrated Regional Water Management Plan
USGS	United States Geologic Survey
SWRCB	State Water Resources Control Board
WQCP	Water Quality Control Plan

3. Description of Plan Area (§ 354.8)

3.1 Area of the Plan

This GSP covers the Big Valley Groundwater Basin (BVGB or Basin), which is located within Modoc and Lassen Counties and is approximately 92,000 acres (144 square miles). The Basin is a broad, flat plain extending about 13 miles north to south and 15 miles east to west and consists of depressed fault blocks surrounded by tilted fault-block ridges. The BVGB is designated as basin number 5-004 by DWR and was most recently described in the 2003 update of Bulletin 118 (DWR 2003):

> *"The basin is bounded to the north and south by Pleistocene and Pliocene basalt and Tertiary pyroclastic rocks of the Turner Creek Formation, to the west by Tertiary rocks of the Big Valley Mountain volcanic series, and to the east by the Turner Creek Formation.*
>
> *The Pit River enters the Basin from the north and exits at the southernmost tip of the valley through a narrow canyon gorge. Ash Creek flows into the valley from Round Valley and disperse into Big Swamp. Near its confluence with the Pit River, Ash Creek reforms as a tributary at the western edge of Big Swamp. Annual precipitation ranges from 13- to 17-inches."*

Communities in the Basin are Nubieber, Bieber, Lookout, and Adin which are categorized as census-designated places (CDPs). Highway 299 is the most significant east to west highway in the Basin, with Highway 139 at the eastern border of the Basin. **Figure 3-1** shows the extent of the GSP area (the BVGB) as well as the significant water bodies, communities, and highways.

Lassen and Modoc Counties were established as the exclusive Groundwater Sustainability Agencies (GSAs) for their respective portions of the Basin in 2017. **Figure 3-1** shows the two GSAs within the Basin~~, which is separated from the nearest basin (~~. Round Valley ~~[~~basin (5-036~~],~~), a very low-priority basin to the northeast~~) by Barber Ridge and a half-mile gap where Ash Creek enters the Basin~~. DWR does not consider it to be connected to Big Valley basin. The Ash Creek State Wildlife Area occupies 14,400 acres in the center of Big Valley.

3.2 Adjudicated Areas

An alternative to a GSP was not submitted. No areas exist in the basin where groundwater is adjudicated. Therefore, this GSP does not include a map or description for adjudicated or alternative areas.

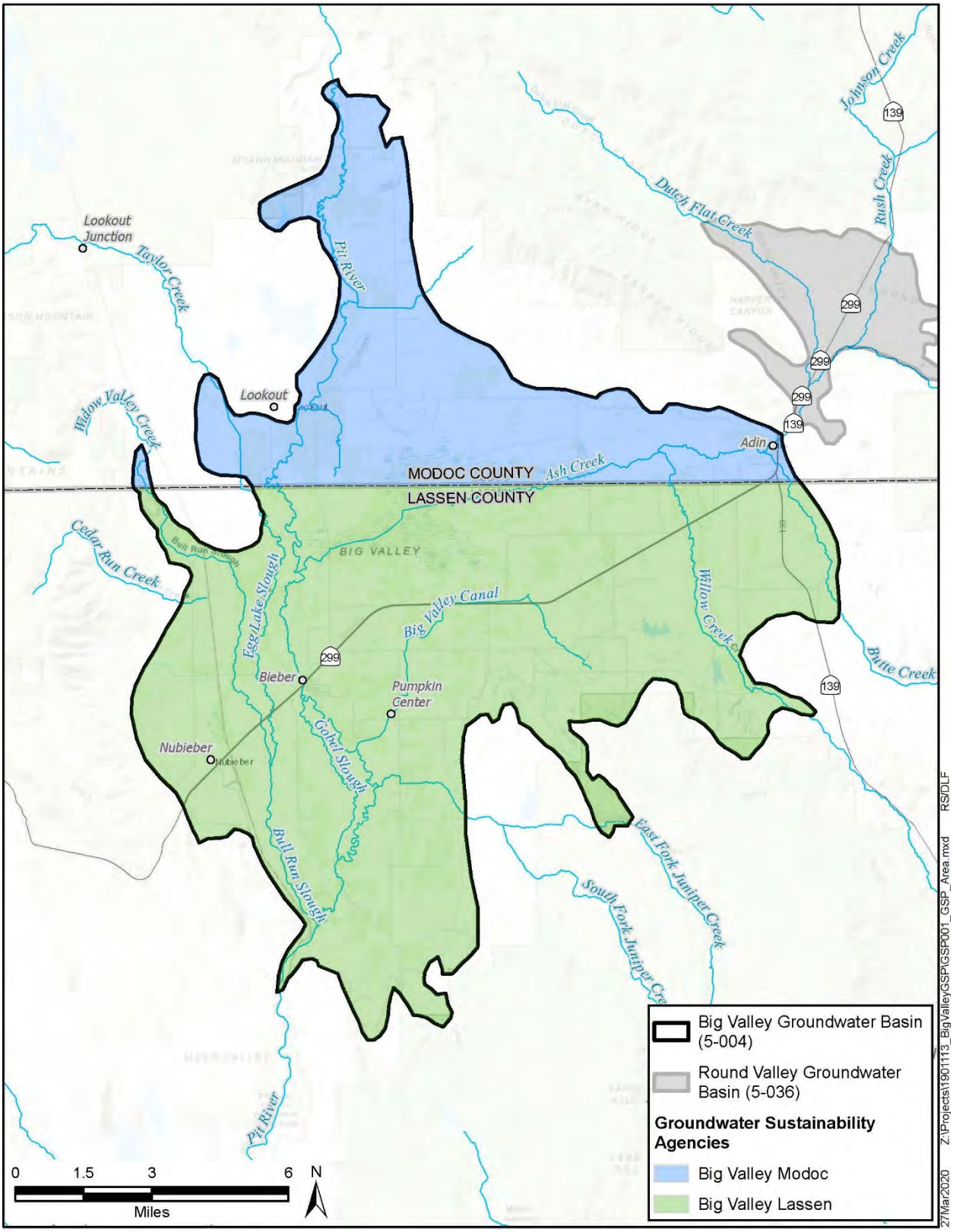

Figure 3-1 Area Covered by the GSP

3.3 Jurisdictional Areas

In addition to the GSAs, several other agencies have water management authority or planning responsibilities in the Basin, as discussed below. A map of the jurisdictional extent of the County and Special Districts within the Basin is shown on **Figure 3-2**.

3.3.1 *Federal Jurisdictions*

The United States Bureau of Land Management as well as the United States Forest Service owns/manages land within the Basin, including Modoc National Forest. The Forest Service Ranger Station in Adin is a public water supplier with a groundwater well (Water System No. CA2500547).

3.3.2 *State Jurisdictions*

The California Department of Fish and Wildlife owns and operates the Ash Creek Wildlife Area, including conservation easements, shown on **Figure 3-2**. The Basin is located within the jurisdiction of the Central Valley Regional Water Quality Control Board (Region 5).

3.3.3 *Tribal Jurisdiction*

The Bureau of Indian Affairs Land Area Representations database identifies one tribal property in the BVGB. The Lookout Rancheria, labeled on **Figure 3-2,** is associated with the Pit River Tribe. The other tribal lands shown on **Figure 3-2** are "public domain allotments," or lands held in trust for the exclusive use of individual tribal members. (DWR 2020)

3.3.4 *County Jurisdictions*

The County of Modoc and the County of Lassen have jurisdiction over the land within the Basin in their respective counties as shown on **Figure 3-1**.

3.3.5 *Local Jurisdictions*

Adin, Bieber, and Nubieber are census-designated places with boundaries shown on **Figure 3-2**. Lookout is primarily located just outside of the the Basin boundary on the northwest side, but does extend into the Basin. Lassen County Waterworks District #1 provides water and sewer services to Bieber. Adin Community Services District provides wastewater services to Adin.

3.3.6 *Special Districts*

Cemeteries

There are several cemeteries in the Big Valley Groundwater Basin as shown on **Figure 3-2**. The Lookout Cemetery and the Adin Cemetery are Special Districts in Modoc County. Mountain View Cemetery in Bieber and Hillside Cemetery west of Nubieber are owned by Lassen County.

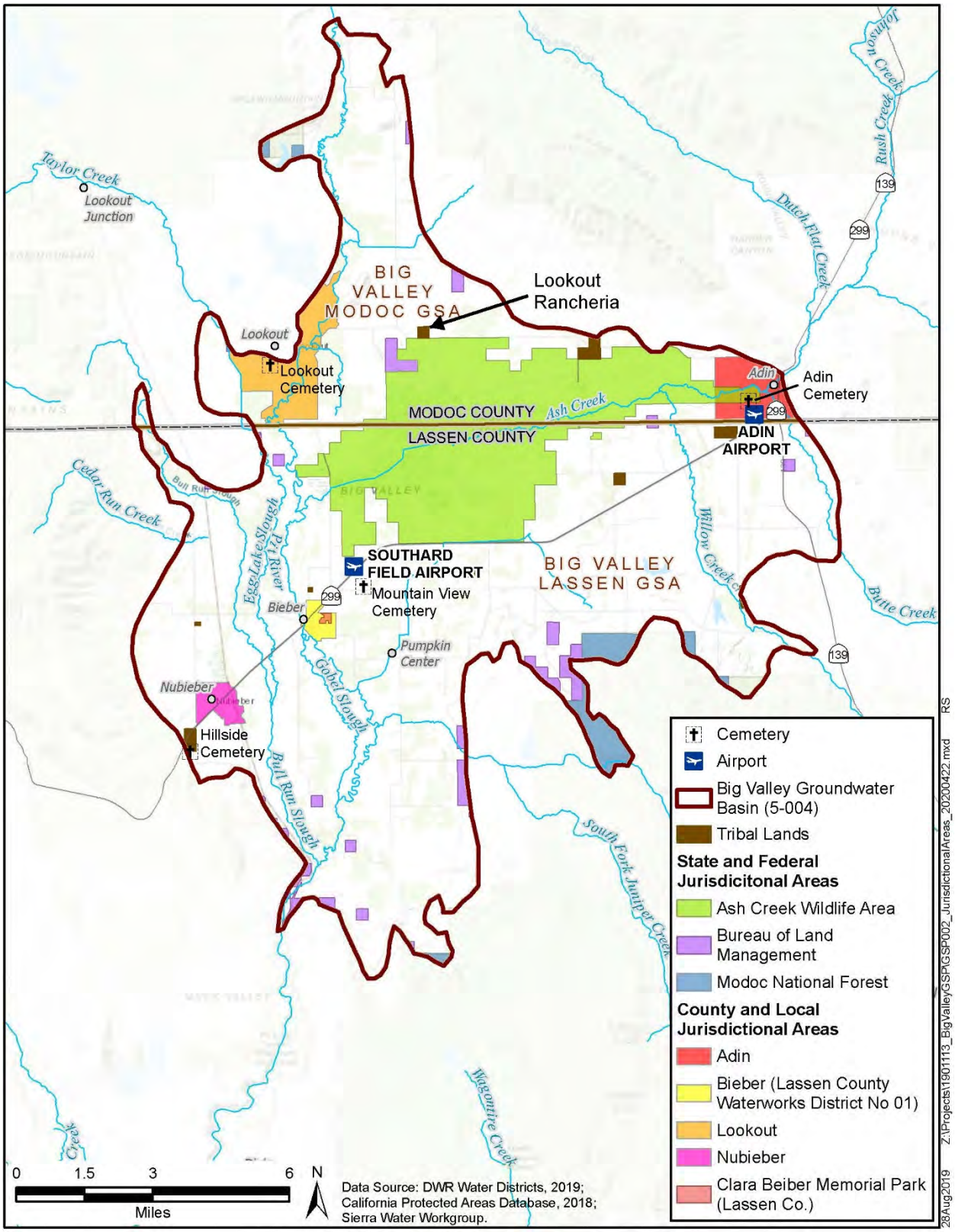

Figure 3-2 Jurisdictional Areas

3.3.7 *Other*

Airports

The Basin has two airports: the Bieber Airport (aka Southard Field) (O55) in Bieber, owned by Lassen County; and the Adin Airport (A26) in Adin, owned by ~~Lassen and~~ Modoc ~~Counties, respectively~~County.

Lassen-Modoc County Flood Control and Water Conservation District

The Lassen-Modoc County Flood Control and Water Conservation District (LMFCWCD or District) was established in 1959 by the California Legislature and was activated in 1960 by the Lassen County Board of Supervisors (LAFCo, 2018). The District covers all of the Lassen County portion of the Basin and a significant portion of the Modoc County portion, extending from the common boundary northward beyond Canby and Alturas. In 1965, the District established Zone 2 in a nearly 1000-square mile area surrounding Big Valley and, in 1994, established Zone 2A for "groundwater management including the exploration of the feasibility of replenishing, augmenting, and preventing interference with or depletion of the subterranean supply of waters used or useful or of common benefit to the lands within the zone." During 2018, the management activities included biannual monitoring of water levels in wells and groundwater use as determined by 85 flow meters, which are replaced as needed.

Upper Pit Integrated Regional Water Management Plan

Big Valley lies within the area of the Upper Pit Integrated Regional Water Management Plan (UPIRWMP), which was developed by the Regional Water Management Group (RWMG). The UPIRWMP is managed by the North Cal-Neva Resource Conservation and Development Council (NCNRCD) who is a member of the RWMG along with 27 other stakeholders, including community organizations; environmental stewards; water purveyors; numerous local, county, state, and federal agencies; industry; the University of California; and the Pit River Tribe. The UPIRWMP addresses a three-million-acre watershed across four counties in northeastern Califonia. The BVGB is located near the center of this area and comprises about three percent (92,000 acres) of the watershed.

The UPIRWMP was established under the Integrated Regional Water Management Act (Senate Bill 1672) which was passed in 2002 to foster local management of water supplies to improve reliability, quantity and quality, and to enhance environmental stewardship. Several propositions were subsequently passed by voters to provide funding grants for planning and implementation. Beginning in early 2011, a plan was developed for the Upper Pit River area and was adopted in late 2013. During 2017 and 2018, the plan was revised according to 2016 guidelines.

3.4 Land Use

Land use planning in the Basin is the responsibility of Lassen and Modoc Counties. Land use information was collected by DWR through a remote sensing process developed by Land IQ.

Current land use in the Basin is shown on **Figure 3-3** and is summarized by cateogory in **Table 3-1**.

The land use categories were established by DWR (2014). These land uses account for about 33,000 acres of the 92,000 total acres in the basin. The remaining 59,000 acres are assumed to be native vegetation.

Table 3-1 Land Use Summary

Land Use Category	Acres
Citrus and subtropical	0
Deciduous fruits and nuts	0
Grain and hay crops[a]	440
Idle fields	1,046
Pasture[b]	17,964
Rice	995
Truck nursery and berry crops	0
Urban	339
Vineyard	0
Young perennial	0
Riparian vegetation	12,107
Total	**32,891**

Source: DWR 2014[1]

[a] Includes wheat and miscellaneous grain and hay crops

[b] Includes alfalfa and mixed pasture crops

3.4.1 *Water Source Types*

The Basin has two water source types: groundwater and surface water. Groundwater resources have long played an important role in the Basin and for its residents, and is used for a variety of purposes throughout the BVGB. Water uses in the Basin include:

- Drinking water from numerous domestic wells and three active public supply wells
- Irrigation water for agricultural uses
- Environmental uses such as wetland habitat in the Ash Creek Wildlife Area.[2]

[1] DWR uses aerial imagery and field verification for their land use surveys.

[2] The wetlands in the Ash Creek Wildlife area are supported by surface water and augmented with groundwater during dry portions of the year.

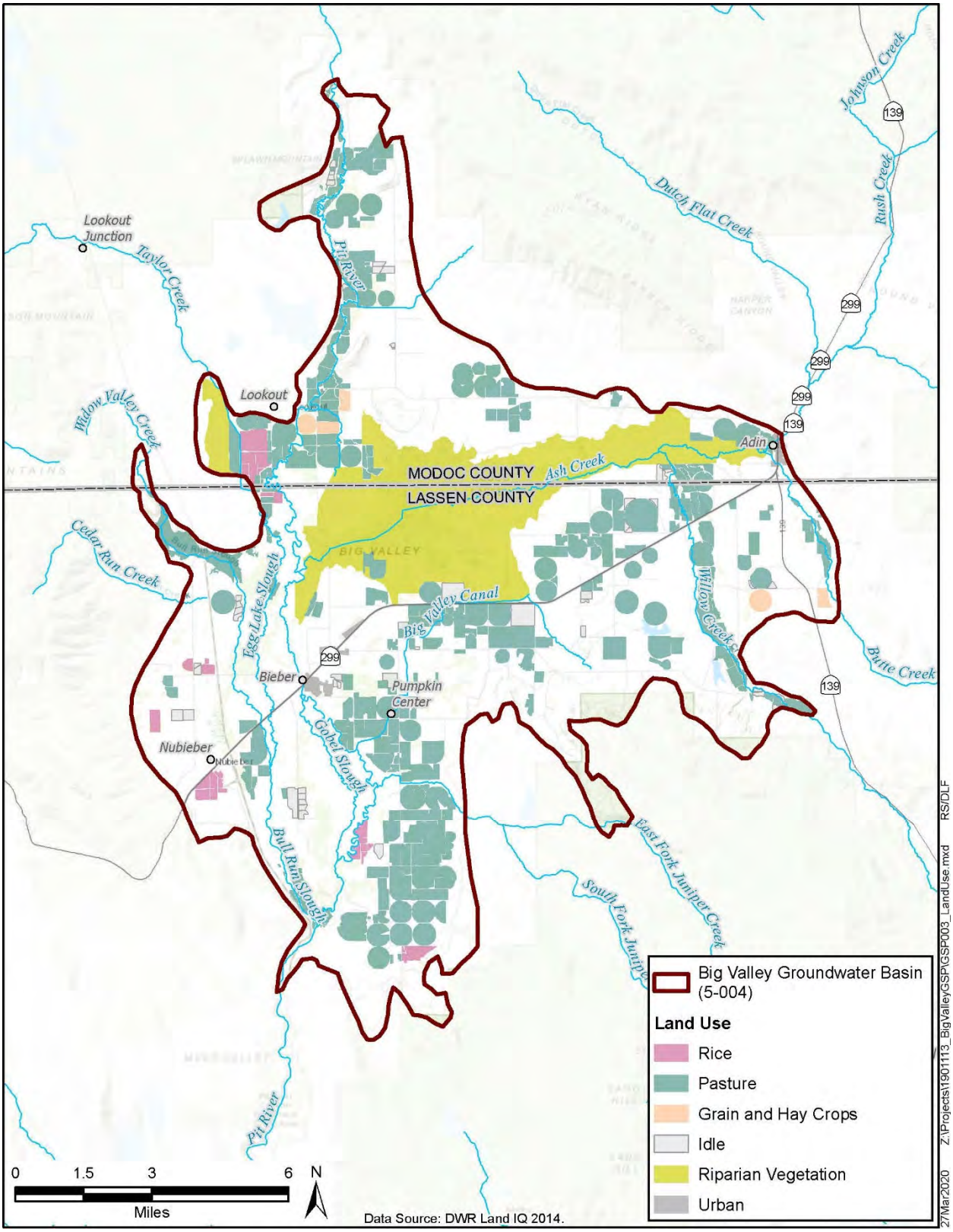

Figure 3-3 Land Use

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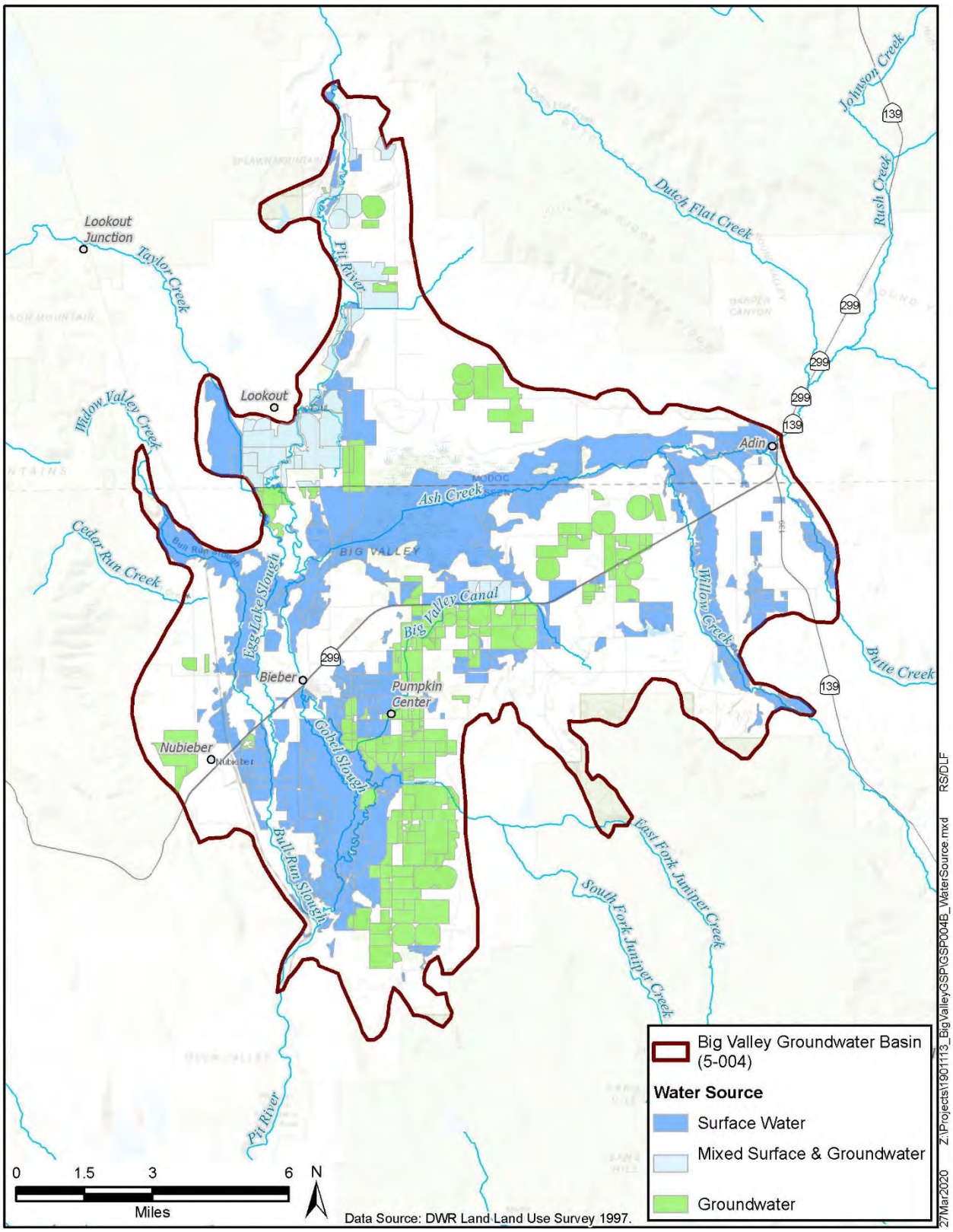

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128 **Figure 3-4** Water Source Types

The best available data for distinguishing surface water and groundwater uses comes from DWR land use datasets from 1997[3]. ~~-~~**Figure 3-4** shows in general where suface water and groundwater are used in the Basin. Lassen County provides drinking water to Bieber via two wells in the their Waterworks District #1. The US Forest Service Ranger Station utilizes a well in Adin for its water supply.

Surface water has been appropriated from Ash Creek on the east side of the Basin and from the Pit River on the west side. SGMA does not alter surface water rights, and the delination of surface water rights in Big Valley is beyond the scope of the GSP.

Recycled water and desalinated water are not utilized in the Basin, nor is stormwater used as a supplemental water supply at the time of the development of this GSP.

3.4.2 *Water Use Sectors*

Water demands in the Basin are organized into the same water use sectors identified in Article 2 of the GSP emergency regulations (DWR 2016). These sectors include:

- **Urban** Urban water use is assigned to non-agricultural water uses in the census-designated places.
- **Domestic** ~~use~~This includes non-agricultural water uses outside ~~of~~the census-designated places~~ is not considered urban use, rather it is categorized under the agricultural use sector~~.
- **Industrial** There is limited industrial use in the Basin. DWR does not have any records of wells in the Basin that are categorized for industrial use. Most industrial use is associated with agriculture and is included under the agricultural water use sector.
- **Agricultural** This is the largest water use sector in the Basin by water use. ~~Agricultural areas also include associated domestic users outside of census designated places.~~
- **Managed Wetlands** The Ash Creek Wildlife Area is located within the center of the Basin. The area includes approximately 14,400 acres of preserved freshwater wetlands created by the seasonal flow of six streams, including Ash Creek. (CDFW 2019)
- **Managed Recharge** There is no formal managed recharge or recycled water discharged in the Basin. However, flood irrigation of some fields and natural flooding of lowland areas do likely provide recharge. In addition, projects implemented at the Ash Creek Wildlife Area to increase wetland areas are also beneficial to groundwater recharge even though that is not their primary purpose.
- **Native Vegetation** This is the largest water use sector in the Basin by land area. This sector includes domestic wells in the rural residential areas that are not agricultural lands.

[3] The more recent land use surveys (i.e 2014) do not distinguish between water sources. Previous land surveys did and 1997 was the last land use survey for both counties with water source data.

Figure 3-5 shows the distribution of the water use sectors in the Basin.

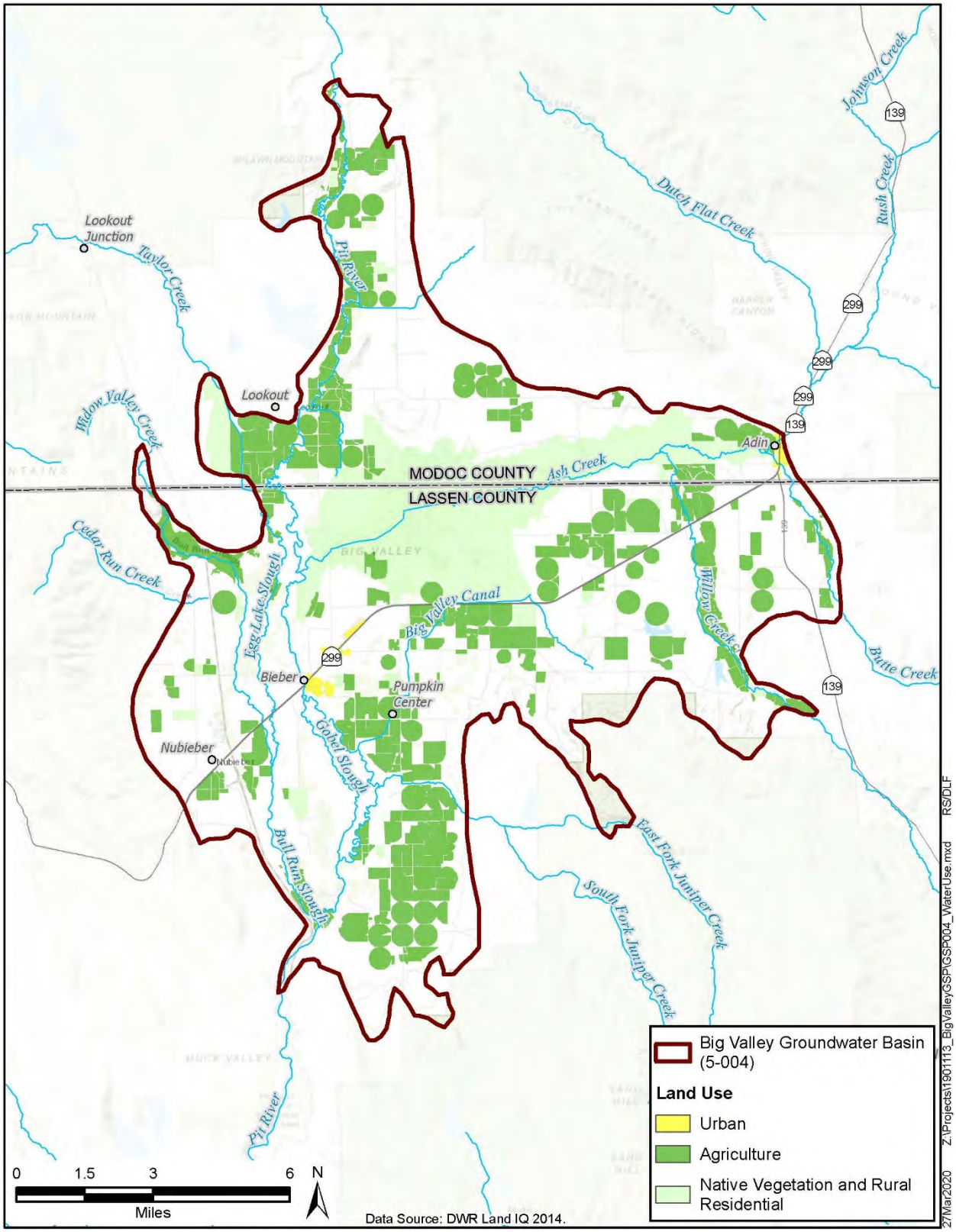

Figure 3-5 Water Use Sectors

3.5 Inventory and Density of Wells

3.5.1 *Well Inventory*

Well types, well depths, and well distribution data were downloaded from DWR's well completion report map application (DWR, 2018). DWR categorizes wells in this mapping application as domestic, production, or public supply. In addition, well inventories were requested and received from DWR during 2015 and 2017. These categories of well type are based on the well use information submitted with the well logs to DWR. **Table 3-2** summarizes the types of wells by use, based on the DWR mapping tool; and on the DWR inventories. The majority of the wells categorized as production wells by the mapping tool are likely used for agricultural puposes and many of those wells in the Basin are used for domestic purposes.

The table shows similar totals by the two approaches for the number of domestic, production, and public supply wells while the DWR inventories show an additional 159 wells from five additional types. The DWR inventories show that 628 wells have been installed in the BVGB. Adding the 20 new monitoring wells from the grant funds increases the total to 648 wells.

Table 3-2 Well Types in the BVGB

DWR Mapping Tool				DWR Inventories		
Type of Well [a]	**Lassen County Total Wells**	**Modoc County Total Wells**		**Proposed Use of Well [b]**	**Lassen County Total Wells**	**Modoc County Total Wells**
Domestic	136	81		Domestic	142	79
Production	177	76		Irrigation	157	65
				Stock	11	5
				Industrial	6	0
Public Supply	5	1		Public	5	1
				Monitor	55	0
				Test	25	29
				Other	7	2
				Unknown	27	7
				Destroyed	5	0
Total (476)	**318**	**158**		**Total (628)**	**440**	**188**
		2019/20 SGMA Monitor (20)			4	16

Source:
[a] DWR SMGA Data Viewer – Well Report Statistics in Big Valley Basin; downloaded in April 2019.
[b] DWR Well Inventories – 2015 and 2017; based on well log.

3.5.2 *Well Density*

Figures 3-6, 3-7, and 3-8 show the density of wells in the Basin per square mile for domestic, production, and public, respectively, based on the DWR mapping tool. These maps are ~~reasonable~~ approximations of well distributions, but do not include the five additional well types, which account for approximately 25 percent of the total number of wells in the inventory for the BVGB.

Figure 3-6 shows that domestic wells are located in 74 of the 180 sections (nominal total, including partial sections) that comprise the BVGB. The density varies from 0 to 18 wells per square mile (section) with a median value of 2 wells per section and an average of 3 wells per section. The highest densities of domestic wells are located near Adin, Bieber, and Lookout and in a section to the east of Lookout and a section south of Adin. In addition, moderate densities are present in the four sections around Nubieber.

Figure 3-7 shows that production wells (primarily assumed to be for irrigation) are located in 93 of the 180 sections with a maximum density of 9 wells per section (median: 2 wells per section, average: nearly 3 wells per section). The highest densities of production wells are located between Bieber and Adin, to the southeast of Bieber, and one section northeast of Lookout.

Figure 3-8 shows that public supply wells ~~are~~ have been drilled in four sections~~, including~~. The BVGB has two active public water suppliers: Lassen County Waterworks District #1, which maintains two wells near Bieber to serve residential use in the town, and the U.S. Forest Service maintains one well ~~near~~in Adin~~, one well~~ to serve non-residential use at the Forest Service station. The remaining 3 public supply wells (near Nubieber~~, and two wells in two sections near Bieber. It should be noted that these are wells that have been drilled, but not all may be currently active~~ and north of Bieber) are inactive.

3.6 Existing Monitoring, Management, and Regulatory Programs

3.6.1 *Groundwater Monitoring*

Levels

Lassen and Modoc Counties are the monitoring entities for the California Statewide Groundwater Elevation Monitoring (CASGEM) program. Each county has an approved CASGEM monitoring plan which provides for monitoring twice a year (spring and fall) at 22 wells. The monitoring is performed by staff from DWR on behalf of the Counties. All but one of the wells have depth information ranging from 73 to 800 feet bgs (median: 270 ft bgs, mean: 335 ft bgs). **Figure 3-9** shows the locations of the CASGEM wells.

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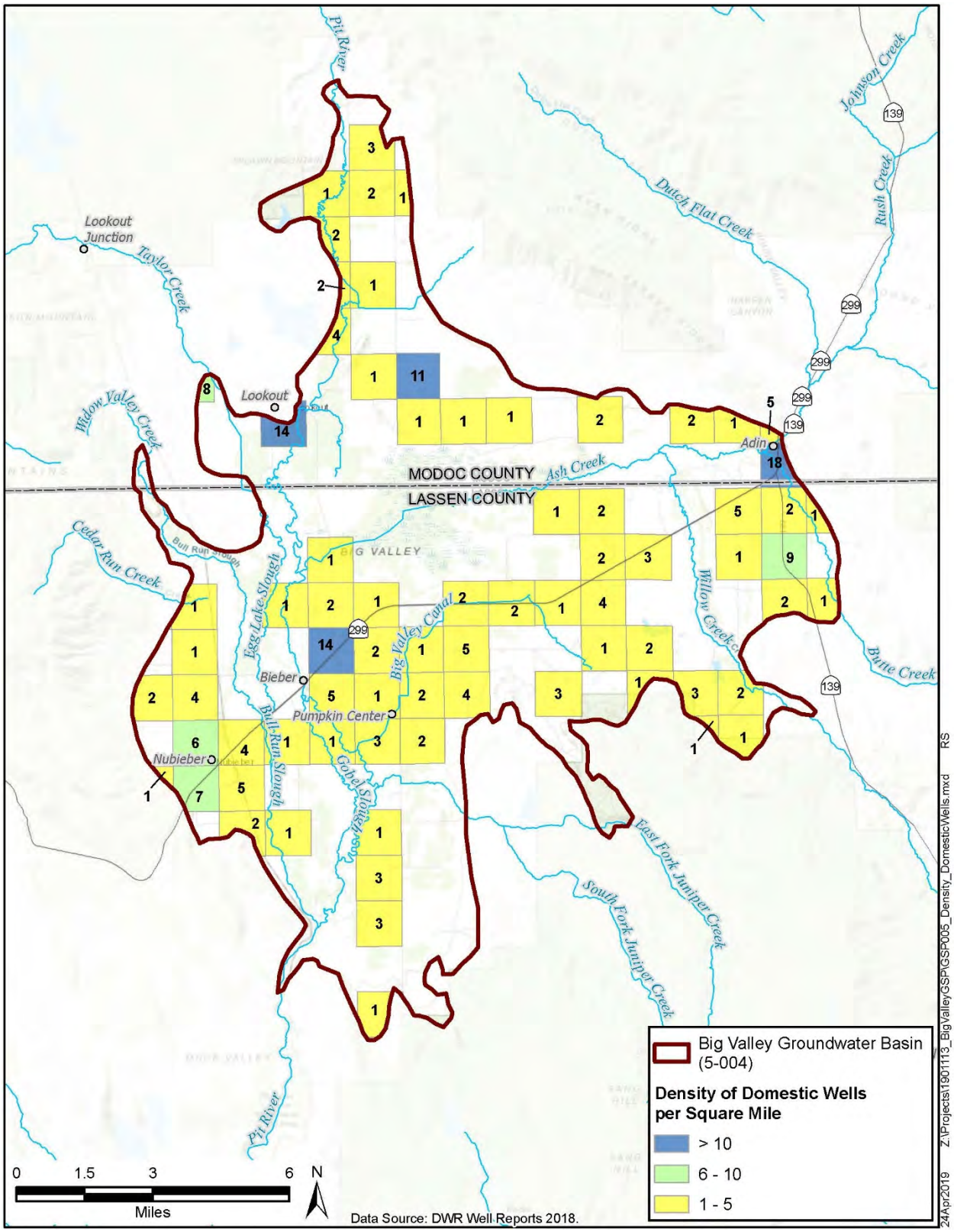

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219 **Figure 3-6** Density of Domestic Wells
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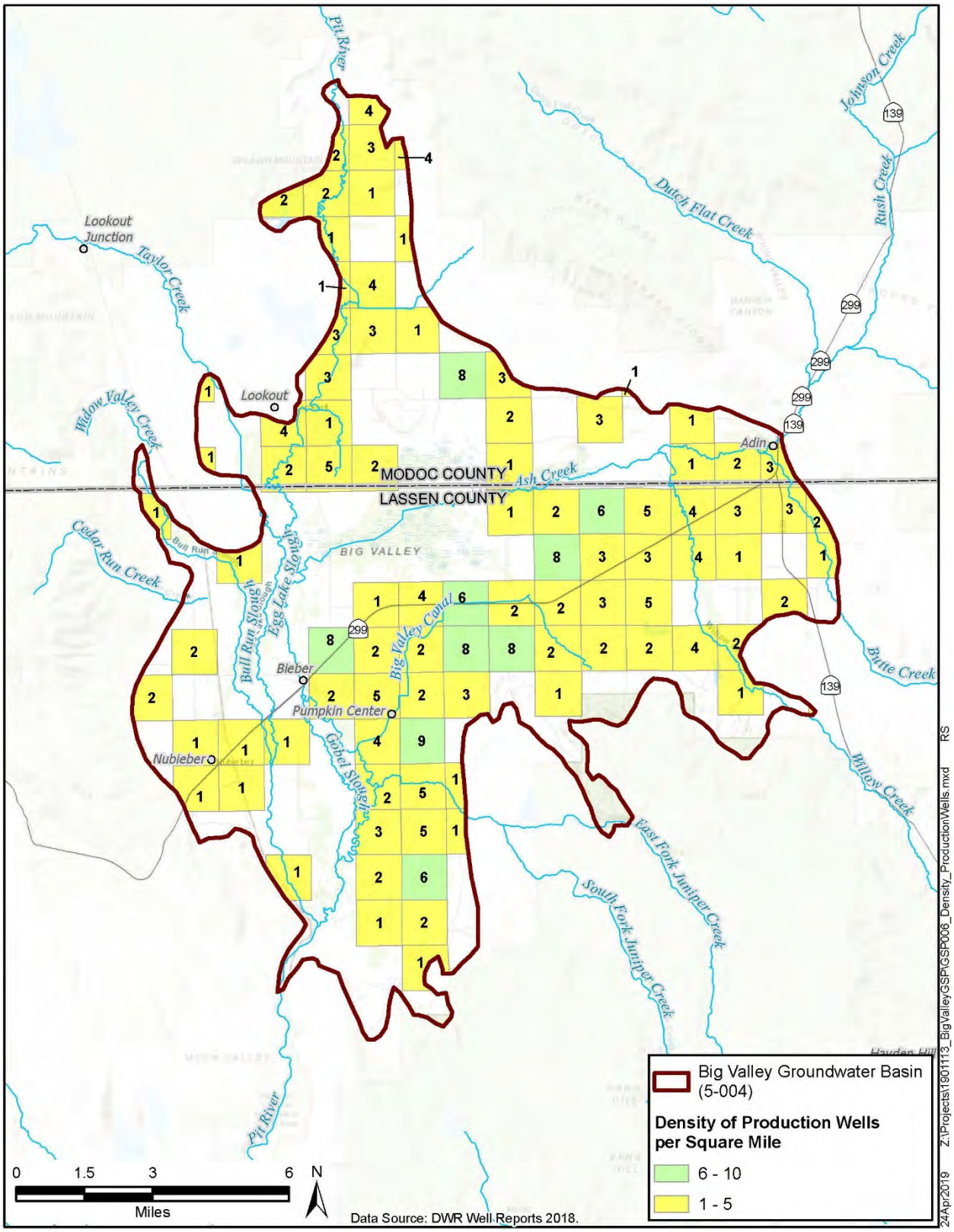

Figure 3-7 Density of Production Wells

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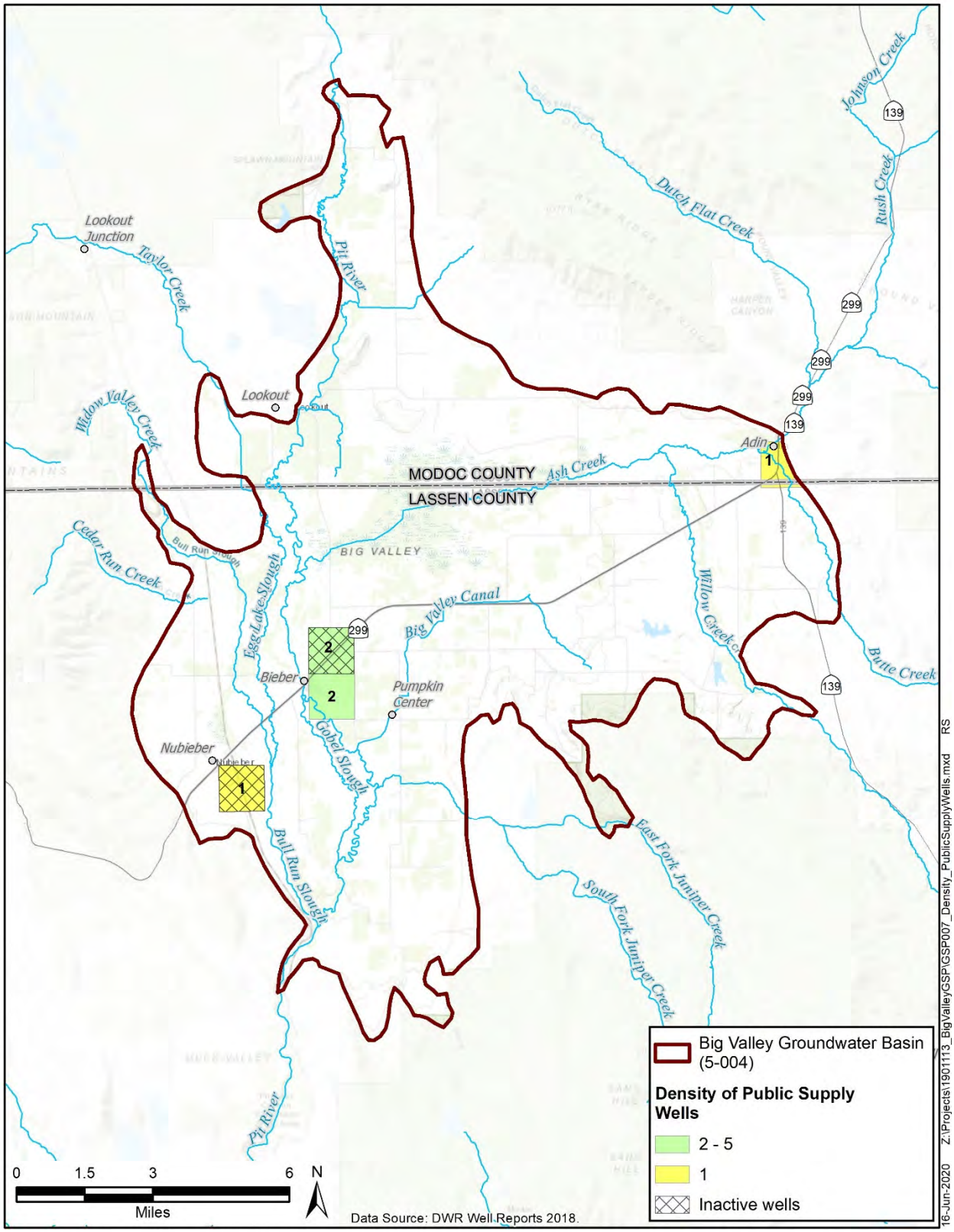

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227 **Figure 3-8** Density of Public Supply Wells
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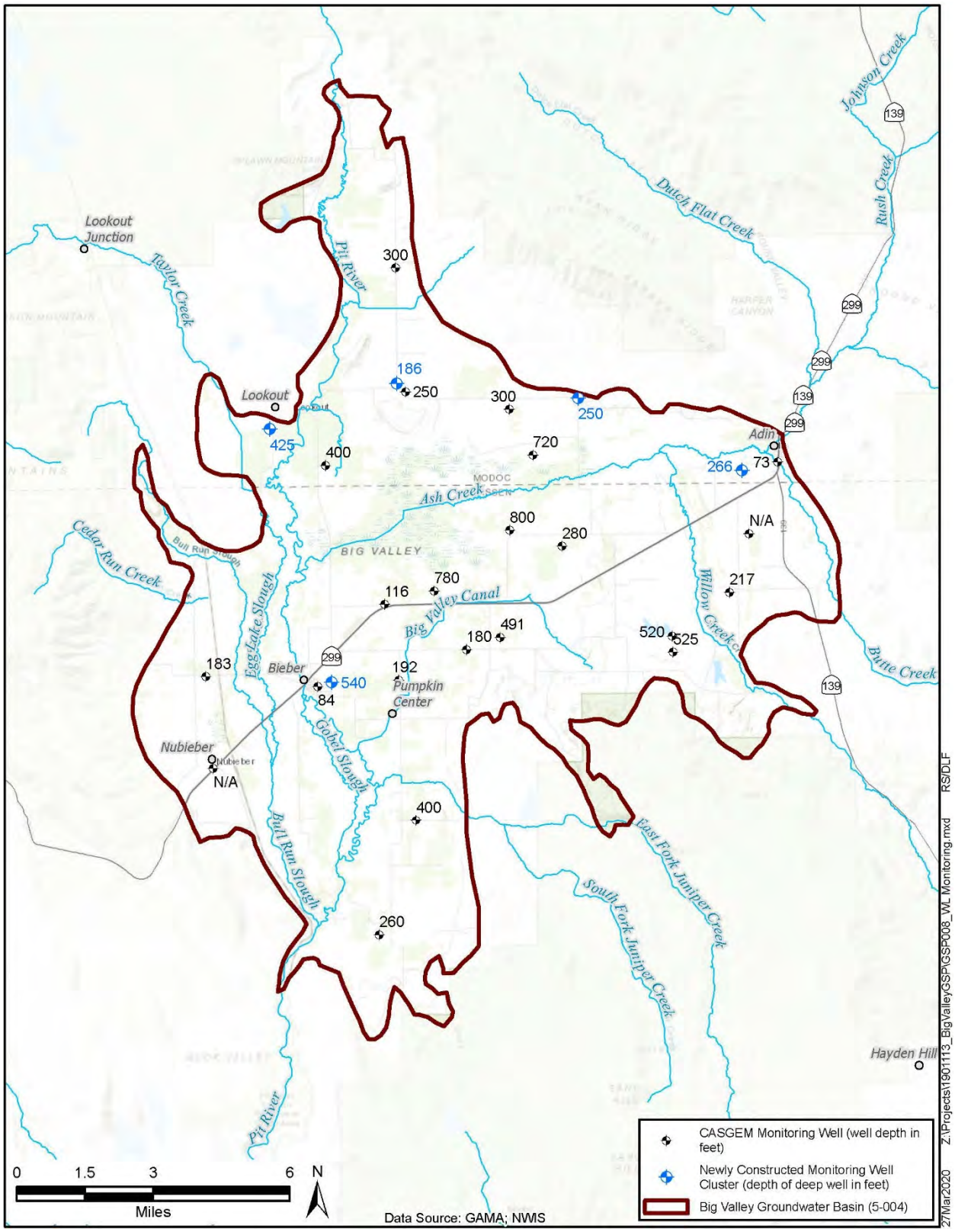

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231 **Figure 3-9** Water Level Monitoring Network
232

Lassen and Modoc Counties drilled five monitoring well clusters in 2019-2020. Each cluster consists of three shallow wells and one deep well. The locations of these clusters and the depth of the deep well at each site is shown on **Figure 3-9**.

The LMFCWCD monitors biannual water levels ~~at 85 wells~~ throughout the basin~~. The locations of these wells is not readily available~~.

Pumping

The LMFCWCD monitors pumping throughout the basin. ~~The LMFCWCD monitors pumping at 85 wells throughout the basin. The locations of these wells is not readily available.~~

Quality

Historic groundwater quality monitoring has been performed under programs with the SWRCB, DWR, and USGS. The SWRCB has compiled the data from these programs and made it available on their GAMA Groundwater Information System website (SWRCB 2019). The locations of wells with historic water quality data are shown on **Figure 3-10**.

The only current programs that monitor groundwater quality on an ongoing basis are the SWRCB's Division of Drinking Water (DDW) and monitoring associated with cleanup sites. The BVGB contains two active public water suppliers: Lassen County Water District #1 in Bieber, and the Forest Service station in Adin. Water quality monitoring at their wells through the DDW can be used for ongoing monitoring in the basin and their locations are shown on **Figure 3-10**. The five newly constructed monitoring well clusters were sampled for water quality after construction and are shown on the figure.

The basin has five active groundwater cleanup sites in various stages of assessment and remediation, all located in Bieber. These sites are not appropriate for ongoing monitoring for groundwater resources in the basin, as they monitor only the shallow aquifer and represent a localized condition that may not be representative of the overall quality of groundwater resources in the Basin. There is ongoing water quality monitoring at the Bieber Class III Solid Waste Municipal Landfill. The Lookout Transfer Station also has ongoing water quality monitoing, but is located outside the boundaries of the BVGB.

Growers in Big Valley participate in the Irrigated Lands Regulatory Program (ILRP) through the Sacramento Valley Water Quality Coalition (SVWQC). However, the Monitoring and Reporting Plan for the SVWQC does not include any wells within the BVGB.

3.6.2 *Surface Water Monitoring*

Streamflow

Streamflow gages have historically been constructed and monitored within the BVGB, but active, maintained streamflow gages for streams in BVGB are limited. For the Pit River, the closest active gage that monitors streamflow is located at Canby, 20 miles upstream of Big

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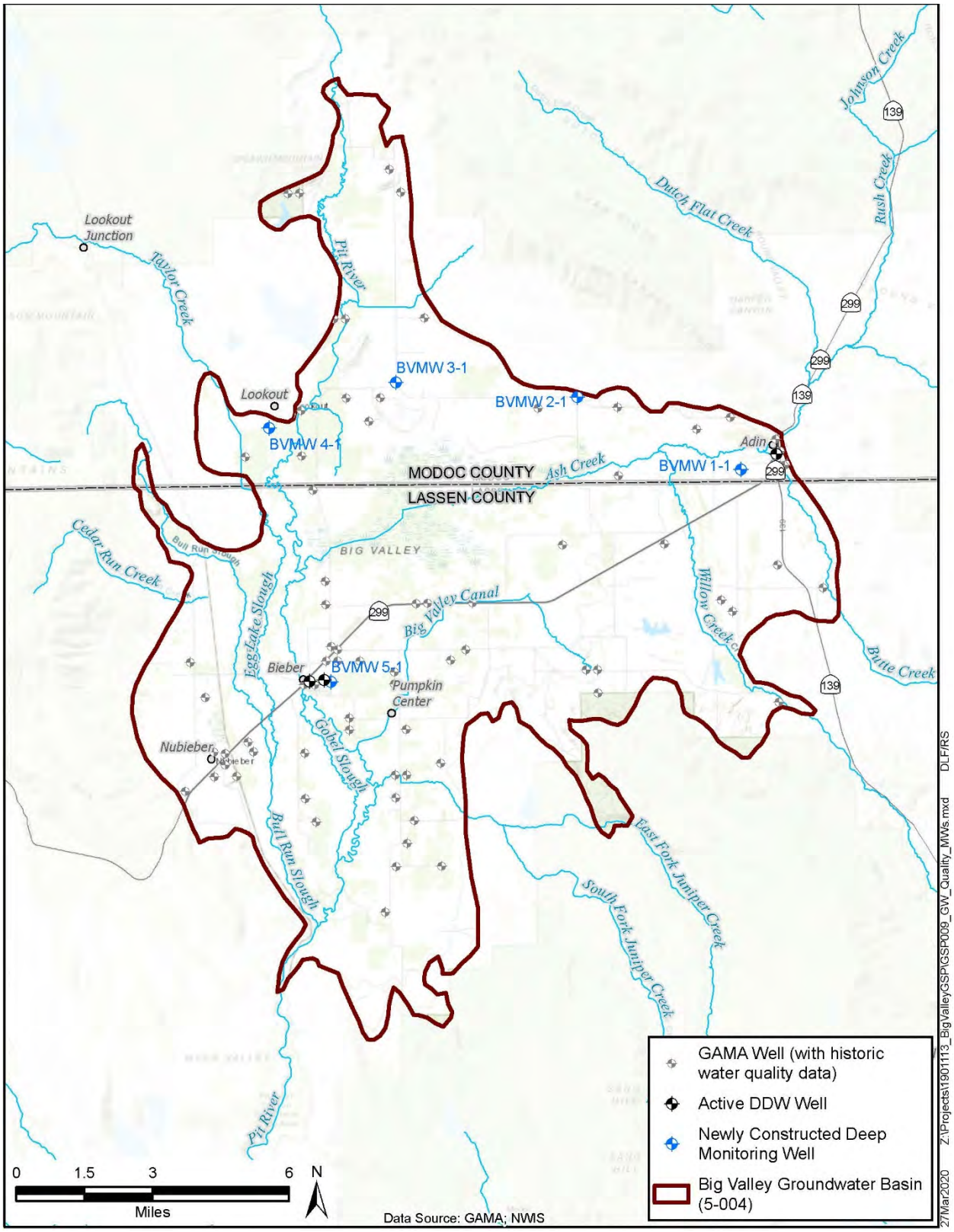

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270 **Figure 3-10** Water Quality Monitoring
271

Valley. Flow on Ash Creek was measured at a gage in Adin from 1981 to 1999. The Adin gage is being reactivated by DWR under SB-19, passed in September 2019 to expand California's stream gaging network. There is a gage where the Pit River exits the Basin in the south at the diversion for the Muck Valley Hydro Power Plant. However, the data is not readily and publicly available. Stream gauges are shown on **Figure 3-11**.

Diversions

Surface water diversions greater than 10 acre-feet per year must be reported to the SWRCB in compliance with state legislation (SB-88). The Big Valley Water Users Association (BVWUA) employs a watermaster service to measure diversions from the Pit River. Ash Creek and Willow Creek diversions are measured as part of the Ash Creek watermaster service.

3.6.3 *Climate Monitoring*

The Basin has limited climate monitoring. The National Oceanic and Atmospheric Administration (NOAA) has two stations located in the Basin: Bieber 4 NW and Adin RS. Both of these stations are no longer active, thus only contain historic data. Annual precipitation at the Bieber station is shown for 1985 to 1995 in **Table 3-3**.

The closest California Irrigation Management Information System (CIMIS) station, number 43, is in MacArthur, CA, and measures a number of climatic factors that allow a calculation of daily reference evapotranspiration for the area. This station is approximately 10 miles southwest of the western boundary of the Basin. **Table 3-4** provides a summary of average monthly rainfall, temperature, and reference evapotranspiration (ETo) for the Basin, and **Figure 3-12** shows annual rainfall for 1984 through 2018. The locations of all climate monitoring stations are shown on **Figure 3-11**.

Table 3-3 Annual Precipitation at Bieber from 1985 to 1995

Water Year	Precipitation at Station ID: BBR (inches)
1985	14.1
1986	25.4
1987	11.6
1988	10.9
1989	20.2
1990	16.1
1991	16.5
1992	10.4
1993	28.2
1994	16.3
1995	31.8
Minimum	10.4
Maximum	31.8
Average	18.3

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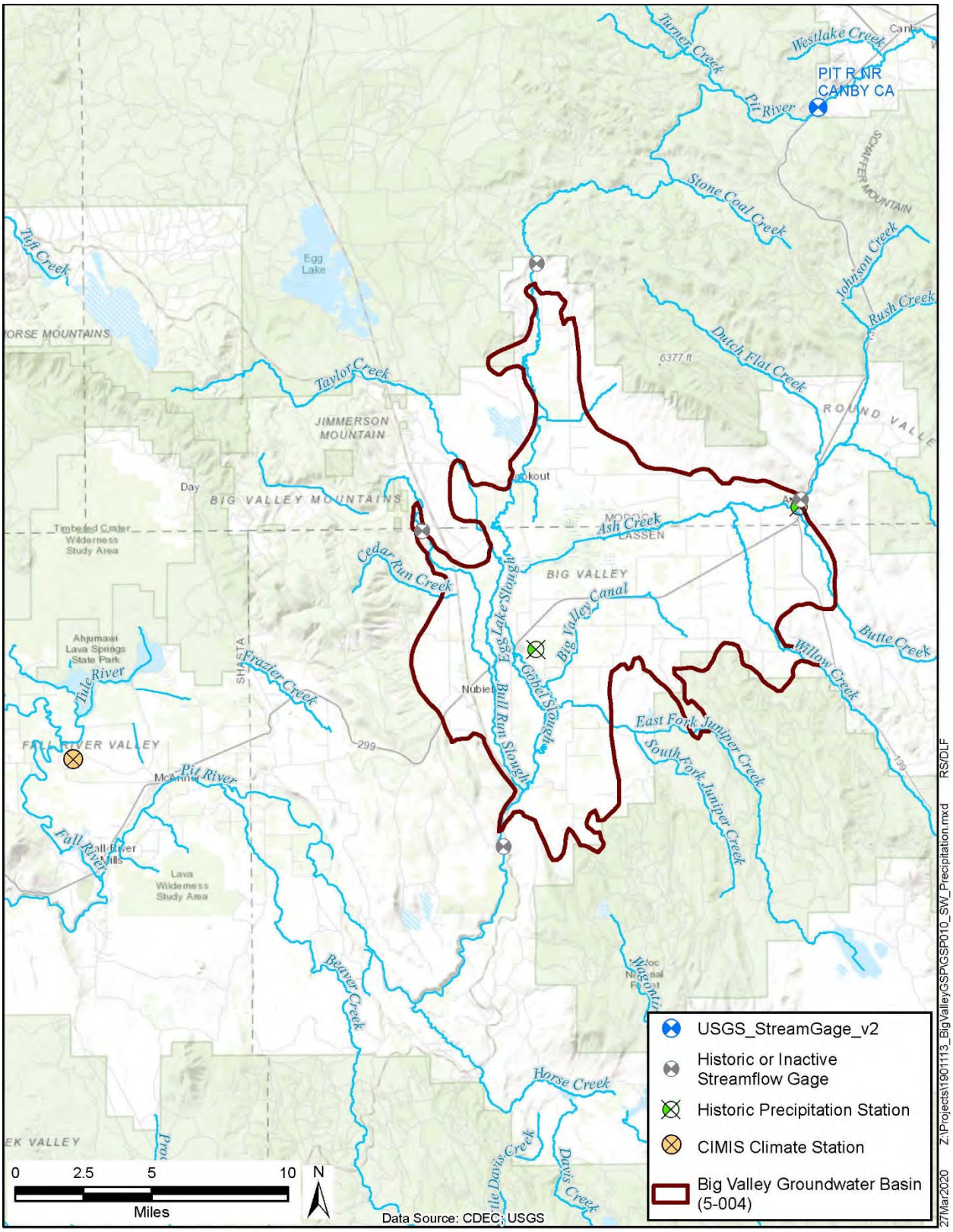

297
298 **Figure 3-11** Surface Water and Climate Monitoring

Table 3-4 Monthly Climate Data from CIMIS Station in McArthur (1984-2018)

Month	Average Rainfall (inches)	Average ET_o (inches)	Average Daily Temperature (°F)
October	1.4	3.02	49.5
November	2.3	1.21	38.2
December	2.9	0.75	32.1
January	2.5	0.89	32.5
February	2.6	1.57	36.8
March	2.4	3.01	42.4
April	1.8	4.39	48.2
May	1.6	5.93	55.1
June	0.7	7.24	62.8
July	0.2	8.17	69.1
August	0.2	7.18	66.1
September	0.4	5.02	59.5
Monthly Average	1.6	4.03	49.4
Average Water Year	18.8	48.3	49.4

3.6.4 *Subsidence Monitoring*

Subsidence monitoring is available in the BVGB at a single continuous global positioning satellite station (P347) on the south side of Adin. P347 began operation in September 2007 and provides daily readings. The five recently constructed monitoring wells will be surveyed and a benchmark will be established at each site. These sites and can be reoccupied in the future to determine subsidence at those points.

In addition, DWR has provided data processed from inferometric synthetic aperture radar (InSAR) collected by the European Space Agency. The InSAR data currently available provides vertical displacement information between January 2015 and September 2019. InSAR is a promising, cost-effective technique, and DWR will likely provide additional data and information going forward.

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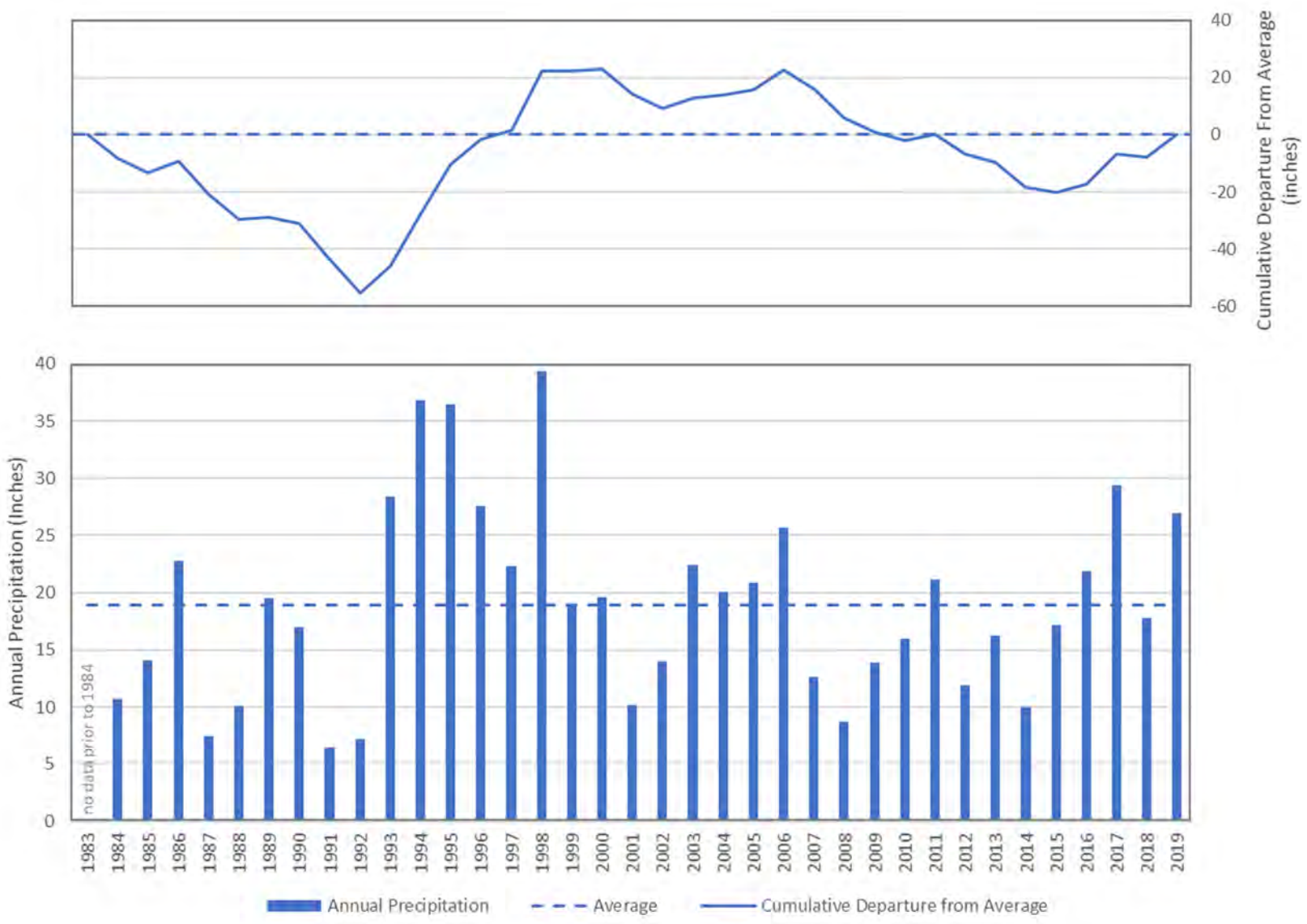

314
315 **Figure 3-12** Annual Precipitation at the McArthur CIMIS Station

3.6.5 *Existing Water Management Plans*

Two water management plans exist that cover the BVGB: the Lassen County Groundwater Management Plan (LCGMP) and the Upper Pit River Integrated Regional Water Management Plan (IRWMP).

Lassen County Groundwater Management Plan

The LCGMP was completed in 2007 and covers all groundwater basins in Lassen County, including the Lassen County portion of the BVGB. The goal of the LCGMP is to "…maintain or enhance groundwater quantity and quality, thereby providing a sustainable, high-quality supply for agricultural, environmental, and urban use…" (Brown and Caldwell 2007). The LCGMP achieves this through the implementation of Basin Management Objectives[4] (BMOs), which establish key wells for monitoring groundwater levels and define "action levels," which, when exceeded, activate stakeholder engagement to determine actions to remedy the exceedance. Action levels are similar to minimum thresholds in SGMA. A BMO ordinance was passed by Lassen County in 2011.

Upper Pit River Watershed IRWMP

The Upper Pit IRWMP was adopted by the Regional Water Management Group in 2013. Twenty five regional entities were involved in the plan development, which included water user groups, federal, state and county agencies, tribal groups, and conservation groups. The management of the IRWMP has now transferred to the North Cal-Neva Resource Conservation and Development Council (NCNRCDC) who has been working to update the Plan. The goal of the IRWMP is to:

> *"…maintain or improve water quality within the watershed; maintain availability of water for irrigation demands and ecological needs (both ground and surface water); sustain/improve aquatic, riparian, and wetland communities; sustain and improve upland vegetation and wildlife communities; control & prevent the spread of invasive noxious weeds; strengthen community watershed stewardship; reduce river and stream channel erosion and restore channel morphology; support community sustainability by strengthening natural-resource-based economies; support and encourage better coordination of data, collection, sharing, and reporting in the watershed; improve domestic drinking water supply efficiency/reliability; address the water-related needs of disadvantaged communities; conserve energy, address the effects of climate variability, and reduce greenhouse gas emissions."*

The Upper Pit IRWMP contains the entire Watershed above Burney and extends past Alturas to the northeast. The area includes the entire BVGB.

[4] Codified as Chapter 17.02 of Lassen County Code.

3.6.6 *Existing Regulatory Programs*

Water Quality Control Plan for the Sacramento River and San Joaquin River Basins

The Basin is located within the jurisdication of the RWQCB-R5 and subject to a Water Quality Control Plan (WQCP), which is required by the California Water Code (Section 13240) and supported by the Federal Clean Water Act. This WQCP was first adopted by the RWQCB in 1975 and covers the entire area of the Sacramento and San Joaquin River drainage basins. The Pit River, which runs through the BVGB, is one of the principal streams and one of the largest tributaries of the Sacramento River. The Porter-Cologne Water Quality Control Act requires that basin plans address beneficial uses, water quality objectives, and a program of implementation for achieving water quality objectives. The designated beneficial uses of the Pit River are: municipal and domestic supply, irrigation and stock watering, water contact and non-contact water recreation, warm and cold fresh water habitat and spawning, and wildlife habitat. Water Quality Objectives for both groundwater (drinking water and irrigation) and surface water are provided in the Basin Plan.

Lassen County Water Well Ordinance

Lassen County adopted a water well ordinance in 1988 to provide for the construction, repair, modification and destruction of wells in such a manner that the groundwater of Lassen County will not be contaminated or polluted, and that water obtained from wells will be suitable for beneficial use and will not jeopardize the health, safety or welfare of the people of Lassen County. The ordinance includes requirements for permits, fees, appeals, standards and specifications, inspection, log of the well (lithology and casing), abandonment, stop work, enforcement and violations and well disinfection. Lassen County Environmental Health Department is responsible for the code enforcement related to wells.

In 1999, Lassen County adopted an ordinance requiring a permit for export of groundwater outside of the County (Lassen County Code 17.01.010).

Modoc County Water Well Requirements

Modoc County Environmental Health Department established its requirements for the permitting of work on water wells in 1990, based on the requirements of the California Water Code (Section 13750.5). The fee structure was last revised in 2018. Modoc County also has an ordinance prohibiting the extraction of groundwater for use outside of the groundwater basin from which it was extracted. (Title 20 Chapter 20.04)

California DWR Well Standards

DWR is responsible for setting the minimum standards for the construction, alteration, and destruction of wells in California in order to protect groundwater quality, as allowed by California Water Code Sections 13700 to 13806. DWR began this effort in 1949 and has published several versions of standards in Bulletin 74, beginning in 1962, and is working on a

significant update for 2021. Current requirments are provided in Bulletin 74-81, Water Well Standards: State of California, and in Bulletin 74-90 (Supplement), California Well Standards. Cities, counties, and water agencies have regulatory authority over wells and can adopt local well ordinances that meet or exceed the state standards.

Title 22 Drinking Water Program

The SWRCB Division of Drinking Water (DDW) was established in 2014 when the regulatory responsibilities were transferred from the California Department of Public Health. DDW regulates public water systems that provide "water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year," as defined by the Health and Safety Code (Section 116275 (h). DDW further defines public water systems as:

- Community (C): Serves at least 15 service connections used by year-round residents or regularly serves 25 year-round residents. Lassen County Water District #1 serves groundwater in Bieber.
- Non-Transient Non-Community (NTNC): Serves at least the same 25 non-residential individuals during 6 months of the year. The Adin Ranger Station utilizes a well for its water supply.
- Transient Non-Community (NC): Regularly serves at least 25 non-residential individuals (transient) during 60 or more days per year.

Private domestic wells, industrial wells, and irrigation wells are not regulated by the DDW.

The SWRCB-DDW enforces the monitoring requirements established in Title 22 of the California Code of Regulations (CCR) for public water system wells, and all the data collected must be reported to the DDW. Title 22 designates the regulatory limits (e.g., maximum contaminant levels [MCLs]) for various constituents, including naturally-occuring inorganic chemicals and metals, and general characteristics; and also for man-made contaminants, including volatile and non-volatile organic compounds, pesticides, herbicides, disinfection byproducts, and other parameters.)

~~Irrigated Lands Regulatory Program~~

~~The Irrigated Lands Regulatory Program, established in 2003 and overseen by the SWRCB, regulates discharges from irrigated agriculture to surface and ground waters and establishes waste discharge orders for selected regions. The Irrigated Lands Regulatory Program focuses on priority water quality issues, such as pesticides and toxicity, nutrients, and sediments. Under the program, wells that are part of the Monitoring and Reporting Program (MRP) are sampled biannually. However, no MRP wells are located in Big Valley.~~

3.6.7 *Incorporation Into GSP*

Information in these various programs may be incorporated into this GSP and used during the preparation of Sustainability Management Criteria (minimum thresholds, measurable objectives, interim milestones) and will be considered during development of Projects and Management Actions.

3.6.8 *Limits to Operational Flexibility*

While some of the existing management programs and ordinances may have the potential to affect operational flexibility, they are not likely to be a factor in the Basin. For example, runoff and stormwater quality is of high quality and would not constrain recharge options. Similarly, groundwater export requirements by Lassen County and Modoc County would be taken into account for any sustainable groundwater management decisions in the Basin.

~~Some of the existing management programs and ordinances may affect operational flexibility. Examples include:~~

- ~~The Basin Plan and the Title 22 Drinking Water Program specify the quality of water that can be recharged into the BVGB.~~
- ~~The Modoc County groundwater pumping ordinance prohibits the export of water out of the basin where it is pumped.~~

3.7 Conjunctive Use Programs

Formally established conjunctive use programs are not currently operating within the Basin.

3.8 Land Use Plans

Modoc and Lassen Counties have land use authority in the BVGB. Land use is an important factor in water management, as described below, and the following sections provide a general description of the land use plans and how implementation may affect groundwater.

3.8.1 *Modoc County General Plan*

The 1988 Modoc County General Plan was developed in order to meet a state requirement and to serve as the "constitution" for the community development and use of land. The plan discusses the mandatory elements of a general plan, including land use, housing, circulation (transportation), conservation and open space, noise, and safety, as well as economic development and an action program in the County. The plan was intended to serve as a guide for growth and change in Modoc County for the 15 years following its publication. Under the Conservation Element, Modoc County recognizes the importance of "use-capacity" for groundwater, among other issues, and the minimization of "adverse resource-use," such as "groundwater mining." The Water Resources section advocates the "wise and prudent" management of groundwater resources to support a sustainable economy as well as maintaining

adequate supplies for domestic wells for rural subdivisions. Groundwater quality was recognized as generally good to excellent within the numerous basins, although some basins contain groundwater with high natural concentrations of boron and/or arsenic (Big Valley).

Policy items from the Modoc General Plan related to groundwater include:

- Cooperate with responsible agencies and organizations to solve water quality problems..
- Work with the agricultural community to resolve any groundwater overdraft problems.
- Require adequate domestic water supply for all rural subdivisions.

The action progam included several general statements for water, including:

- Initiate a cooperative effort among state and local agencies and special districts to explore appropriate actions necessary to resolve long-term water supply and quality problems in the county.
- Require as a part of the review of any subdivision approval a demonstration to the satisfaction of the County that the following conditions exist for every lot in the proposed development:
    - An adequate domestic water supply.
    - Suitable soil depth, slope and surface acreage capable of supporting an approved sewage disposal system.

In 2018, a general plan amendment was adopted to update the housing element section.

3.8.2 *Lassen County General Plan*

The Lassen County General Plan 2000 was adopted in 1999 by the Lassen County Board of Supervisors (Resolution 99-060) to address the requirements of California Government Code Section 65300 et seq, and related provisions of California law pertaining to general plans. The General Plan (GP) reflects the concerns and efforts of the County to efficiently and equitably address a wide range of development issues which confront residents, property owners, and business operators. Many of these issues also challenge organizations and agencies concerned with the management of land and resources and the provisions of community services within Lassen County.

The goals of the plan are to:

- Protect the rural character and culture of Lassen County life.
- Maintain economic viability for existing industries such as agriculture, timber and mining.
- Promote new compatible industries to provide a broader economic base.

- Create livable communities through carefully planned development which efficiently utilize natural resources and provide amenities for residents.
- Maintain and enhance natural wildlife communities and recreational opportunities.
- Sustain the beauty and open space around use in this effort.

The GP addresses the mandatory elements (land use, circulation, housing, conservation, open space, noise, and safety) via several plan documents and alternate element titles. The 1999 GP elements include land use, natural resources (conservation), agriculture, wildlife, open space, circulation, and safety. Separate documents were produced for housing, noise, and energy. The land use element designates the proposed general distribution and intensity of uses of the land, serves as the central framework for the entire general plan, and correlates all land use issues into a set of coherent development policies. The Lassen County GP land use map from 1999 is shown in **Figure 3-13**, and shows intensive agriculture as the dominant land use within the Big Valley area, along with scattered population (small) centers. Otherwise Extensive Agriculture is the dominant land use.

Groundwater is addressed in several elements, including agriculture, land use, and natural resources. The GP identified the BVGB as a 'major ground water basin' due to the operation of wells at over 100 gallons per minute. Moreover, the GP expressed concern about water transfers and their impact on local water needs and environmental impacts due to water marketeers pumping groundwater from the BVGB into the Pit River and selling it to downstream water districts or municipalities or using groundwater to augment summer flow through the Delta. The GP recognized that safe yield is dependent on recharge and that overdraft pumping would increase operating costs due to a greater pumping lift and could result in subsidence and water quality degradation. In addition, the GP referred to 1980s legislation that authorized the formation of water districts in Lassen County to manage and regulate the use of groundwater resources and to the 1959 Lassen-Modoc County Flood Control and Water Conservation District, as discussed above. The SGMA process established the requirements for a GSP in the BVGB and creation of the two GSAs.

The land use element identified several issues related to groundwater, including public services where 62 percent of rural, unicorporated housing units relied on individual (domestic) wells for their water. Another issue included open space and the managed production of resources, which includes areas for recharge of groundwater among others. The GP referred to the 1972 Open Space Plan, which required that residental sewage disposal systems would not contaminate groudwater supplies. The agriculture element identified an issue with incompatible land uses where agricultural pumping lowers the groundwater level and impacts the use of domestic wells. The wildlife element recognized that changes in groundwater storage could impact wet meadow habitat and threaten fish and wildlife species.

Groundwater is included in polices under the water resources section of the Natural Resources (NR) and Open Space (OS) Elements, as listed below.

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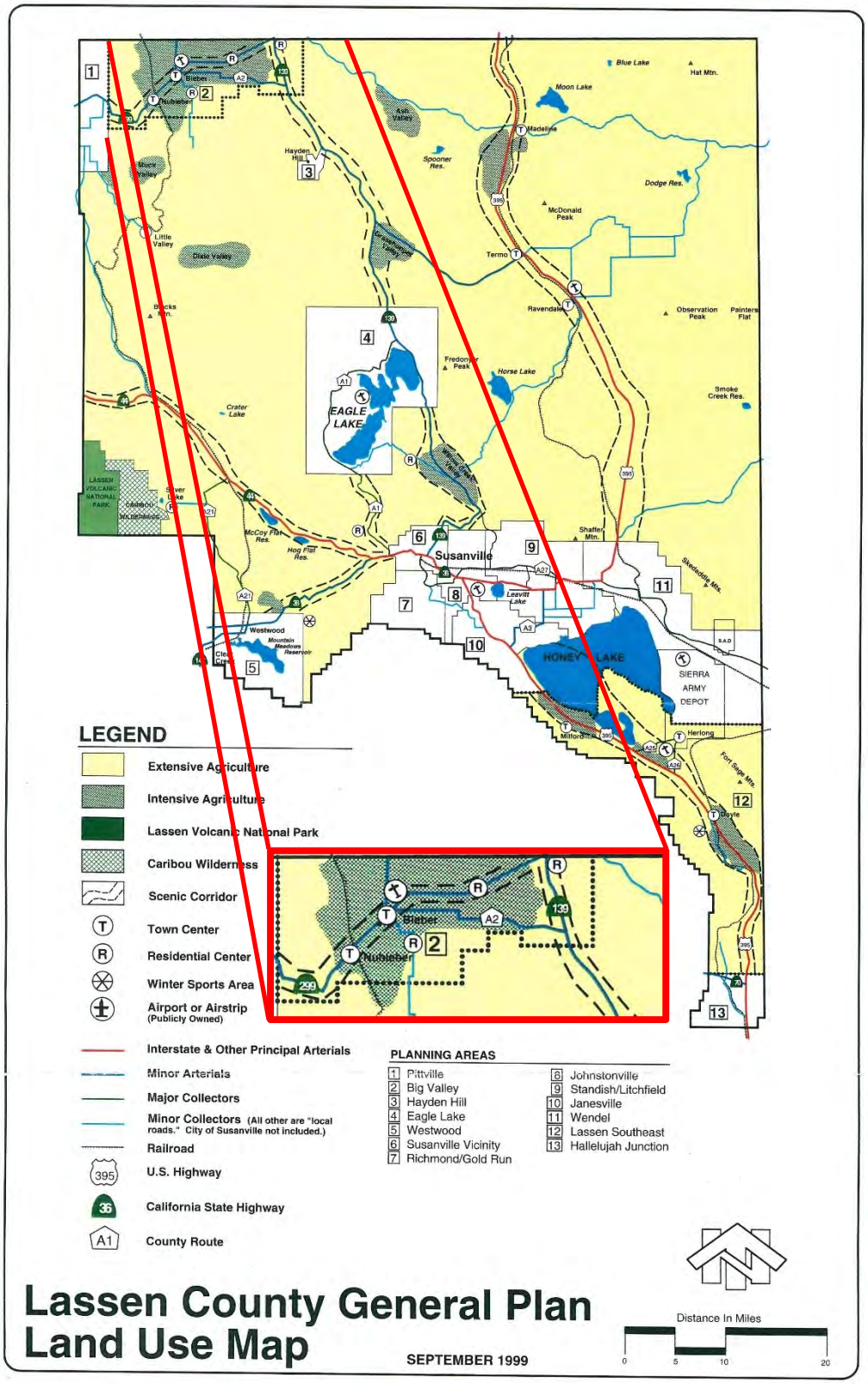

526
527 **Figure 3-13** Lassen County General Plan Land Use Map
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- NR15 POLICY: The County advocates the cooperation of state and Federal agencies, including the State Water Resources Control Board and its regional boards, in considering programs and actions to protect the quality of ground water and surface water resources.
- NR17 POLICY: The County supports measures to protect and insure the integrity of water supplies and is opposed to proposals for the exportation of ground water and surface waters from ground water basins and aquifers located in Lassen County (in whole or part) to areas outside those basins.
    - Implementation Measure:

      NR-H: The County will maintain ground water ordinances and other forms of regulatory authority to protect the integrity of water supplies in Lassen County and regulate the exportation of water from ground water basins and aquifers in the county to areas outside those basins.
- NR19 POLICY: The County supports control of water resources at the local level, including the formation of local ground water management districts to appropriately manage and protect the long-term viability of ground water resources in the interest of County residents and the County's resources.
- OS27 POLICY: The County recognizes that its surface and ground water resources are especially valuable resources which deserve and are in need of appropriate measures to protect their quality and quantity.
- OS28 POLICY: The County shall, in conjunction with the Water Quality Control Board, adopt specific resource policies and development restrictions to protect specified water resources (e.g., Eagle Lake, Honey Lake, special recharge areas, etc.) to support the protection of those resources from development or other damage which may diminish or destroy their resource value.
    - Implementaion Measure:

      OS-N: When warranted, the County shall consider special restrictions to development in and around recharge areas of domestic water sources and other special water resource areas to prevent or reduce possible adverse impacts to the quality or quantity of water resources.

3.8.3 *GSP Implementation Effects on Existing Land Use*

The implementation of this GSP is not expected to have an effect on existing designation of land use.

3.8.4 *GSP Implementation Effects on Water Supply*

The implementation of this GSP is not expected to have an effect on Water Supply. Prior to the development of this plan, the Counties had established several policies and ordinances for the management of water and land use in the BVGB. This GSP will incorporate the previous work and will establish sustainable management criteria to continue the successful use of the groundwater resources during the SGMA implementation period and beyond.

3.8.5 *Well Permitting*

Lassen and Modoc Counties both require a permit to install a well as discussed above. The Lassen County Municipal Code (Section 7.28.030) states that "no person, firm, corporation, governmental agency or any other legal entity shall, within the unincorporated area of Lassen County, construct, repair, modify or destroy any well unless a written permit has first been obtained from the health officer of the county." Modoc County states that "a valid permit to drill, destory, deepen, or recondition a water well is required in Modoc County. Permits are obatined from the Environmental Health Department after acceptance of a completed application, plot plan and fees."

3.8.6 *Land Use Plans Outside of the Basin*

The stakeholders submitting this GSP have not included information regarding the implementation of land use plans outside of the BVGB, as these nearby basins are also subject to the land use plan in either Lassen County or Modoc County. These nearby basins are not adjacent to the BVGB and are separated by mountain ranges. Moreover, the nearby basins are all classified as very low or low priority and are not currently subject to SGMA.

3.9 Management Areas

Because the GSP is still under development, the GSAs have not defined management areas within the BVGB. SGMA allows for the basin to be delineated into management areas which:

> *"…may be defined by natural or jurisdictional boundaries, and may be based on differences in water use sector, water source type, geology, or aquifer characteristics. Management areas may have different minimum thresholds and measurable objectives than the basin at large and may be monitored to a different level. However, GSAs in the basin must provide descriptions of why those differences are appropriate for the management area, relative to the rest of the basin." (DWR 2017)*

It should be noted that minimum thresholds and measurable objectives can vary throughout the basin even without established management areas. In deciding whether to implement management areas, the GSAs will need to weigh the added degree of complexity management areas bring to the GSP. For the final GSP, this section will be rewritten to reflect the GSAs decisions related to management areas.

3.10 Additional GSP Elements, if Applicable

The plan elements from California Water Code Section 10727.4 require GSPs to address numerous components listed in **Table 3-5**. The table lists the agency or department with whom the GSA will coordinate or where it will be addressed in the GSP.

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603 **Table 3-5** Plan Elements from CWC Section 10727.4

Element of Section 10727.4	Approach
(a) Control of saline water intrusion	Not applicable
(b) Wellhead protection areas and recharge areas	To be coordinated with county environmental health departments
(c) Migration of contaminated groundwater	Coordinated with RWQCB
(d) A well abandonment and well destruction program	To be coordinated with county environmental health departments
(e) Replenishment of groundwater extractions	Chapter 9, Projects and Management Actions
(f) Activities implementing, opportunities for, and removing impediments to, conjunctive use or underground storage	Chapter 9, Projects and Management Actions
(g) Well construction policies	To be coordinated with county environmental health departments
(h) Measures addressing groundwater contamination cleanup, groundwater recharge, in-lieu use, diversions to storage, conservation, water recycling, conveyance, and extraction projects	Coordinated with RWQCB and in Chapter 9, Projects and Management Actions
(i) Efficient water management practices, as defined in Section 10902, for the delivery of water and water conservation methods to improve the efficiency of water use	To be coordinated with county farm advisors
(j) Efforts to develop relationships with state and federal regulatory agencies	Chapter 8, Plan Implementation
(k) Processes to review land use plans and efforts to coordinate with land use planning agencies to assess activities that potentially create risks to groundwater quality or quantity	To be coordinated with appropriate county departments.
(l) Impacts on groundwater dependent ecosystems	Chapter 5, Groundwater Conditions

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3.11 References

Department of Water Resources (DWR), 2002. Bulletin 118 Basin description for the Big Valley Groundwater Basin (5-004).

DWR, 2014. Land use survey for the Big Valley Groundwater Basin.

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DWR, 2018. Department of Water Resources Well Completion Report Map Application. Available at: https://www.arcgis.com/apps/webappviewer/index.html?id=181078580a214c0986e2da28f8623b37

DWR, 2020. California Department of Water Resources Water Management Planning Tool. Available at: https://gis.water.ca.gov/app/boundaries/.

Lassen County Local Agency Formation Commission (LAFCo), 2018. Lassen-Modoc Flood Control and Water Conservation District Municipal Service Review and Sphere of Influence Update, October 2018.

Big Valley Groundwater Sustainability Plan GSP Regulations Checklist (Elements Guide) for Chapter 4

This checklist of the GSP Elements and indicates where in the GSP each element of the regulations is addressed.

Article 5.			Plan Contents for Big Valley Groundwater Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
§ 354.14.			**Hydrogeologic Conceptual Model**					
(a)			Each Plan shall include a descriptive hydrogeologic conceptual model of the basin based on technical studies and qualified maps that characterizes the physical components and interaction of the surface water and groundwater systems in the basin.	X	4			
(b)			The hydrogeologic conceptual model shall be summarized in a written description that includes the following:					
	(1)		The regional geologic and structural setting of the basin including the immediate surrounding area, as necessary for geologic consistency.	X	4.2	4-2		
	(2)		Lateral basin boundaries, including major geologic features that significantly affect groundwater flow.	X	4.2.1	4-2		
	(3)		The definable bottom of the basin.	X	4.4.3			
	(4)		Principal aquifers and aquitards, including the following information:					
		(A)	Formation names, if defined.	X	4.4.1	4-3,4-4		
		(B)	Physical properties of aquifers and aquitards, including the vertical and lateral extent, hydraulic conductivity, and storativity, which may be based on existing technical studies or other best available information.	X	4.4.5		4-2	
		(C)	Structural properties of the basin that restrict groundwater flow within the principal aquifers, including information regarding stratigraphic changes, truncation of units, or other features.	X	4.4.4	4-8		
		(D)	General water quality of the principal aquifers, which may be based on information derived from existing technical studies or regulatory programs.	X	4.7	4-13		
		(E)	Identification of the primary use or uses of each aquifer, such as domestic, irrigation, or municipal water supply.	X	4.6			
	(5)		Identification of data gaps and uncertainty within the hydrogeologic conceptual model	X	4.11			
(c)			The hydrogeologic conceptual model shall be represented graphically by at least two scaled cross-sections that display the information required by this section and are sufficient to depict major stratigraphic and structural features in the basin.	X	4.4.2	4-6,4-7		
(d)			Physical characteristics of the basin shall be represented on one or more maps that depict the following:					
	(1)		Topographic information derived from the U.S. Geological Survey or another reliable source.	X	4.1	4-1		
	(2)		Surficial geology derived from a qualified map including the locations of cross-sections required by this Section.	X	4.3	4-2,4-3,4-4		
	(3)		Soil characteristics as described by the appropriate Natural Resources Conservation Service soil survey or other applicable studies.	X	4.5	4-9,4-10,4-11		
	(4)		Delineation of existing recharge areas that substantially contribute to the replenishment of the basin, potential recharge areas, and discharge areas, including significant active springs, seeps, and wetlands within or adjacent to the basin.	X	4.8	4-14		

"X" indicates that the element has been addressed.
The page number will be filled in once the entire GSP is compiled.

Shaded areas are elements of the regulations that don't have to be addressed in the GSP

Article 5.			Plan Contents for Big Valley Groundwater Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(5)		Surface water bodies that are significant to the management of the basin.	X	4.9	4-14		
	(6)		The source and point of delivery for imported water supplies.	N/A				No water is imported to the BVGB
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10727.2, 10733, and 10733.2, Water Code.					

"X" indicates that the element has been addressed.
The page number will be filled in once the entire GSP is compiled.

Shaded areas are elements of the regulations that don't have to be addressed in the GSP

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Abbreviations and Acronyms

Basin	Big Valley Groundwater Basin
BVGB	Big Valley Groundwater Basin
CDFW	California Department of Fish and Wildlife
CGS	California Geological Survey
DDW	Division of Drinking Water (SWRCB)
DWR	California Department of Water Resources
EOD	Environment of Deposition
GEI	GEI Consultants, Inc.
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
HCM	Hydrogeologic Conceptual Model
msl	elevation above mean sea level
NRCS	National Resources Conservation Service
SAGBI	Soil Agricultural Groundwater Banking Index
SGMA	Sustainable Groundwater Management Act of 2014
SSURGO	Soil Survey Geographic Database
SWRCB	California State Water Resources Control Board
UC	University of California
UCD	University of California at Davis
USBR	United States Bureau of Reclamation

4. Hydrogeologic Conceptual Model §354.14

A hydrogeologic conceptual model (HCM) is a description of the physical characteristics of a groundwater basin related to the hydrology, geology, and defines the principal aquifer(s). The HCM provides the context for the development of a water budget (Chapter 6), sustainable management criteria (Chapter 7), and monitoring a monitoring network (Chapter 8).

This chapter presents the HCM for the Big Valley Groundwater Basin (BVGB or Basin, 5-004) and was developed by GEI Consultants for the Lassen County and Modoc County groundwater sustainability agencies (GSAs). This HCM supports the development of the monitoring network, water budget, and the sustainable management criteria of this Groundwater Sustainability Plan (GSP). The content of this HCM is defined by the regulations of the Sustainable Groundwater Management Act (SGMA) – Chapter 1.5, Article 5, Subarticle 2: 354.14.

4.1 Basin Setting §354.14(d)(1)

BVGB is located in Lassen and Modoc Counties in northeastern California, 50 miles north-northwest of Susanville and 70 miles east-northeast of Redding (road distances are greater). Most of BVGB is in Lassen County (60%) with the remainder in Modoc County. BVGB is approximately 21 miles long (north-south) in the vicinity of the Pit River and 15 miles wide (east-west) south of Ash Creek Wildlife area. According to DWR (2004), the BVGB area is approximately 144 square miles or 92,000 acres. The topography of BVGB is relatively flat within the central area with increasing elevations along the perimeter, particularly in the eastern portions where Willow and Ash Creeks enter the Basin. Ground surface elevations range from about 4,090 feet above mean sea level (msl) near the south end of BVGB to over 4,500 feet msl. In the north central portion of the basin, two buttes protrude from the valley (Pilot and Roberts Buttes). The Pit River enters the BVGB at an elevation of 4,150 feet msl and leaves the Basin at 4,090 feet msl over the course of about 30 river miles, giving the Pit River a gradient of 2 feet per mile. By contrast, the Pit River above and below Big Valley has a gradient over 50 feet per mile. This low gradient in the Basin results in a meandering river morphology and frequent, widespread flooding. Ash Creek enters the Basin at Adin at an elevation of 4,100 feet msl, eventually joining the Pit River when flows are sufficient to make it past Big Swamp. **Figure 4-1** shows the ground topography for the BVGB.

Topographic maps (7.5-minute) for the BVGB area include (north-south, west-east):

Donica Mountain	Halls Canyon	-
Lookout	Big Swamp	Adin
Bieber	Hog Valley	Letterbox Hill

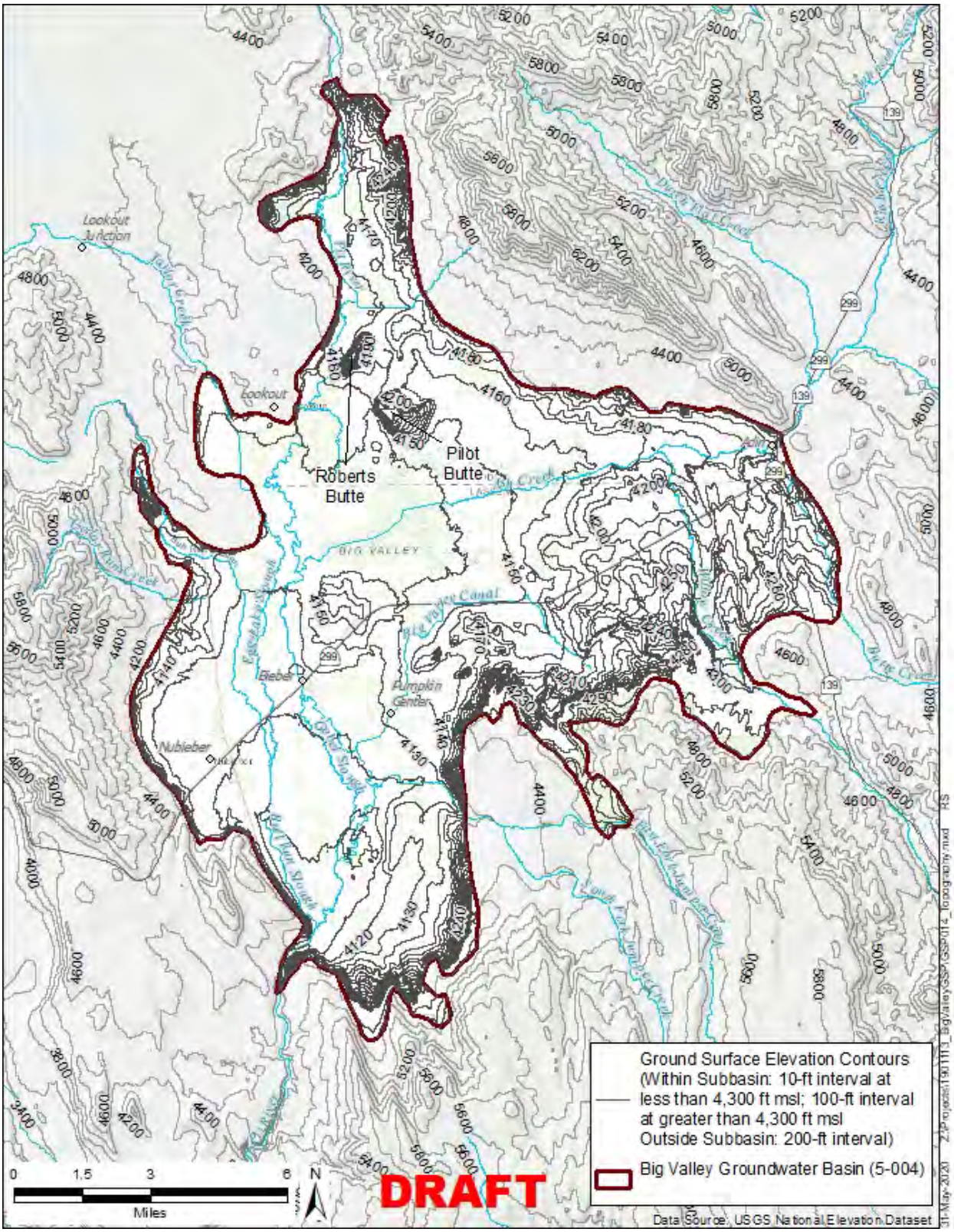

Figure 4-1 Topography

4.2 Regional Geology and Structure §354.14(b)(1)

The regional geology is depicted on the Alturas Sheet, a 1:250,000 scale map with an excerpt shown on **Figure 4-2**. (CGS 1958) The Big Valley Groundwater Basin is in the central area of the Modoc Plateau geomorphic province. According to the California Geological Survey (2002), the Modoc Plateau is "a volcanic table land" broken into blocks by north-south faults. The Basin is underlain by a thick sequence of lava flows and tuffs. The volcanic material is variable, but primarily basaltic of Miocene to Holocene age, which erupted into sediment-filled basins between the block-faulted mountain ranges (Norris and Webb, 1990).

According to MacDonald (1966), the Modoc Plateau is transitional between two provinces: block faulting of the Basin and Range and volcanism of the Cascade Range. This can be observed on **Figure 4-2** with the faults trending north/northwest surrounding Big Valley and the most recent center of volcanism (indicated by the numerous cinders centered around Medicine Lake) about 30 miles northwest of Big Valley. Moreover, the historic volcanism and tectonics occurred concurrently, which disrupted the drainage from the province and resulted in the formation of numerous lakes, including an ancestral lake in Big Valley. Volcanic material was deposited as lava flows, ignimbrites (hot ash), subaerial and water-laid layers of ash (cooler), and mudflows combined with sedimentary material, although thick sections of rock can be either entirely sedimentary or volcanic. The composition of the lava flows are primarily basalt and basaltic andesite, while ash deposits (pyroclastic) are rhyolitic.

4.2.1 *Lateral Basin Boundaries §354.14(b)(2)*

The CGS (1958) map was used by DWR to draw the BVGB boundary. The lateral boundaries of BVGB are described by DWR (2004) as "bounded to the north and south by Pleistocene and Pliocene basalt and Tertiary pyroclastic rocks of the Turner Creek Formation, to the west by Tertiary rocks of the Big Valley Mountain volcanic series, and to the east by the Turner Creek Formation." In general, the boundary drawn by DWR can be described as the contact between the valley alluvial deposits and the surrounding volcanic rocks. Because this boundary was drawn using a regional-scale map drawn with the surface expression of geologic units, it may be necessary to modify the boundary at a future date with more precision and including the extent of aquifer materials which may extend outside of the current boundary within the subsurface.

4.3 Local Geology §354.14(d)(2)

Several geologic maps were available at a more detailed scale than the CGS (1958) map. Two of them had accompanying studies that more thoroughly described the geology. Both studies provide useful information but differ slightly on some details, particularly the surficial geology.

- 1963 DWR Bulletin 98–Northeastern Counties Ground Water Investigation (**Figure 4-3**)
- 1975 GeothermEx Report–Geology of the Big Valley Geothermal Prospect, Lassen, Modoc, Shasta, and Siskiyou Counties (**Figure 4-4**)

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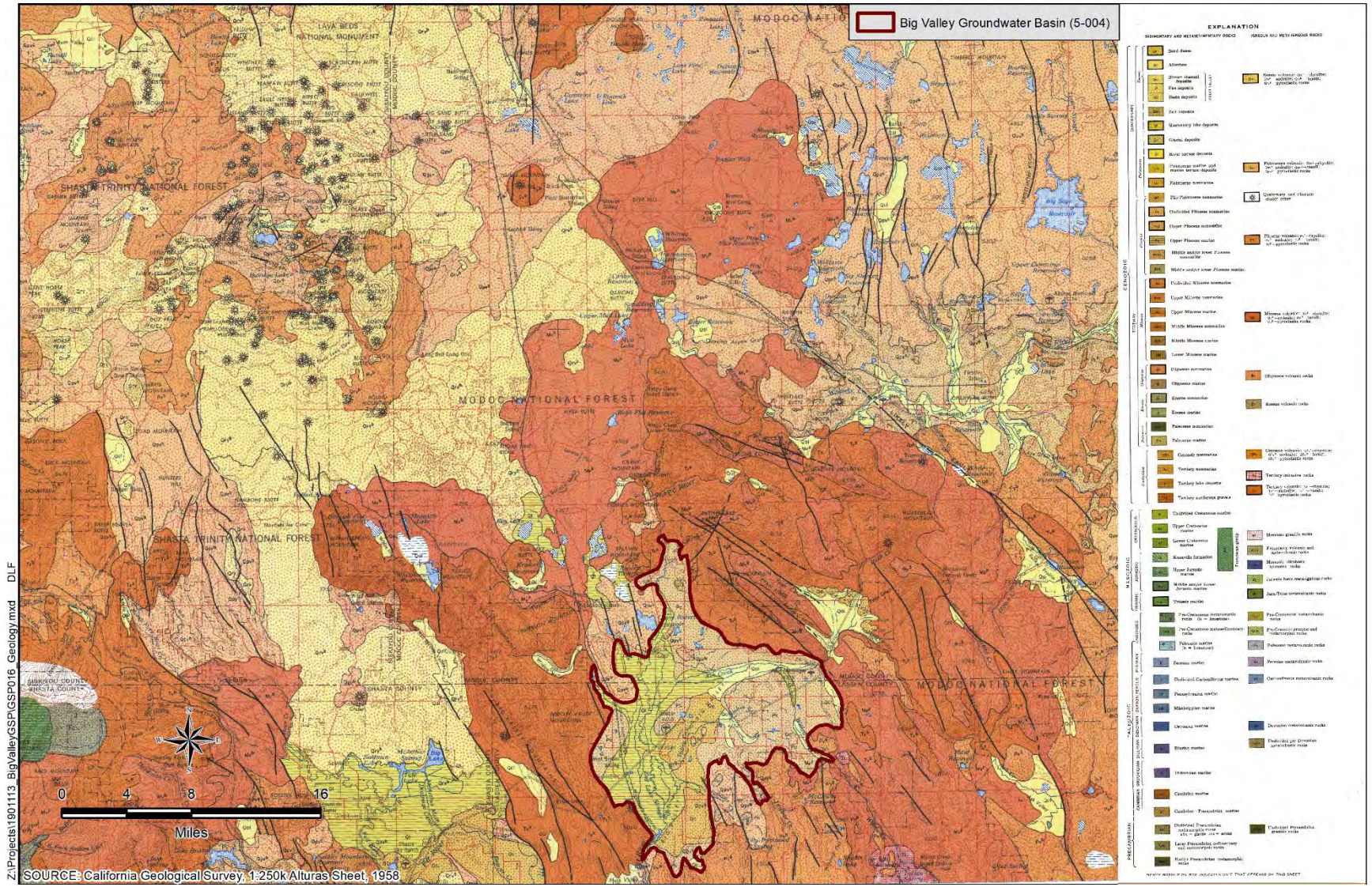

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75 **Figure 4-2** Regional Geologic Map

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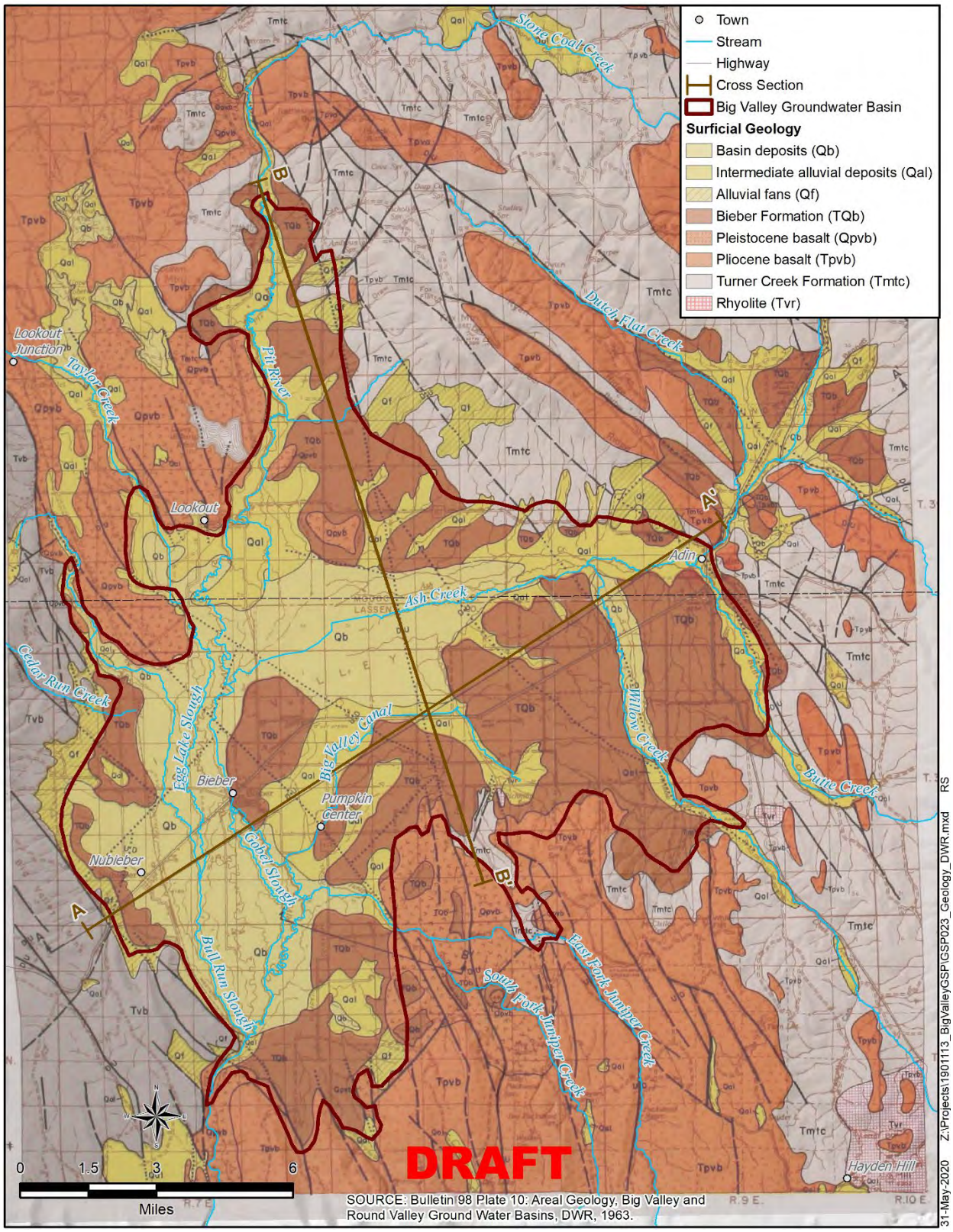

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78 **Figure 4-3** DWR 1963 Local Geologic Map

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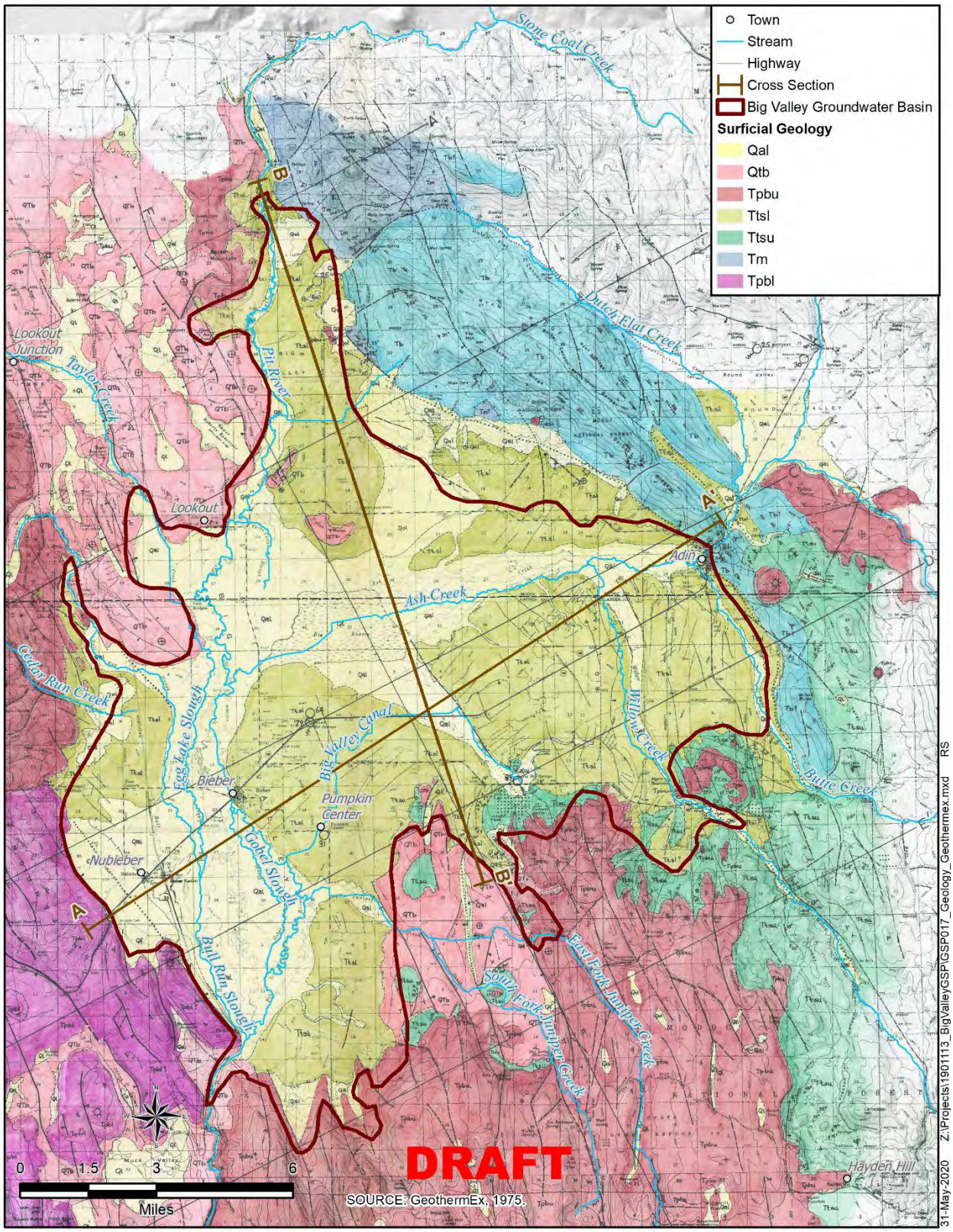

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81 **Figure 4-4** GeothermEx 1975 Local Geologic Map

The two different reports were written for different purposes, with DWR (1963) being developed as a general investigation of the potential of groundwater resources, and GeothermEx (1975) as an investigation specifically performed for hydrothermal groundwater resources. All reviewed sources agree that the BVGB is surrounded by mountain blocks of volcanic rocks of somewhat variable composition, but primarily basalt. Although these mountains are outside of the groundwater basin, they capture and accumulate precipitation, which produces runoff that flows into BVGB. Moreover, DWR (1963) suggested that these mountains serve as "upland recharge areas" and provide subsurface recharge to BVGB. These recharge areas suggested by DWR are shown in red shading on **Figure 4-5** and correlate with Pliocene to Pleistocene (5.3 million years to 11,700 years ago) basalts (Tpbv and Qpbv). These units are mapped by DWR (1963) outside the Basin to the northwest and southeast as well as along the crests of Barber and Ryan Ridges to the northeast of Big Valley.[1] GeothermEx (1975) generally concurs with this mapping, except for the areas along Barber and Ryan Ridges, which they map as a much older unit (Miocene) which is corroborated by a radiometric age date measured at 13.8 million years. This distinction is important because an older unit is more likely to underlie the basin sediments and less likely to be hydraulically connected to the BVGB. At the northwestern end of Barber Ridge, GeothermEx maps the oldest unit in the BVGB area (Tm) of Andesitic composition. This unit contains the site of the Shaw Pit quarry.

4.4 Principal Aquifer §354.14(b)(4)

4.4.1 *Formation Names §354.14(b)(4)(A)*

The Pliocene-Pleistocene age Bieber Formation (TQb) is the main formation of aquifer material defined within BVGB, extending to depths of 1,000 feet or more. It meets the surface around the perimeter of the basin, especially on the southeast side (DWR, 1963). The formation was deposited in a lacustrine (lake) environment and is comprised of unconsolidated to semi-consolidated layers of interbedded clay, silt, sand, gravel, and diatomite. Layers of black sand and white sand (pumiceous) were identified as highly permeable but discontinuous and mostly thin. GeothermEx (1975) did not embrace the DWR name and identified this formation as an assemblage of tuffaceous lacustrine and fluvial sediments (Ttsu, Ttsl). Both investigations identified the formation in the same overall location, based on a comparison of the two geologic maps, but the GeothermEx map provides more detail and resolution than the DWR map. For the purposes of the GSP, the name Bieber Formation will be used.

Recent deposits (Quaternary, Q) were mapped within the center of the basin and along drainage courses from the upland areas and are identified by DWR (1963) as alluvial fans (Qf), intermediate alluvium (Qal), and basin deposits (Qb). The composition of these unconsolidated deposits varies from irregular layers of gravel, sand, and silt with clay (Qf) to poorly sorted silt

[1] The GSAs specifically requested a basin boundary modification to include these upland recharge areas within the Basin boundary. The request was denied by DWR as not being sufficiently substantiated. (See **Appendix 1A**)

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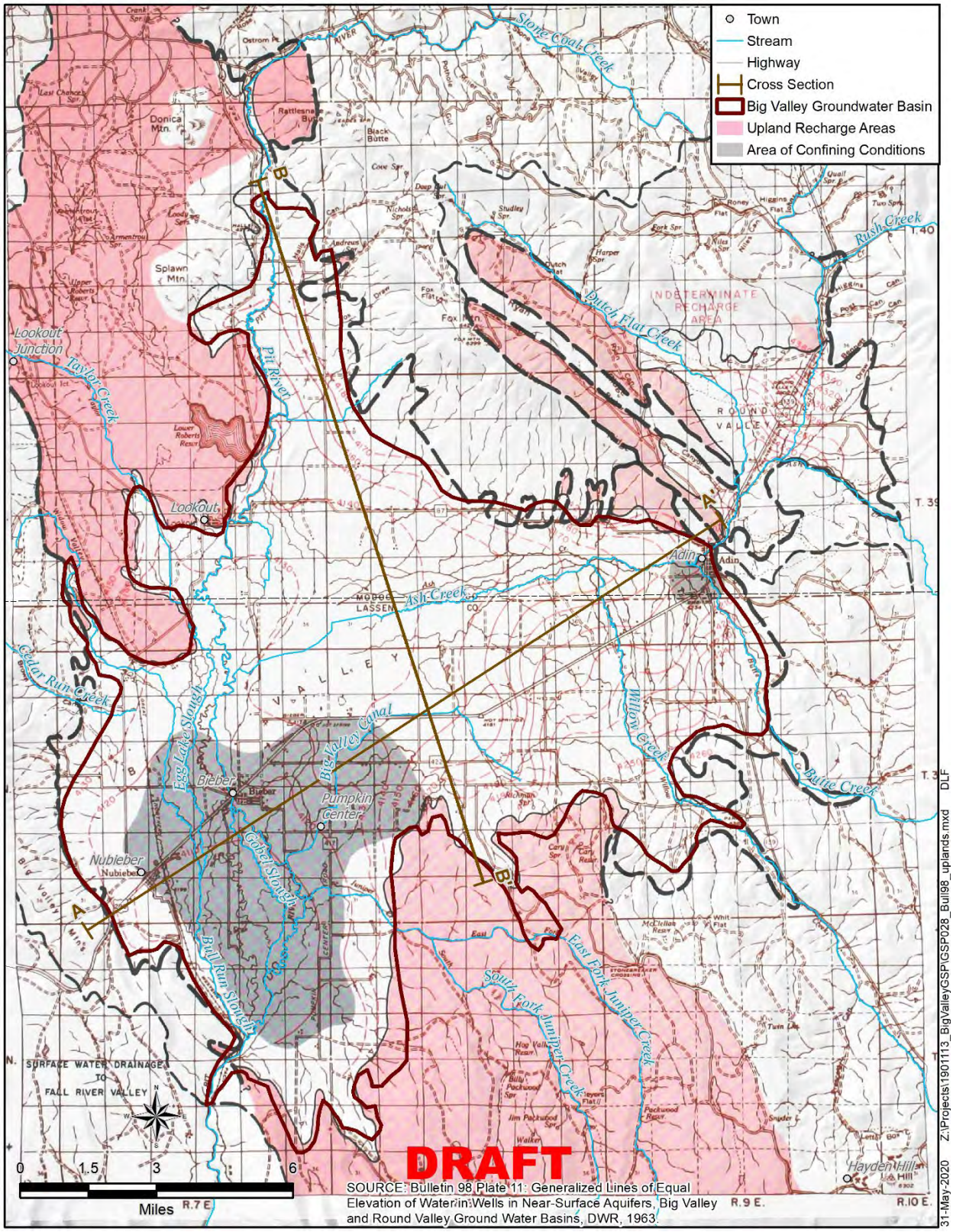

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119 **Figure 4-5** DWR 1963 Upland Recharge Areas and Areas of Confining Conditions

and sand with minor clay and gravel (Qal) to interbedded silt, clay, and "organic muck" (Qb). The latter two deposits occur in poorly drained, low-lying areas where alkali could accumulate. The thickness of these sediments is estimated to be less than 150 feet. GeothermEx (1975) identified these deposits as older valley fill (Qol), lake and swamp deposits (Ql), fan deposits (Qf) as well as undifferentiated alluvium (Qal). All of these recent deposits are aquifer material[2] and are part of the Big Valley principal aquifer.

The principal aquifer consists of the Bieber Formation (TOb) and recent deposits (Qal, Qg, Qb). While DWR (1963) delineates an "area of confining conditions" in the southwest area of the basin on **Figure 4-5**, the data to support the confinement and the definition of a broad-scale, well-defined aquitard[3] is not currently available. As such, a single principal aquifer can be used for this GSP. Future data collection and development of the groundwater resources could lead to the definition of multiple aquifers.

4.4.2 *Geologic Profiles §354.14(c)*

Figures 4-6 and **4-7** show cross-sections across Big Valley. The locations of the cross-sections are shown on **Figures 4-3, 4-4,** and **4-5**. The locations of these sections were drawn to be similar to DWR (1963) and GeothermEx (1975) and characterize the aquifers in two directions (southwest-northeast, and northwest-southeast). The sections show the lithology of numerous wells across the valley. Very little geological correlation could be made across each section which is likely to be related to the concurrent block faulting and volcanic and alluvial deposition which causes great variation over short distances. The pertinent information from cross-sections presented by DWR (1963) and GeothermEx (1975) are shown on the sections.

4.4.3 *Definable Bottom §354.14(b)(3)*

The SGMA and DWR's GSP regulations do not provide clear guidance for what constitutes a "definable bottom" of a basin. However, DWR's (2016) Bulletin 118 Interim Update describe the "physical bottom" as where the porous sediments contact the underlying bedrock and the "effective bottom" as the depth below which water is unusable because it is brackish or saline.

The "physical bottom" of BVGB is difficult to define because few borings have been drilled deeper than 1200 ft and the compositions of the alluvial and bedrock formations are similar (derived from active volcanism), with contacts that are gradational. Moreover, the base of the aquifer system is likely variable across BVGB due to the concurrent volcanism and horst/graben faulting of the bedrock.

[2] Meaning they contain porous material with recoverable water.
[3] Layer of low permeability that prevents significant flow, except at very slow rates.

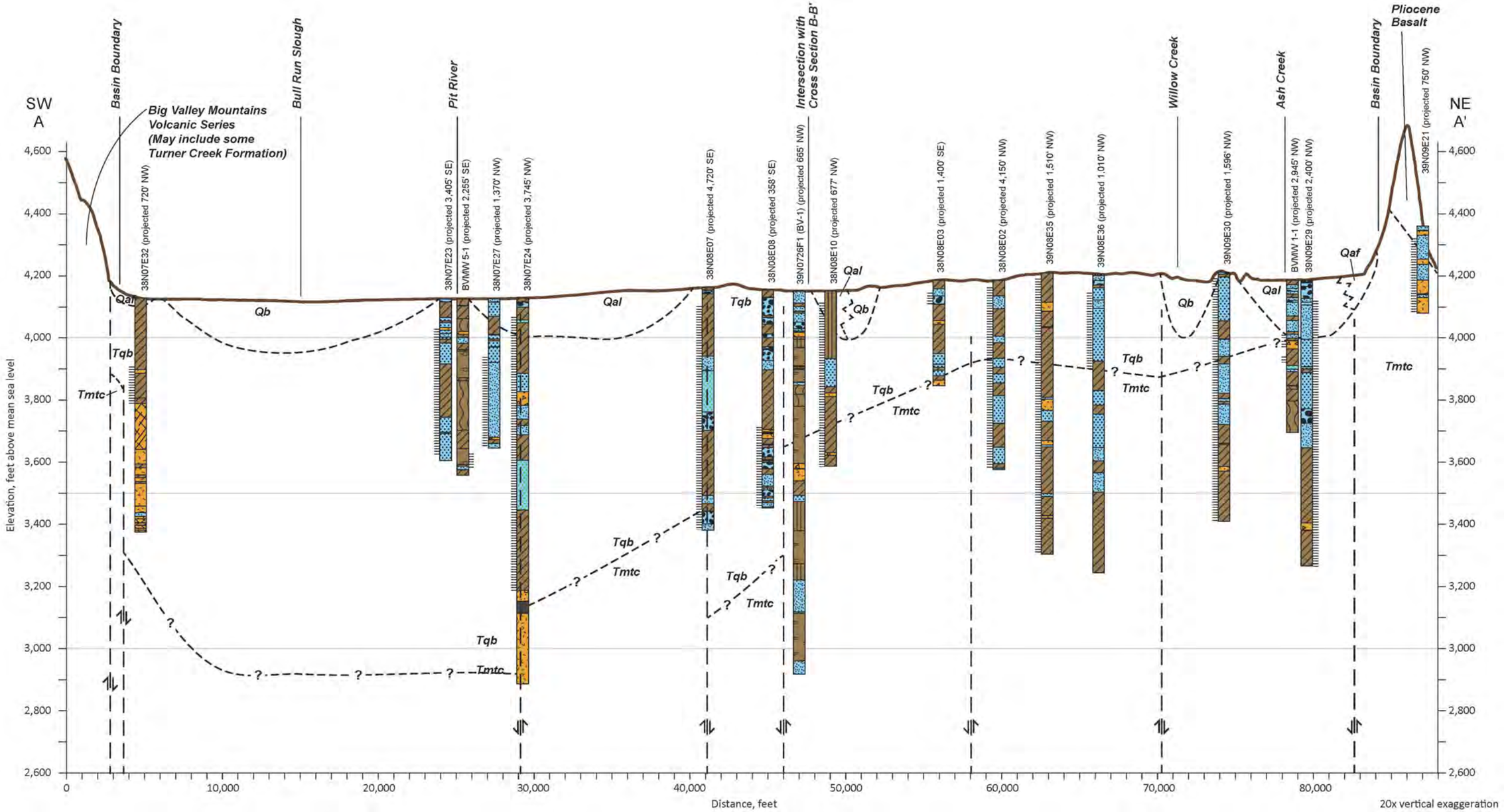

Figure 4-6 Geologic Cross Section A-A'

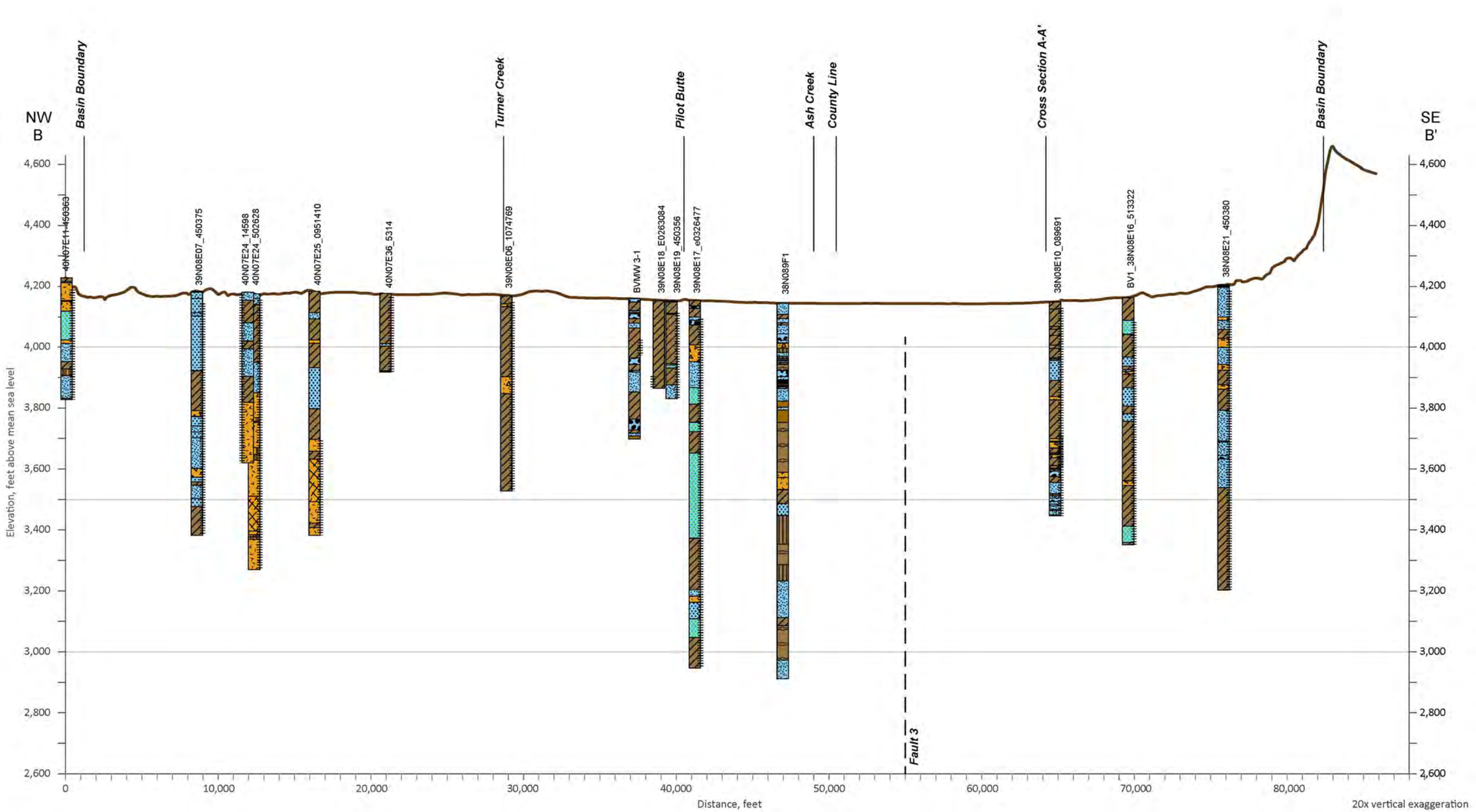

Figure 4-7 Geologic Cross Section B-B'

A previous report of Big Valley groundwater resources (DWR 1963), which included two deep test borings[4], indicates that the "practical bottom" of the BVGB might be 1,000 feet below ground surface (bgs). To define the "practical bottom" for the purposes of this GSP, an updated inventory of wells was performed. DWR's well log inventory shows that over 600 wells have been installed in the BVGB. Although DWR's well log inventory may not completely and precisely capture all the wells in the basin, it is the only readily available inventory and can be used to estimate a "practical bottom" of the aquifer. Wells in this inventory with known depths are summarized in **Table 4-1**. The table shows that the only wells drilled deeper than 1,200 feet are the two DWR test borings. Therefore, a 1,200 feet bgs definable bottom will be used as the delineation until additional data are available to consider extending the bottom deeper.

Table 4-1 Well Depths

Depth Interval (feet bgs)	Deepest Well per Section [a]		Count of All Wells
< 200	10%		41%
200 – 400	16%	43%	25%
400 – 600	27%		17%
600 – 800	28%	42%	12%
800 – 1000	14%		4%
1000 – 1200	4%		1%
> 1200 [b]	1%		< 1%

[a] A section is a 1 mile by 1 mile square. There are 134 sections in the BVGB

[b] Test borings: BV-1 and BV-2

4.4.4 *Structural Properties with Potential to Restrict Groundwater Flow §354.14(b)(4)(C)*

Faults can sometimes affect flow, but sufficient evidence has not been gathered and analyzed to determine whether any of the faults in Big Valley restrict flow. The mountains around BVGB are heavily faulted, with older basalt units more faulted than younger basalt units. Most of the faults trend to the north/northwest with some faulting oriented northeasterly. **Figure 4-8** is an excerpt of the regional fault map by the California Geological Survey (2010). Faults on the western side of BVGB are shown to be Quaternary in age (Wills, 1990) while faults on the eastern side are pre-Quaternary (older than 1.6 million years [my]). Note that numerous faults to the west of BVGB were identified as later Quaternary to Holocene-age faults (displacement during the last 700,000 or within the last 11,700 years, respectively)

[4] BV-1 was drilled to 1,231 feet 5 miles northeast of Bieber along Highway 299 and BV-2 was drilled to 1,843 feet 1.5 miles south of Lookout along Lookout Road (~4.8 miles north of Bieber).

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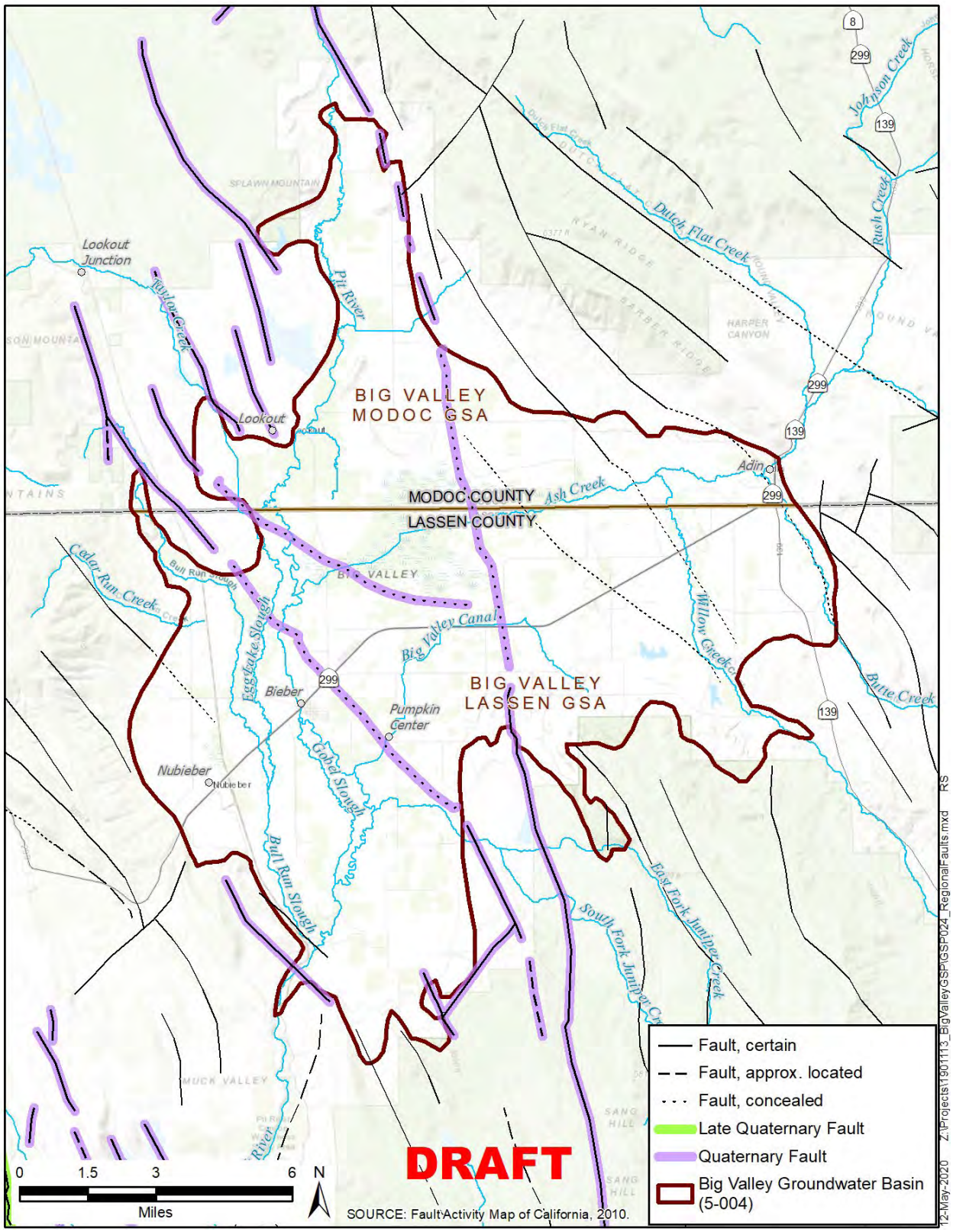

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182 **Figure 4-8** Local Faults
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Some of the faults extend across the Basin, concealed beneath the alluvial materials. Two hot springs are located in the valley near these faults. DWR (1963) acknowledged the potential restriction of groundwater flow by faults but did not provide specific information. However, such fault impacts cannot be determined with certainty at this time given the limited number of widely spaced wells with groundwater level data and the absence of a pumping test to verify restricting conditions.

4.4.5 *Physical Properties and Hydraulic Characteristics §354.14(b)(4)(B)*

The physical properties of a groundwater system are typically defined by the hydraulic conductivity[5], transmissivity[6], and storativity[7] of the aquifer. The preferred method of defining hydraulic characteristics is a pumping test with pumping rates and water levels monitored (either in the pumping well or a nearby monitoring well) throughout the test. Such pumping tests were performed after the construction of five sets of monitoring wells in late 2019 and early 2020.

The tests were performed by pumping each 2.5-inch diameter well for one hour at a rate of 8 gallons per minute (gpm) while measuring water level drawdown in the pumping well. A well efficiency[8] of 70% was assumed and the length of the well screen was used as a proxy for the aquifer thickness (b). **Table 4-2** shows the results of the Theis[9] solution that best matched the drawdown curve at each well. Storativity (S) ranged from highly confined ($3.0x10^{-6}$ at BVMW 3-1) to unconfined ($1.5x10^{-1}$ at BVMW 4-1). Hydraulic conductivity (K) ranged from 2 feet per day (ft/d) to 19 ft/d, although these K values likely range higher since pumping tests with larger pumps in larger wells for longer periods of time tend to give higher T and K. The results of these five pumping tests are documented further in **Appendix 4A**.

Table 4-2 Aquifer Test Results

Parameter	Units	BVMW 1-1	BVMW 2-1	BVMW 3-1	BVMW 4-1	BVMW 5-1
Thickness (b)	ft	50	40	50	30	50
Flow (Q)	gpm	8	8	8	8	8
Drawdown after 1 hr	ft	4.3	16.0	27.5	2.0	3.0
Transmissivity (T)	gpd/ft	3000	750	700	4200	4500
Storativity (S)	unitless	1.5E-03	1.0E-03	3.0E-06	1.0E-01	2.0E-03
Hydraulic Conductivity (K)	ft/d	8	3	2	19	12

[5] Hydraulic conductivity (K) is defined as the volume of water that will move in a unit of time under a unit hydraulic gradient through a unit area. It is a measure of how easily water moves through a material and is usually given in gallons per day per square foot (gpd/ft^2) or feet per day (ft/day).
[6] Transmissivity (T) is the product of K and aquifer thickness (b) and is a measure of how easily water moves through a thickness of aquifer. It is usually expressed in units of gallons per day per foot of aquifer (gpd/ft) or square feet per day (ft^2/day).
[7] Storativity (S, also called storage coefficient) is defined as the volume of water that an aquifer releases from or takes into storage per unit surface area per unit change in groundwater elevation. High values of S are indicative of unconfined aquifers, while low values indicate confined (pressurized) aquifers. S does not have units.
[8] Pumping tests with water levels measured in the pumping well will experience more drawdown than elsewhere in the aquifer. The predicted drawdown divided by the actual drawdown is well efficiency.
[9] Theis is a mathematical solution for predicting drawdown in a well and is commonly used to estimate K, T, and S.

The specific yield (SY) is another important aquifer characteristic, as it defines the fraction of the aquifer that contains recoverable water, and therefore governs the volume of groundwater stored in the Basin. USBR (1979) discussed the SY in Big Valley and postulated that it varies with depth, at 7% for the first 100 feet below ground surface (bgs), 6% for the 100 to 200 feet bgs, and 5% from 200 to 1000 feet bgs. However, they don't give any supporting evidence for these percentages. SY in the Sacramento Valley has been estimated to vary between 5 to 10% (DWR 1978). Since Big Valley aquifer materials were primarily deposited in a lacustrine environment (as opposed to Sacramento Valley which has a higher percentage of riverine deposits), Big Valley's SY is likely on the lower end at 5%. This conservative percentage will be used for all depth intervals in this GSP.

4.5 Soils §354.14(d)(3)

Information on soils within the BVGB were obtained from the Soil Survey Geographic Database (SSURGO) of the Natural Resources Conservation Service (NRCS). The SSURGO data included two categories of information relevant to the GSP: taxonomic soil orders and hydrologic soil groups. Taxonomic data include general characteristics of a soil and the processes of formation while hydrologic data relate to the soil's ability to transmit water under saturated conditions and is an important consideration for hydrology and groundwater recharge. The following section describes the soils of BVGB.

4.5.1 *Taxonomic Soil Orders*

Of the 12 established taxonomic soil orders, three were found within the BVGB, as listed below, and their distributions are presented in **Figure 4-9**. Descriptions below were taken from the *Illustrated Guide to Soil Taxonomy* (NRCS, 2015):

- Alfisol – Naturally fertile soils with high base saturation and a clay-enriched subsoil horizon. Alfisols develop from a wide range of parent materials and occur under broad environmental conditions, ranging from tropical to boreal. The movement of clay and other weathering products from the upper layers of the soil and their subsequent accumulation in the subsoil are important processes. The soil-forming processes are in relative balance. As a result, nutrient bases (such as calcium, magnesium, and potassium) are supplied to the soil through weathering and the leaching process is not sufficiently intense to remove them from the soil before plants can use and recycle them.

- Mollisol – Very dark-colored, naturally very fertile soils of grasslands. Mollisols develop from predominantly grasslands in temperate regions at midlatitudes and result from deep inputs of organic matter and nutrients from decaying roots, especially the short, mid, and tall grasses common to prairie and steppe areas. Mollisols have high contents of base nutrients throughout their profile due to mostly non-acid parent materials in environments (subhumid to semiarid) where the soil was not subject to intense leaching of nutrients.

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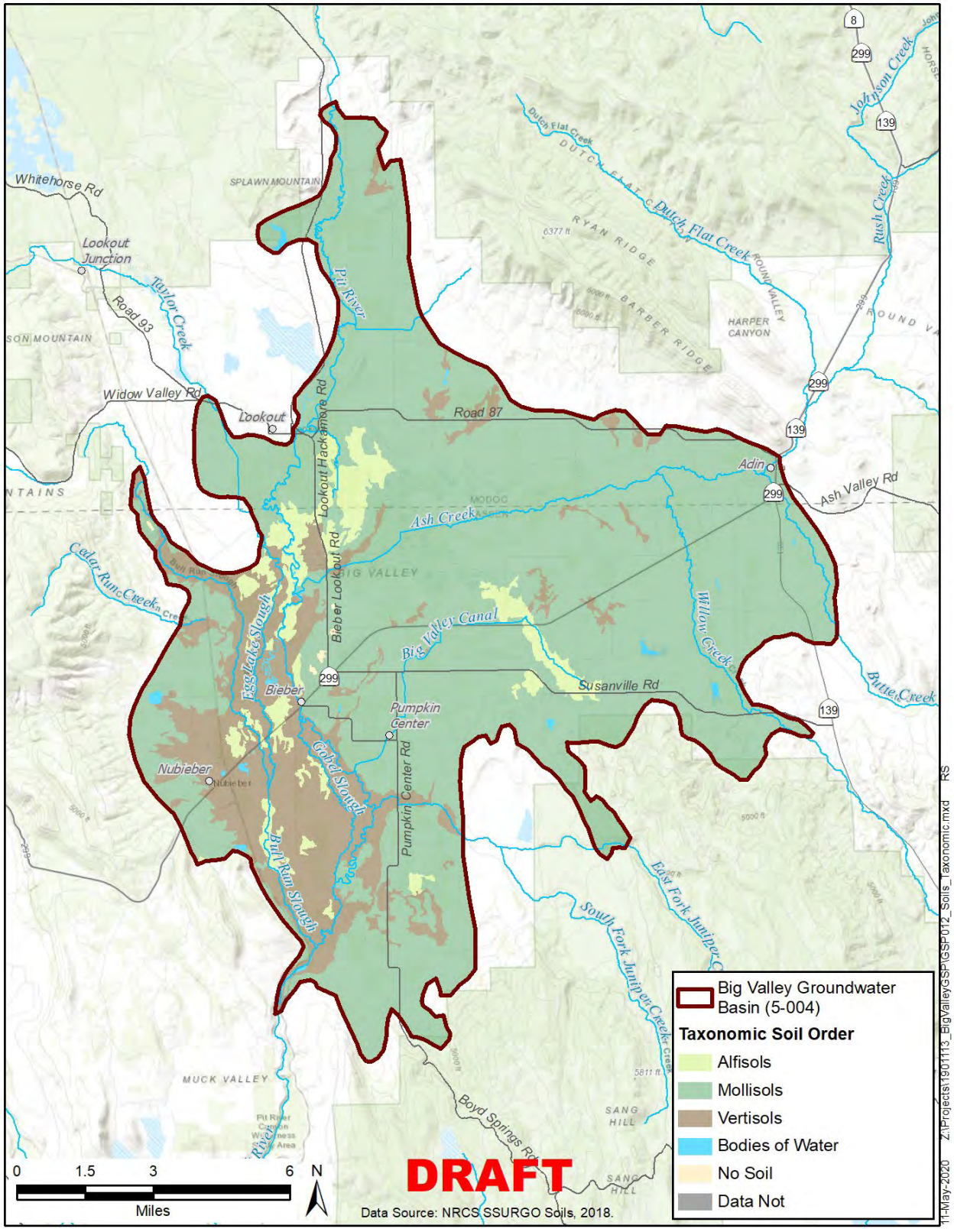

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245 **Figure 4-9** Taxonomic Soils Classifications

- Vertisol – Very clayey soils that shrink and crack when dry and expand when wet. They are dominated by clay minerals (smectites) and tend to be very sticky and plastic when wet and very firm and hard when dry. Vertisols are commonly very dark in color and distinct soil horizons are often difficult to discern due to the deep mixing (churning) that results from the shrink-swell cycles. Vertisols form over a variety of parent materials, most of which are neutral or calcareous, over a wide range of climatic environments, but all Vertisols require seasonal drying.

Mollisols are the most prominent soil order within the BVGB occupying nearly 78% of the total area. Vertisols occupy over 16% and are found mostly on the southwestern side of BVGB within the floodplain of the Pit River. Small patches of Vertisols are scattered in the remainder of the basin. Alfisols occupy over 5% of the basin and are found mostly on the west side of the basin and along Hot Spring Slough in the south-central portion of the basin.

4.5.2 *Hydrologic Soil Groups*

The NRCS Hydrologic Soils Group (HSG) classifications provide an indication of soil infiltration potential and ability to transmit water under saturated conditions, based on hydraulic conductivities of shallow, surficial soils. **Figure 4-10** shows the distribution of the hydrologic soil groups, where higher conductivities (greater infiltration) are labeled as Group A and lowest conductivities (lower infiltration) as Group D. As defined by the NRCS (2012), the four HSGs are:

- Hydrologic Group A – "Soils in this group have low runoff potential when thoroughly wet. Water is transmitted freely through the soil. Group A soils typically have less than 10 percent clay and more than 90 percent sand or gravel and have gravel or sand textures." Group A soils have the highest conductivity values (greater than 5.67 inches per hour [in/hr]) and therefore a high infiltration rate[10], and the greatest recharge potential.
- Hydrologic Group B – "Soils in this group have moderately low runoff potential when thoroughly wet. Water transmission is unimpeded. Group B soils typically have between 10 percent and 20 percent clay and 50 percent to 90 percent sand and have loamy sand or sandy loam textures. Group B soils have a wide range of conductivity values (1.42 in/hr to 5.67 in/hr), a moderate infiltration rate[2], and a moderate potential for recharge.
- Hydrologic Group C – "Soils in this group have moderately high runoff potential when thoroughly wet. Water transmission through the soil is somewhat restricted. Group C soils typically have between 20 percent and 40 percent clay and less than 50 percent sand and have loam, silt loam, sandy clay loam, clay loam, and silty clay loam textures." Group C soils have a relatively low range of conductivity values (0.14 to 1.42 in/hr), a slow infiltration rate[2], and limited potential for groundwater recharge due to their fine textures.

[10] Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey

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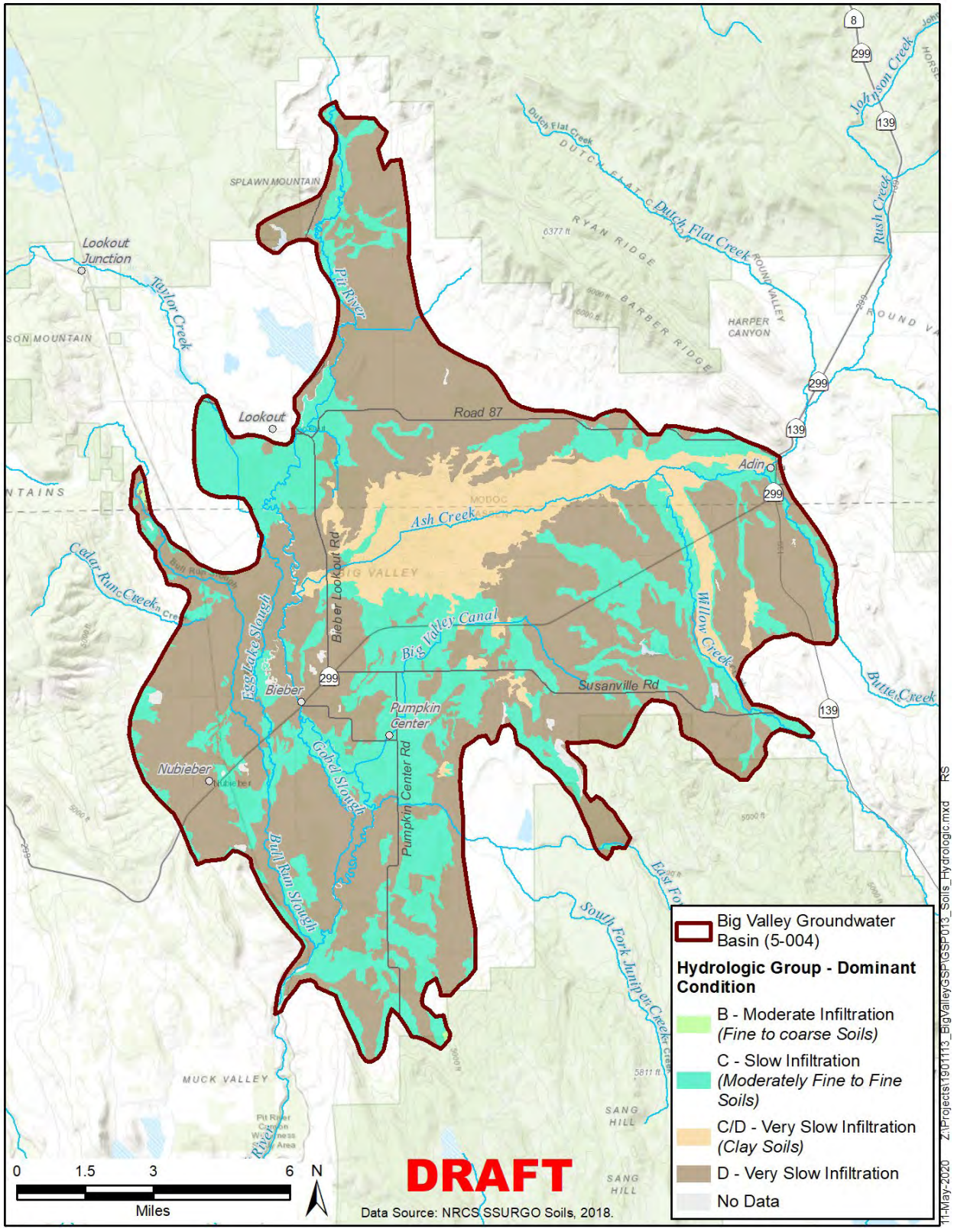

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285 **Figure 4-10** Hydrologic Soils Group Classifications

- Hydrologic Group D – "Soils in this group have high runoff potential when thoroughly wet. Water movement through the soil is restricted or very restricted. Group D soils typically have greater than 40 percent clay, less than 50 percent sand, and have clayey textures. In some areas, they also have high shrink-swell potential." Group D soils have conductivity values less than 0.14 in/hr, a very slow infiltration rate2, and a very limited capacity to contribute to groundwater recharge.

A dual hydrologic group (C/D) is assigned to an area to characterize runoff potential under drained and undrained conditions, where the first letter represents drained conditions and the second letter applies to undrained conditions. For the purposes of this GSP, these dual soils are considered to have a very slow infiltration rate.

According to this HSG dataset, no areas BVGB show high infiltration rates (Group A), and only a tiny area (<0.1%) of Group B soil (moderate infiltration) is located on the western edge of the basin at the top of Bull Run Slough near Kramer Reservoir. The remainder of the Basin is shown with hydrologic soils Groups C and D, slow to very slow infiltration rates (Group C at 30% and Group D at 58% of Basin area). Most of the Ash Creek Wildlife Area is underlain by the dual hydrologic group C/D (11% of Basin area).

It should be noted that the NRCS develops these maps using a variety of information including remote sensing and some limited field data collection and does not always capture variations that may occur on a small scale. Historical experience from landowners and additional field data could identify areas of better infiltration. Additionally, Group C and D soils may have slow infiltration rates due to shallow hardpan, and groundwater recharge could potentially be enhanced if this hardpan can be disrupted.

4.5.3 *Soil Agricultural Groundwater Banking Index*

The University of California at Davis (UCD) has established the Soil Agricultural Groundwater Banking Index (SAGBI) using data within the SSURGO database, which gives a rating of suitability of the soils for groundwater recharge. This index expands on the HSG to include topography, chemical limitations, and soil surface condition. This effort has resulted in a mapping tool that illustrates six SAGBI classes (excellent to very poor) and has been completed for much of the state. This mapping tool is only available for the Modoc County portion of BVGB as shown on **Figure 4-11**, and the indices vary mostly between moderately poor to very poor. Small areas of moderately good are present along the Pit River as it enters BVGB and to the west of Adin. It should be noted that the SAGBI is a large-scale, planning level tool and does not preclude local site conditions that are good for groundwater recharge.

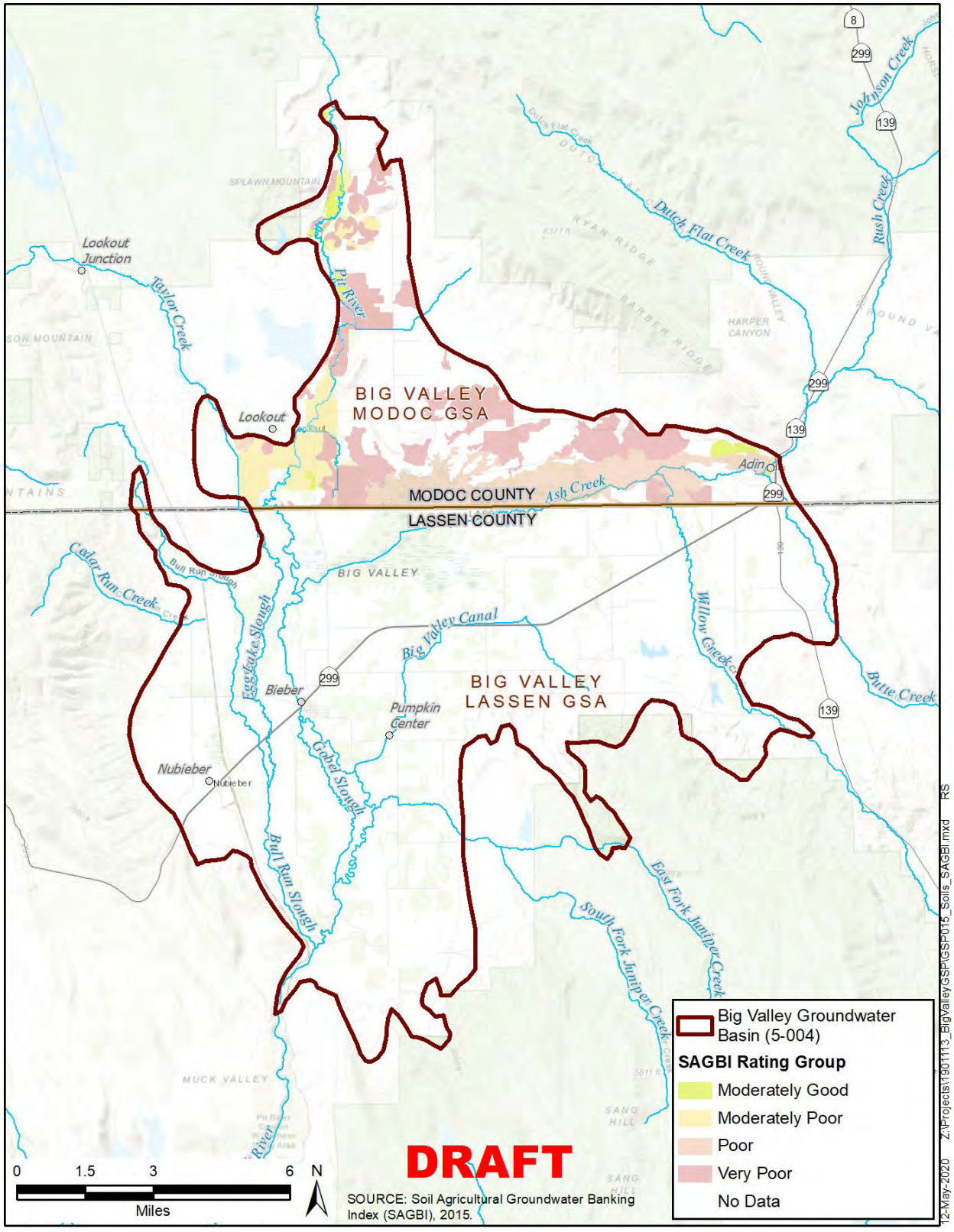

Figure 4-11 SAGBI Classifications

4.6 Beneficial Uses of Principal Aquifers §354.14(b)(4)(E)

Beneficial uses of groundwater include agricultural, environmental, municipal, and domestic uses. A description of each is provided below.

Agricultural

Agricultural users get their supply from surface water diversions, groundwater, or a combination of the two. **Figure 3-4** from the previous chapter illustrates where in the Basin DWR has determined that each source is being used. The primary crops are grain and hay crops (primarily alfalfa) with some rice west of the Pit River as shown in **Figure 3-3**.

Industrial

There is little to no industrial groundwater use in the BVGB. According to DWR well logs, five industrial wells have been drilled, all of them near Bieber at Big Valley Lumber, which is not currently in operation.

Environmental

Environmental uses for wetland and riparian habitat occur primarily within the Ash Creek Wildlife Area (ACWA) in the center of the Basin, near the overflow channels adjacent to the Pit River in the southern portion of the Basin, and along the riparian corridors of some of the minor streams that flow into Big Valley. **Figure 4-12** shows the wetlands delineated in the Natural Communities Commonly Associated with Groundwater (NCCAG) dataset. (DWR 2018) This dataset is a compilation of 48 publicly available State and Federal agency data sources, which have been screened to include the data most likely to be associated with groundwater. This dataset is a starting point in identifying groundwater dependent ecosystems (GDEs). Groundwater dependent ecosystems will be discussed further in Chapter 5.

Municipal

The SWRCB recognizes two public water systems that use groundwater under the purview of the Division of Drinking Water (DDW): Lassen County Waterworks District #1 (LCWWD#1) which serves Bieber's 312 residents and the Forest Service Station in Adin which does not serve a resident population.

Domestic

Domestic users include residents that use their own well for household purposes. The BVGB has a population of about 1,046. With the 312 Bieber residents receiving water from municipal supply, the majority of the remaining 734 residents are domestic users.

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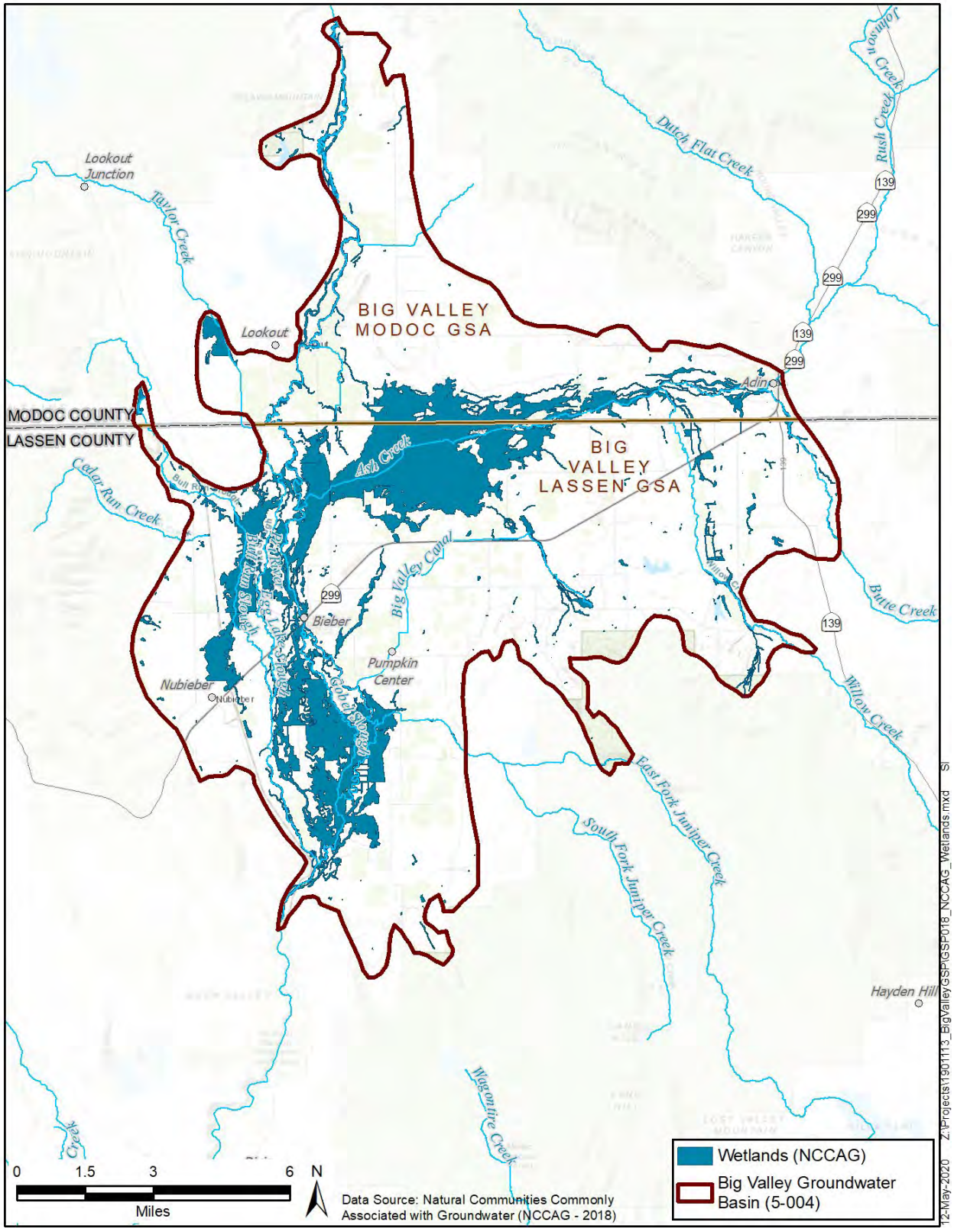


355
356 **Figure 4-12** NCCAG Wetlands

4.7 General Water Quality §354.14(b)(4)(D)

Previous reports have characterized the water quality as excellent. (DWR 1963, USBR 1979) The central area of the basin, where naturally occurring hot springs influence the chemistry, has elevated levels of sulfate, fluoride, boron, and arsenic. (USBR 1979) This poorer quality water occurs in localized areas near the major faults that traverse the valley.

Figure 4-13 shows a Piper Diagram for water samples that were collected in late 2019 and early 2020 and characterizes the relative concentrations of the major cations (Ca, Mg, Na, K) and anions (SO_4, Cl, HCO_3). The dominant cations range from sodium rich to mixed with higher

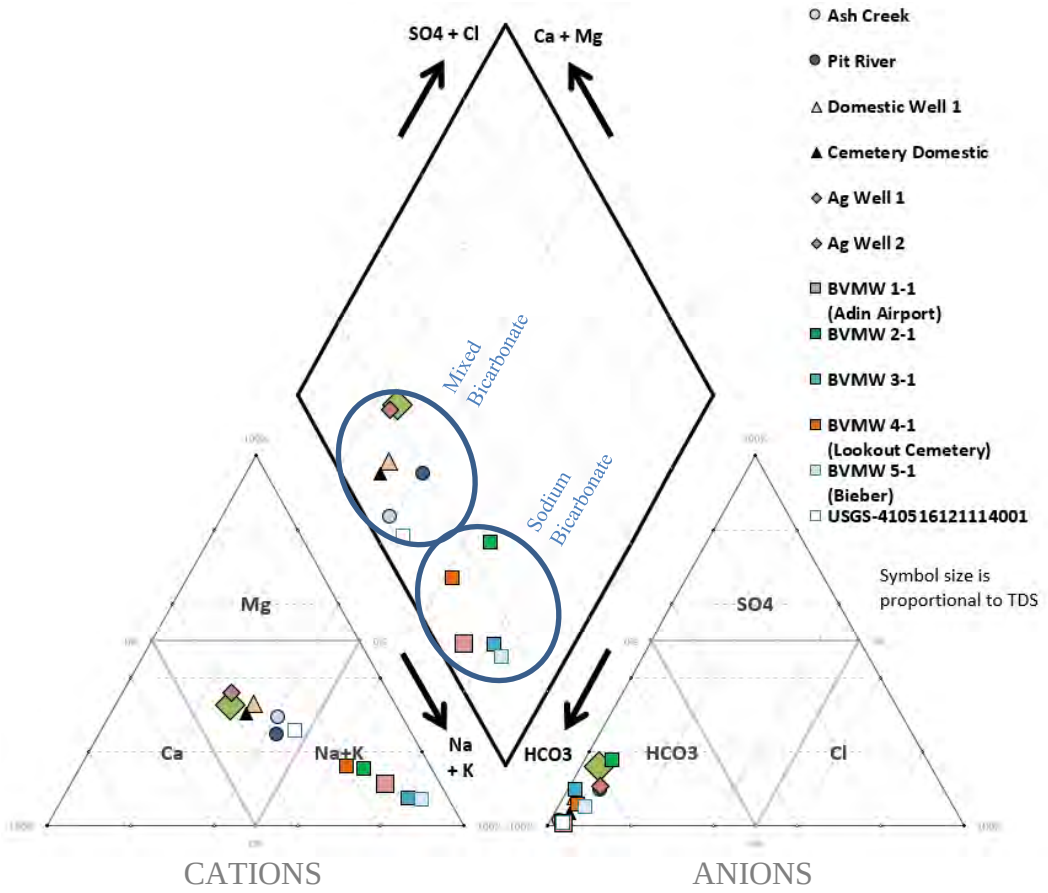


Figure 4-13 Piper Diagram showing major cations and anions

amounts of calcium and magnesium which increases the water hardness. The major anion is strongly bicarbonate which indicates that the water is generally young in geologic terms.

Some areas in the Basin have elevated levels of iron, manganese, and/or arsenic, all of which are naturally occurring in volcanic terrains such as Big Valley. The nature and distribution of these constituents will be discussed further in Chapter 5.

4.8 Groundwater Recharge and Discharge Areas §354.14(d)(4)

4.8.1 *Recharge*

Groundwater recharge in BVGB likely occurs via several mechanisms discussed below.

Underflow from adjacent upland areas and other areas outside the basin

The upland areas consist of fractured basalt flows where the precipitation infiltrates vertically through joints and fractures until it hits underlying aquifer material and then travels horizontally into the Basin. DWR has postulated that the areas shown in pink on **Figure 4-14** provide recharge in such a way. However, other areas adjacent to the Basin could provide some recharge in a similar fashion. In addition, underflow could enter the Basin where the Pit River and Ash Creek enter the Basin.

Infiltration of precipitation on the valley floor

Some direct infiltration of rain and snow on the valley floor likely occurs. However, because the aquifer materials in the basin are largely lacustrine and much of the soils have slow infiltration rates, most of the precipitation likely runs off or is consumed through evapotranspiration. **Figure 4-14** shows the areas from the NRCS datasets that may have a slightly higher infiltration rate (HSG B and HSG C) than the other areas and therefore potentially more recharge.

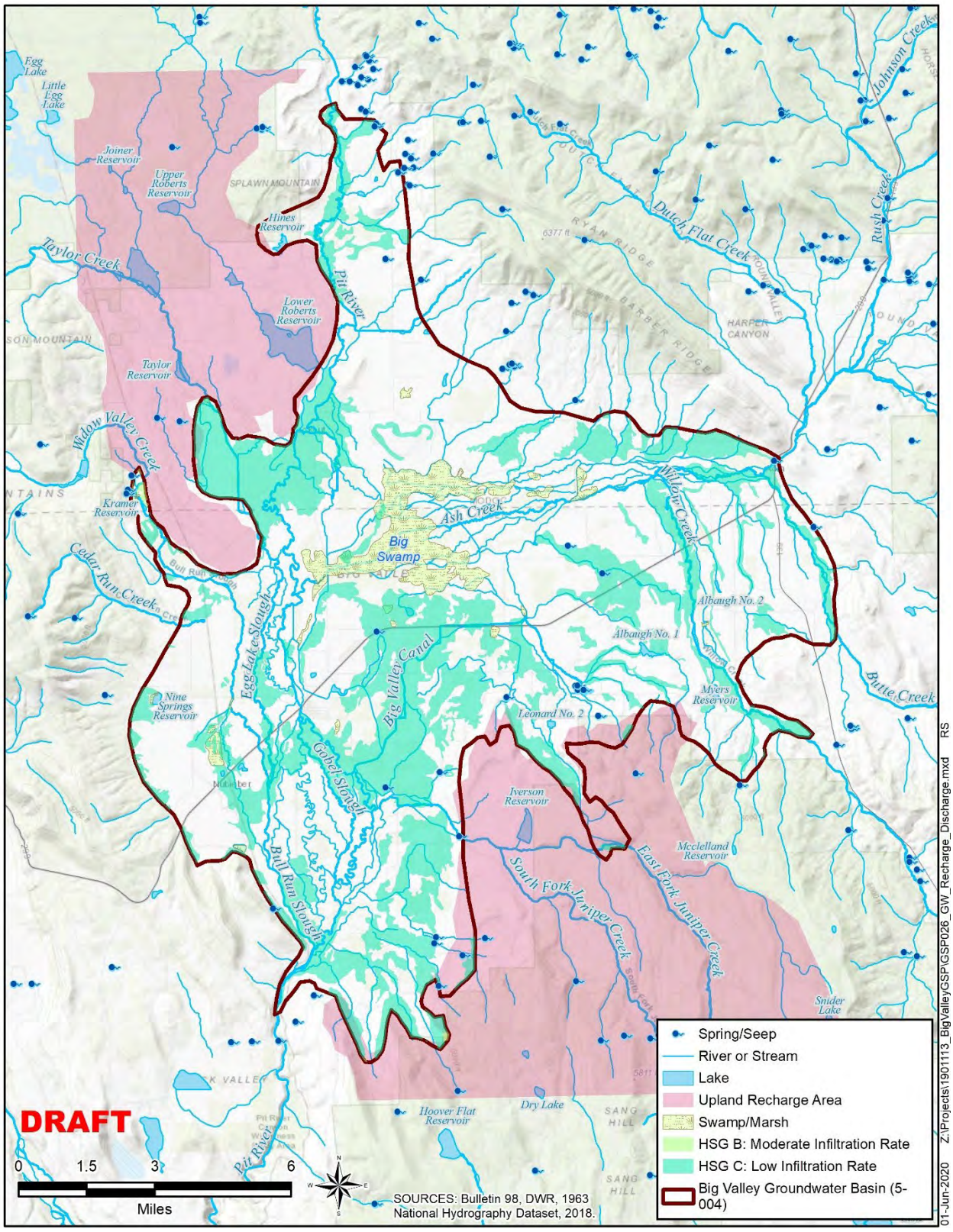
Rivers and streams that flow through the Basin

Streams that flow through the basin lose water to the aquifer, particularly where they enter the Basin. Aquifer materials are typically coarser on the fringes of the Basin where the stream gradient begins to flatten. In general recharge likely occurs in the eastern portions of the Basin along Ash Creek, Butte Creek, and Willow Creek and then flows westerly through the subsurface. As Ash Creek flows to the center of the Basin and Big Swamp, the water slows and spreads out into a large marsh. The California Department of Fish and Wildlife (CDFW), who owns and manages that land has recently enhanced this slowing and spreading of water through "pond and plug" projects which bring the water up out of the previously incised channel. Even though the soils and aquifer materials in this portion of the Basin have slow infiltration rates, recharge still is likely to occur from Big Swamp because of the long period of time that the shallow soils remain wet and saturated.

Deep percolation of irrigation water

Depending on the irrigation method, particularly flood irrigation, deep percolation of irrigation water into the aquifer likely occurs. Flood irrigation tends to be practiced adjacent to the southern portions of the Pit River. But irrigation throughout the Basin may provide recharge, depending on the amount of water applied.

408



409
410 **Figure 4-14** Recharge, Discharge, and Major Surface Water Bodies

4.8.2 *Discharge*

Flow out of the groundwater aquifer (and out of the Basin) most likely occurs at the southern portion of the Basin where groundwater flow is towards the Pit River. The gaining river[11] then transports the water out of the Basin. DWR (1963) indicates that artesian[12] conditions occurred in this southwestern area and therefore historically discharged some small portion to the surface. Based on currently documented water levels, this area is no longer artesian. There are numerous springs throughout the basin shown on **Figure 4-14** where groundwater is discharged, including several hot springs in the center of the Basin. Evapotranspiration may also be a significant discharge mechanism.

4.9 Surface Water Bodies §354.14(d)(5)

Figure 4-14 shows the numerous small streams that enter the Basin and flow towards the center where they connect with the two major streams: the Pit River and Ash Creek. The figure also shows the many small ponds and several reservoirs that are just outside the Basin.

4.10 Imported Water Supplies §354.14(d)(6)

BVGB users do not import surface water into the basin.

4.11 Data Gaps in the Hydrogeologic Conceptual Model §354.14(b)(5)

Hydrogeology has inherent uncertainties due to sparse data, and in the case of Big Valley, a limited number of detailed studies on the groundwater resources in the Basin. Identified below are some of the uncertainties associated with the hydrogeology in the Basin. In some instances, this uncertainty can be reduced while other uncertainties will remain. The filling of the data gaps below is contingent on the needs that arise as the GSP is developed and the level of available funding.

Basin Boundary

The Basin boundary was drawn with a regional scale map (CGS 1958) and was not drawn with as much precision as subsequent geologic maps. Additionally, the “uplands” areas outside the Basin boundary are postulated to be recharge areas interconnected to the basin, which is contrary to DWR’s definition of a lateral basin boundary as being “features that significantly impede groundwater flow”. (DWR 2016) Further refinement of the Basin boundaries may be desired and necessary.

[11] Gaining rivers are where groundwater flows toward the river and contributes to surface water flow.
[12] Artesian aquifers are under pressure and wells screened in them flow from the surface.

Confining conditions

Confining conditions exist throughout the Basin. Often the confinement is simply a result of depth and the fact that horizontal hydraulic conductivities are about 10 times greater than vertical. However, in the southwest portion of the Basin, DWR (1963) has documented an area of confining conditions. It is unknown whether the confinement is due to a single, coherent aquitard or is just a result of depth. It is also unknown whether the confinement is significant enough to warrant separate principal aquifers, which could have implications for the GSP.

Definable bottom

This HCM has used the "practical" depth of 1,200 feet as the definable bottom. If stakeholders seek to develop groundwater deeper than this depth, newly constructed wells will demonstrate that the "physical bottom" and/or the base of fresh water ("effective bottom") extend deeper.

Faults as barriers to flow

It is unknown if the faults which traverse the Basin are barriers to flow. On the Lassen County side of the Basin, this has bearing on understanding whether the eastern portions of the basin near Willow Creek are interconnected with the southwestern portions of the Basin near Pumpkin Center. This uncertainty could be reduced by conducting a pumping test with observation well(s) on the other side of the fault.

Soil permeability

The NRCS mapping of soils indicates primarily low to very low permeability soils throughout the Basin. However, there is some variation of permeabilities indicated by the maps, which are drawn at a large scale with limited field verification. Further field investigation of soils and permeability tests could help identify more permeable areas where groundwater recharge could be enhanced.

Recharge

The recharge sources below have been identified, but the rate and amount of recharge is unknown. In development of the water budget, estimates of the amount of recharge will be estimated using changes in water levels over a hydrologic base period.

- Effect of Ash Creek on recharge (incl. Big Swamp)
- Effect of Pit River on recharge (incl. overflow channels)
- Effect of smaller streams on recharge (incl.Willow Creek)
- Amount of recharge from direct precipitation
- Amount of recharge from deep percolation of applied water
- Amount of recharge from upland recharge areas

4.12 References

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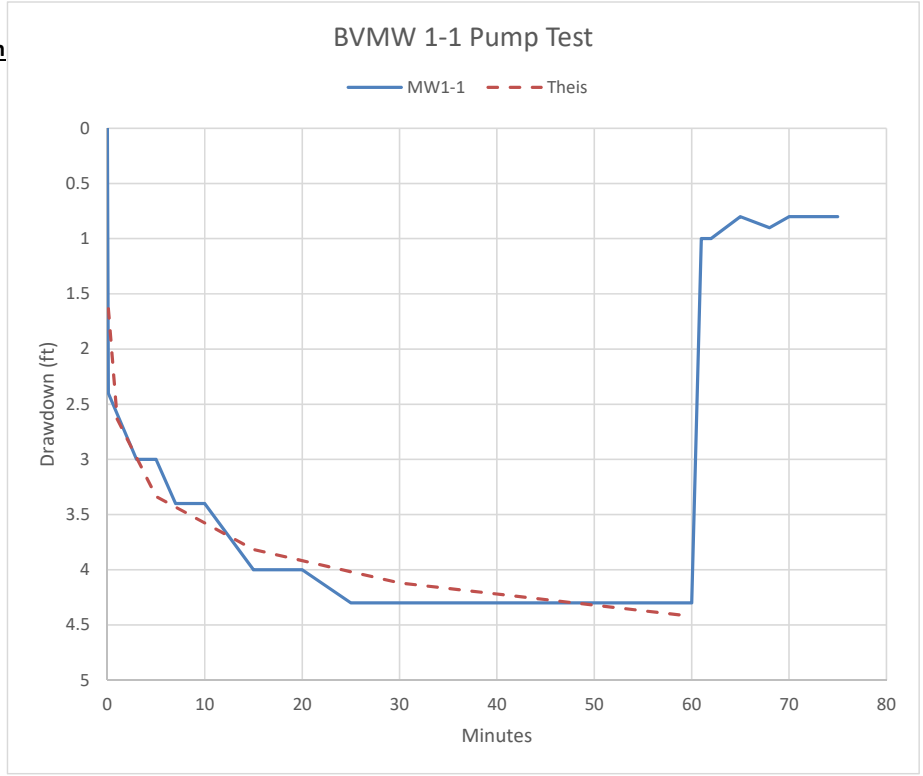
Appendix 4A

Aquifer Test Results

Pumping Test

Theis Solution

MW1-1		Adin Airport	
Time	**Minutes**	**Depth to Water (ft)**	**Drawdown**
10:59	0.0	31.6	0
11:00	0.1	34	2.4
11:03	3	34.6	3
11:05	5	34.6	3
11:07	7	35	3.4
11:10	10	35	3.4
11:15	15	35.6	4
11:20	20	35.6	4
11:25	25	35.9	4.3
11:30	30	35.9	4.3
11:35	35	35.9	4.3
11:40	40	35.9	4.3
11:45	45	35.9	4.3
11:50	50	35.9	4.3
11:55	55	35.9	4.3
12:00	60	35.9	4.3
12:01	61	32.6	1
12:02	62	32.6	1
12:05	65	32.4	0.8
12:08	68	32.5	0.9
12:10	70	32.4	0.8
12:15	75	32.4	0.8

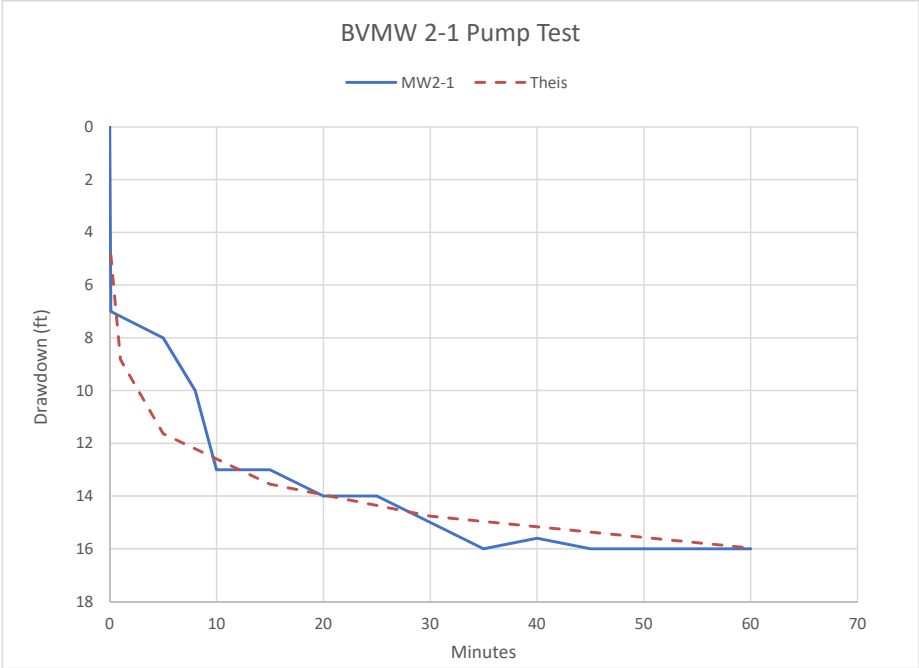


Thickness (b)	50	ft
Flow (Q)	8	gpm
Well Efficiency	0.7	unitless
Transmissivity (T)	3000	gpd/ft
Radius (r)	1	ft
Storativity (S)1	1.5E-03	unitless
Hydraulic Conductivity (K)	8	ft/d

Pumping Test

MW2-1

Time	Minutes	Depth to Water (ft)	Drawdown
7:40	0	26	0
7:41	0.1	33	7
7:45	5	34	8
7:48	8	36	10
7:50	10	39	13
7:55	15	39	13
8:00	20	40	14
8:05	25	40	14
8:10	30	41	15
8:15	35	42	16
8:20	40	41.6	15.6
8:25	45	42	16
8:30	50	42	16
8:35	55	42	16
8:40	60	42	16

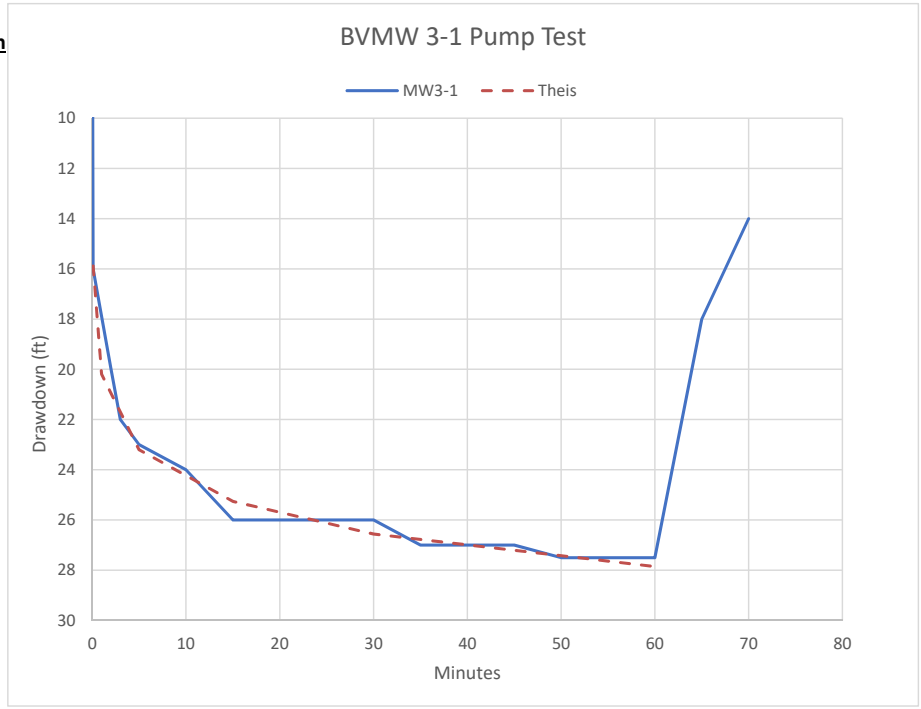


Theis Solution

Thickness (b)	40	ft
Flow (Q)	8	gpm
Well Efficiency	13	unitless
Transmissivity (T)	750	gpd/ft
Radius (r)	1	ft
Storativity (S)1	0	unitless
Hydraulic Conductivity (K)	3	ft/d

Pumpng Test

MW3-1		Lookout	
Time	**Minutes**	**Depth to Water (ft)**	**Drawdown**
9:20	0	18	0
9:21	0.1	34	16
9:22	2	38	20
9:23	3	40	22
9:25	5	41	23
9:30	10	42	24
9:35	15	44	26
9:40	20	44	26
9:45	25	44	26
9:50	30	44	26
9:55	35	45	27
10:00	40	45	27
10:05	45	45	27
10:10	50	45.5	27.5
10:15	55	45.5	27.5
10:20	60	45.5	27.5
10:25	65	36	18
10:30	70	32	14



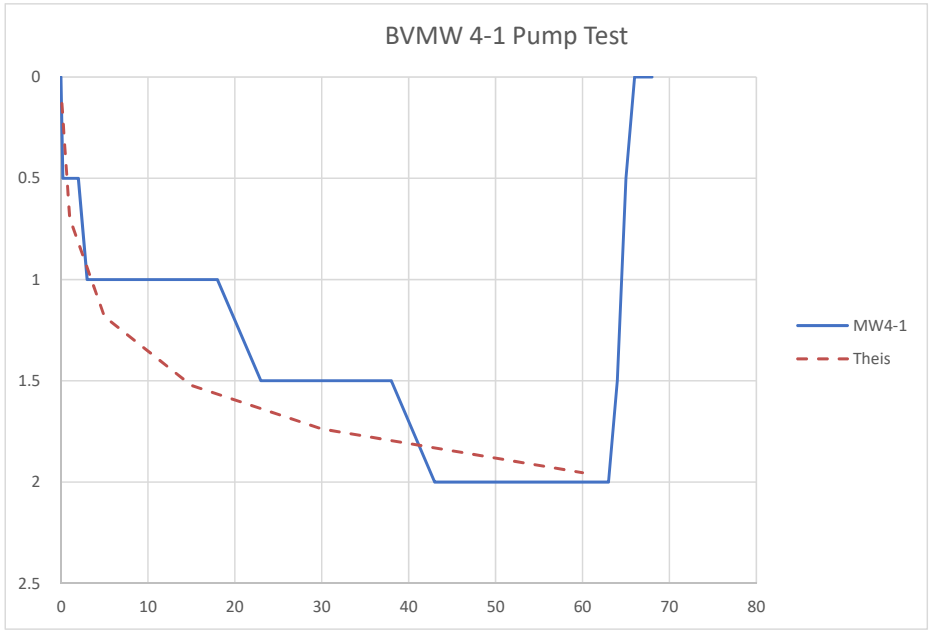
Theis Solution

Thickness (b)	50	ft
Flow (Q)	8	gpm
Well Efficiency	13	unitless
Transmissivity (T)	700	gpd/ft
Radius (r)	1	ft
Storativity (S)1	0.000003	unitless
Hydraulic Conductivity (	1.87	ft/d

Pumping Test

MW4-1

Time	Minutes	Depth to Water (ft)	Drawdown
1:55	0	33.5	0
1:57	0.2	34	0.5
1:58	1	34	0.5
1:59	2	34	0.5
2:00	3	34.5	1
2:05	8	34.5	1
2:10	13	34.5	1
2:15	18	34.5	1
2:20	23	35	1.5
2:25	28	35	1.5
2:30	33	35	1.5
2:35	38	35	1.5
2:40	43	35.5	2
2:45	48	35.5	2
2:50	53	35.5	2
2:55	58	35.5	2
3:00	63	35.5	2
3:01	64	35	1.5
3:02	65	34	0.5
3:03	66	33.5	0
3:04	67	33.5	0
3:05	68	33.5	0



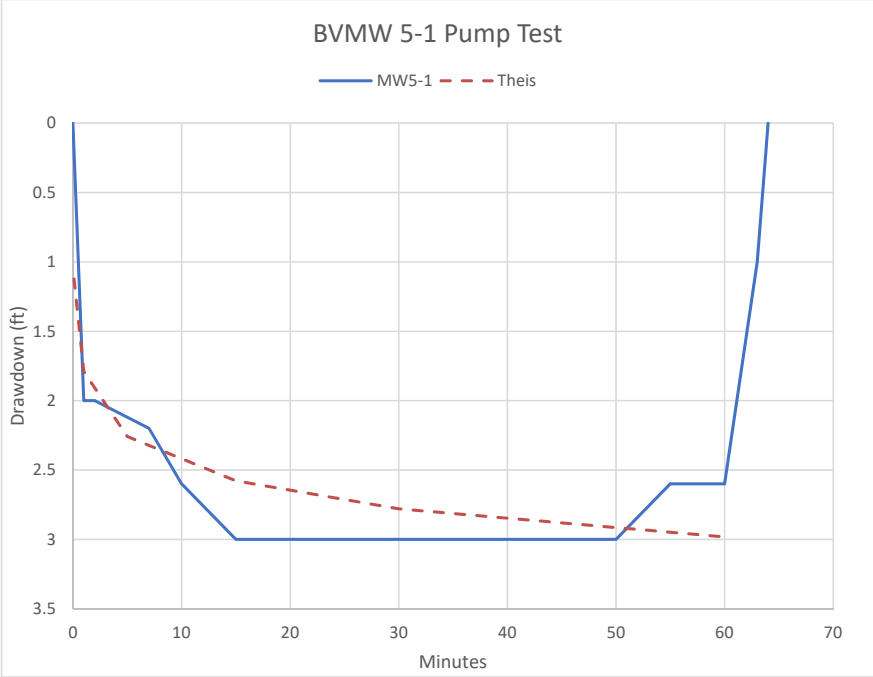
Theis Solution

Thickness (b)	30	ft
Flow (Q)	8	gpm
Well Efficiency	13	unitless
Transmissivity (T)	4200	gpd/ft
Radius (r)	1	ft
Storativity (S)1	0.1	unitless
Hydraulic Conductivity (K)	19	ft/d

Pumping Test

MW5-1

Time	Minutes	Depth to Water (ft)	Drawdown
11:50	0	42	0
11:51	1	44	2
11:52	2	44	2
11:57	7	44.2	2.2
12:00	10	44.6	2.6
12:05	15	45	3
12:10	20	45	3
12:15	25	45	3
12:20	30	45	3
12:30	40	45	3
12:35	45	45	3
12:40	50	45	3
12:45	55	44.6	2.6
12:50	60	44.6	2.6
12:57	63	43	1
12:58	64	42	0



Theis Solution

Thickness (b)	50	ft
Flow (Q)	8	gpm
Well Efficiency	13	unitless
Transmissivity (T)	4500	gpd/ft
Radius (r)	1	ft
Storativity (S)1	0.002	unitless
Hydraulic Conductivity (K)	12	ft/d

Big Valley Groundwater Sustainability Plan GSP Regulations Checklist (Elements Guide) for Chapter 5

This checklist of the GSP Elements and indicates where in the GSP each element of the regulations is addressed.

Article 5.			Plan Contents for Big Valley Groundwater Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
§ 354.16.			**Groundwater Conditions**					
			Each Plan shall provide a description of current and historical groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes the following:					
(a)			Groundwater elevation data demonstrating flow directions, lateral and vertical gradients, and regional pumping patterns, including:					
	(1)		Groundwater elevation contour maps depicting the groundwater table or potentiometric surface associated with the current seasonal high and seasonal low for each principal aquifer within the basin.	X	5.1.3	5-4,5-5		Also Appendix 5B
	(2)		Hydrographs depicting long-term groundwater elevations, historical highs and lows, and hydraulic gradients between principal aquifers.	X	5.1.1,5.1.2	5-2,5-3,5-4		Also Appendix 5A
(b)			A graph depicting estimates of the change in groundwater in storage, based on data, demonstrating the annual and cumulative change in the volume of groundwater in storage between seasonal high groundwater conditions, including the annual groundwater use and water year type.	X	5.2	5-6	5-2	
(c)			Seawater intrusion conditions in the basin, including maps and cross-sections of the seawater intrusion front for each principal aquifer.	N/A	5.3			Not applicable due to inland location.
(d)			Groundwater quality issues that may affect the supply and beneficial uses of groundwater, including a description and map of the location of known groundwater contamination sites and plumes.		5.4			
(e)			The extent, cumulative total, and annual rate of land subsidence, including maps depicting total subsidence, utilizing data available from the Department, as specified in Section 353.2, or the best available information.	X	5.5	5-7,5-8		
(f)			Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information.		5.6			
(g)			Identification of groundwater dependent ecosystems within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information.		5.6.2			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.2, 10727.2, 10727.4, and 10733.2, Water Code.					

"X" indicates that the element has been addressed.
The page number will be filled in once the entire GSP is compiled.

Shaded areas are elements of the regulations that don't have to be addressed in the GSP

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Tables

Figures

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Abbreviations and Acronyms

ACWA	Ash Creek Wildlife Area
AF	Acre-Feet
AFY	Acre-Feet per Year
Basin	Big Valley Groundwater Basin
bgs	below ground surface
BVGB	Big Valley Groundwater Basin
CASGEM	California Statewide Groundwater Elevation Monitoring
CGPS	Continuous Global Positioning System
DTW	Depth to Water
DWR	Department of Water Resources
ft	feet
GIS	
GMP	Groundwater Management Plan
GPS	Global Positioning System
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
InSAR	Interferometric Synthetic-Aperture RADAR
msl	above mean sea level
PBO	Plate Boundary Observatory
SGMA	Sustainable Groundwater Management Act of 2014
SRI	Sacramento River Index of water year types
WY	Water Year (October 1 – September 30)
yr	year

5. Groundwater Conditions §354.16

This chapter presents available information on the Groundwater Conditions for the Big Valley Groundwater Basin (BVGB or Basin, 5-004) developed by GEI Consultants for the Lassen County and Modoc County groundwater sustainability agencies (GSAs). This chapter provides some of the information needed for the development of the monitoring network and the sustainable management criteria of this Groundwater Sustainability Plan (GSP). The content of this chapter is defined by the regulations of the Sustainable Groundwater Management Act of 2014 (SGMA) – Chapter 1.5, Article 5, Subarticle 2: 354.16.

5.1 Groundwater Elevations

Historic groundwater elevations are available from a total of 22 wells in Big Valley, six located in Modoc County and sixteen in Lassen County as shown on **Figure 5-1** and listed in **Table 5-1**. Twenty of the wells are part of Lassen and Modoc Counties' monitoring network which was approved by the counties in 2011, in compliance with the California Statewide Groundwater Elevation Monitoring (CASGEM) program. The Department of Water Resources (DWR) staff measure water levels in these wells twice annually (spring and fall) on behalf of the counties. Some measurements from wells are missing, which is typically a result of access issues to the wells sites or occasionally a well owner who has removed their well from the monitoring program. These wells may or may not be used as part of the GSP monitoring network, which will be addressed in Chapter 8.

The first water level measurements in the BVGB began in the late 1950s at two wells near Bieber (17K1) and Nubieber (32A2). Regular monitoring of these two wells began in the mid-1960s and monitoring began in most of the other wells during the late 1970s or early 1980s. Three wells located on the Ash Creek Wildlife Area (ACWA) were added to the CASGEM networks in 2016. Of the 22 historically monitored wells one well (12G1) has not been monitored since 1992, and one well (06C1) has no measurements since 2015. Construction details are not available for one well (32R1). Well 32R1 could benefit from 'downhole' video inspection of the well casing to determine the depth interval associated with the water levels.

In addition to these 22 wells, five well clusters were constructed in late 2019 and early 2020 to support the GSP. Their locations are shown on **Figure 5-1**. Each cluster consists of a deep well (200-500 feet) and three shallow wells (60-100 feet). Water level information is not yet available from these five clusters.

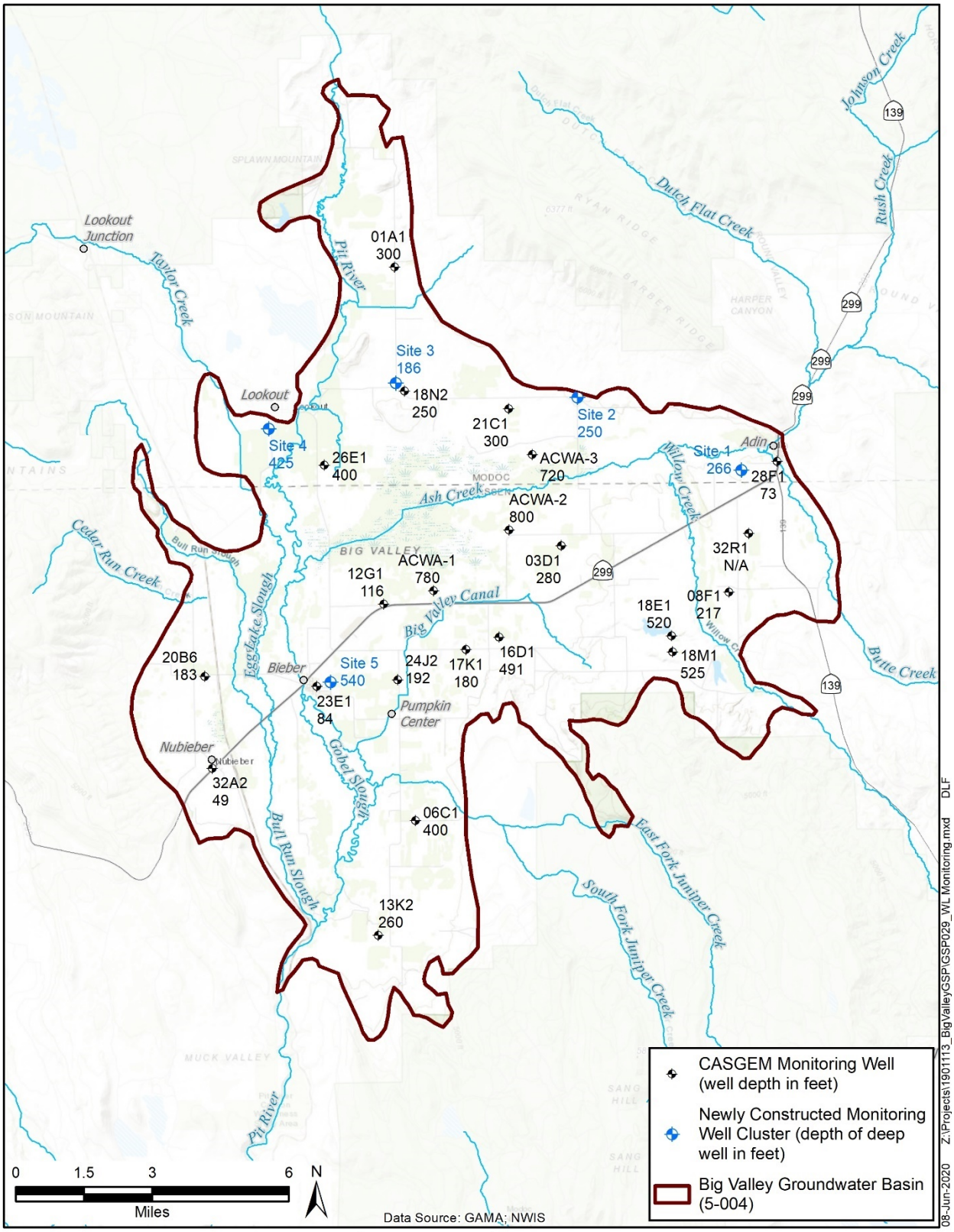

Figure 5-1 Water Level Monitoring

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38 **Table 5-1 Historic Water Level Monitoring Wells**

Well Name	State Well Number	CASGEM ID	County	Well Use	Well Depth (feet bgs)	Ground Elevation (feet msl)	Reference Point Elevation (feet msl)	Period of Record Start Year	Period of Record End Year	Number of Measurements	Minimum Groundwater Elevation (feet msl)	Maximum Groundwater Elevation (feet msl)
18E1	38N09E18E001M	411356N1209900W001	Lassen	Irrigation	520	4248.40	4249.50	1981	2019	73	4198.20	4234.10
23E1	38N07E23E001M	411207N1211395W001	Lassen	Residential	84	4123.40	4123.40	1979	2020	81	4070.40	4109.10
260	39N07E26E001M	411911N1211354W001	Modoc	Irrigation	400	4133.40	4135.00	1979	2020	79	4088.90	4131.30
01A1	39N07E01A001M	412539N1211050W001	Modoc	Stockwatering	300	4183.40	4184.40	1979	2020	81	4035.40	4163.90
03D1	38N08E03D001M	411647N1210358W001	Lassen	Irrigation	280	4163.40	4163.40	1982	2020	71	4076.60	4148.60
06C1	37N08E06C001M	410777N1210986W001	Lassen	Irrigation	400	4133.40	4133.90	1982	2016	69	4066.20	4126.80
08F1	38N09E08F001M	411493N1209656W001	Lassen	Other	217	4253.40	4255.40	1979	2020	83	4167.90	4229.50
12G1	38N07E12G001M	411467N1211110W001	Lassen	Residential	116	4143.38	4144.38	1979	1993	28	4130.98	4138.68
13K2	37N07E13K002M	410413N1211147W001	Lassen	Irrigation	260	4127.40	4127.90	1982	2018	70	4061.90	4109.70
16D1	38N08E16D001M	411359N1210625W001	Lassen	Irrigation	491	4171.40	4171.60	1982	2020	74	4078.73	4162.40
17K1	38N08E17K001M	411320N1210766W001	Lassen	Residential	180	4153.30	4154.30	1957	2020	146	4115.08	4150.00
18M1	38N09E18M001M	411305N1209896W001	Lassen	Irrigation	525	4288.40	4288.90	1981	2020	74	4192.30	4232.70
18N2	39N08E18N002M	412144N1211013W001	Modoc	Residential	250	4163.40	4164.40	1979	2020	80	4136.60	4160.20
20B6	38N07E20B006M	411242N1211866W001	Lassen	Residential	183	4126.30	4127.30	1979	2019	80	4076.94	4116.60
21C1	39N08E21C001M	412086N1210574W001	Modoc	Irrigation	300	4161.40	4161.70	1979	2020	79	4082.10	4148.50
24J2	38N07E24J002M	411228N1211054W001	Lassen	Irrigation	192	4138.40	4139.40	1979	2019	77	4056.70	4137.70
28F1	39N09E28F001M	411907N1209447W001	Modoc	Residential	73	4206.60	4207.10	1982	2020	76	4194.57	4202.10
32A2	38N07E32A002M	410950N1211839W001	Lassen	Other	49	4118.80	4119.50	1959	2020	133	4106.70	4118.80
32R1	39N09E32R001M	411649N1209569W001	Lassen	Irrigation	unknown	4243.40	4243.60	1981	2020	64	4161.20	4205.50
ACWA-1	38N08E07A001M	411508N1210900W001	Lassen	Irrigation	780	4142.00	4142.75	2016	2020	8	4039.15	4126.35
ACWA-2	39N08E33P002M	411699N1210579W001	Lassen	Irrigation	800	4153.00	4153.20	2016	2020	8	4126.40	4139.35
ACWA-3	39N08E28A001M	411938N1210478W001	Modoc	Irrigation	720	4159.00	4159.83	2016	2020	7	4136.23	4150.58

source: https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer

bgs = below ground surface

39 msl = above mean sea level

5.1.1 *Groundwater Level Trends §354.16(a)(2)*

Figures 5-2 and **5-3** show hydrographs for the two longest records along with background colors representing the Water Year (WY) type: wet, normal, dry, and critical dry. These WY types are developed from the Sacramento River Index (SRI), which is calculated from annual runoff of the Sacramento River Watershed, of which the Pit River is a tributary. The SRI (no units) varies between 3.1 and 15.3 (average: 8.1) and are divided into the four WY categories.

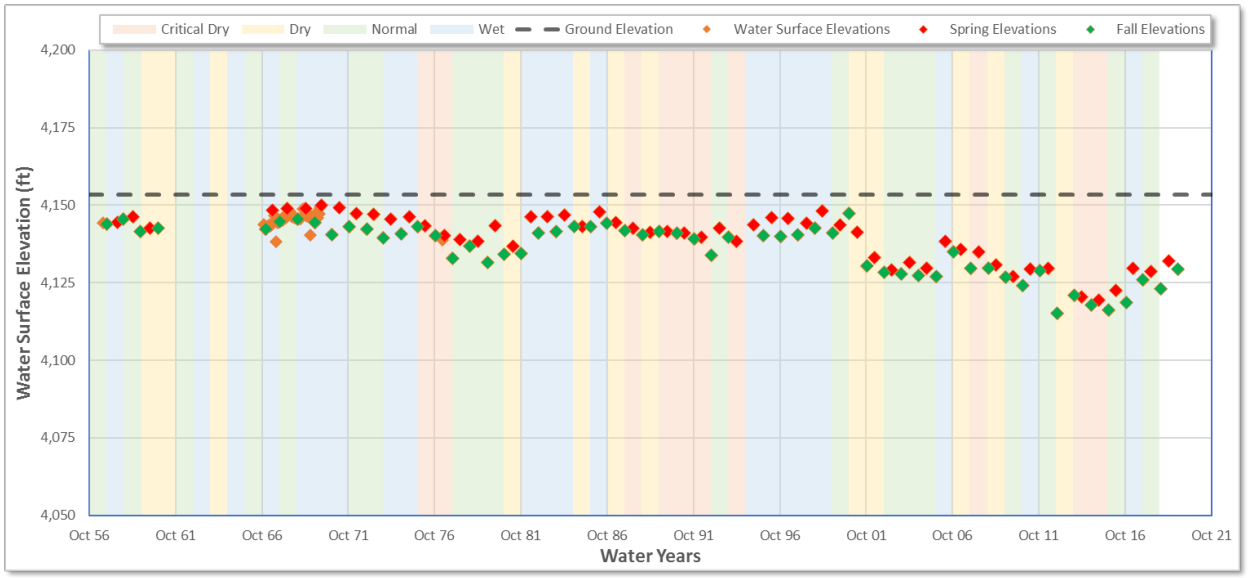


Figure 5-2 Hydrograph of Well 17K1

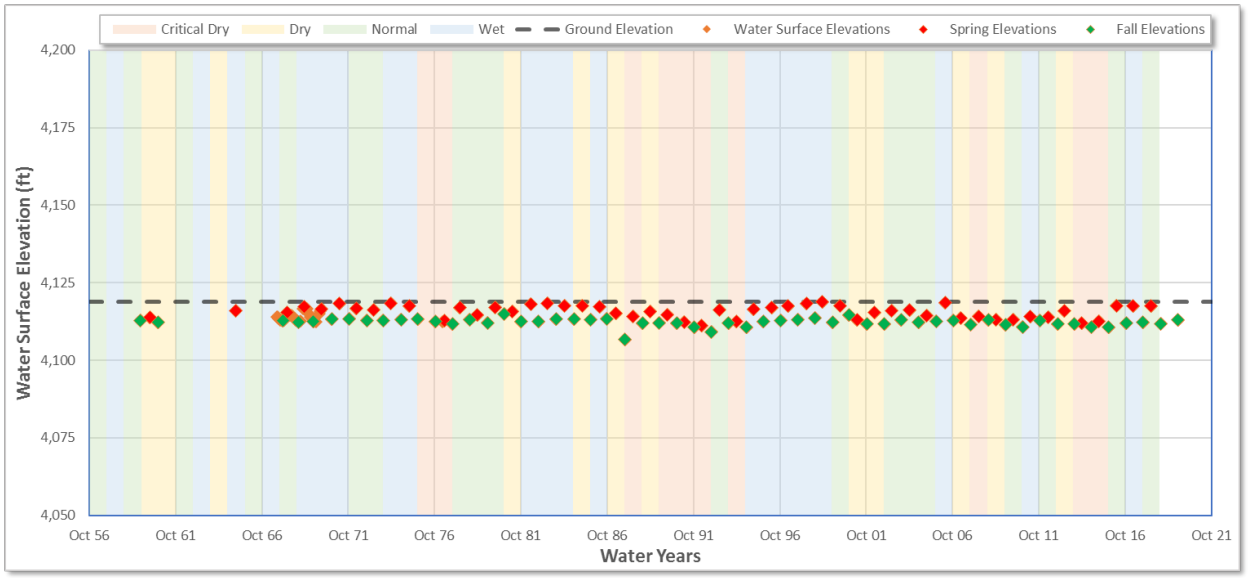


Figure 5-3 Hydrograph of Well 32A2

The water level record for these two wells illustrates that some areas of the Basin have experienced little to no change in water levels, while other areas have fluctuated more and have shown a measurable decline since about 2000. Hydrographs for all 22 wells are presented in **Appendix 5A**. On each hydrograph in the appendix a red trend line is shown, which is determined from a linear regression[1] of the spring water level measurements between 2000 and 2019. The average water level change during that period, in feet per year, is also shown. Nine wells show stable (less than 0.5 ft) or rising water levels and twelve wells show declining water levels of up to -3.1 feet per year.

5.1.2 *Vertical Groundwater Gradients §354.16(a)(2)*

Chapter 4 contained the Hydrogeologic Conceptual Model which defined a single principal aquifer in the BVGB; therefore there is no vertical gradient that needs to be described between principal aquifers. However, vertical gradients likely exist, and the five recently constructed well clusters will have data to describe these gradients once water level data is available from those wells. The locations of the clusters are shown on **Figure 5-1**.

5.1.3 *Groundwater Contours §354.16(a)(1)*

Water level data from spring and fall 2018 were used to illustrate current groundwater conditions, because the data available for 2019 or 2020 was inadequate. **Figures 5-5** and **5-6** show the 2018 seasonal high and seasonal low groundwater elevation contours, respectively. Each contour line shows equal groundwater elevation. Groundwater flows from higher elevations to lower elevations, perpendicular to the contour lines. The direction of flow is emphasized on the figures with arrows. In general, groundwater is highest in the east, particularly where Willow and Butte Creeks enter the Basin. The general flow of water is to the west and south. The contours do indicate, however, northerly flow toward Ash Creek near Adin. West of Adin, flow diverges from Ash Creek, with a some flow moving southerly.

5.2 Change in Storage §354.16(b)

In order to determine the annual and seasonal change in storage, groundwater elevation surfaces[2] were developed for spring and fall for each year between 1983 and 2018. These surfaces are included in **Appendix 5B**. The amount of groundwater in storage for each set of contours was calculated. This calculation was performed using Geographic Information System (GIS) software which is able to subtract the groundwater elevation surface from the ground elevation surface (using a digital elevation model) at each raster cell (pixel) and calculating the average depth to water (DTW) throughout the Basin. This average DTW was then subtracted from the definable

[1] Also known as a line of best fit, which is developed from a mathematical interpretation of the data.
[2] Groundwater elevation surfaces are developed using the known groundwater elevations at wells throughout the Basin and using a kriging mathematical method to interpolate for the areas between the known points. The surface consists of a grid (pixels) covering the entire basin that has interpolated groundwater elevation values for each grid cell.

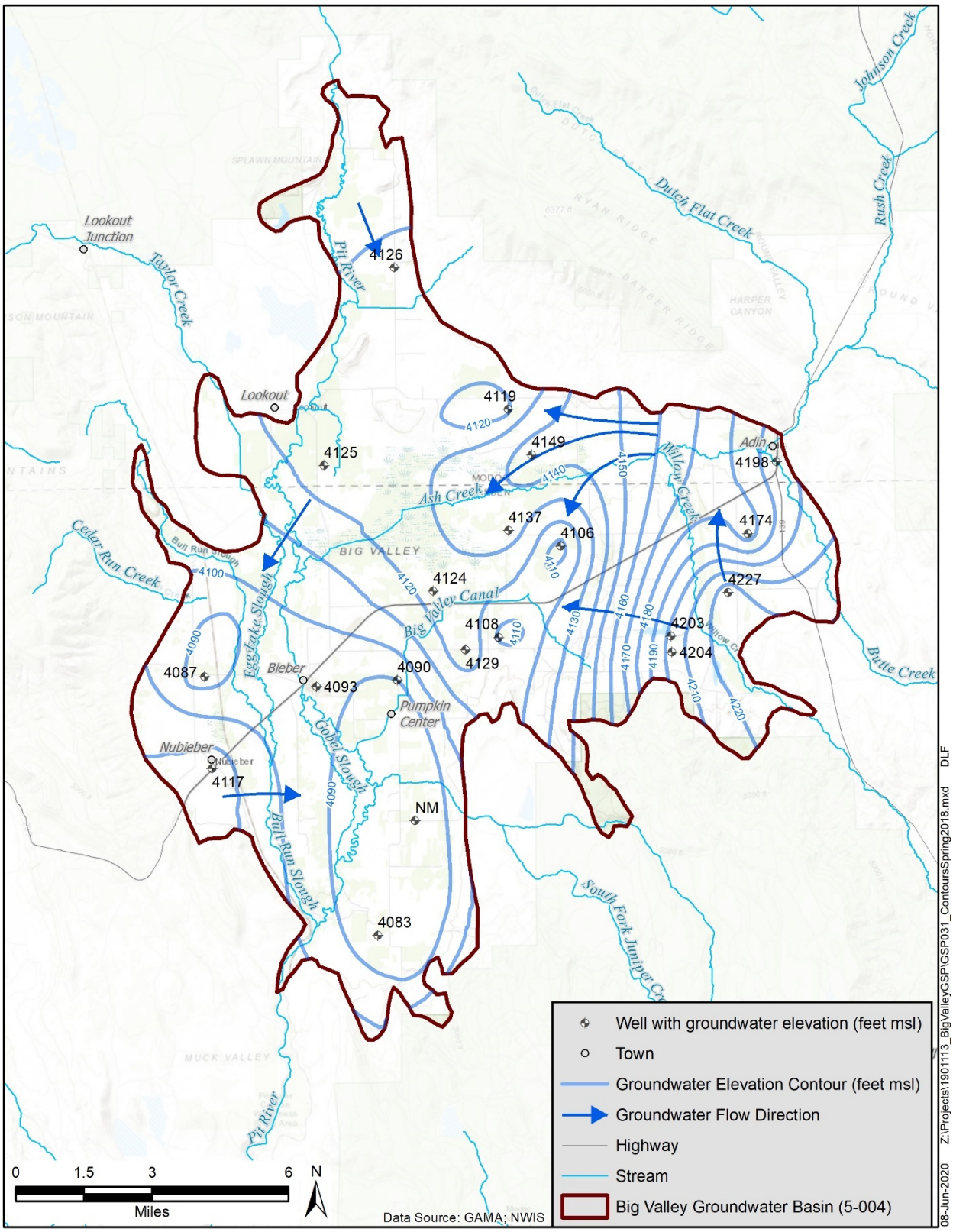
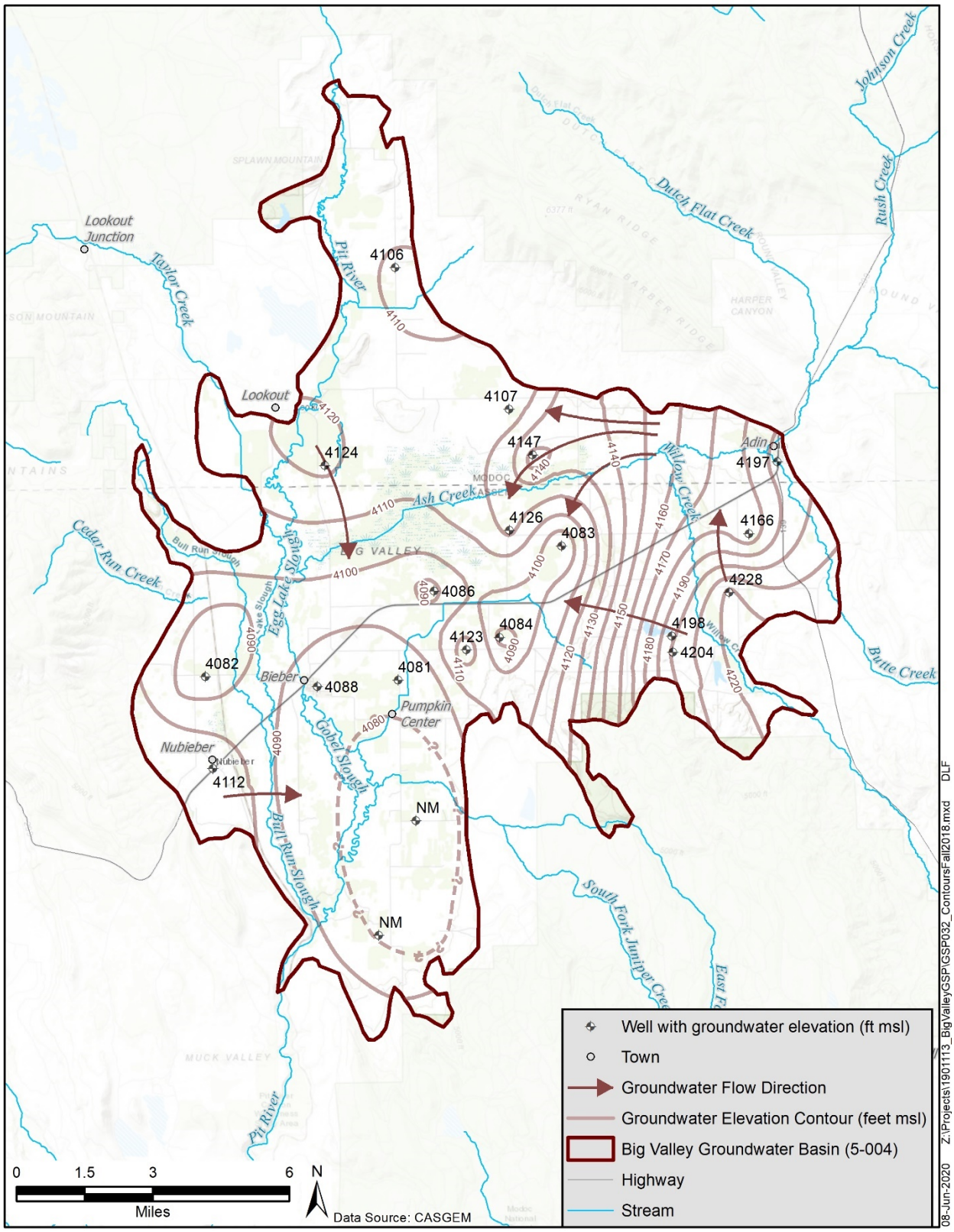


Figure 5-4 Groundwater Elevation Contours and Flow Direction Spring 2018

89



90
91 **Figure 5-5 Groundwater Elevation Contours and Flow Direction Fall 2018**
92

bottom of the Basin (1,200 feet), multiplied by the area of the basin, and multiplied by 5%, which is used as the specific yield (the fraction of the aquifer material that contains recoverable water from Chapter 4).

Table 5-2 shows, from 1983 to 2018, the total water in storage, the change in storage from the previous year, and the cumulative change in storage. **Figure 5-7** shows this information graphically, along with the annual precipitation from the McArthur station. This graph shows that groundwater storage generally declines during dry years and stays stable or increases slightly during normal or wet years. Over the 36-year period, groundwater storage has declined by about 96,000 acre-feet (AF) (using spring measurements) which is a slight increase from the historic low of about 116,000 AF in spring 2015.

Annual groundwater use is not shown on **Figure 5-7**. Groundwater use will be addressed in Chapter 6 (Water Budget).

5.3 Seawater Intrusion §354.16(c)

The BVGB is not located near the ocean, and therefore seawater intrusion is not applicable to this GSP.

5.4 Groundwater Quality Distribution and Trends §354.16(d)

Analysis of groundwater quality is still in development.

5.5 Subsidence §354.16(e)

Vertical displacement of the land surface is comprised of two components: 1) elastic displacement which fluctuates according to various cycles (daily, seasonally, and annually) due to temporary changes in hydrostatic pressure (e.g. atmospheric pressure and changes in groundwater levels) and 2) inelastic displacement or permanent subsidence which occurs when groundwater pumping causes a prolonged and/or extreme decrease in hydrostatic pressure of the aquifer. This decrease in pressure can allow the aquifer to compress, primarily within fine-grained beds (clays). Inelastic subsidence cannot be restored after the hydrostatic pressure increases.

Subsidence can be measured by a variety of methods, including

- Regular measurements of any vertical space between the ground surface and the concrete pad around the well. If space is present and increasing over time, subsidence is occurring at that location. If a space is not present, subsidence may not be occurring, or the well is not deep enough to show that subsidence is occurring because the well and groundwater are subsiding together.

- Terrestrial surveys of paved roads and benchmarks.

126 **Table 5-2 Change in Storage 1998-2018**

Year	Average Spring Depth to Water[1] (feet)	Spring Storage[2] (Acre-feet)	Spring Cumulative Change in Storage (Acre-feet)	Average Fall Depth to Water[1] (feet)	Fall Storage[2] (Acre-feet)	Fall Cumulative Change in Storage (Acre-feet)
1983	29.3	5,390,192	-	37.1	5,354,430	(35,762)
1984	29.4	5,389,508	(684)	36.4	5,357,352	(32,841)
1985	31.4	5,380,526	(9,666)	38.9	5,346,150	(44,042)
1986	31.0	5,382,539	(7,653)	40.1	5,340,481	(49,711)
1987	32.6	5,375,135	(15,057)	42.1	5,331,386	(58,806)
1988	34.9	5,364,459	(25,733)	43.9	5,323,094	(67,099)
1989	35.2	5,363,150	(27,042)	42.5	5,329,302	(60,890)
1990	35.6	5,360,976	(29,216)	46.2	5,312,610	(77,582)
1991	36.8	5,355,677	(34,515)	43.2	5,326,124	(64,068)
1992	38.0	5,350,297	(39,895)	48.5	5,301,609	(88,583)
1993	36.9	5,355,293	(34,899)	42.1	5,331,046	(59,146)
1994	37.5	5,352,221	(37,971)	43.1	5,326,613	(63,579)
1995	35.3	5,362,737	(27,456)	41.0	5,336,197	(53,996)
1996	32.4	5,375,861	(14,332)	39.6	5,342,700	(47,493)
1997	31.8	5,378,600	(11,592)	39.7	5,342,405	(47,787)
1998	31.1	5,382,014	(8,179)	36.9	5,355,217	(34,975)
1999	29.5	5,389,070	(1,122)	38.7	5,346,921	(43,271)
2000	32.3	5,376,287	(13,905)	46.5	5,310,947	(79,245)
2001	38.0	5,350,015	(40,177)	51.1	5,289,979	(100,213)
2002	39.3	5,344,357	(45,835)	46.6	5,310,695	(79,497)
2003	39.4	5,343,881	(46,311)	48.9	5,299,889	(90,303)
2004	39.2	5,344,515	(45,677)	47.7	5,305,401	(84,791)
2005	41.5	5,334,164	(56,028)	47.8	5,305,141	(85,052)
2006	36.7	5,356,175	(34,017)	46.2	5,312,218	(77,975)
2007	38.8	5,346,641	(43,551)	49.4	5,297,661	(92,531)
2008	41.6	5,333,712	(56,480)	51.7	5,287,070	(103,122)
2009	42.5	5,329,337	(60,856)	53.7	5,277,825	(112,368)
2010	46.4	5,311,440	(78,752)	54.4	5,274,613	(115,580)
2011	45.9	5,313,710	(76,482)	52.5	5,283,348	(106,844)
2012	44.9	5,318,299	(71,893)	56.3	5,265,670	(124,523)
2013	49.3	5,298,013	(92,179)	58.0	5,257,951	(132,242)
2014	51.7	5,287,059	(103,133)	61.6	5,241,427	(148,765)
2015	54.4	5,274,644	(115,548)	67.5	5,214,239	(175,953)
2016	51.3	5,288,702	(101,490)	62.6	5,237,000	(153,193)
2017	49.7	5,296,127	(94,066)	61.1	5,243,879	(146,313)
2018	50.1	5,294,464	(95,728)	59.0	5,253,677	(136,515)

Note: Parentheses indicate negative numbers

[1] From water surface elevation contours - Appendix 5A

127 [2] Calculated from average depth to water, area of basin, 1,200 foot aquifer bottom, and specific yield of 5%

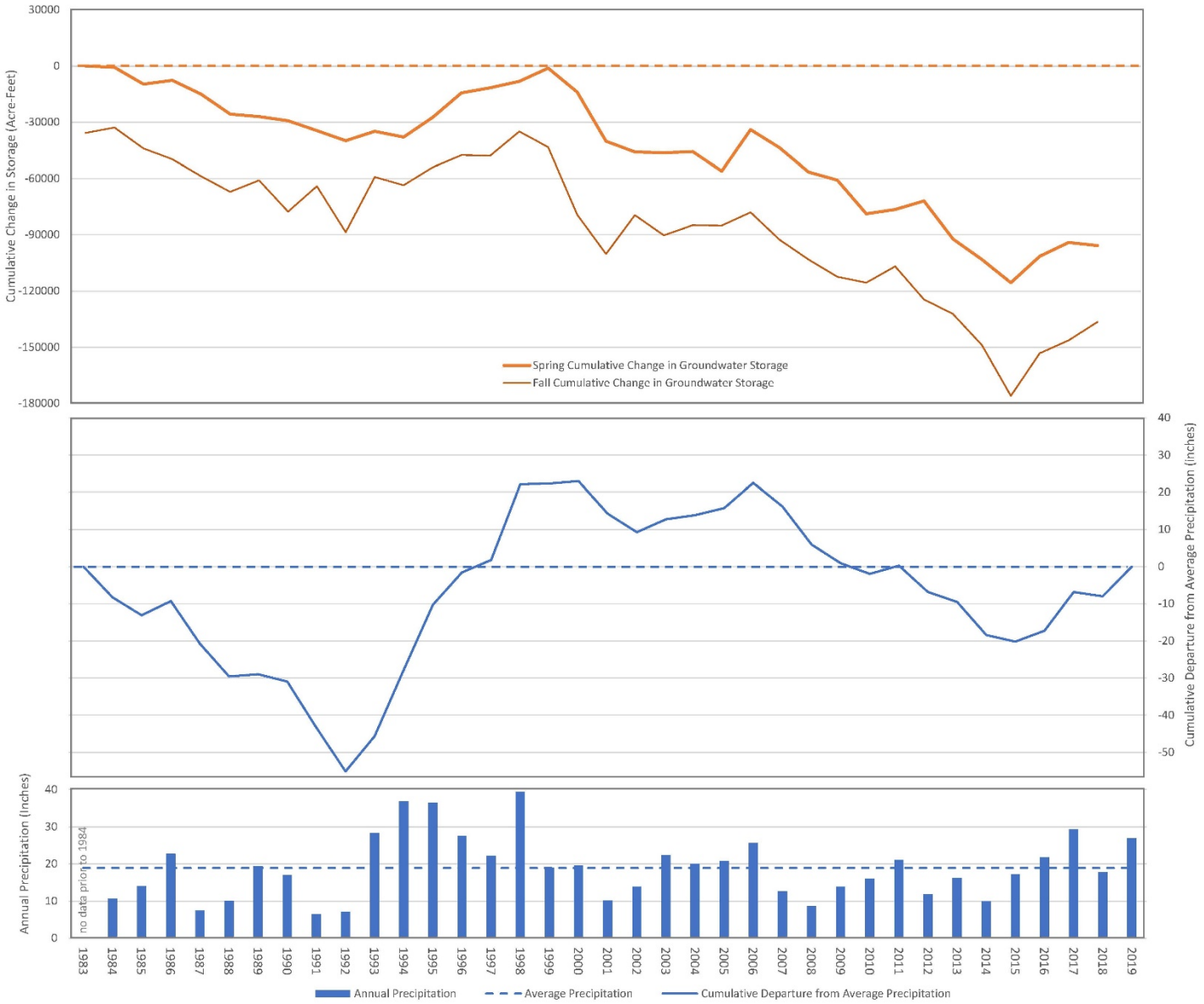


Figure 5-6 Cumulative Change in Storage and Precipitation

- Global Positioning Survey (GPS) of benchmarks. GPS uses a constellation of satellites to measure the 3-dimensional position of a benchmark. The longer the time that the GPS is left to collect measurements, the higher the accuracy. Big Valley has one continuously-operating GPS (CGPS) station near Adin.

- Monitoring of specially constructed "extensometer" wells.

- Use of Interferometric Synthetic-Aperture Radar (InSAR), which is microwave-based satellite technology that has been used to evaluate ground surface elevation and deformation since the early 1990s. InSAR can document changes in ground elevation between successive passes of the satellite. Between 2015 and 2019, InSAR was used to evaluate subsidence throughout California, including Big Valley.

Subsidence was recognized as an important consideration in the 2007 Groundwater Management Plan (GMP) for Lassen County (Brown and Caldwell 2007) but was not identified as an issue for Big Valley specifically. The analysis in the GMP was based on indirect observations (groundwater levels) and anecdotal information. This section presents additional data that has become available since the development of the GMP.

5.5.1 *Continuous GPS Station P347*

A CGPS station (P347) was installed at the CalTrans yard near Adin in September 2007. The station is part of the Plate Boundary Observatory (PBO) which is measuring 3-dimensional changes in the Earth surface due to the movement of tectonic plates (e.g. Pacific and North American plates).

Figure 5-8 is a plot of the vertical displacement at P347 and shows a slight decline (0.6 inches) over the first 11 years of operation, based on the annual mean values (large black open circles). Daily values (blue dots) show substantial variation, as much as an inch, but more typically only 0.1 inch on average. This scattering of daily values around the annual mean provides an indication of the elastic nature of the displacement. The overall decline of 0.6 inches is an indication of inelastic displacement has occurred over an 11-year period, which equates to a rate of -0.05 inches per year at this location near Adin.

5.5.2 *InSAR Mapping 2015 to 2019*

Figure 5-9 is a map of InSAR data made available by DWR's SGMA Data Viewer mapping tool for the 4.3-year period between June 2015 and September 2019. The majority of Big Valley was addressed by this InSAR survey although the survey excludes some areas including much of the Big Swamp/Ash Creek Wildlife Area, areas along the Pit River near Lookout, and south of Bieber. Most of the survey shows downward displacement (subsidence) between 0 and -1 inches throughout Big Valley. This widespread, small displacement is likely due to tectonic activities. Two localized areas of subsidence exceeding -1.5 inches are apparent from this data, one in the east-central portion of the basin north of Highway 299 and one in the southern portion of the

Basin between the Pit River and Bull Run Slough. Maximum downward displacement in the Basin is -3.3 inches, or -0.77 inches per year over the 4.3-year period.

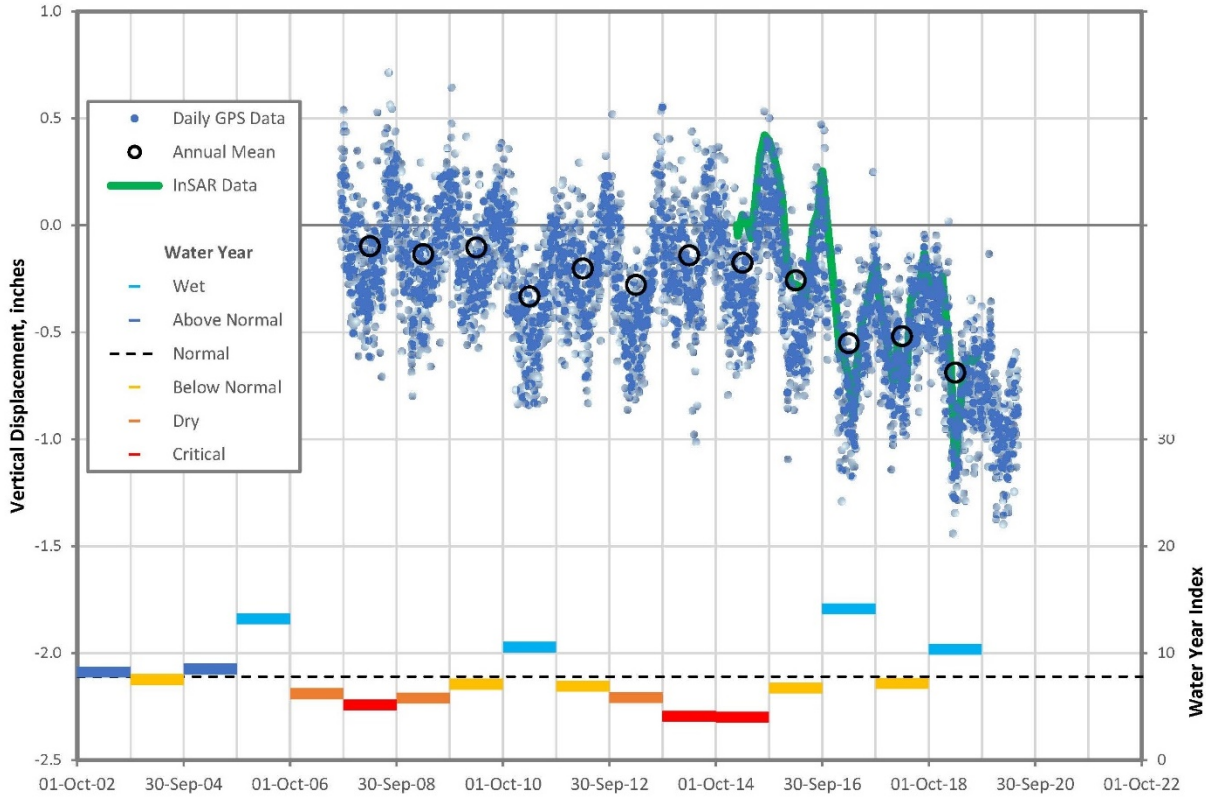


Figure 5-7 Vertical Displacement at CGPS P347

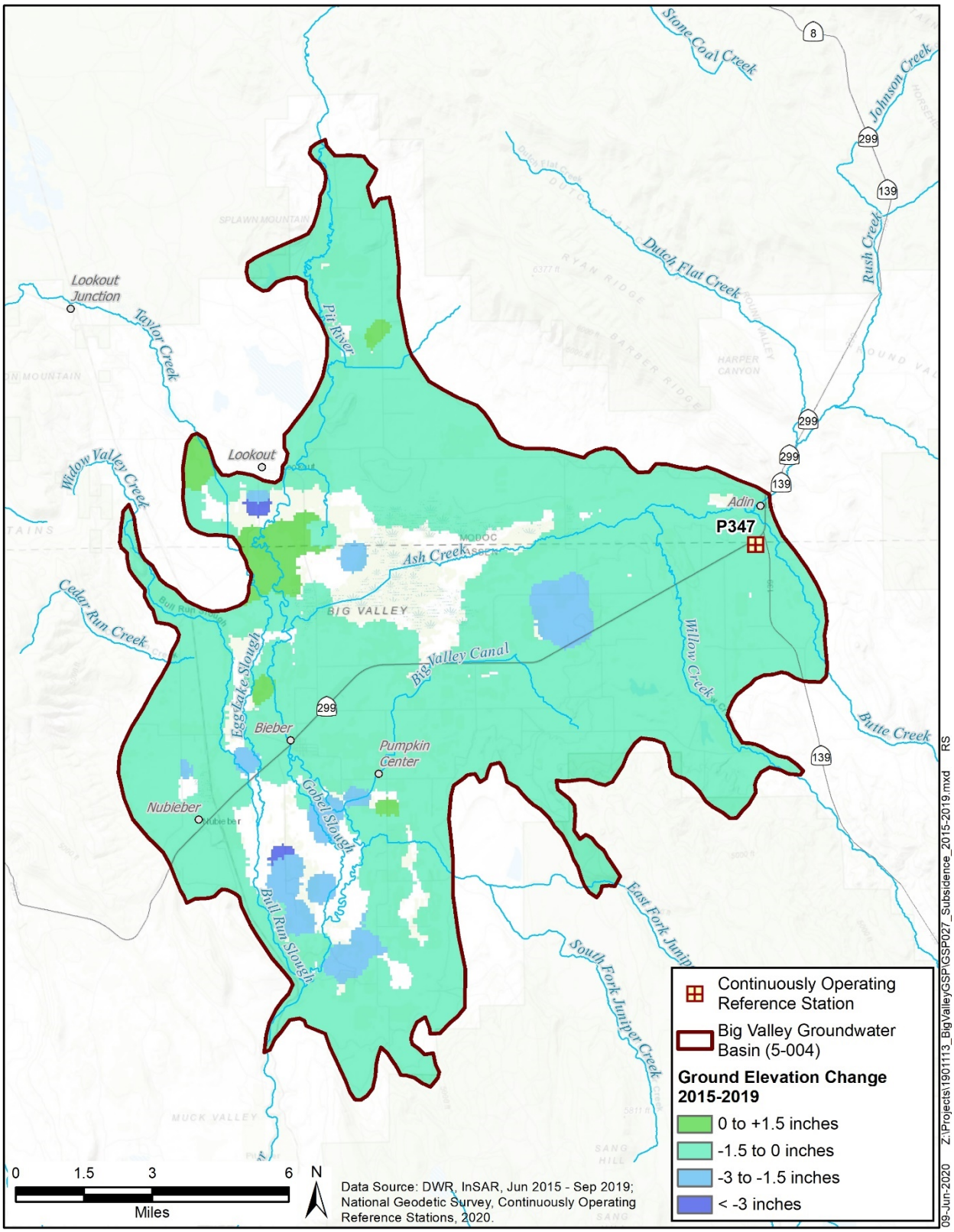
5.6 Interconnected Surface Water §354.16(f)

Analysis of interconnected surface water is still in development

5.6.1 *Streams and Lakes*

5.6.2 *Groundwater-Dependent Ecosystems §354.16(g)*

175



176
177 **Figure 5-8 InSAR Change in Ground Elevation 2015 to 2019**
178

5.7 References

Brown and Caldwell, 2007. Lassen County Groundwater Management Plan, June 2007.

Appendix 5A

Water Level Hydrographs

Well Water Surface Level Report

Date: 2/19/2020

Well Information	
Well ID	087190-38N07E32A002M
Alternate Name	38N07E32A002M
State Number	38N07E32A002M
CASGEM ID	410950N1211839W001

Well Location	
County	Lassen
Basin	BIG VALLEY
Sub-Basin	-

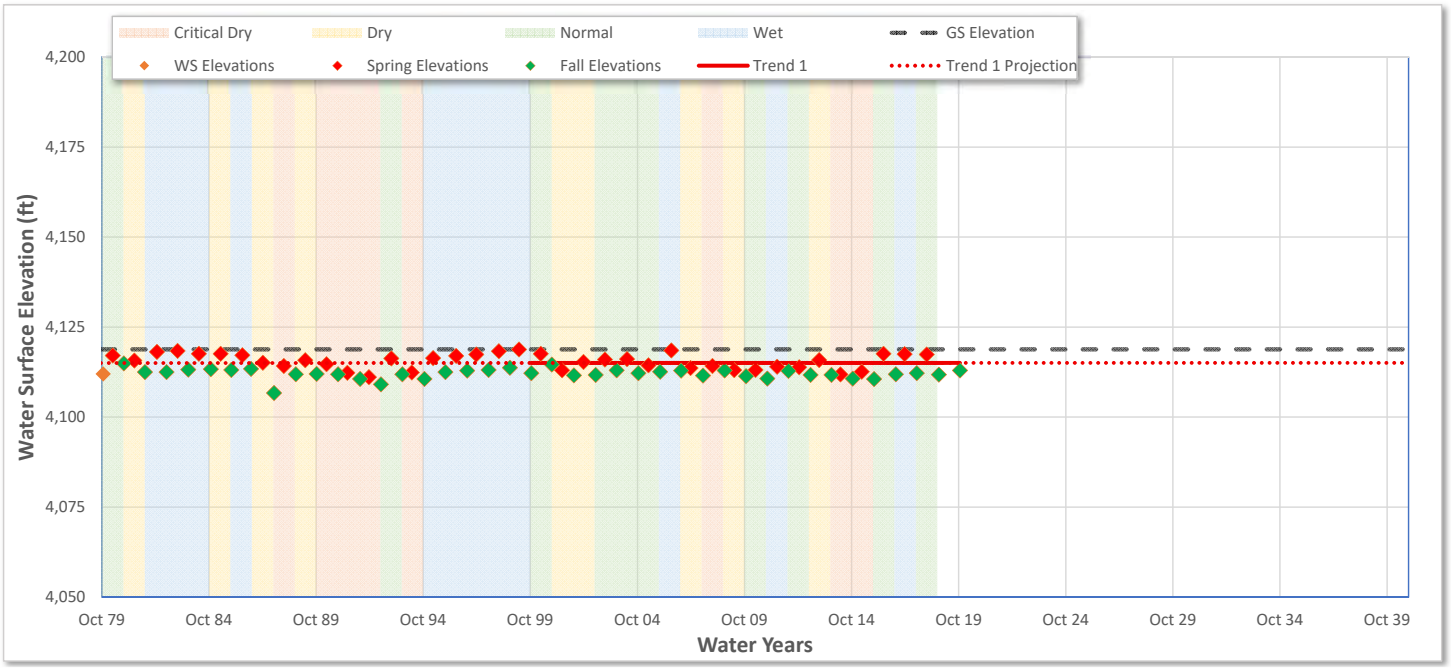
Well Type Information	
Well Type	-
Well Use	Other
Completion Type	Single

Well Coordinates/Geometry		
Location	Lat:	41.0950
	Long:	-121.1839
Well Delth		49.00 ft
Ground Surface Elevation		4118.80 ft
Ref. Point Elevation		4119.50 ft

Well Period of Record		
Period-of-Record		1959..2020
WS Elev-Range	Min:	4106.7 ft
	Max	4118.8 ft

Trend Analsys		
Seasonal Data Method		Max/Min
Show Trend 1		Spring Data
Date Range	Start WY:	2000
	End WY:	2040
Extend Trend Line		Yes
Trend Results	Slope	0.001 ft/yr
Show Trend 2		None
Date Range	Start WY:	
	End WY:	
Extend Trend Line		No
Trend Results	Slope	

Water Surface Elevation (WSE) Hydrograph



Well Water Surface Level Report

Date: 2/19/2020

Well Information	
Well ID	087188-38N07E23E001M
Alternate Name	38N07E23E001M
State Number	38N07E23E001M
CASGEM ID	411207N1211395W001

Well Location	
County	Lassen
Basin	BIG VALLEY
Sub-Basin	-

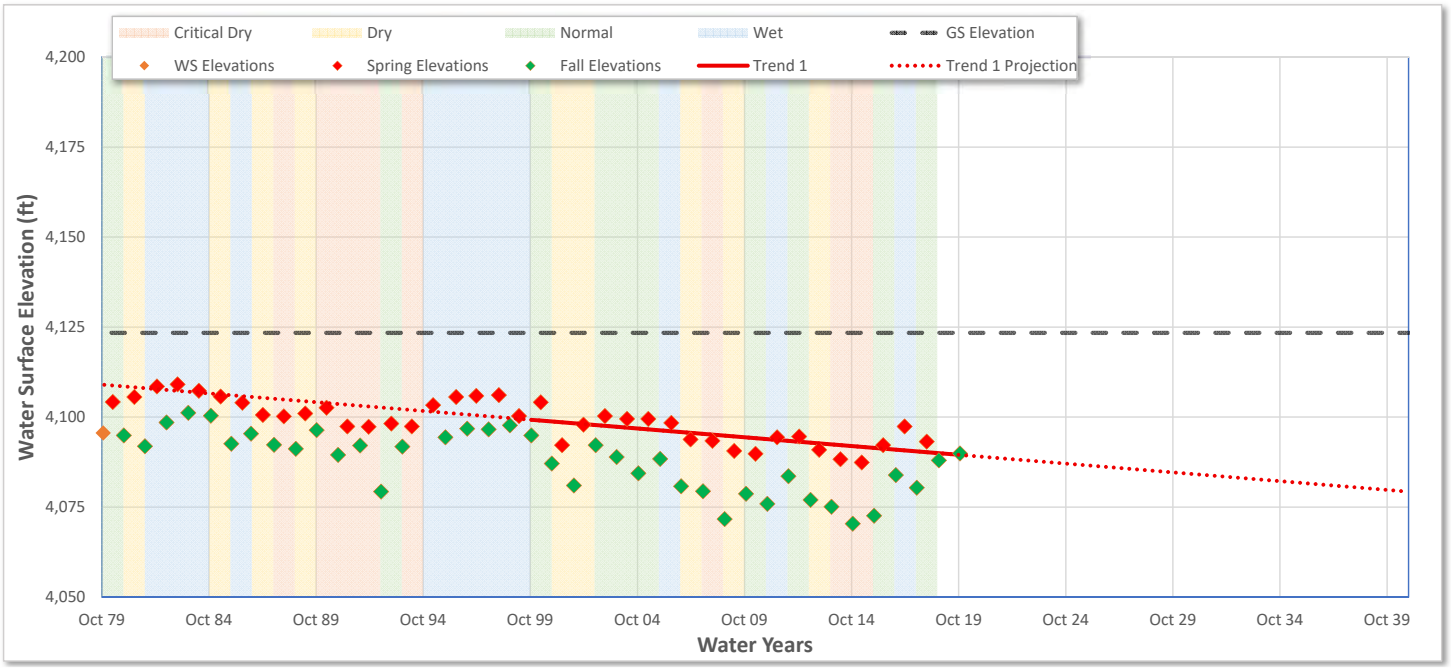
Well Type Information	
Well Type	-
Well Use	Residential
Completion Type	Single

Well Coordinates/Geometry		
Location	Lat:	41.1207
	Long:	-121.1395
Well Delth		84.00 ft
Ground Surface Elevation		4123.40 ft
Ref. Point Elevation		4123.40 ft

Well Period of Record		
Period-of-Record		1979..2020
WS Elev-Range	Min:	4070.4 ft
	Max	4109.1 ft

Trend Analsys		
Seasonal Data Method		Max/Min
Show Trend 1		Spring Data
Date Range	Start WY:	2000
	End WY:	2040
Extend Trend Line		Yes
Trend Results	Slope	(0.487 ft/yr)
Show Trend 2		None
Date Range	Start WY:	
	End WY:	
Extend Trend Line		No
Trend Results	Slope	

Water Surface Elevation (WSE) Hydrograph



Well Water Surface Level Report

Date: 2/19/2020

Well Information	
Well ID	086510-38N07E20B006M
Alternate Name	38N07E20B006M
State Number	38N07E20B006M
CASGEM ID	411242N1211866W001

Well Location	
County	Lassen
Basin	BIG VALLEY
Sub-Basin	-

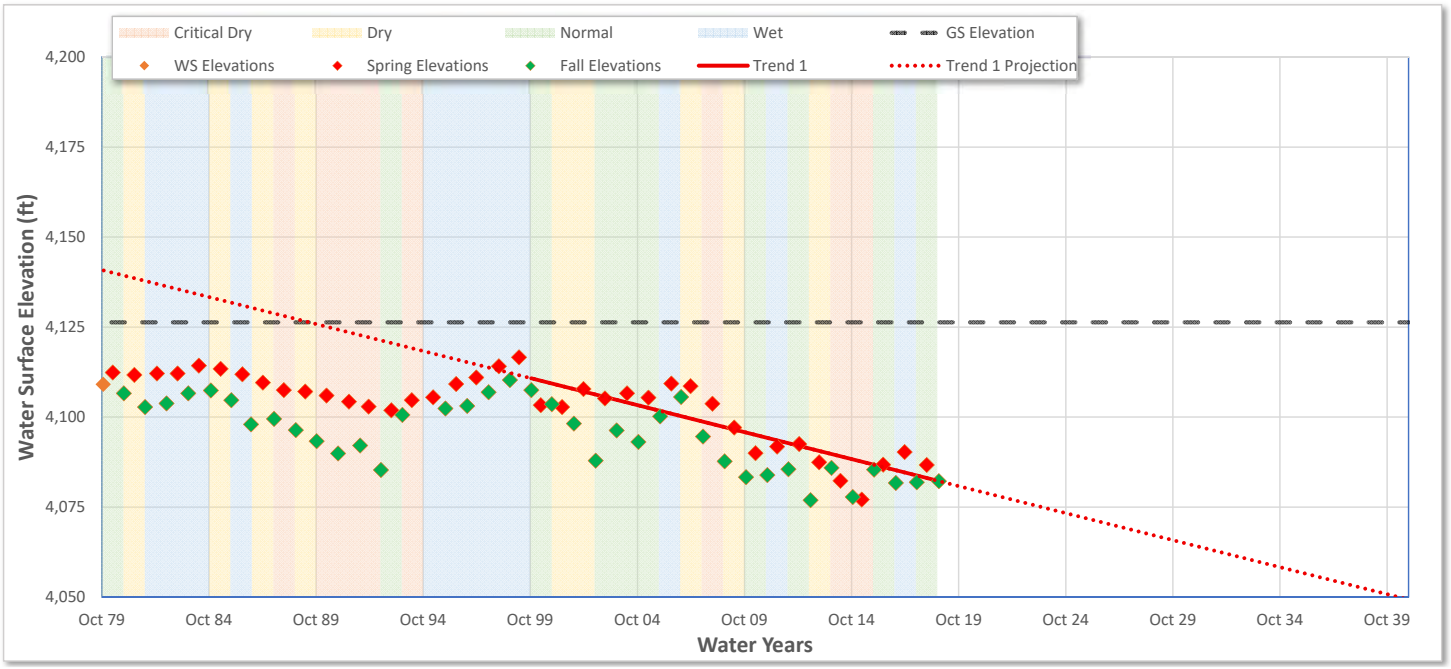
Well Type Information	
Well Type	-
Well Use	Residential
Completion Type	Single

Well Coordinates/Geometry		
Location	Lat:	41.1242
	Long:	-121.1866
Well Delth		183.00 ft
Ground Surface Elevation		4126.30 ft
Ref. Point Elevation		4127.30 ft

Well Period of Record		
Period-of-Record		1979..2019
WS Elev-Range	Min:	4076.9 ft
	Max	4116.6 ft

Trend Analsys		
Seasonal Data Method		Max/Min
Show Trend 1		Spring Data
Date Range	Start WY:	2000
	End WY:	2040
Extend Trend Line		Yes
Trend Results	Slope	(1.501 ft/yr)
Show Trend 2		None
Date Range	Start WY:	
	End WY:	
Extend Trend Line		No
Trend Results	Slope	

Water Surface Elevation (WSE) Hydrograph



Well Water Surface Level Report

Date: 2/19/2020

Well Information	
Well ID	087331-37N07E13K002M
Alternate Name	37N07E13K002M
State Number	37N07E13K002M
CASGEM ID	410413N1211147W001

Well Location	
County	Lassen
Basin	BIG VALLEY
Sub-Basin	-

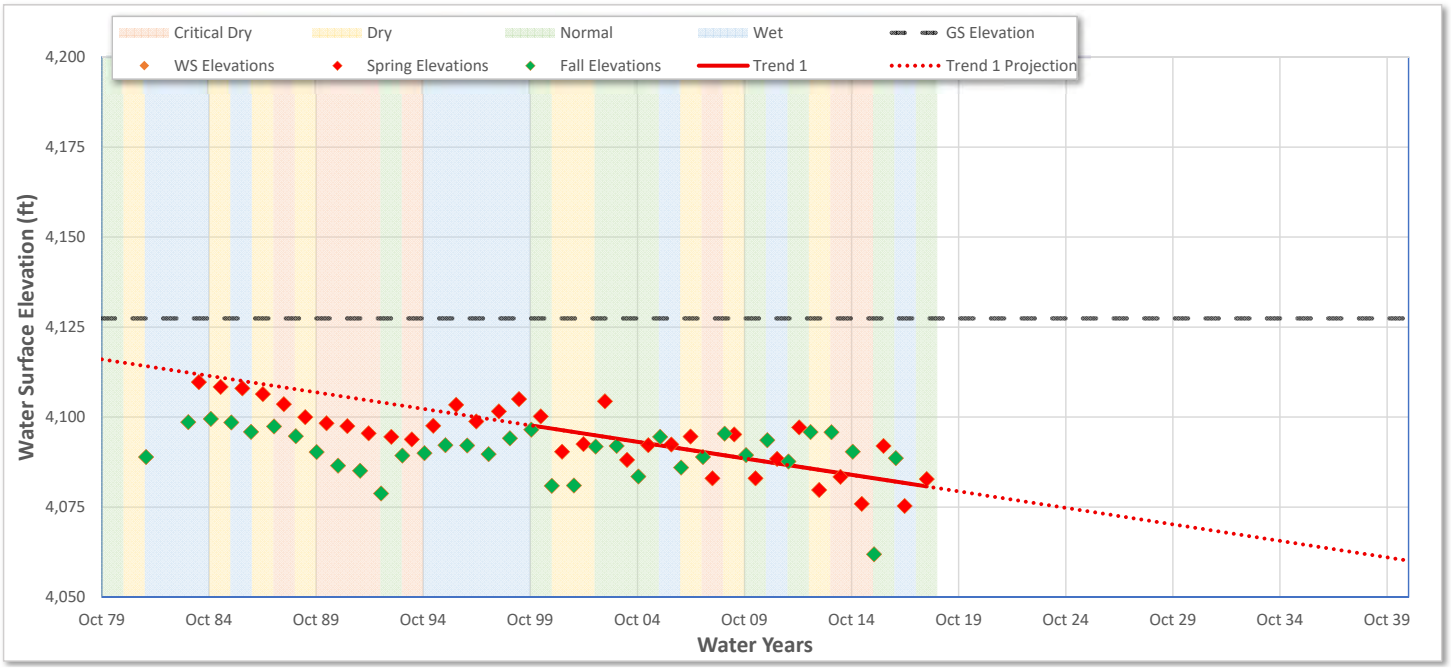
Well Type Information	
Well Type	-
Well Use	Irrigation
Completion Type	Single

Well Coordinates/Geometry		
Location	Lat:	41.0413
	Long:	-121.1147
Well Delth		260.00 ft
Ground Surface Elevation		4127.40 ft
Ref. Point Elevation		4127.90 ft

Well Period of Record		
Period-of-Record		1982..2018
WS Elev-Range	Min:	4061.9 ft
	Max	4109.7 ft

Trend Analsys		
Seasonal Data Method		Max/Min
Show Trend 1		Spring Data
Date Range	Start WY:	2000
	End WY:	2040
Extend Trend Line		Yes
Trend Results	Slope	(0.917 ft/yr)
Show Trend 2		None
Date Range	Start WY:	
	End WY:	
Extend Trend Line		No
Trend Results	Slope	

Water Surface Elevation (WSE) Hydrograph



Well Water Surface Level Report

Date: 2/19/2020

Well Information	
Well ID	087332-37N08E06C001M
Alternate Name	37N08E06C001M
State Number	37N08E06C001M
CASGEM ID	410777N1210986W001

Well Location	
County	Lassen
Basin	BIG VALLEY
Sub-Basin	-

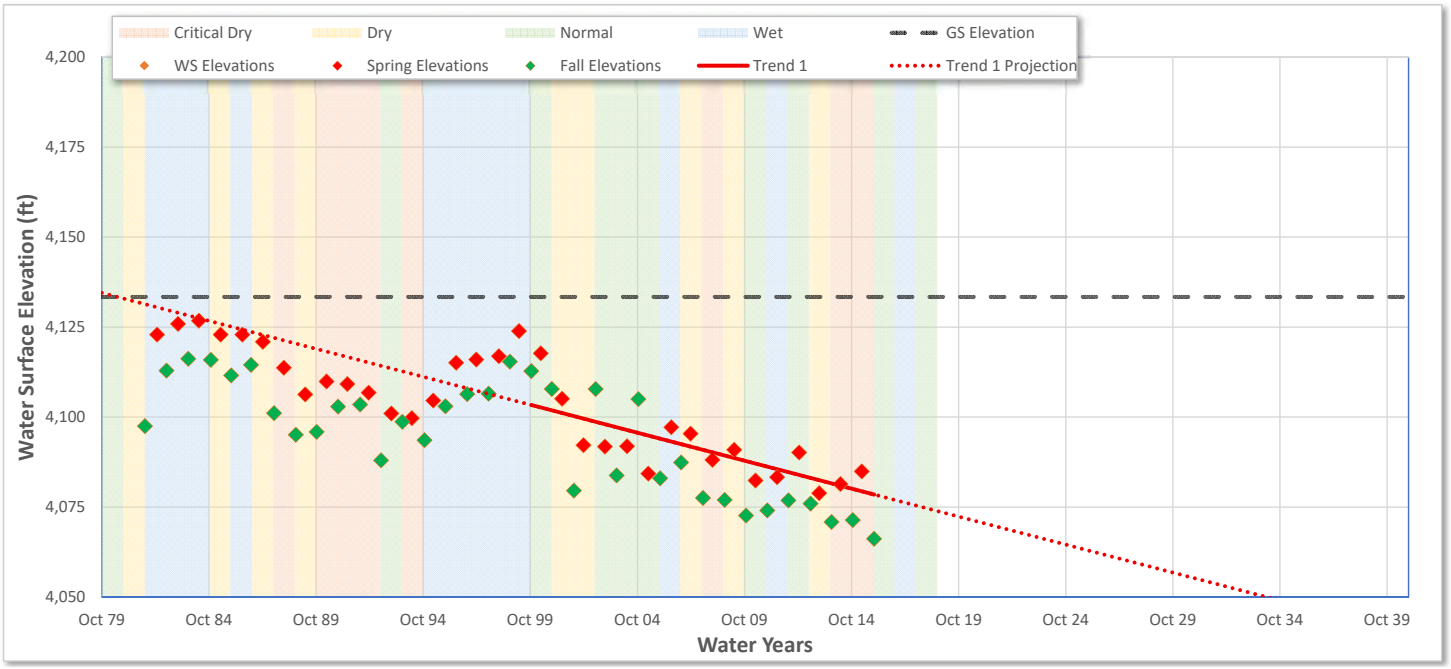
Well Type Information	
Well Type	-
Well Use	Irrigation
Completion Type	Single

Well Coordinates/Geometry		
Location	Lat:	41.0777
	Long:	-121.0986
Well Delth		400.00 ft
Ground Surface Elevation		4133.40 ft
Ref. Point Elevation		4133.90 ft

Well Period of Record		
Period-of-Record		1982..2016
WS Elev-Range	Min:	4066.2 ft
	Max	4126.8 ft

Trend Analsys		
Seasonal Data Method		Max/Min
Show Trend 1		Spring Data
Date Range	Start WY:	2000
	End WY:	2040
Extend Trend Line		Yes
Trend Results	Slope	(1.553 ft/yr)
Show Trend 2		None
Date Range	Start WY:	
	End WY:	
Extend Trend Line		No
Trend Results	Slope	

Water Surface Elevation (WSE) Hydrograph



Well Water Surface Level Report

Date: 2/19/2020

Well Information	
Well ID	087199-39N07E26E001M
Alternate Name	39N07E26E001M
State Number	39N07E26E001M
CASGEM ID	411911N1211354W001

Well Location	
County	Modoc
Basin	BIG VALLEY
Sub-Basin	-

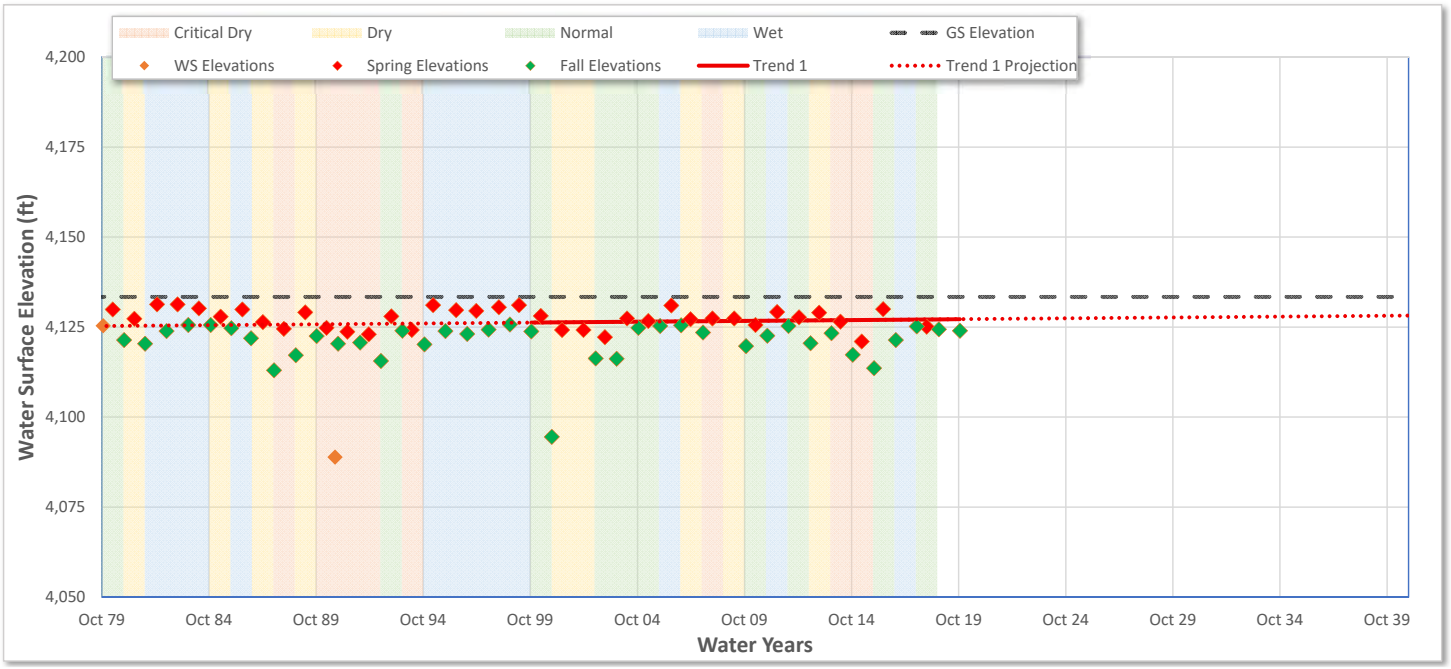
Well Type Information	
Well Type	-
Well Use	Irrigation
Completion Type	Single

Well Coordinates/Geometry		
Location	Lat:	41.1911
	Long:	-121.1354
Well Delth		400.00 ft
Ground Surface Elevation		4133.40 ft
Ref. Point Elevation		4135.00 ft

Well Period of Record		
Period-of-Record		1979..2020
WS Elev-Range	Min:	4088.9 ft
	Max	4131.3 ft

Trend Analsys		
Seasonal Data Method		Max/Min
Show Trend 1		Spring Data
Date Range	Start WY:	2000
	End WY:	2040
Extend Trend Line		Yes
Trend Results	Slope	0.048 ft/yr
Show Trend 2		None
Date Range	Start WY:	
	End WY:	
Extend Trend Line		No
Trend Results	Slope	

Water Surface Elevation (WSE) Hydrograph



Well Water Surface Level Report

Date: 2/19/2020

Well Information	
Well ID	087189-38N07E24J002M
Alternate Name	38N07E24J002M
State Number	38N07E24J002M
CASGEM ID	411228N1211054W001

Well Location	
County	Lassen
Basin	BIG VALLEY
Sub-Basin	-

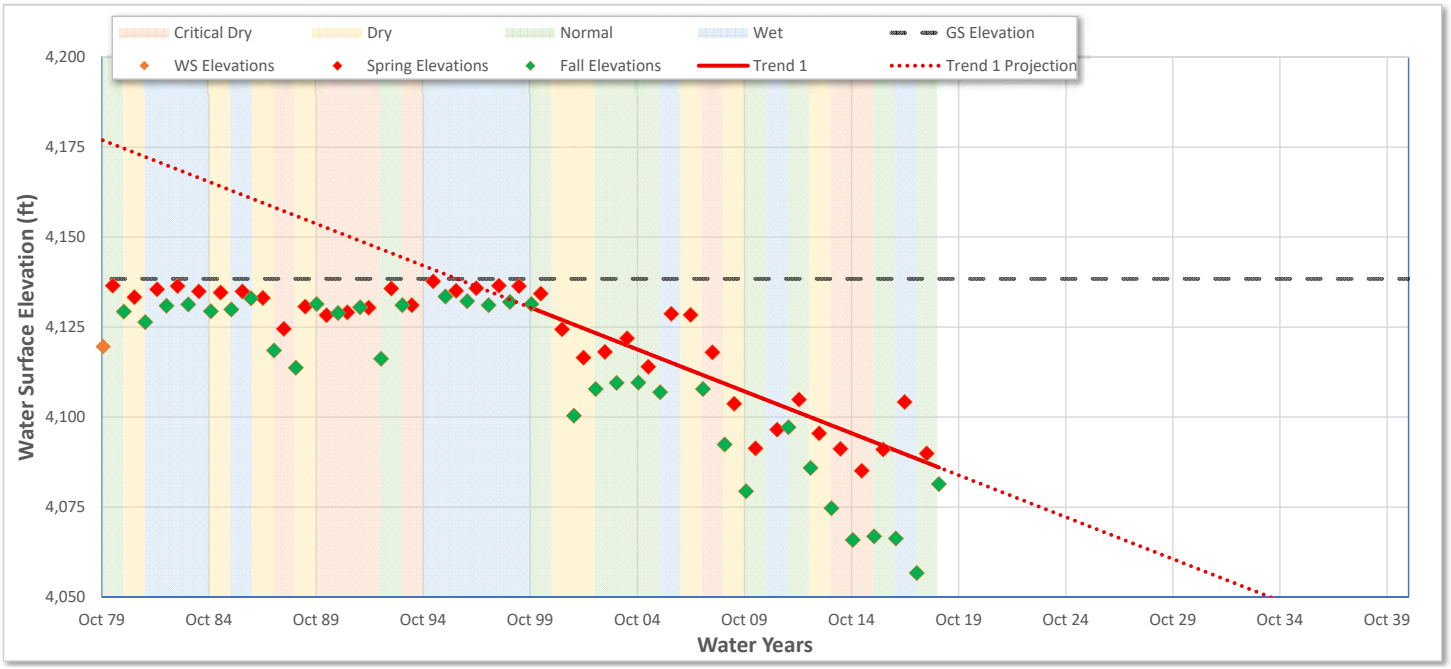
Well Type Information	
Well Type	-
Well Use	Irrigation
Completion Type	Single

Well Coordinates/Geometry		
Location	Lat:	41.1226
	Long:	-121.1054
Well Delth		192.00 ft
Ground Surface Elevation		4138.40 ft
Ref. Point Elevation		4139.40 ft

Well Period of Record		
Period-of-Record		1979..2019
WS Elev-Range	Min:	4056.7 ft
	Max	4137.7 ft

Trend Analsys		
Seasonal Data Method		Max/Min
Show Trend 1		Spring Data
Date Range	Start WY:	2000
	End WY:	2040
Extend Trend Line		Yes
Trend Results	Slope	(2.328 ft/yr)
Show Trend 2		None
Date Range	Start WY:	
	End WY:	
Extend Trend Line		No
Trend Results	Slope	

Water Surface Elevation (WSE) Hydrograph



Well Water Surface Level Report

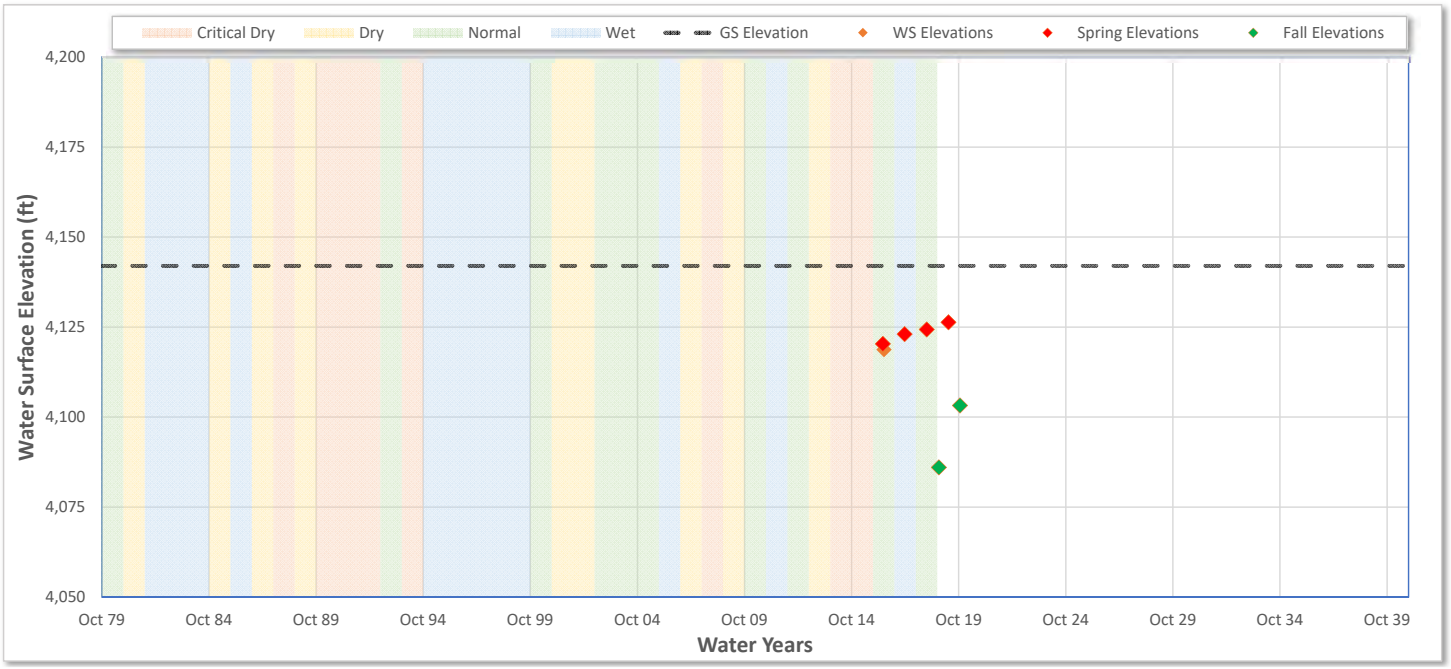
Date: 2/19/2020

Well Information	
Well ID	087403-ACWA-1
Alternate Name	ACWA-1
State Number	38N08E07A001M
CASGEM ID	411508N1210900W001
Well Location	
County	Lassen
Basin	BIG VALLEY
Sub-Basin	-
Well Type Information	
Well Type	-
Well Use	Irrigation
Completion Type	Single

Well Coordinates/Geometry		
Location	Lat:	41.1508
	Long:	-121.0900
Well Delth		780.00 ft
Ground Surface Elevation		4142.00 ft
Ref. Point Elevation		4142.75 ft
Well Period of Record		
Period-of-Record		2016..2020
WS Elev-Range	Min:	4039.2 ft
	Max	4126.4 ft

Trend Analsys		
Seasonal Data Method		Max/Min
Show Trend 1		Spring Data
Date Range	Start WY:	2000
	End WY:	2040
Extend Trend Line		Yes
Trend Results	Slope	1.889 ft/yr
Show Trend 2		None
Date Range	Start WY:	
	End WY:	
Extend Trend Line		No
Trend Results	Slope	

Water Surface Elevation (WSE) Hydrograph



Well Water Surface Level Report

Date: 2/19/2020

Well Information	
Well ID	086615-38N07E12G001M
Alternate Name	38N07E12G001M
State Number	38N07E12G001M
CASGEM ID	411467N1211110W001

Well Location	
County	Lassen
Basin	BIG VALLEY
Sub-Basin	-

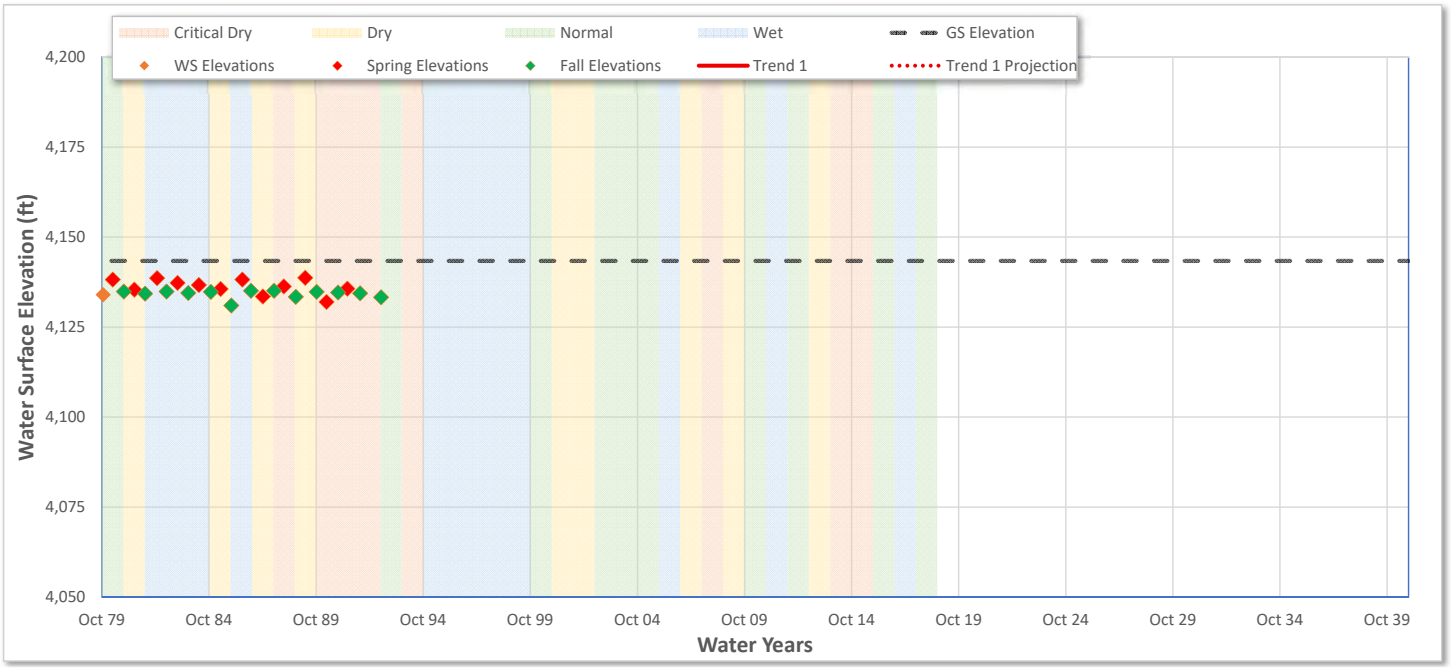
Well Type Information	
Well Type	-
Well Use	Residential
Completion Type	Single

Well Coordinates/Geometry		
Location	Lat:	41.1467
	Long:	-121.1110
Well Delth		116.00 ft
Ground Surface Elevation		4143.38 ft
Ref. Point Elevation		4144.38 ft

Well Period of Record		
Period-of-Record		1979..1993
WS Elev-Range	Min:	4131.0 ft
	Max	4138.7 ft

Trend Analsys		
Seasonal Data Method		Max/Min
Show Trend 1		Spring Data
Date Range	Start WY:	2000
	End WY:	2040
Extend Trend Line		Yes
Trend Results	Slope	-
Show Trend 2		None
Date Range	Start WY:	
	End WY:	
Extend Trend Line		No
Trend Results	Slope	

Water Surface Elevation (WSE) Hydrograph



Well Water Surface Level Report

Date: 2/19/2020

Well Information	
Well ID	086206-ACWA-2
Alternate Name	ACWA-2
State Number	39N08E33P002M
CASGEM ID	411699N1210579W001

Well Location	
County	Lassen
Basin	BIG VALLEY
Sub-Basin	-

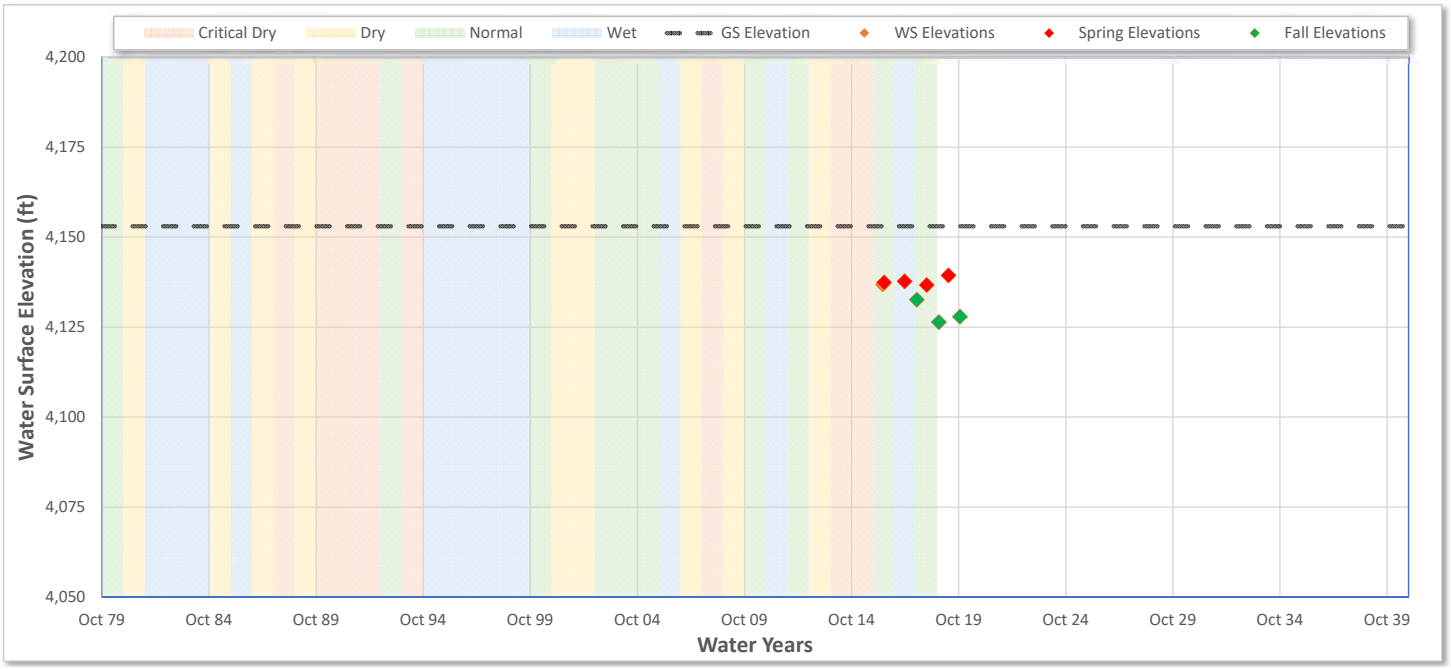
Well Type Information	
Well Type	-
Well Use	Irrigation
Completion Type	Single

Well Coordinates/Geometry		
Location	Lat:	41.1699
	Long:	-121.0579
Well Delth		800.00 ft
Ground Surface Elevation		4153.00 ft
Ref. Point Elevation		4153.20 ft

Well Period of Record		
Period-of-Record		2016..2020
WS Elev-Range	Min:	4126.4 ft
	Max	4139.4 ft

Trend Analsys		
Seasonal Data Method		Max/Min
Show Trend 1		Spring Data
Date Range	Start WY:	2000
	End WY:	2040
Extend Trend Line		Yes
Trend Results	Slope	0.484 ft/yr
Show Trend 2		None
Date Range	Start WY:	
	End WY:	
Extend Trend Line		No
Trend Results	Slope	

Water Surface Elevation (WSE) Hydrograph



Well Water Surface Level Report

Date: 2/19/2020

Well Information	
Well ID	087193-38N08E17K001M
Alternate Name	38N08E17K001M
State Number	38N08E17K001M
CASGEM ID	411320N1210766W001

Well Location	
County	Lassen
Basin	BIG VALLEY
Sub-Basin	-

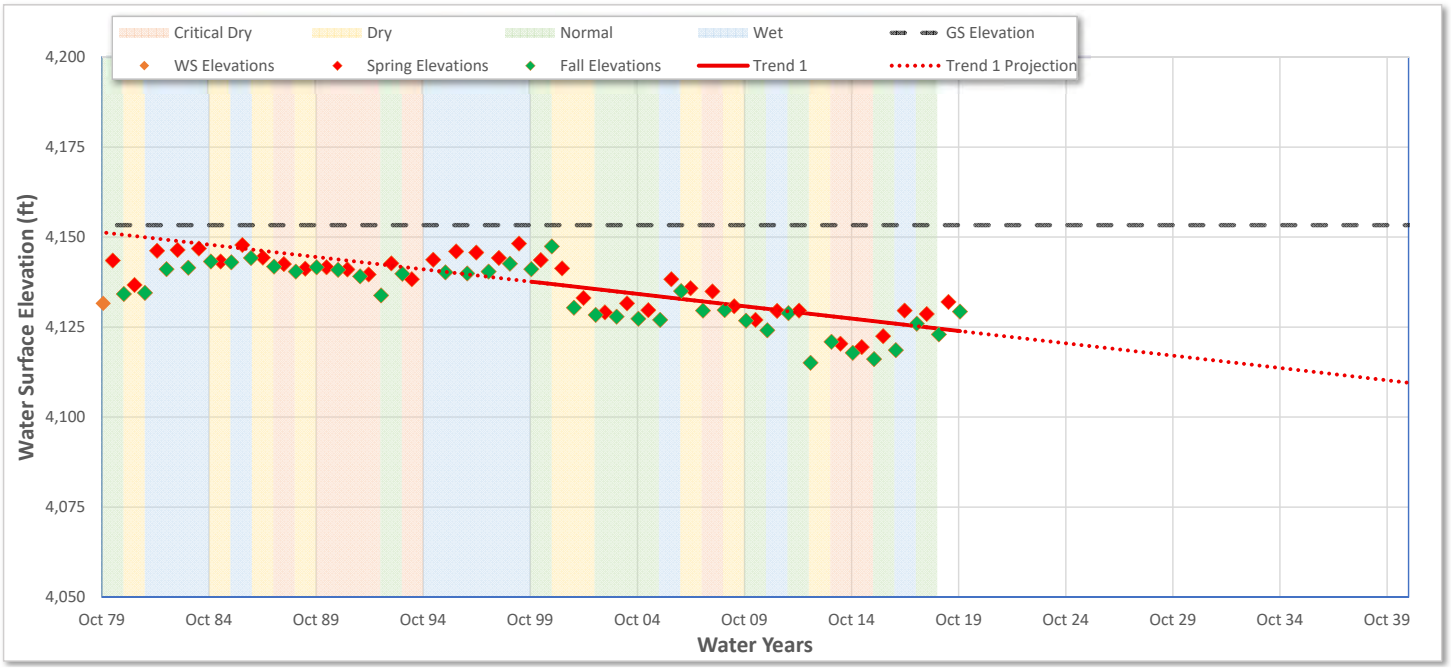
Well Type Information	
Well Type	-
Well Use	Residential
Completion Type	Single

Well Coordinates/Geometry		
Location	Lat:	41.1320
	Long:	-121.0766
Well Delth		180.00 ft
Ground Surface Elevation		4153.30 ft
Ref. Point Elevation		4154.30 ft

Well Period of Record		
Period-of-Record		1957..2020
WS Elev-Range	Min:	4115.1 ft
	Max	4150.0 ft

Trend Analsys		
Seasonal Data Method		Max/Min
Show Trend 1		Spring Data
Date Range	Start WY:	2000
	End WY:	2040
Extend Trend Line		Yes
Trend Results	Slope	(0.685 ft/yr)
Show Trend 2		None
Date Range	Start WY:	
	End WY:	
Extend Trend Line		No
Trend Results	Slope	

Water Surface Elevation (WSE) Hydrograph



Well Water Surface Level Report

Date: 2/19/2020

Well Information	
Well ID	087526-ACWA-3
Alternate Name	ACWA-3
State Number	39N08E28A001M
CASGEM ID	411938N1210478W001

Well Location	
County	Modoc
Basin	BIG VALLEY
Sub-Basin	-

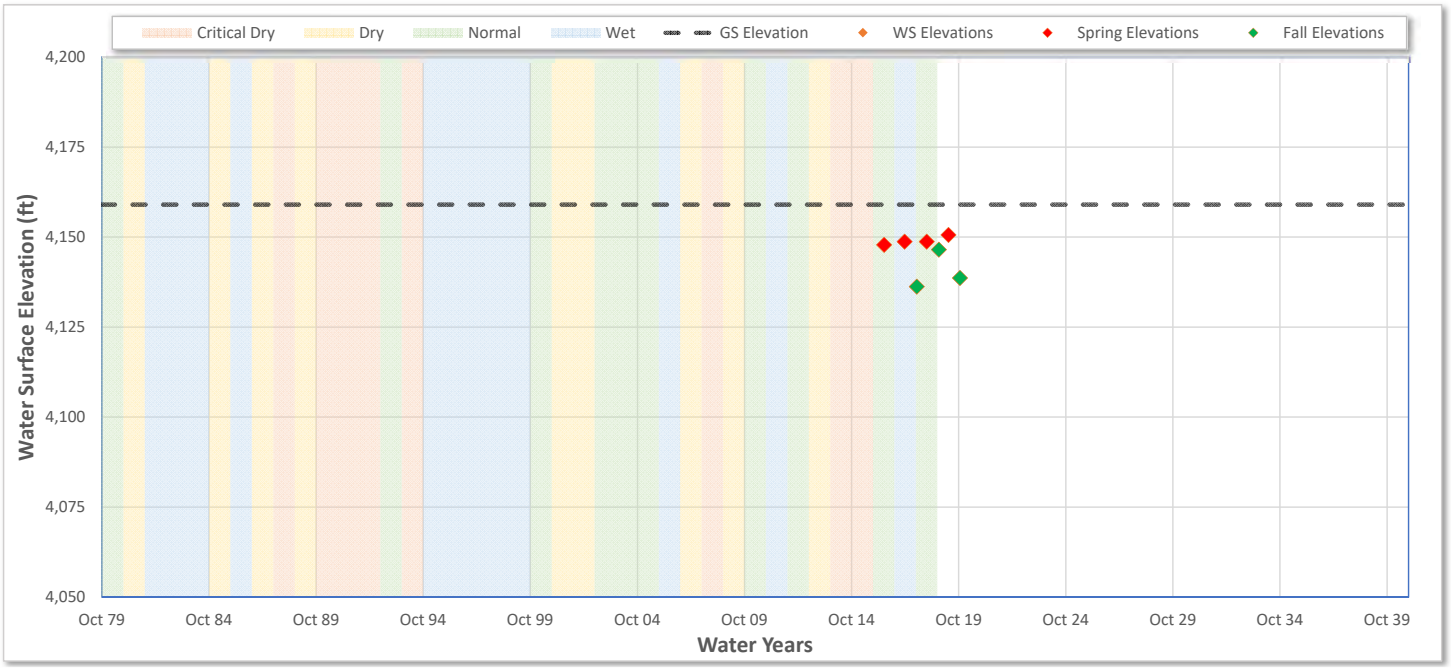
Well Type Information	
Well Type	-
Well Use	Irrigation
Completion Type	Single

Well Coordinates/Geometry		
Location	Lat:	41.1938
	Long:	-121.0478
Well Delth		720.00 ft
Ground Surface Elevation		4159.00 ft
Ref. Point Elevation		4159.83 ft

Well Period of Record		
Period-of-Record		2016..2020
WS Elev-Range	Min:	4136.2 ft
	Max	4150.6 ft

Trend Analsys		
Seasonal Data Method		Max/Min
Show Trend 1		Spring Data
Date Range	Start WY:	2000
	End WY:	2040
Extend Trend Line		Yes
Trend Results	Slope	0.821 ft/yr
Show Trend 2		None
Date Range	Start WY:	
	End WY:	
Extend Trend Line		No
Trend Results	Slope	

Water Surface Elevation (WSE) Hydrograph



Well Water Surface Level Report

Date: 2/19/2020

Well Information	
Well ID	087201-39N08E21C001M
Alternate Name	39N08E21C001M
State Number	39N08E21C001M
CASGEM ID	412086N1210574W001

Well Location	
County	Modoc
Basin	BIG VALLEY
Sub-Basin	-

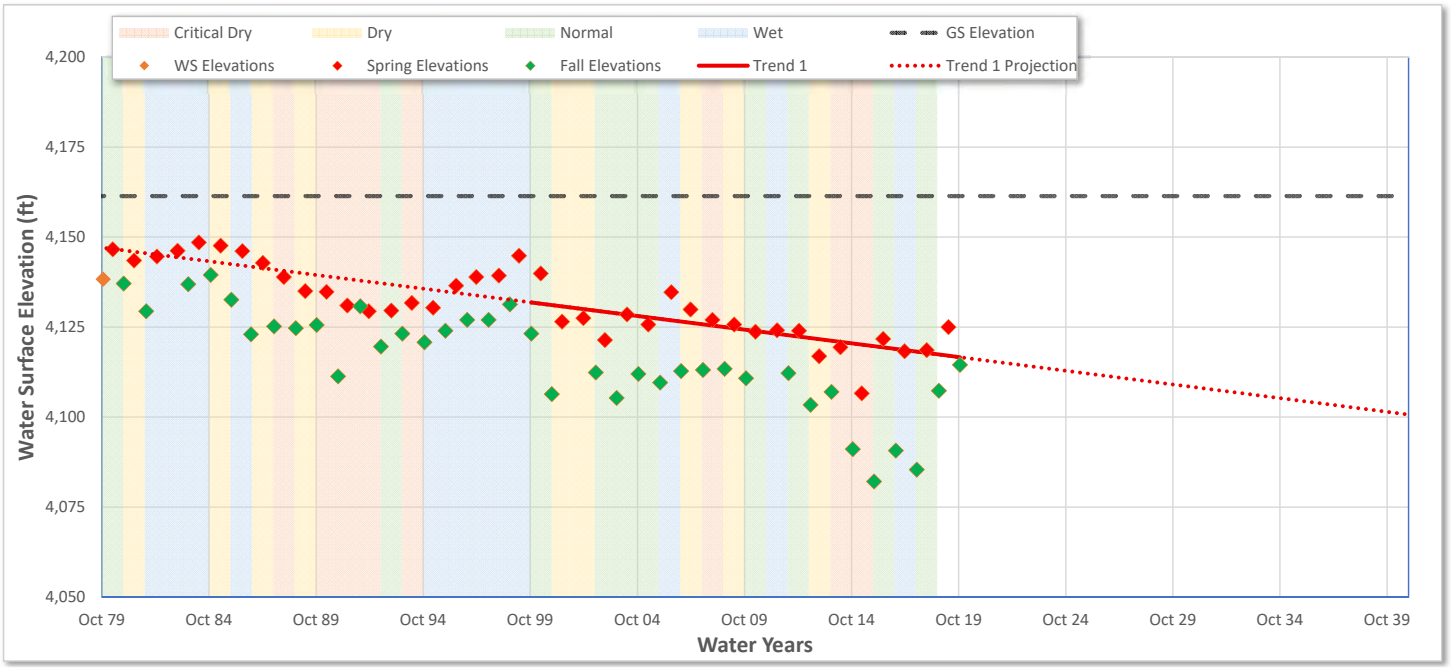
Well Type Information	
Well Type	-
Well Use	Irrigation
Completion Type	Single

Well Coordinates/Geometry		
Location	Lat:	41.2084
	Long:	-121.0576
Well Delth		300.00 ft
Ground Surface Elevation		4161.40 ft
Ref. Point Elevation		4161.70 ft

Well Period of Record		
Period-of-Record		1979..2020
WS Elev-Range	Min:	4082.1 ft
	Max	4148.5 ft

Trend Analsys		
Seasonal Data Method		Max/Min
Show Trend 1		Spring Data
Date Range	Start WY:	2000
	End WY:	2040
Extend Trend Line		Yes
Trend Results	Slope	(0.760 ft/yr)
Show Trend 2		None
Date Range	Start WY:	
	End WY:	
Extend Trend Line		No
Trend Results	Slope	

Water Surface Elevation (WSE) Hydrograph



Well Water Surface Level Report

Date: 2/19/2020

Well Information	
Well ID	087191-38N08E03D001M
Alternate Name	38N08E03D001M
State Number	38N08E03D001M
CASGEM ID	411647N1210358W001

Well Location	
County	Lassen
Basin	BIG VALLEY
Sub-Basin	-

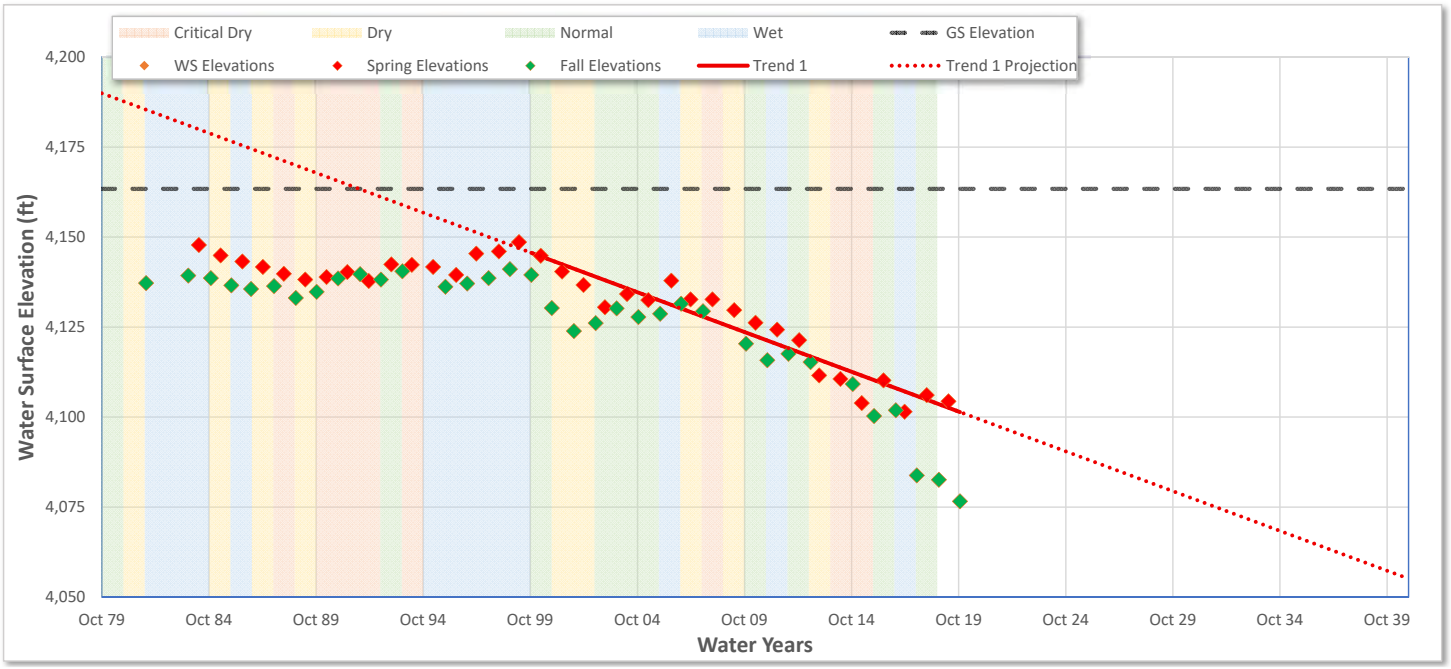
Well Type Information	
Well Type	-
Well Use	Irrigation
Completion Type	Single

Well Coordinates/Geometry		
Location	Lat:	41.1646
	Long:	-121.0360
Well Delth		280.00 ft
Ground Surface Elevation		4163.40 ft
Ref. Point Elevation		4163.40 ft

Well Period of Record		
Period-of-Record		1982..2020
WS Elev-Range	Min:	4076.6 ft
	Max	4148.6 ft

Trend Analsys		
Seasonal Data Method		Max/Min
Show Trend 1		Spring Data
Date Range	Start WY:	2000
	End WY:	2040
Extend Trend Line		Yes
Trend Results	Slope	(2.210 ft/yr)
Show Trend 2		None
Date Range	Start WY:	
	End WY:	
Extend Trend Line		No
Trend Results	Slope	

Water Surface Elevation (WSE) Hydrograph



Well Water Surface Level Report

Date: 2/19/2020

Well Information	
Well ID	087200-39N08E18N002M
Alternate Name	39N08E18N002M
State Number	39N08E18N002M
CASGEM ID	412144N1211013W001

Well Location	
County	Modoc
Basin	BIG VALLEY
Sub-Basin	-

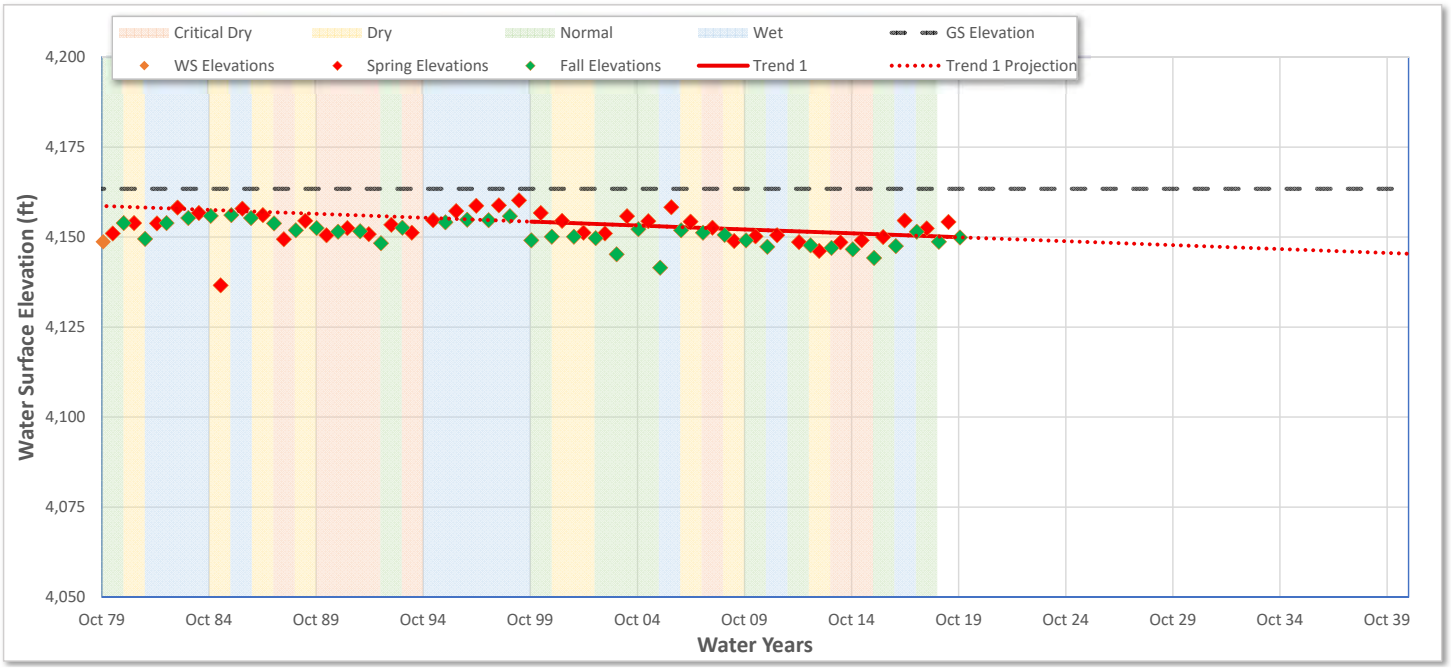
Well Type Information	
Well Type	-
Well Use	Residential
Completion Type	Single

Well Coordinates/Geometry		
Location	Lat:	41.2144
	Long:	-121.1013
Well Delth		250.00 ft
Ground Surface Elevation		4163.40 ft
Ref. Point Elevation		4164.40 ft

Well Period of Record		
Period-of-Record		1979..2020
WS Elev-Range	Min:	4136.6 ft
	Max	4160.2 ft

Trend Analsys		
Seasonal Data Method		Max/Min
Show Trend 1		Spring Data
Date Range	Start WY:	2000
	End WY:	2040
Extend Trend Line		Yes
Trend Results	Slope	(0.217 ft/yr)
Show Trend 2		None
Date Range	Start WY:	
	End WY:	
Extend Trend Line		No
Trend Results	Slope	

Water Surface Elevation (WSE) Hydrograph



Well Water Surface Level Report

Date: 2/19/2020

Well Information	
Well ID	087192-38N08E16D001M
Alternate Name	38N08E16D001M
State Number	38N08E16D001M
CASGEM ID	411359N1210625W001

Well Location	
County	Lassen
Basin	BIG VALLEY
Sub-Basin	-

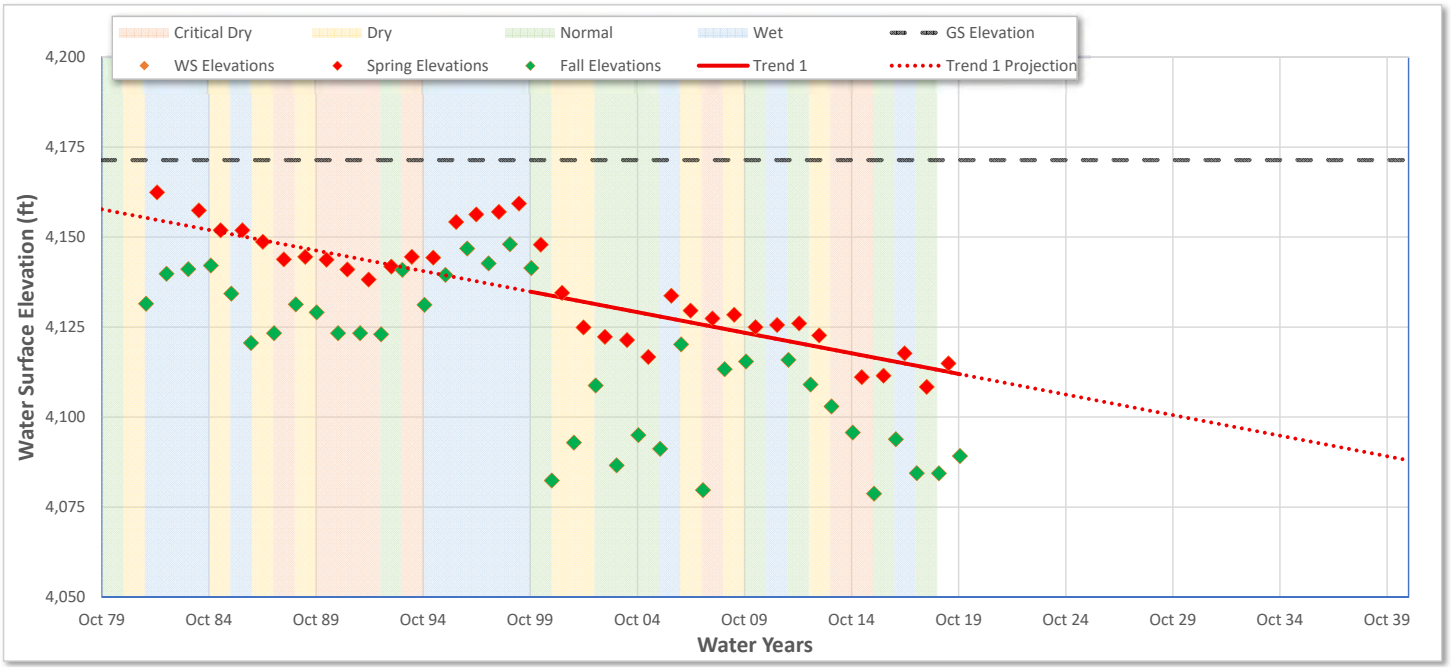
Well Type Information	
Well Type	-
Well Use	Irrigation
Completion Type	Single

Well Coordinates/Geometry		
Location	Lat:	41.1358
	Long:	-121.0625
Well Delth		491.00 ft
Ground Surface Elevation		4171.40 ft
Ref. Point Elevation		4171.60 ft

Well Period of Record		
Period-of-Record		1982..2020
WS Elev-Range	Min:	4078.7 ft
	Max	4162.4 ft

Trend Analsys		
Seasonal Data Method		Max/Min
Show Trend 1		Spring Data
Date Range	Start WY:	2000
	End WY:	2040
Extend Trend Line		Yes
Trend Results	Slope	(1.143 ft/yr)
Show Trend 2		None
Date Range	Start WY:	
	End WY:	
Extend Trend Line		No
Trend Results	Slope	

Water Surface Elevation (WSE) Hydrograph



Well Water Surface Level Report

Date: 2/19/2020

Well Information	
Well ID	087197-39N07E01A001M
Alternate Name	39N07E01A001M
State Number	39N07E01A001M
CASGEM ID	412539N1211050W001

Well Location	
County	Modoc
Basin	BIG VALLEY
Sub-Basin	-

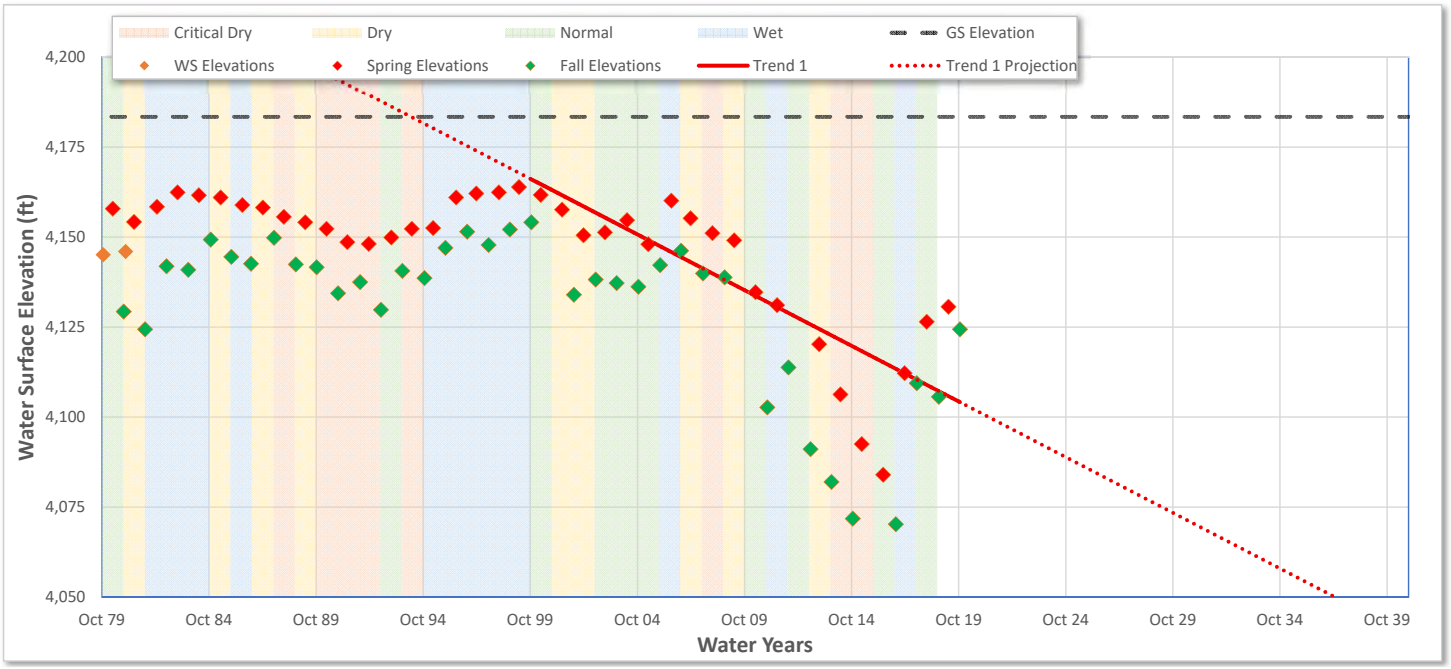
Well Type Information	
Well Type	-
Well Use	Stockwatering
Completion Type	Single

Well Coordinates/Geometry		
Location	Lat:	41.2539
	Long:	-121.1050
Well Delth		300.00 ft
Ground Surface Elevation		4183.40 ft
Ref. Point Elevation		4184.40 ft

Well Period of Record		
Period-of-Record		1979..2020
WS Elev-Range	Min:	4035.4 ft
	Max	4163.9 ft

Trend Analsys		
Seasonal Data Method		Max/Min
Show Trend 1		Spring Data
Date Range	Start WY:	2000
	End WY:	2040
Extend Trend Line		Yes
Trend Results	Slope	(3.092 ft/yr)
Show Trend 2		None
Date Range	Start WY:	
	End WY:	
Extend Trend Line		No
Trend Results	Slope	

Water Surface Elevation (WSE) Hydrograph



Well Water Surface Level Report

Date: 2/19/2020

Well Information	
Well ID	087204-39N09E28F001M
Alternate Name	39N09E28F001M
State Number	39N09E28F001M
CASGEM ID	411907N1209447W001

Well Location	
County	Modoc
Basin	BIG VALLEY
Sub-Basin	-

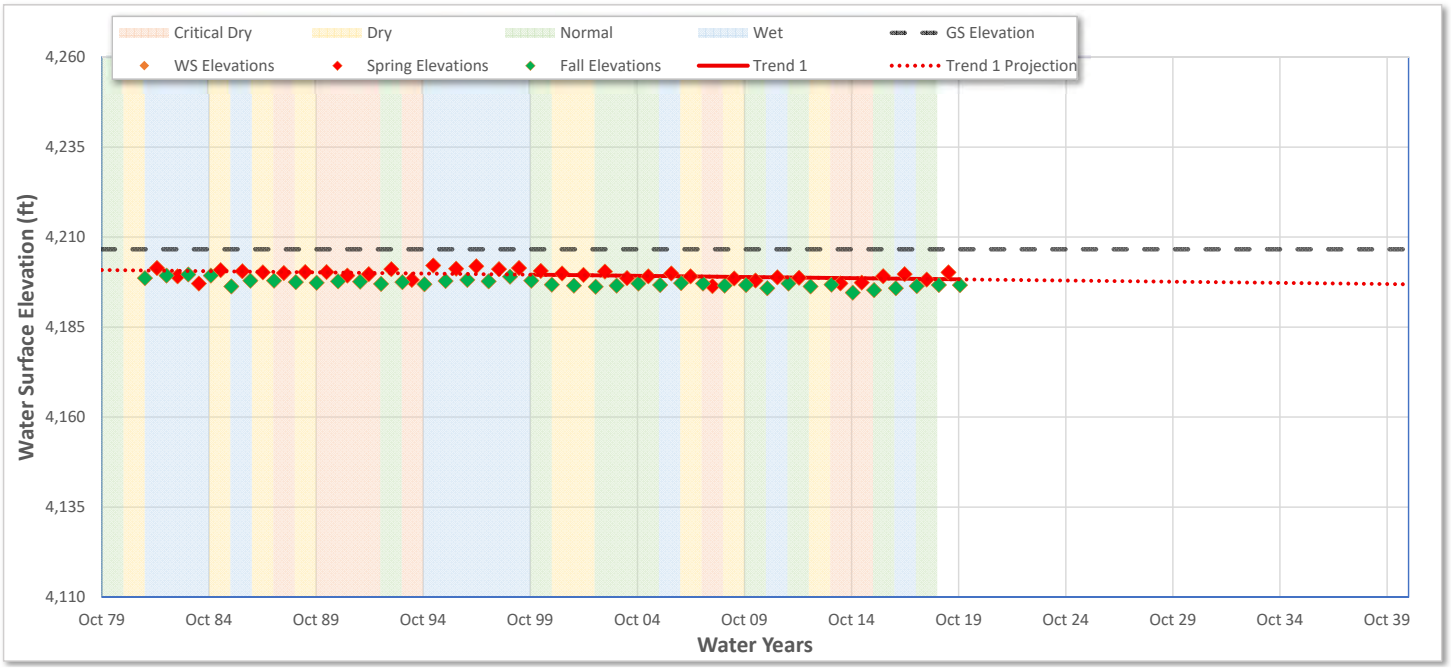
Well Type Information	
Well Type	-
Well Use	Residential
Completion Type	Single

Well Coordinates/Geometry		
Location	Lat:	41.1907
	Long:	-120.9447
Well Delth		73.00 ft
Ground Surface Elevation		4206.60 ft
Ref. Point Elevation		4207.10 ft

Well Period of Record		
Period-of-Record		1982..2020
WS Elev-Range	Min:	4194.6 ft
	Max	4202.1 ft

Trend Analsys		
Seasonal Data Method		Max/Min
Show Trend 1		Spring Data
Date Range	Start WY:	2000
	End WY:	2040
Extend Trend Line		Yes
Trend Results	Slope	(0.065 ft/yr)
Show Trend 2		None
Date Range	Start WY:	
	End WY:	
Extend Trend Line		No
Trend Results	Slope	

Water Surface Elevation (WSE) Hydrograph



Well Water Surface Level Report

Date: 2/19/2020

Well Information	
Well ID	087205-39N09E32R001M
Alternate Name	39N09E32R001M
State Number	39N09E32R001M
CASGEM ID	411649N1209569W001

Well Location	
County	Lassen
Basin	BIG VALLEY
Sub-Basin	-

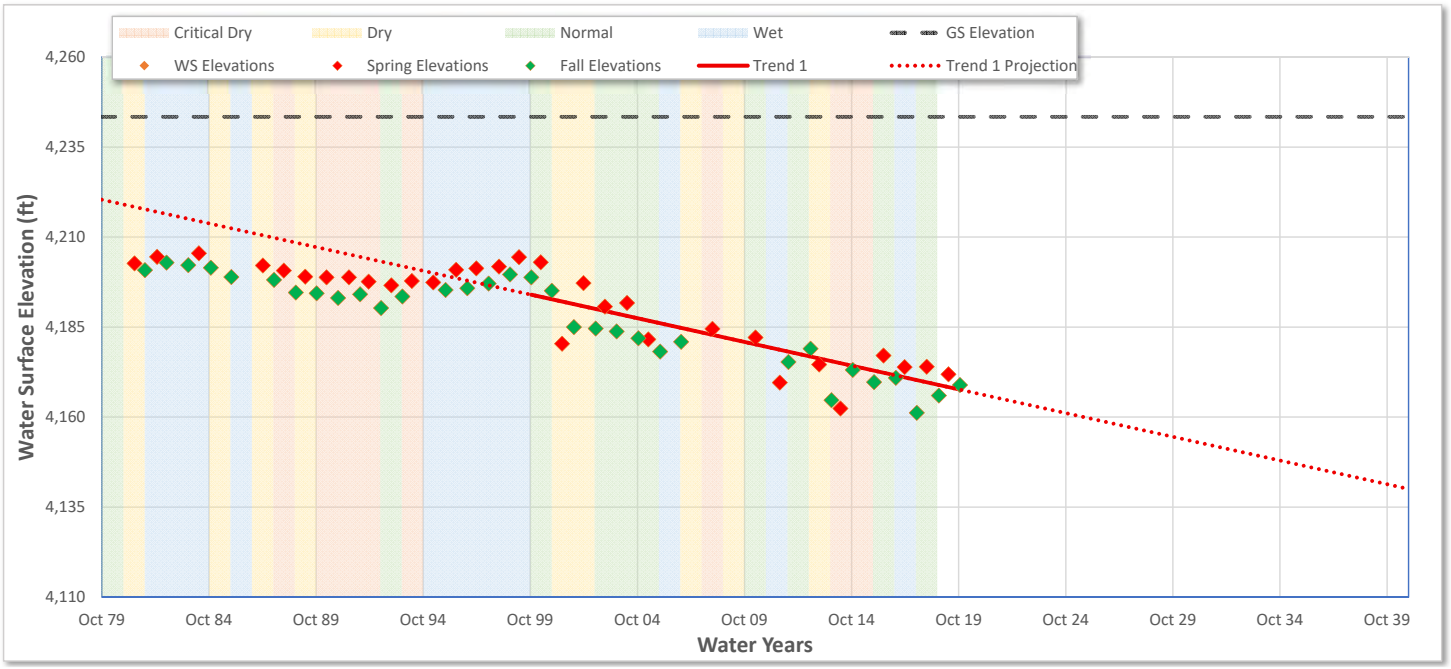
Well Type Information	
Well Type	-
Well Use	Irrigation
Completion Type	Single

Well Coordinates/Geometry		
Location	Lat:	41.1680
	Long:	-120.9570
Well Delth		-
Ground Surface Elevation		4243.40 ft
Ref. Point Elevation		4243.60 ft

Well Period of Record		
Period-of-Record		1981..2020
WS Elev-Range	Min:	4161.2 ft
	Max	4205.5 ft

Trend Analsys		
Seasonal Data Method		Max/Min
Show Trend 1		Spring Data
Date Range	Start WY:	2000
	End WY:	2040
Extend Trend Line		Yes
Trend Results	Slope	(1.317 ft/yr)
Show Trend 2		None
Date Range	Start WY:	
	End WY:	
Extend Trend Line		No
Trend Results	Slope	

Water Surface Elevation (WSE) Hydrograph



Well Water Surface Level Report

Date: 2/19/2020

Well Information	
Well ID	087195-38N09E18E001M
Alternate Name	38N09E18E001M
State Number	38N09E18E001M
CASGEM ID	411356N1209900W001

Well Location	
County	Lassen
Basin	BIG VALLEY
Sub-Basin	-

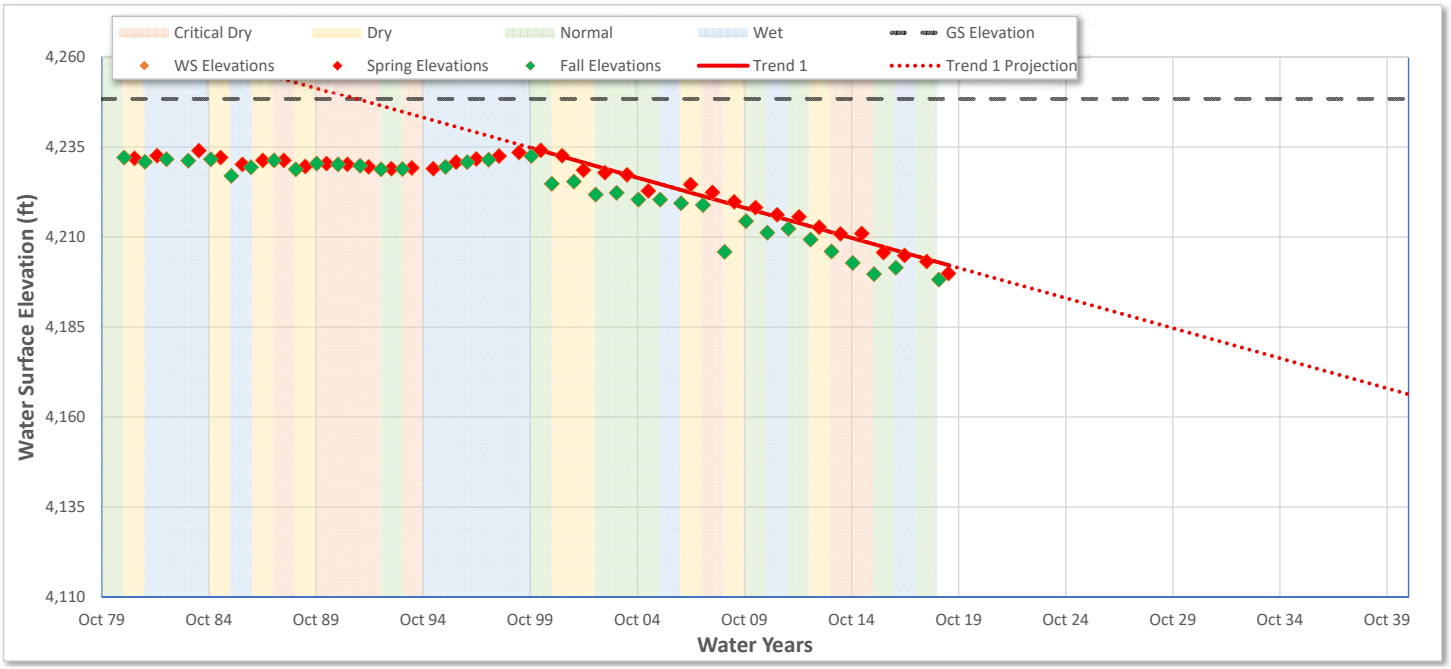
Well Type Information	
Well Type	-
Well Use	Irrigation
Completion Type	Single

Well Coordinates/Geometry		
Location	Lat:	41.1356
	Long:	-120.9900
Well Delth		520.00 ft
Ground Surface Elevation		4248.40 ft
Ref. Point Elevation		4249.50 ft

Well Period of Record		
Period-of-Record		1981..2019
WS Elev-Range	Min:	4198.2 ft
	Max	4234.1 ft

Trend Analsys		
Seasonal Data Method		Max/Min
Show Trend 1		Spring Data
Date Range	Start WY:	2000
	End WY:	2040
Extend Trend Line		Yes
Trend Results	Slope	(1.671 ft/yr)
Show Trend 2		None
Date Range	Start WY:	
	End WY:	
Extend Trend Line		No
Trend Results	Slope	

Water Surface Elevation (WSE) Hydrograph



Well Water Surface Level Report

Date: 2/19/2020

Well Information	
Well ID	087194-38N09E08F001M
Alternate Name	38N09E08F001M
State Number	38N09E08F001M
CASGEM ID	411493N1209656W001

Well Location	
County	Lassen
Basin	BIG VALLEY
Sub-Basin	-

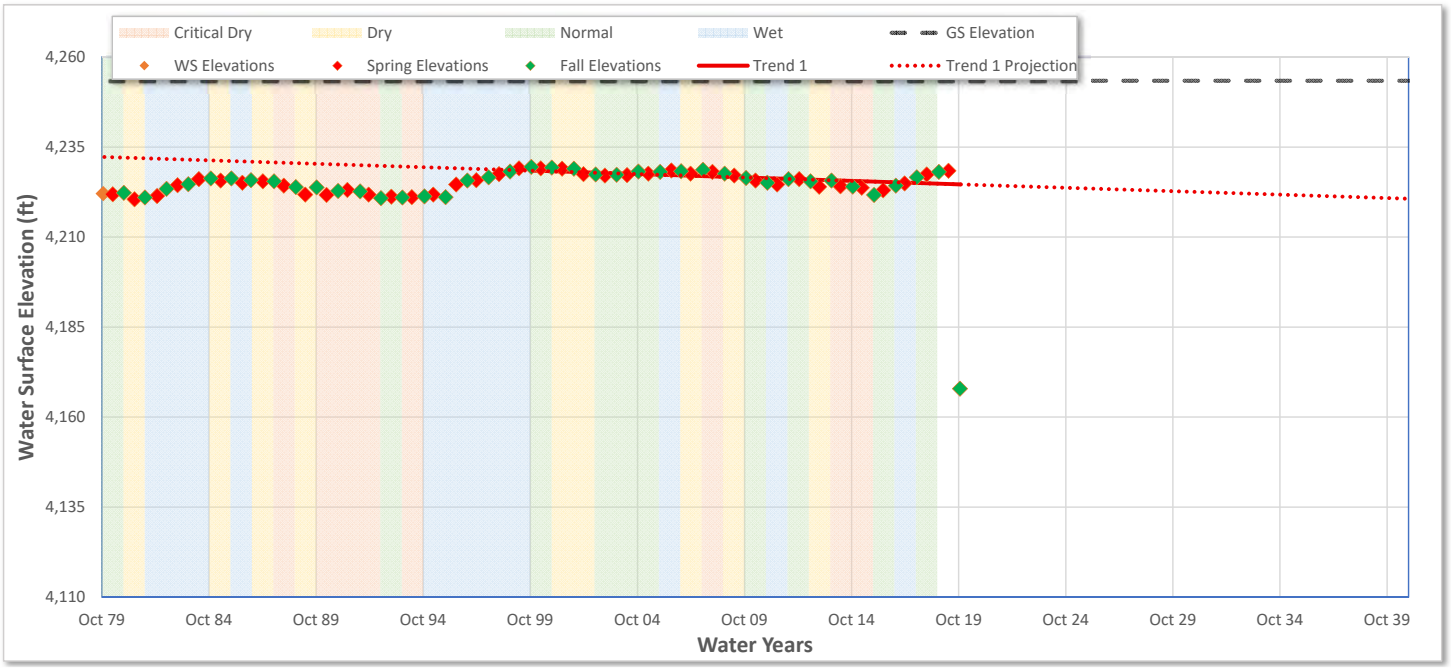
Well Type Information	
Well Type	-
Well Use	Other
Completion Type	Single

Well Coordinates/Geometry		
Location	Lat:	41.1493
	Long:	-120.9656
Well Delth		217.00 ft
Ground Surface Elevation		4253.40 ft
Ref. Point Elevation		4255.40 ft

Well Period of Record		
Period-of-Record		1979..2020
WS Elev-Range	Min:	4167.9 ft
	Max	4229.5 ft

Trend Analsys		
Seasonal Data Method		Max/Min
Show Trend 1		Spring Data
Date Range	Start WY:	2000
	End WY:	2040
Extend Trend Line		Yes
Trend Results	Slope	(0.190 ft/yr)
Show Trend 2		None
Date Range	Start WY:	
	End WY:	
Extend Trend Line		No
Trend Results	Slope	

Water Surface Elevation (WSE) Hydrograph



Well Water Surface Level Report

Date: 2/19/2020

Well Information	
Well ID	087196-38N09E18M001M
Alternate Name	38N09E18M001M
State Number	38N09E18M001M
CASGEM ID	411305N1209896W001

Well Location	
County	Lassen
Basin	BIG VALLEY
Sub-Basin	-

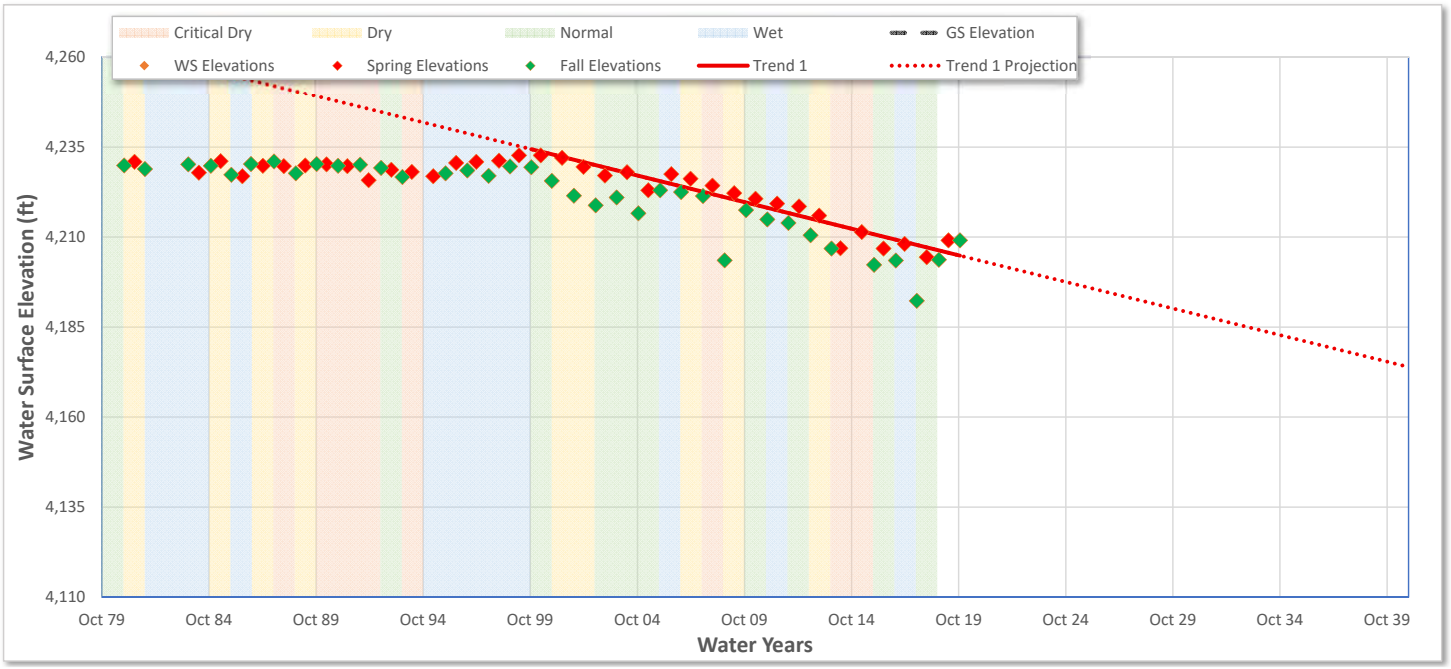
Well Type Information	
Well Type	-
Well Use	Irrigation
Completion Type	Single

Well Coordinates/Geometry		
Location	Lat:	41.1305
	Long:	-120.9897
Well Delth		525.00 ft
Ground Surface Elevation		4288.40 ft
Ref. Point Elevation		4288.90 ft

Well Period of Record		
Period-of-Record		1981..2020
WS Elev-Range	Min:	4192.3 ft
	Max	4232.7 ft

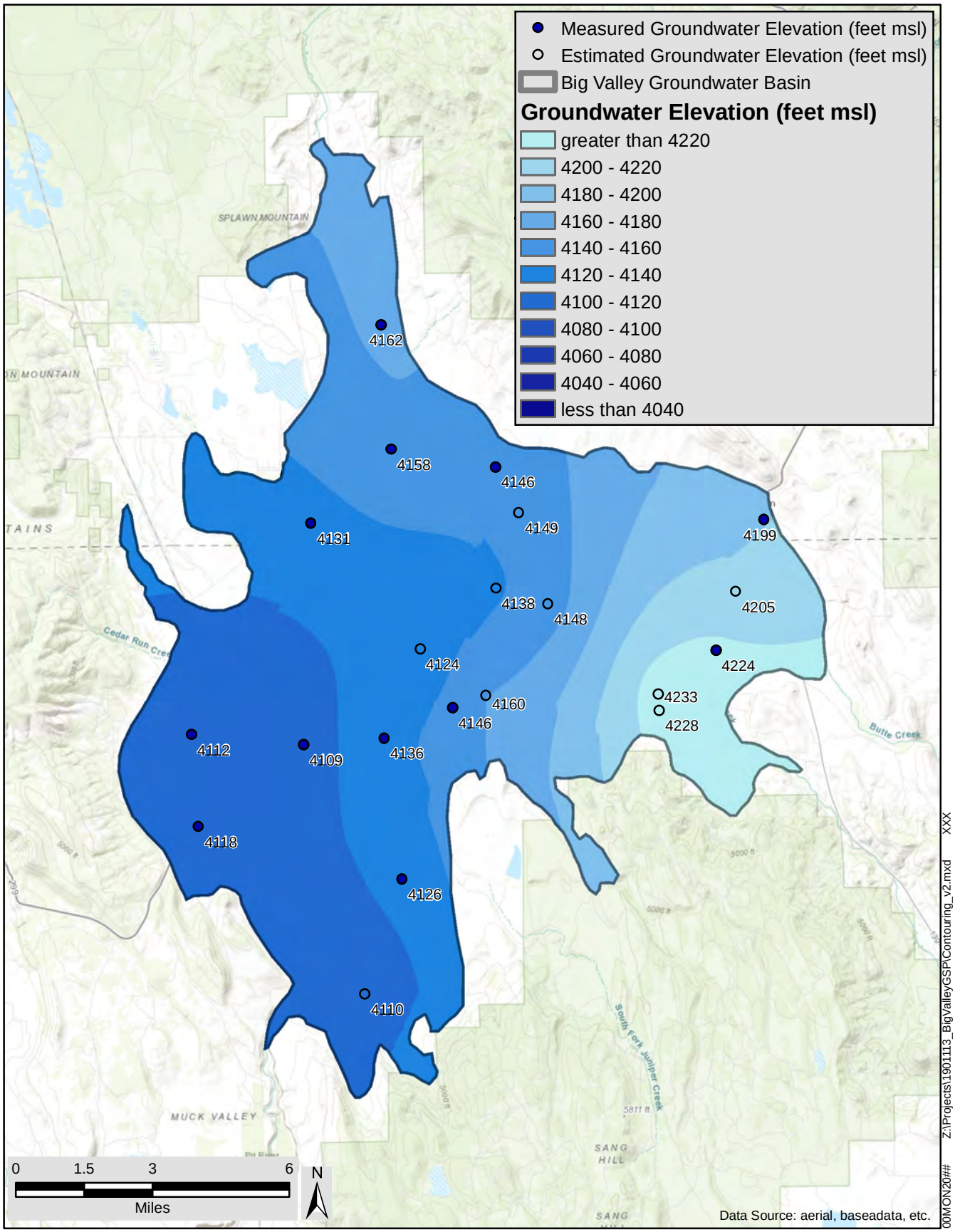
Trend Analsys		
Seasonal Data Method		Max/Min
Show Trend 1		Spring Data
Date Range	Start WY:	2000
	End WY:	2040
Extend Trend Line		Yes
Trend Results	Slope	(1.477 ft/yr)
Show Trend 2		None
Date Range	Start WY:	
	End WY:	
Extend Trend Line		No
Trend Results	Slope	

Water Surface Elevation (WSE) Hydrograph

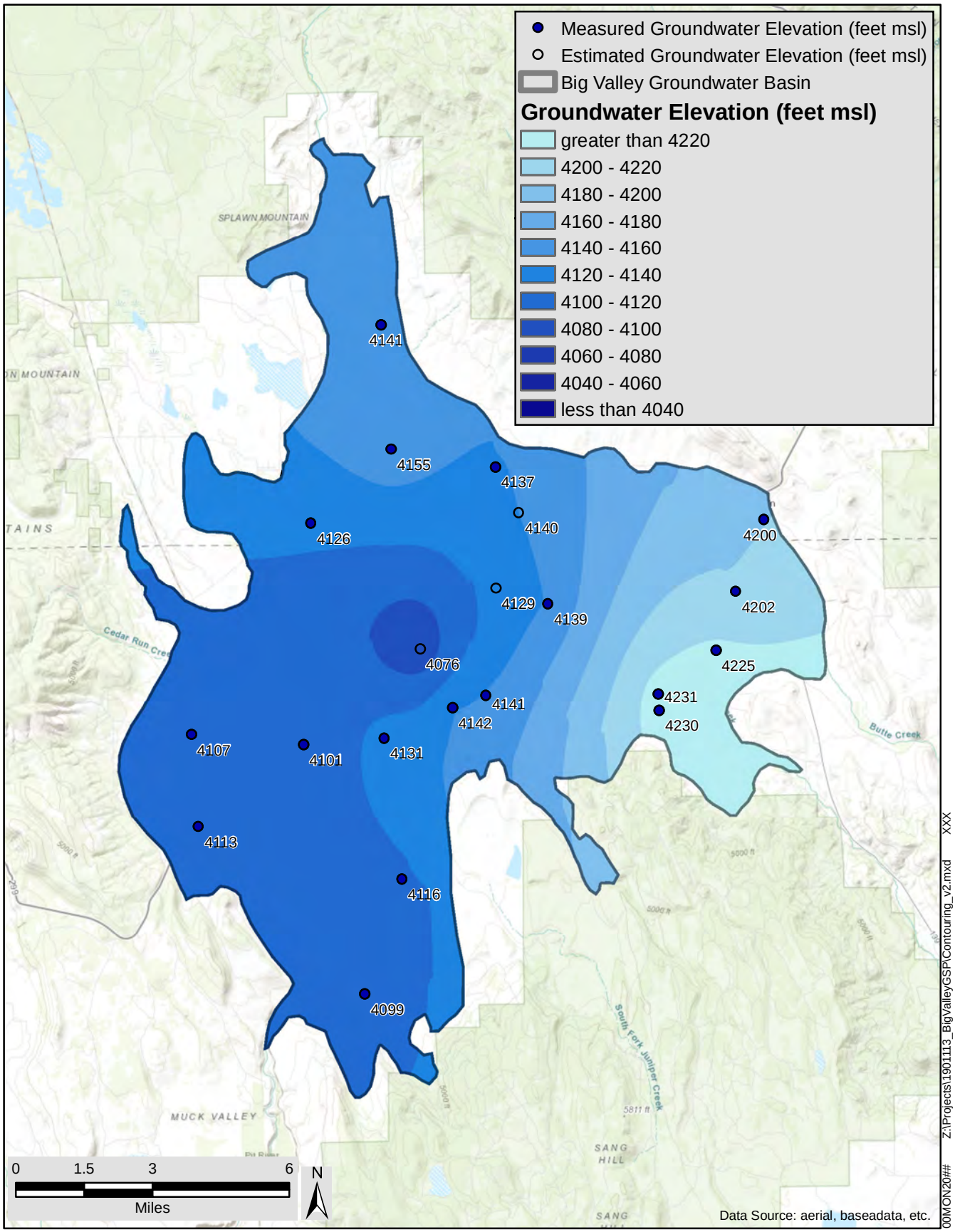


Appendix 5B

Groundwater Elevation Contours 1983 to 2018



Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Spring 1983	
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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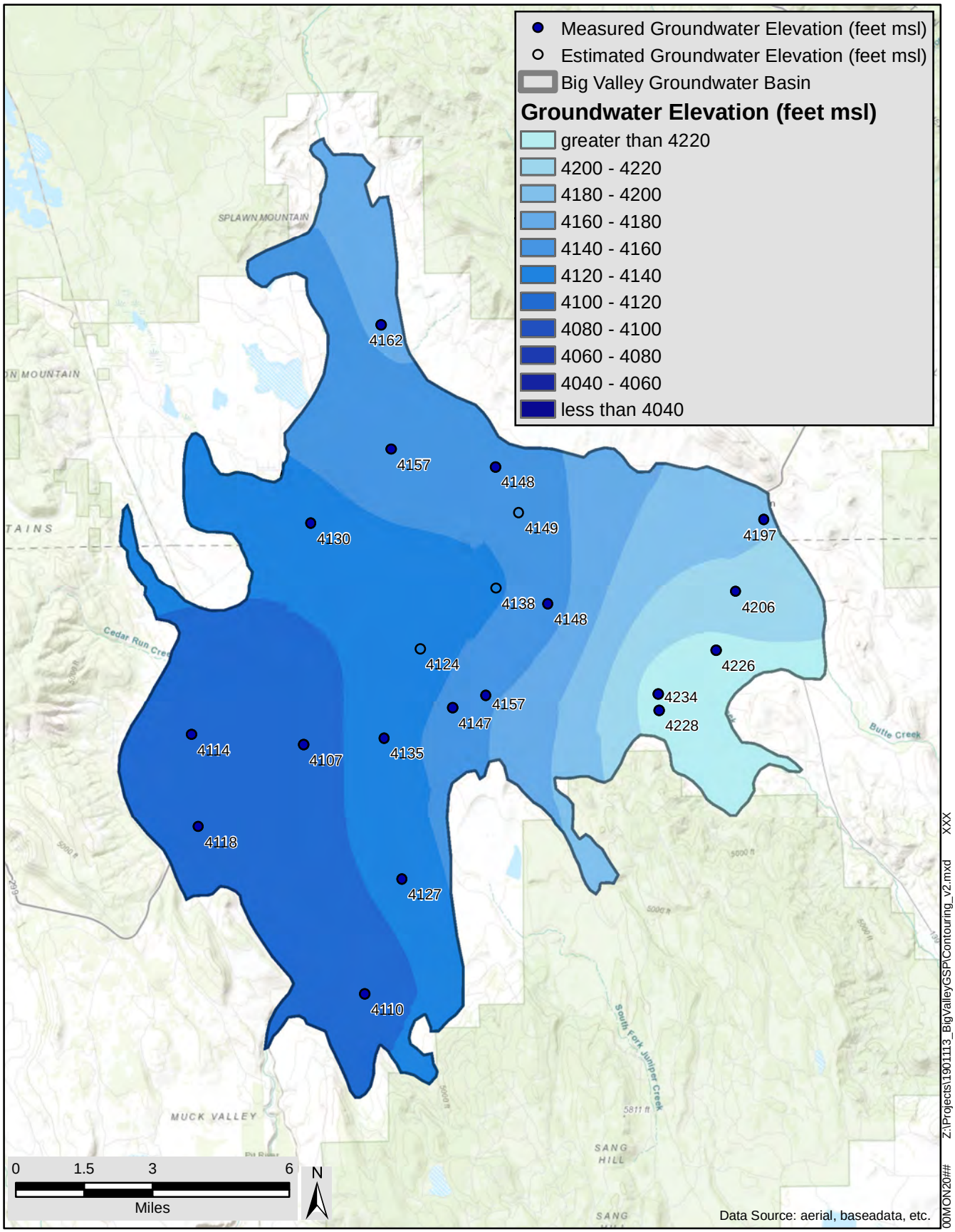
Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Fall 1983	
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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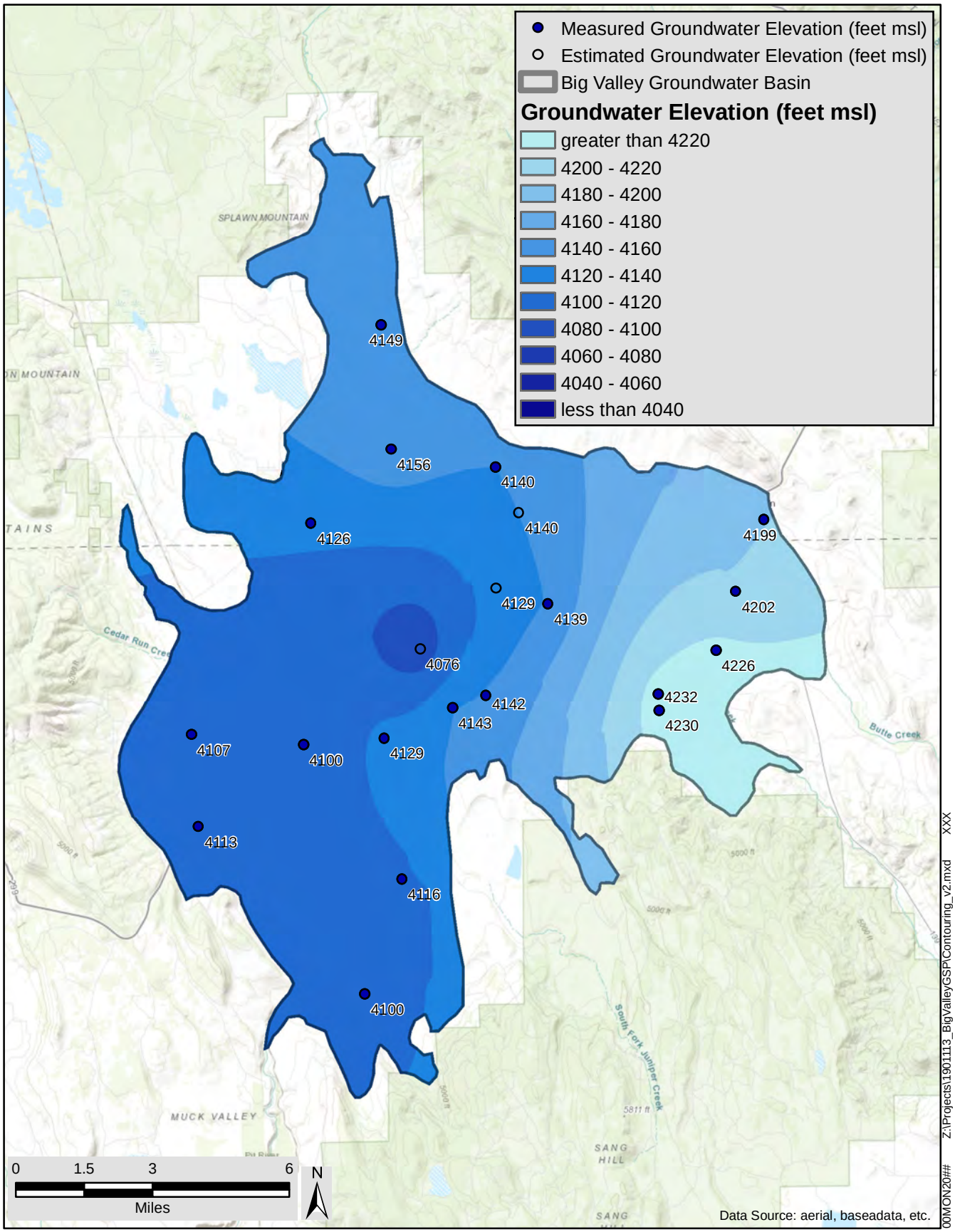
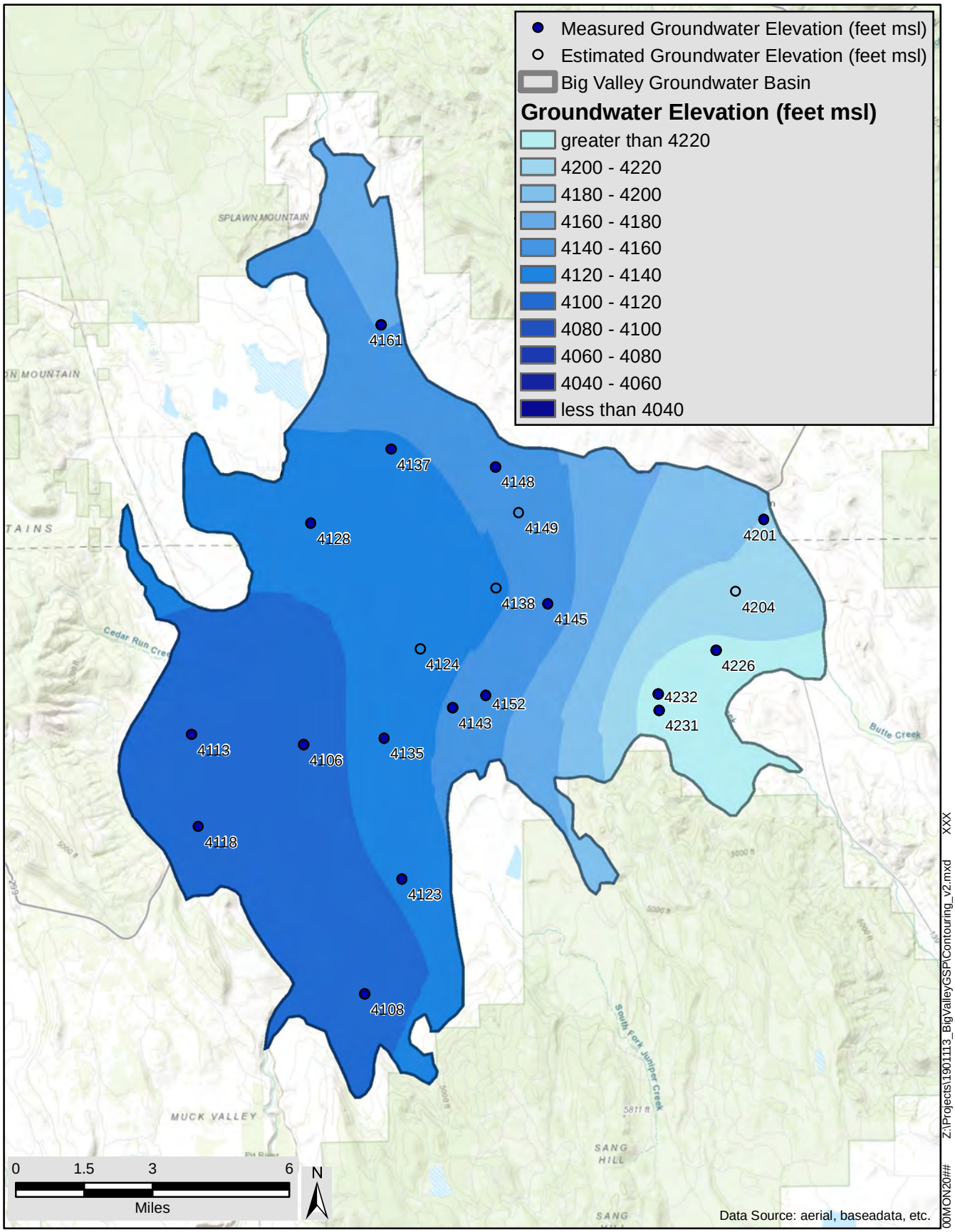
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Fall 1984	
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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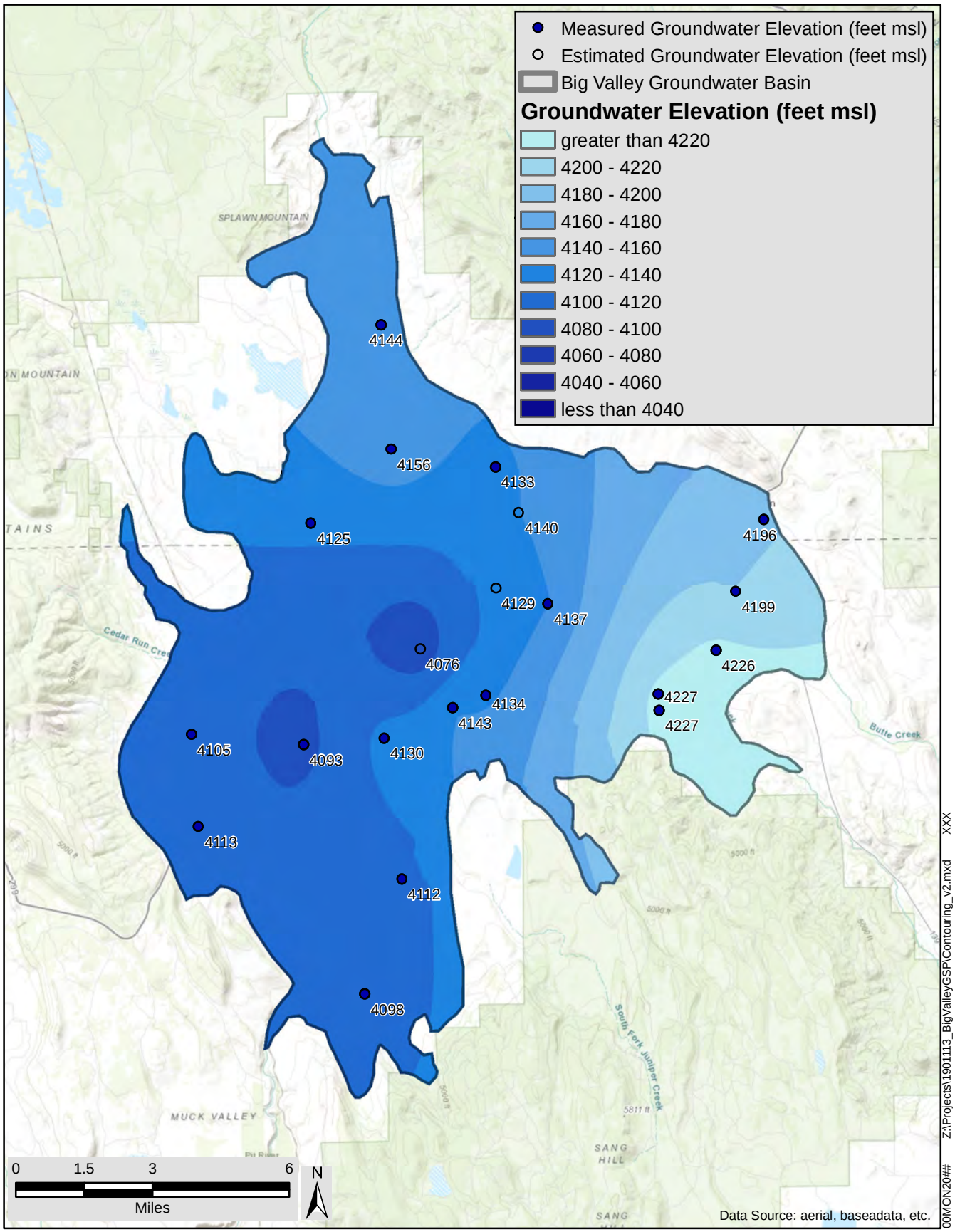
Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Spring 1985	
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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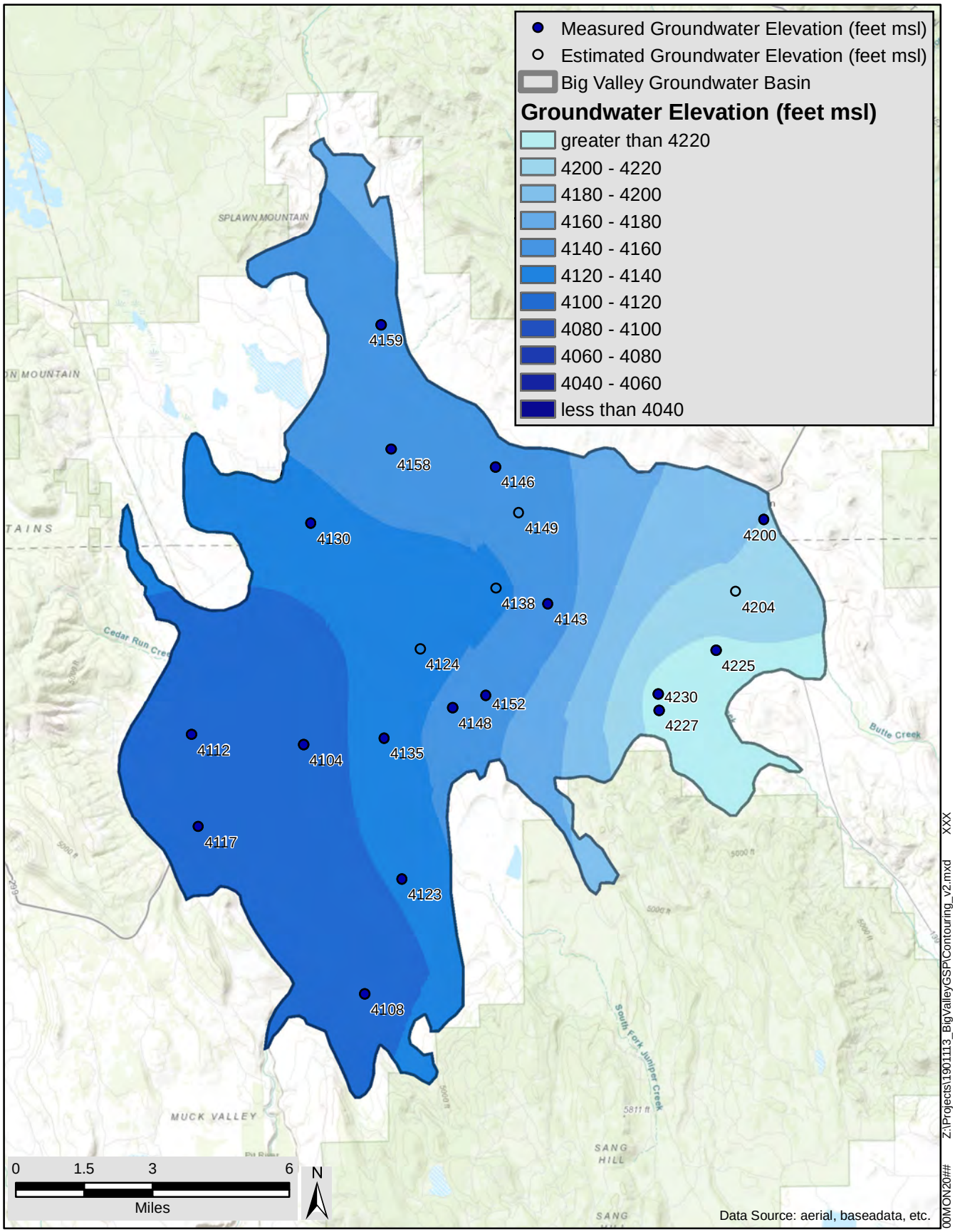
Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Fall 1985	
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Spring 1986	
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE

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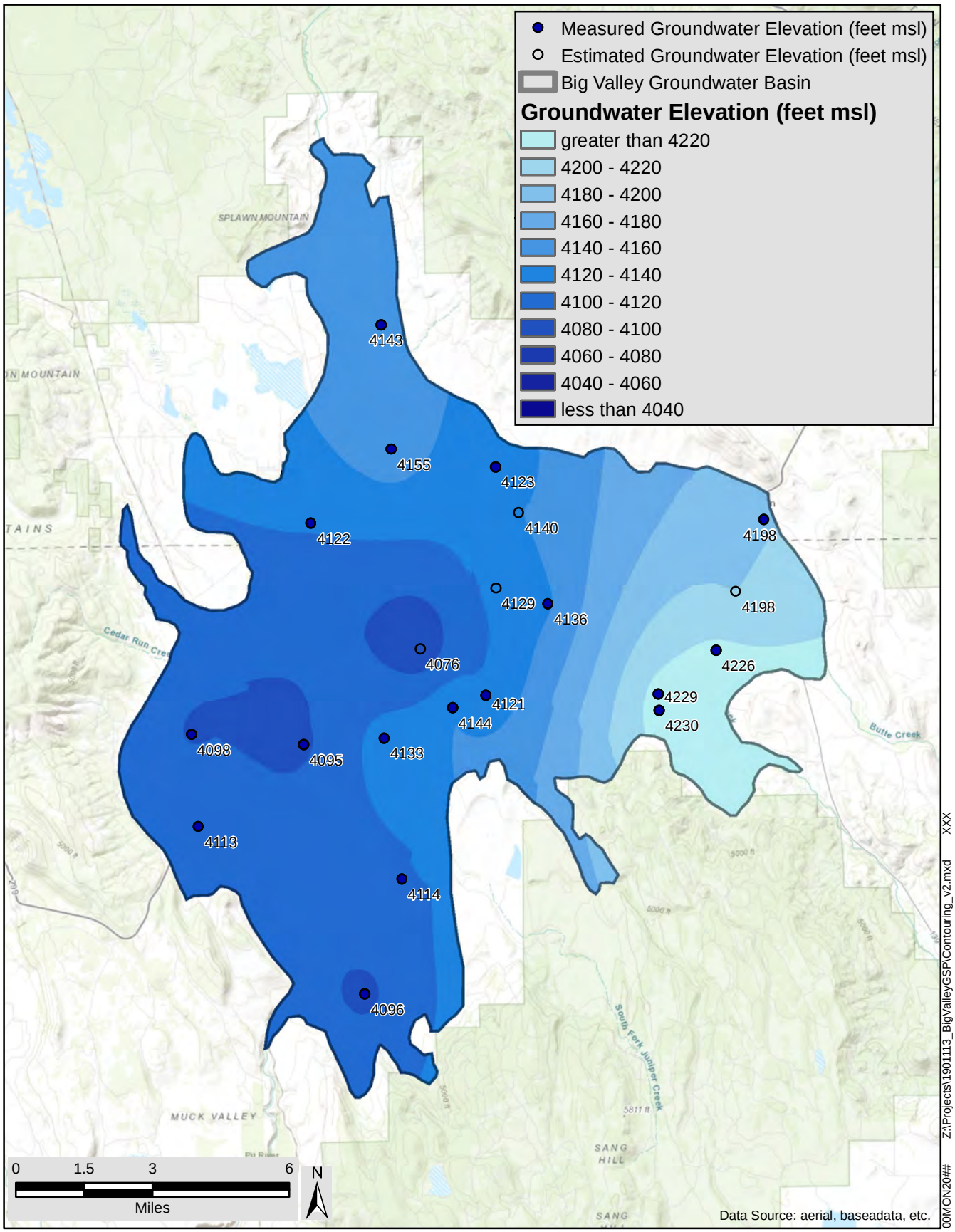
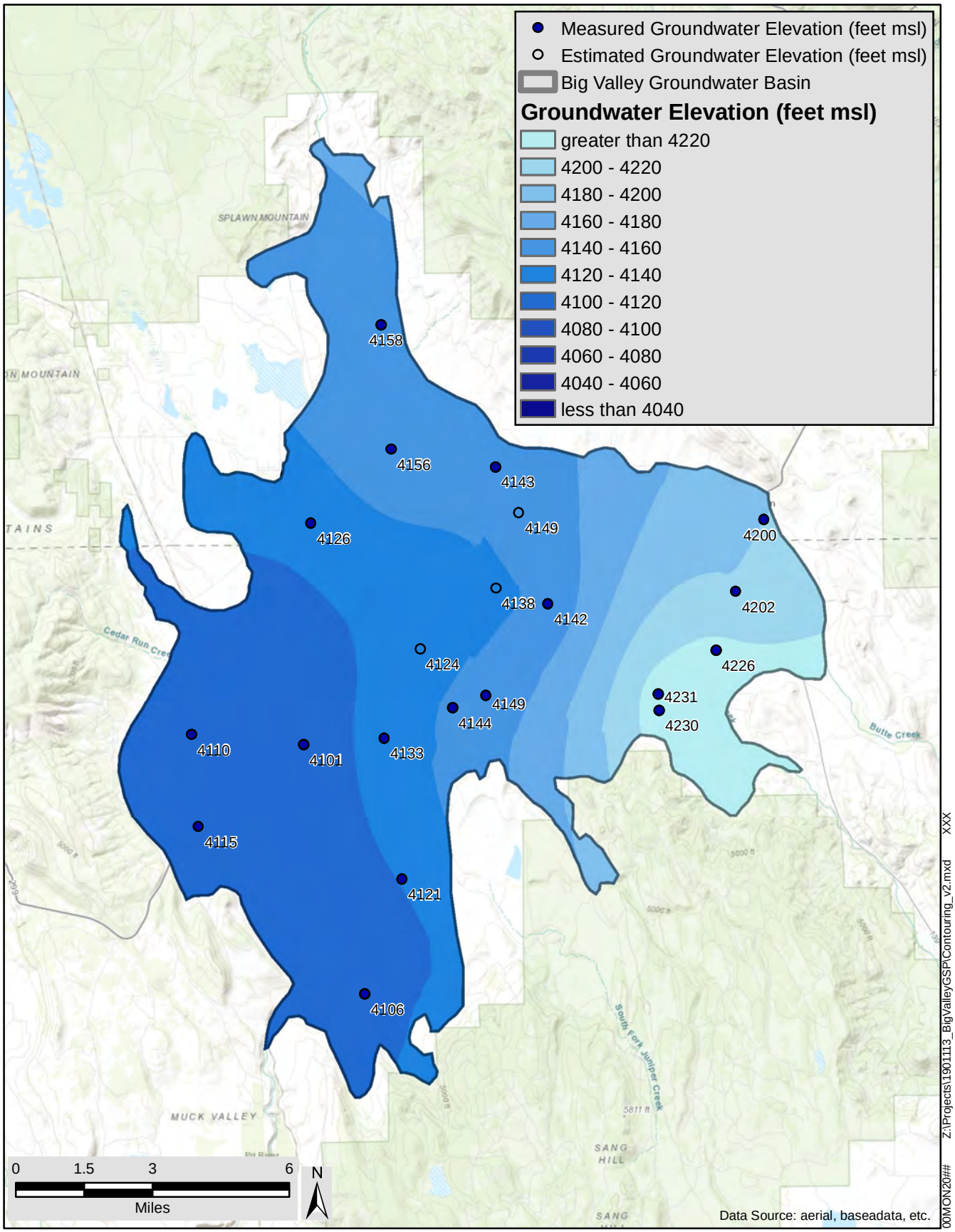


Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Fall 1986	
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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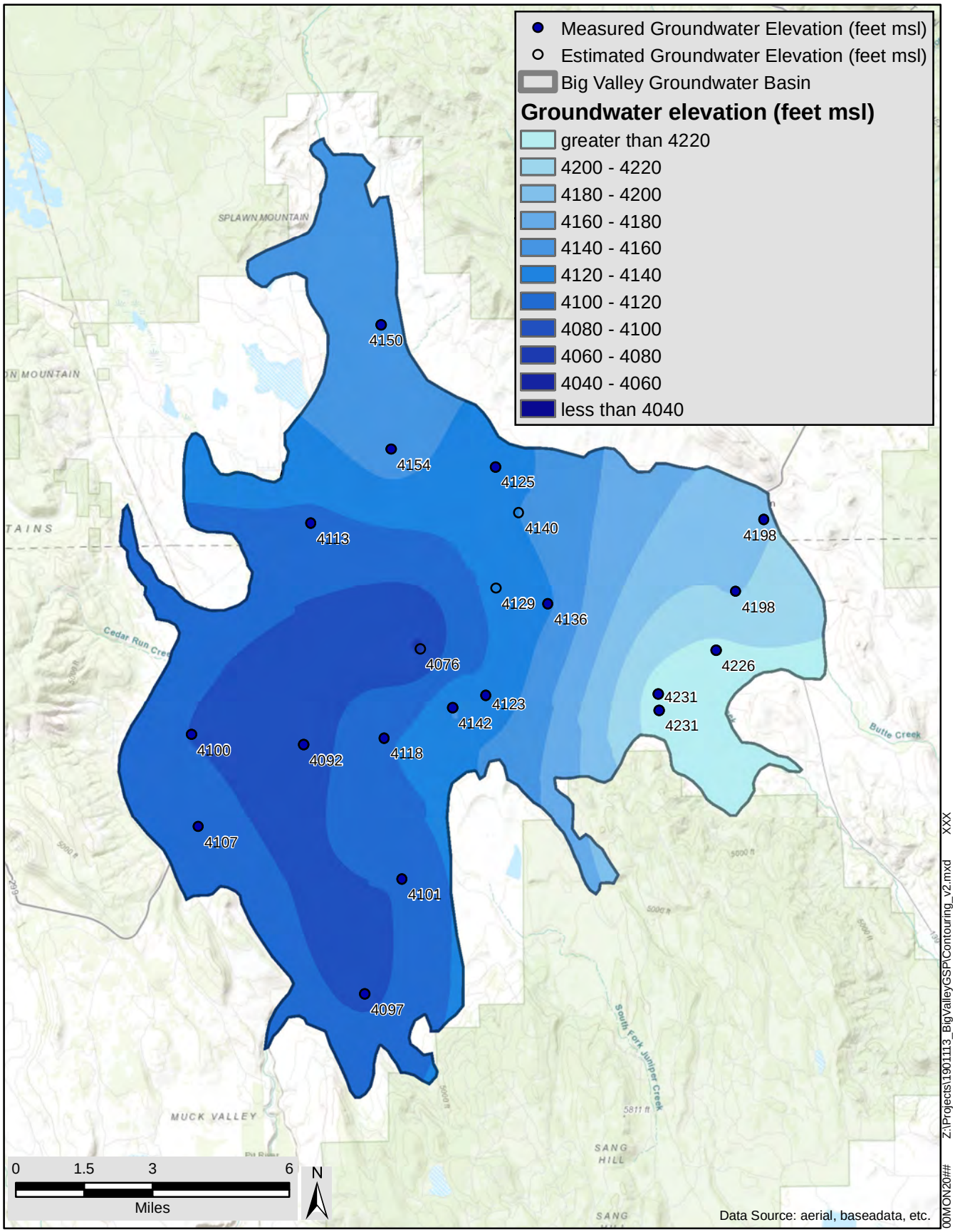
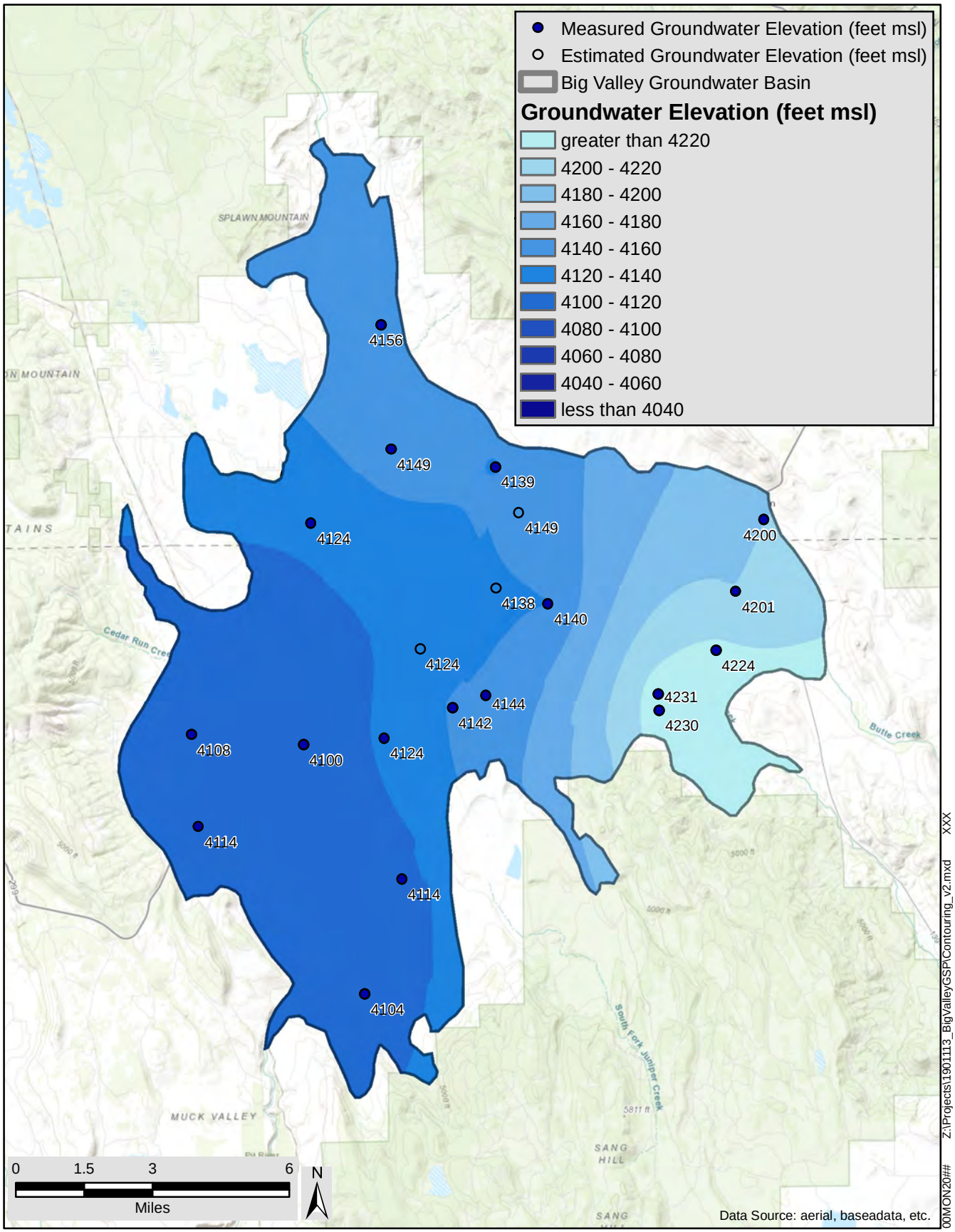
Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Spring 1987	
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Fall 1987	
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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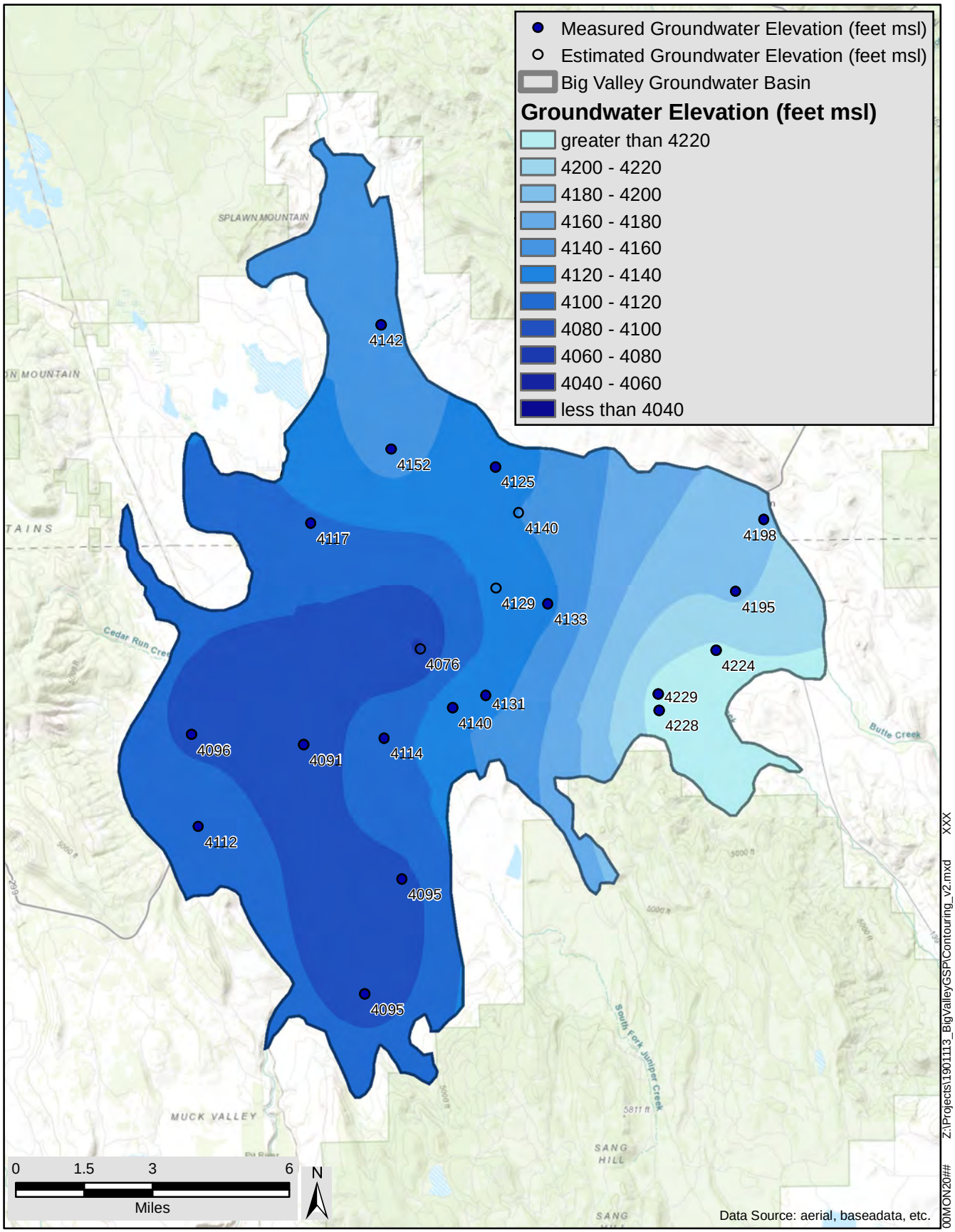
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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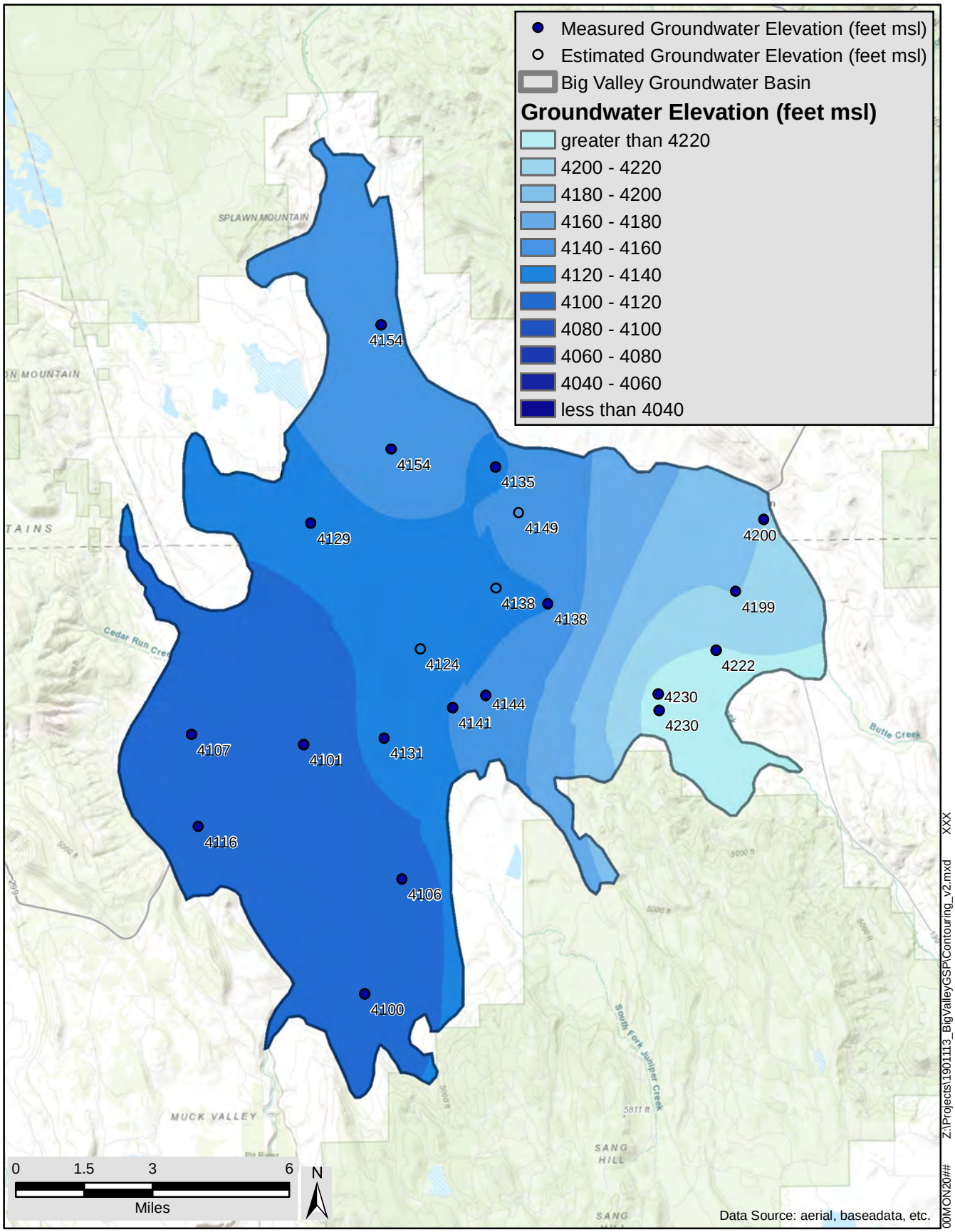
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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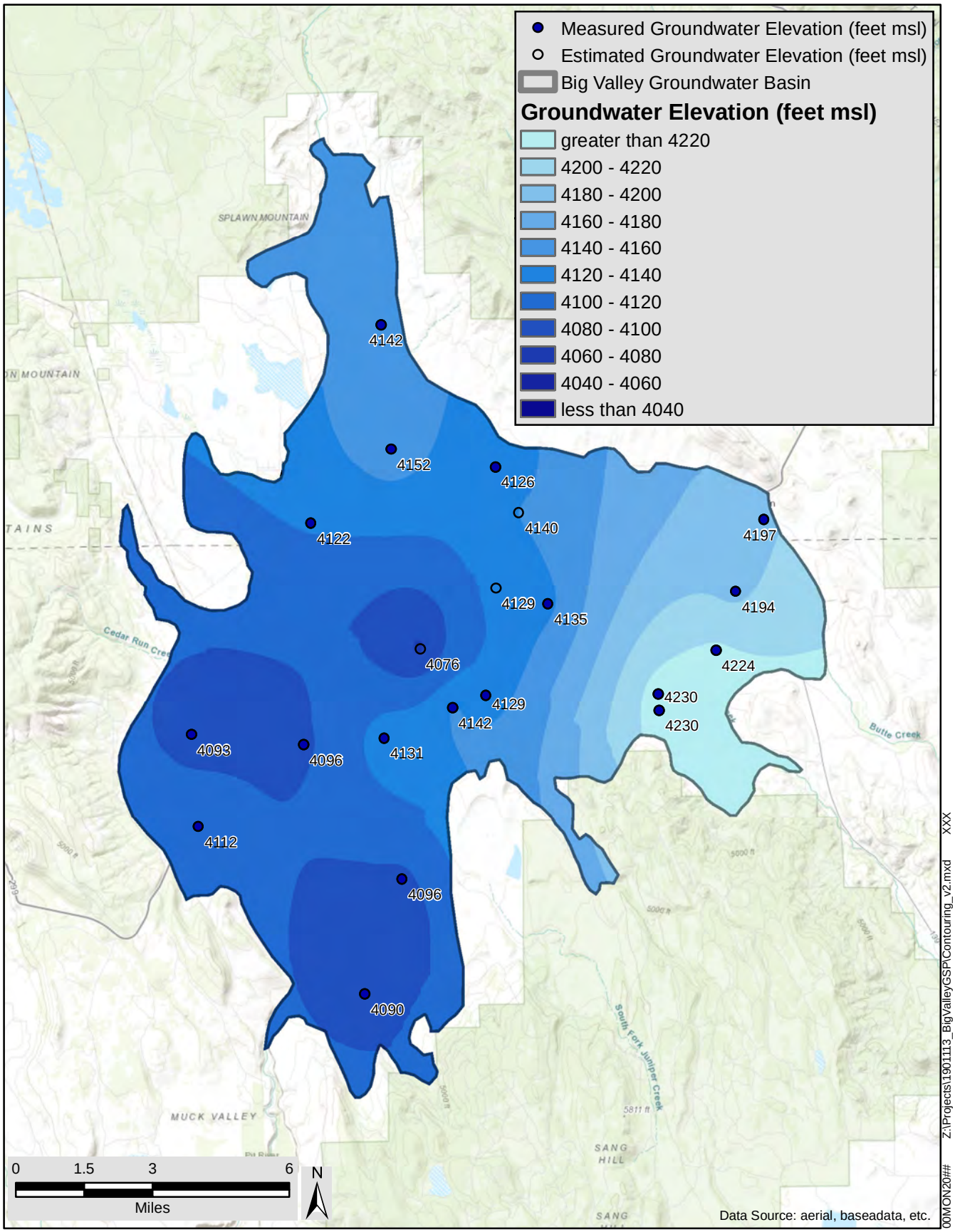
Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Spring 1989	
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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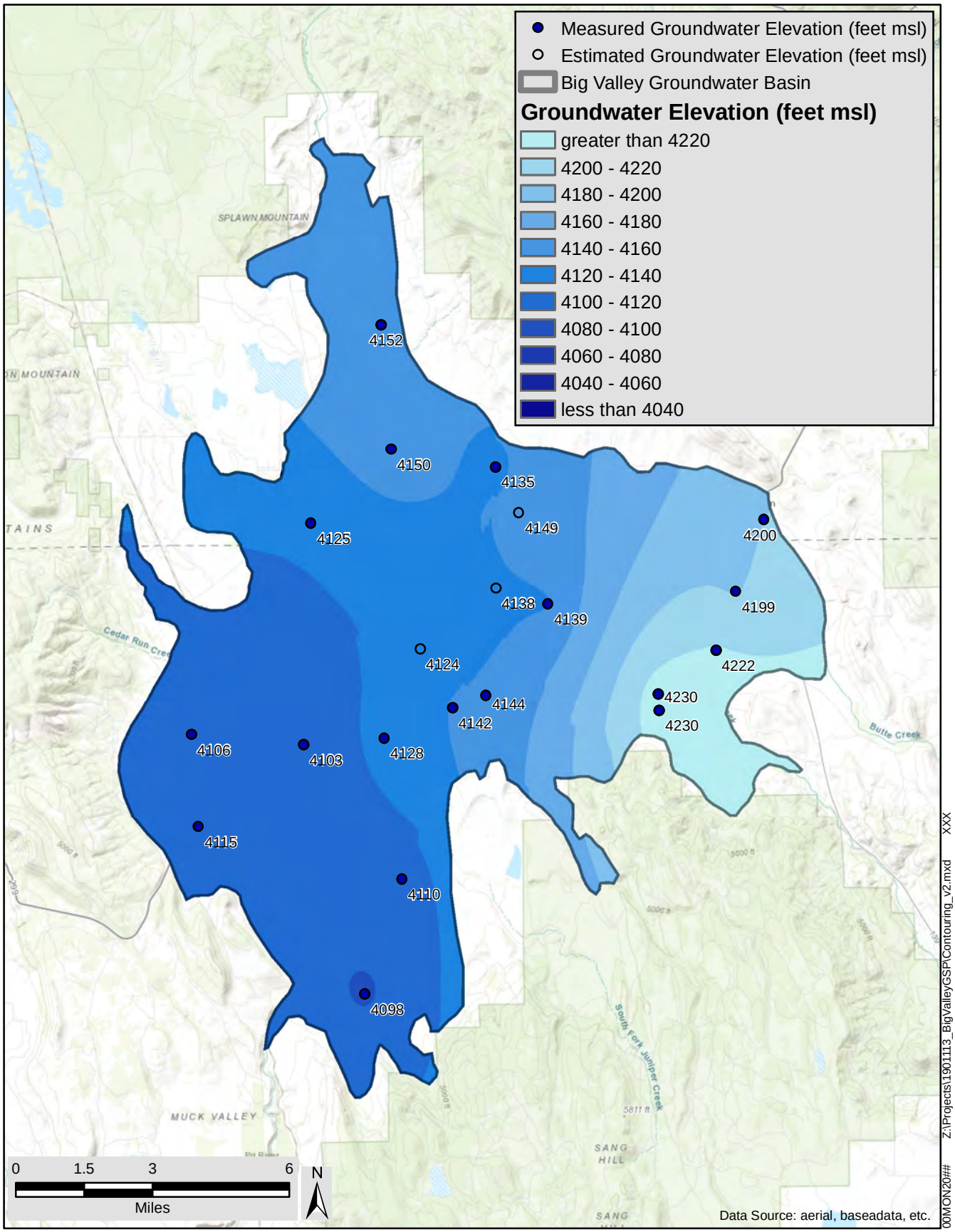

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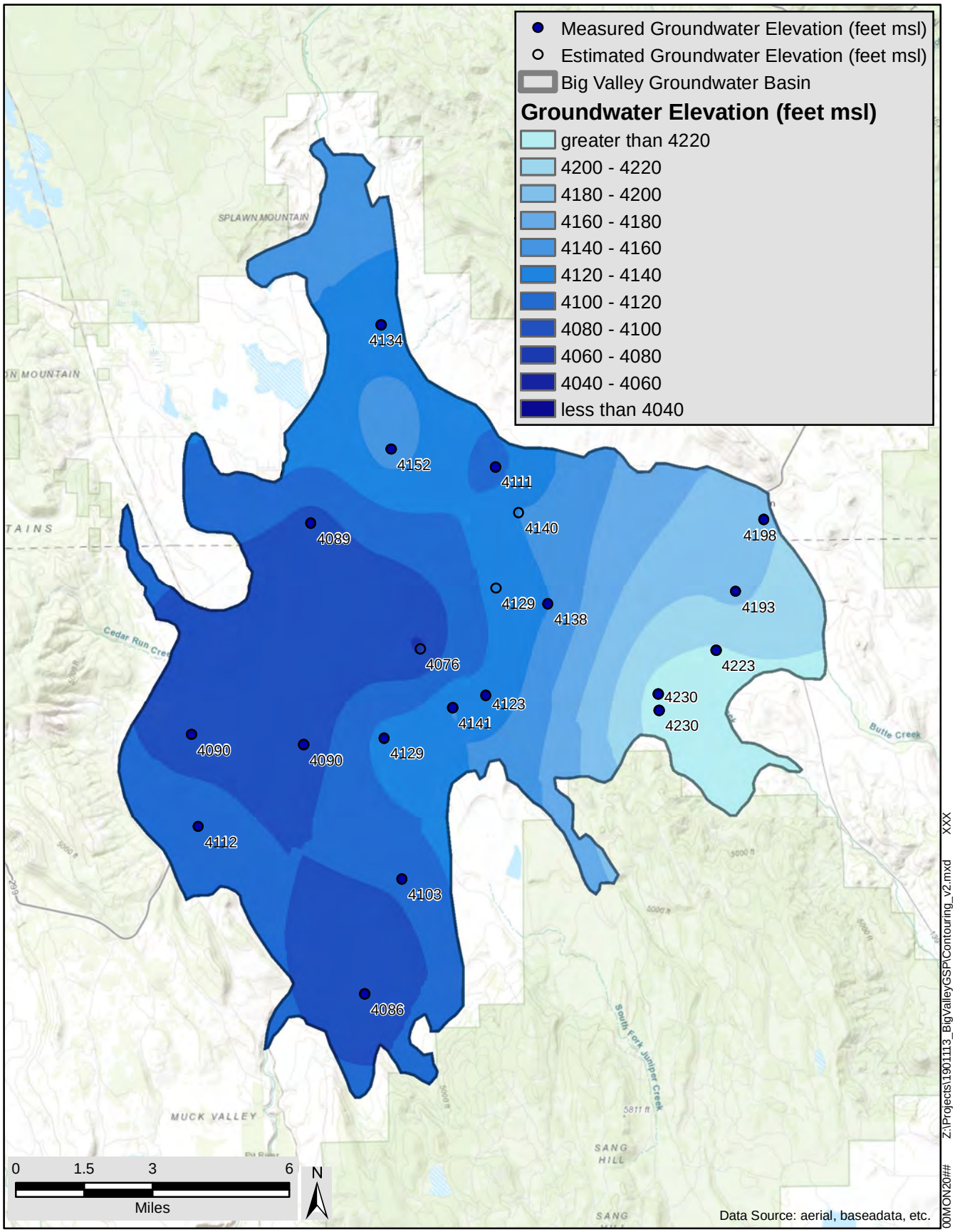
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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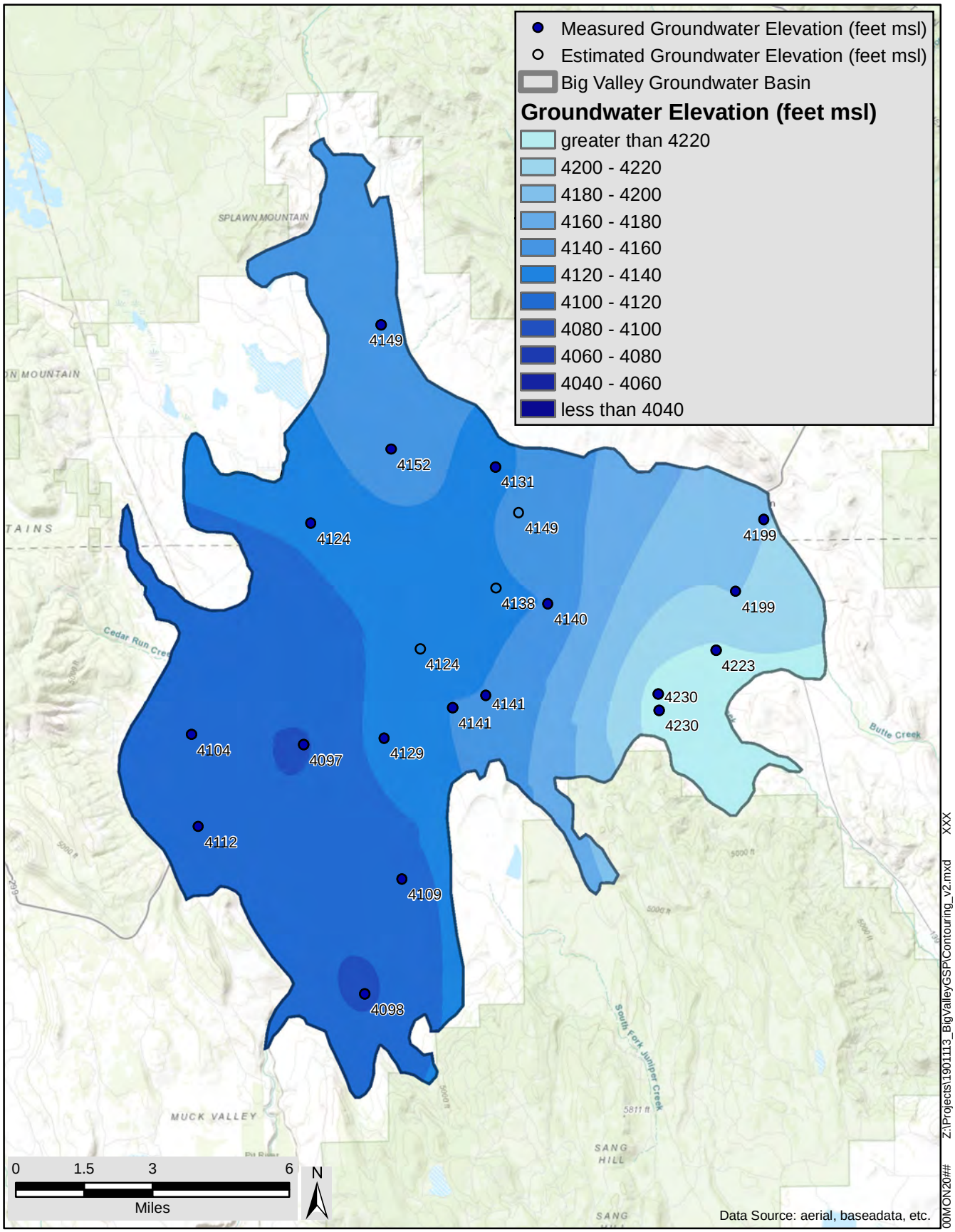
Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Fall 1990	
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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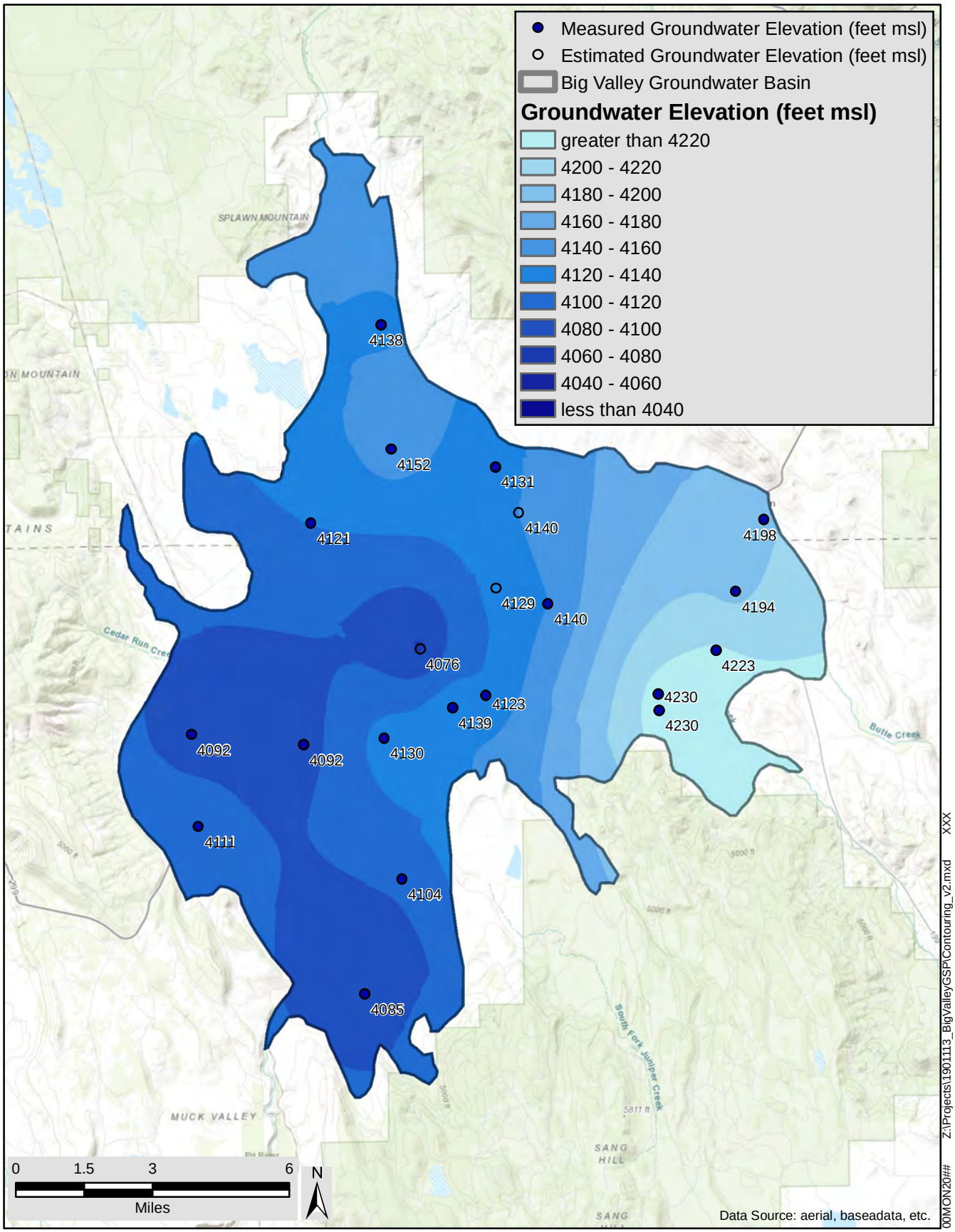
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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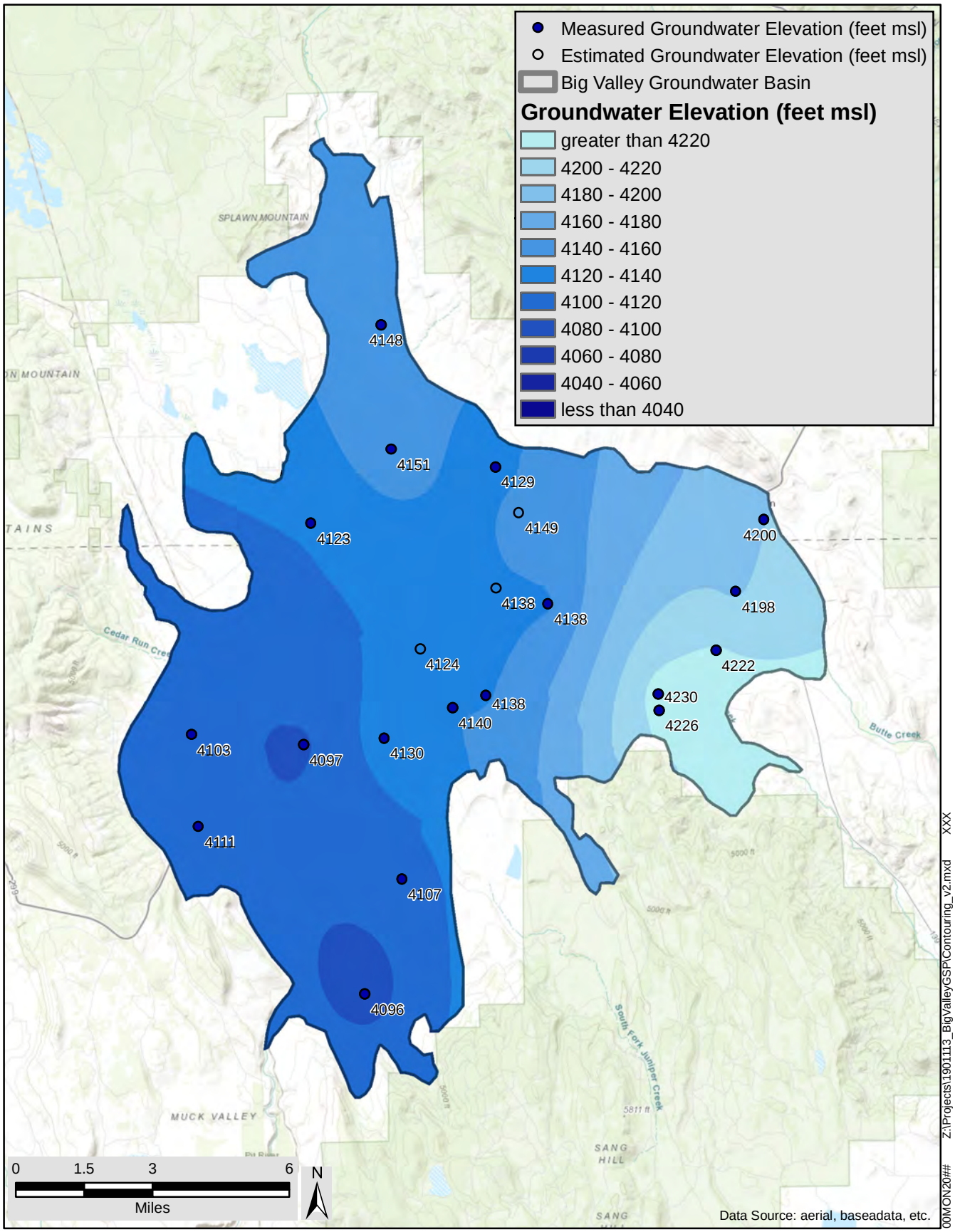

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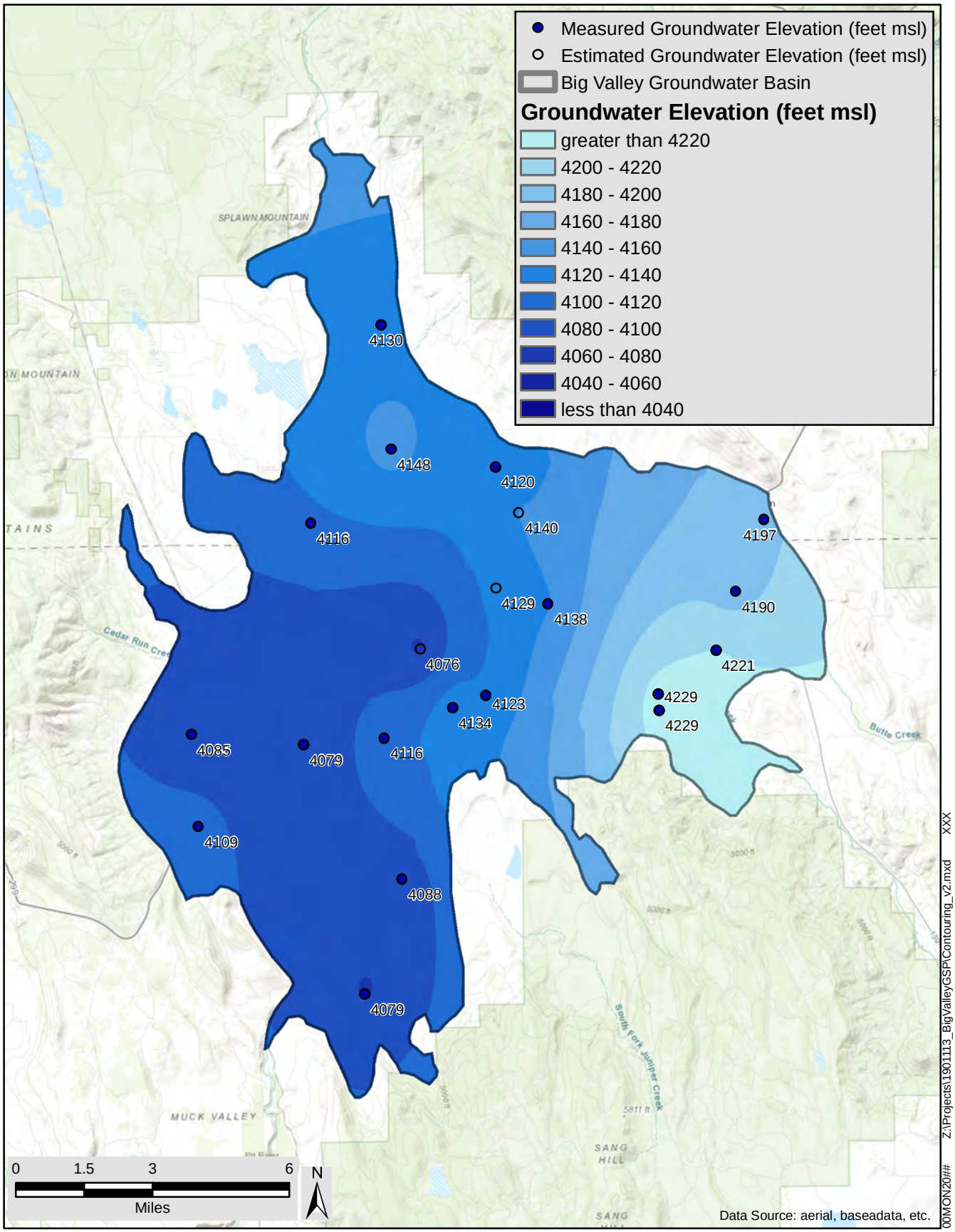

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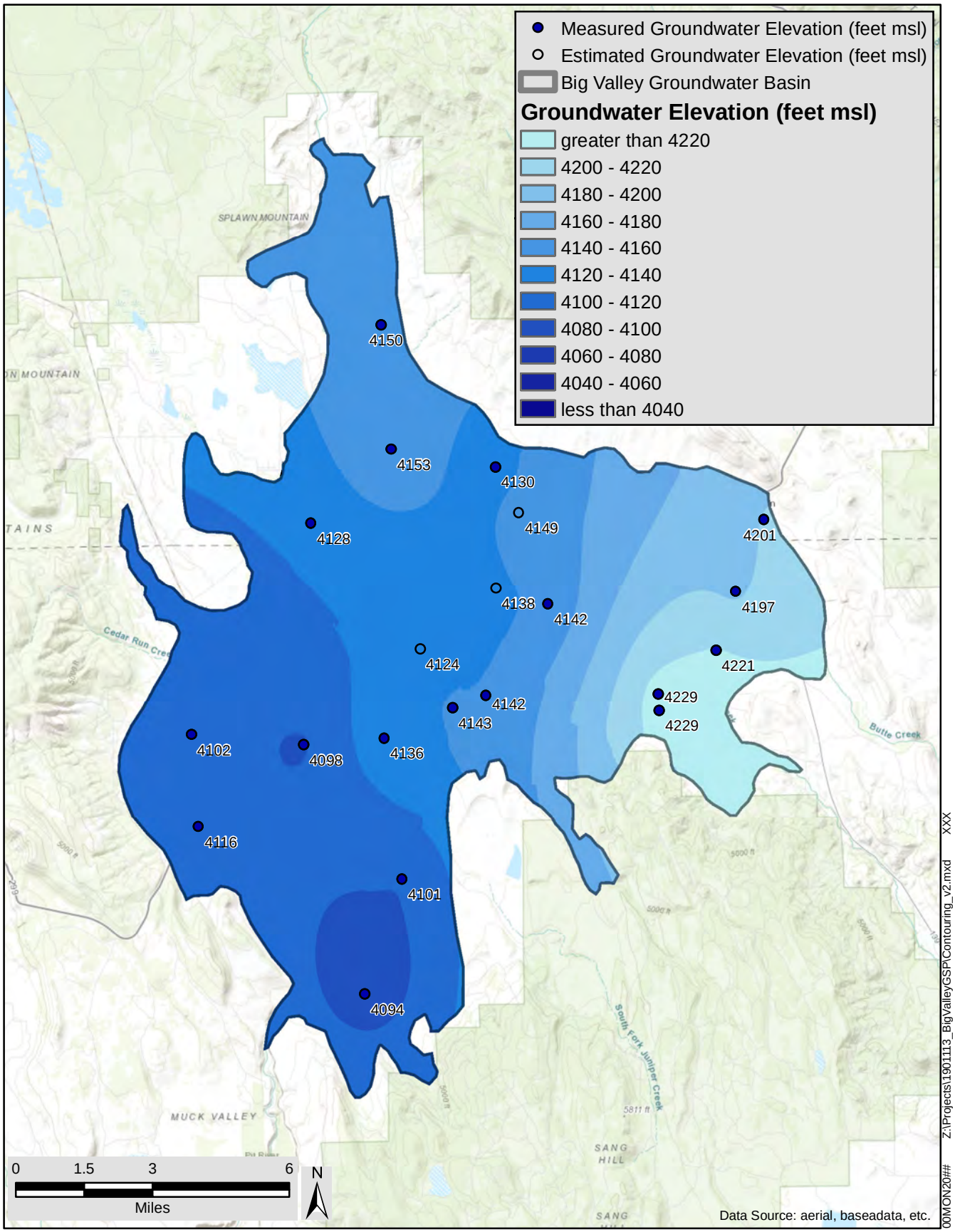
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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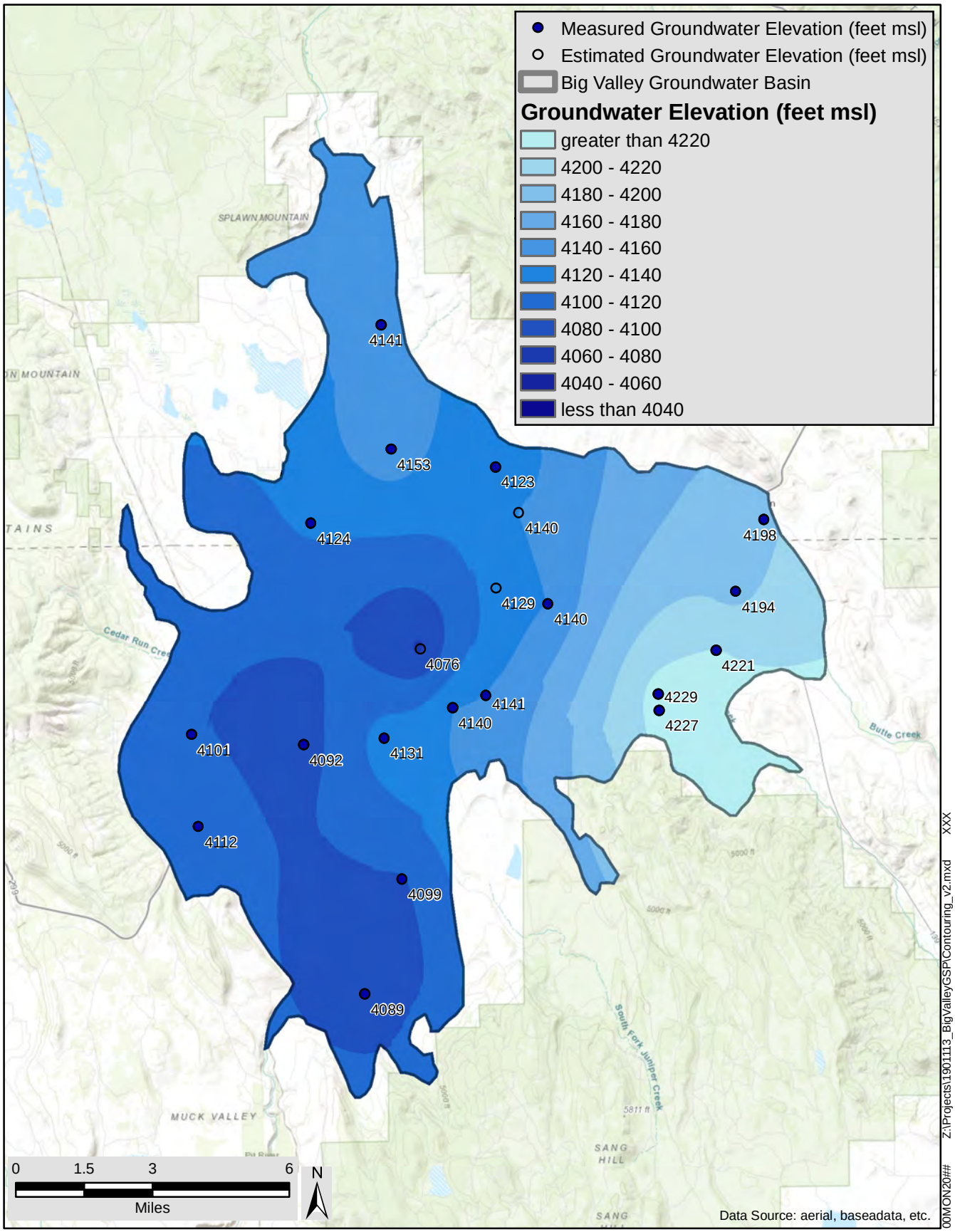
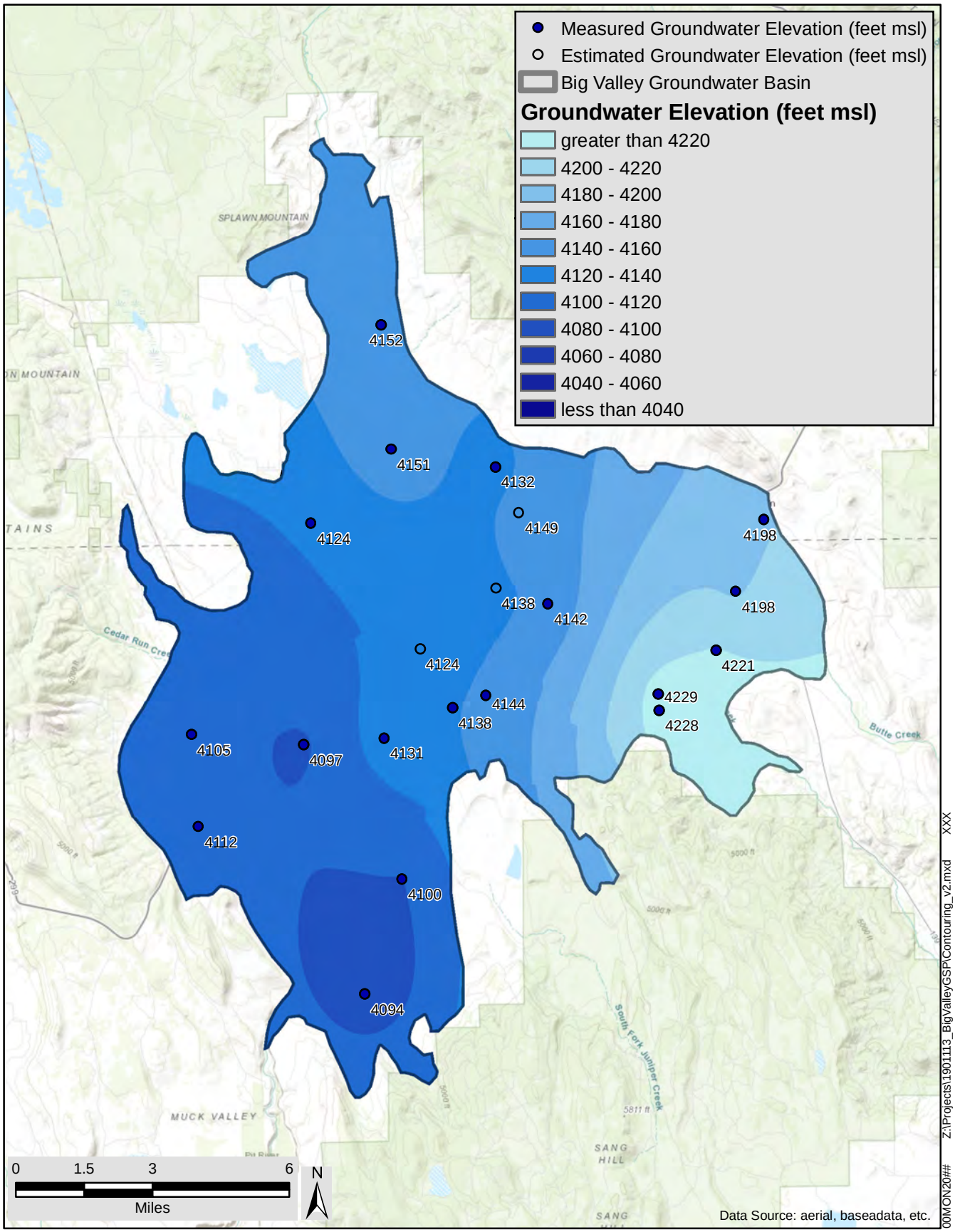
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Fall 1993	
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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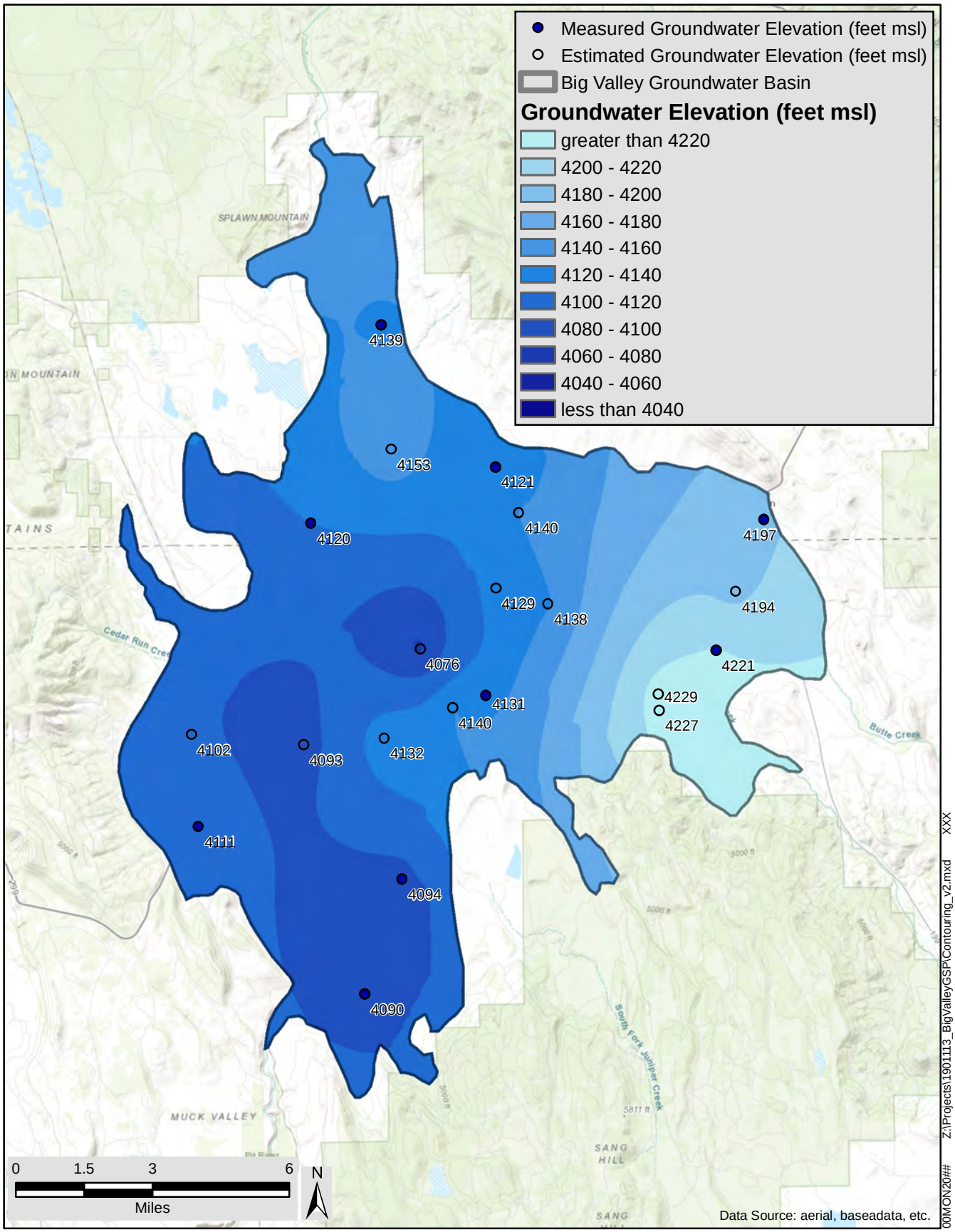
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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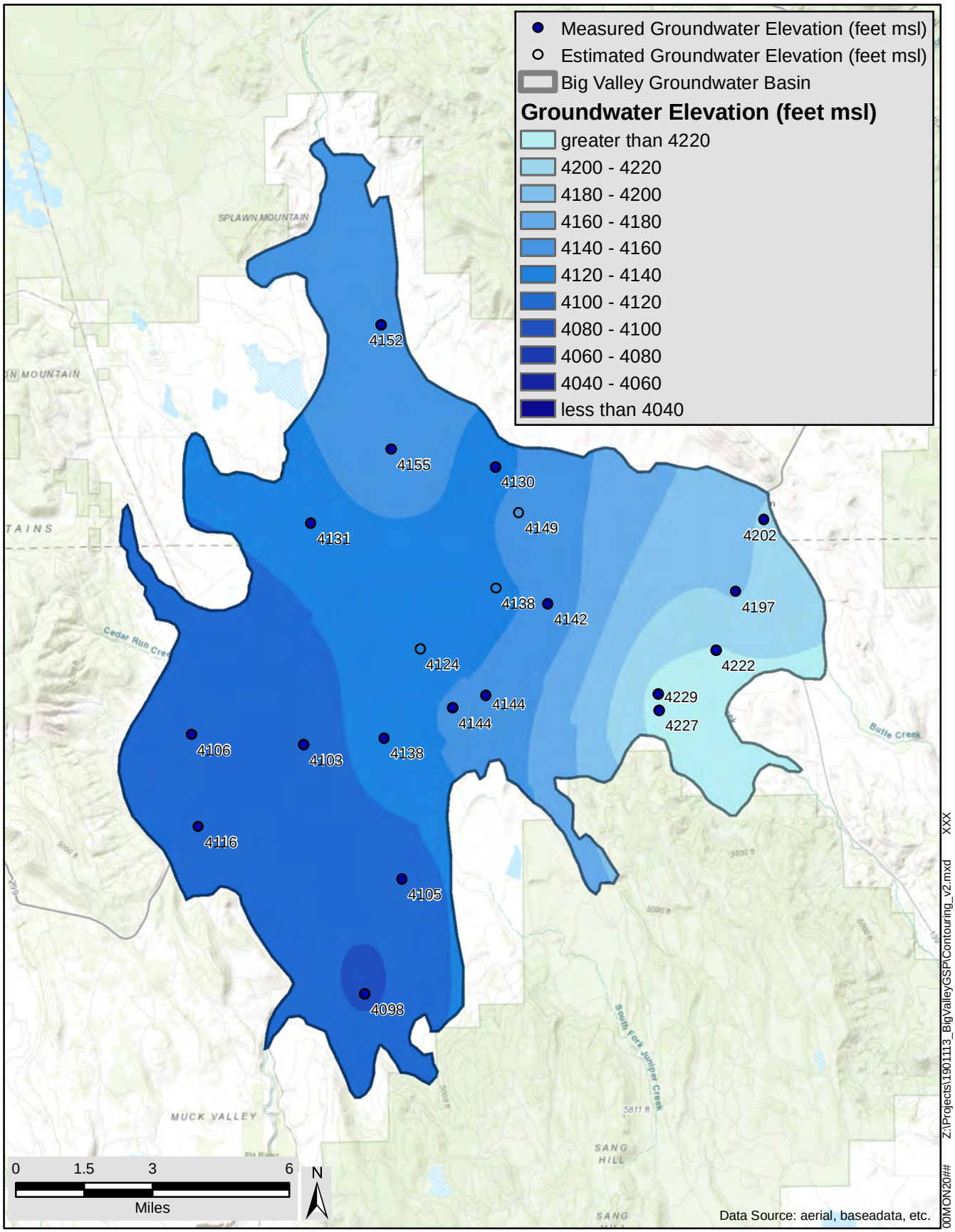
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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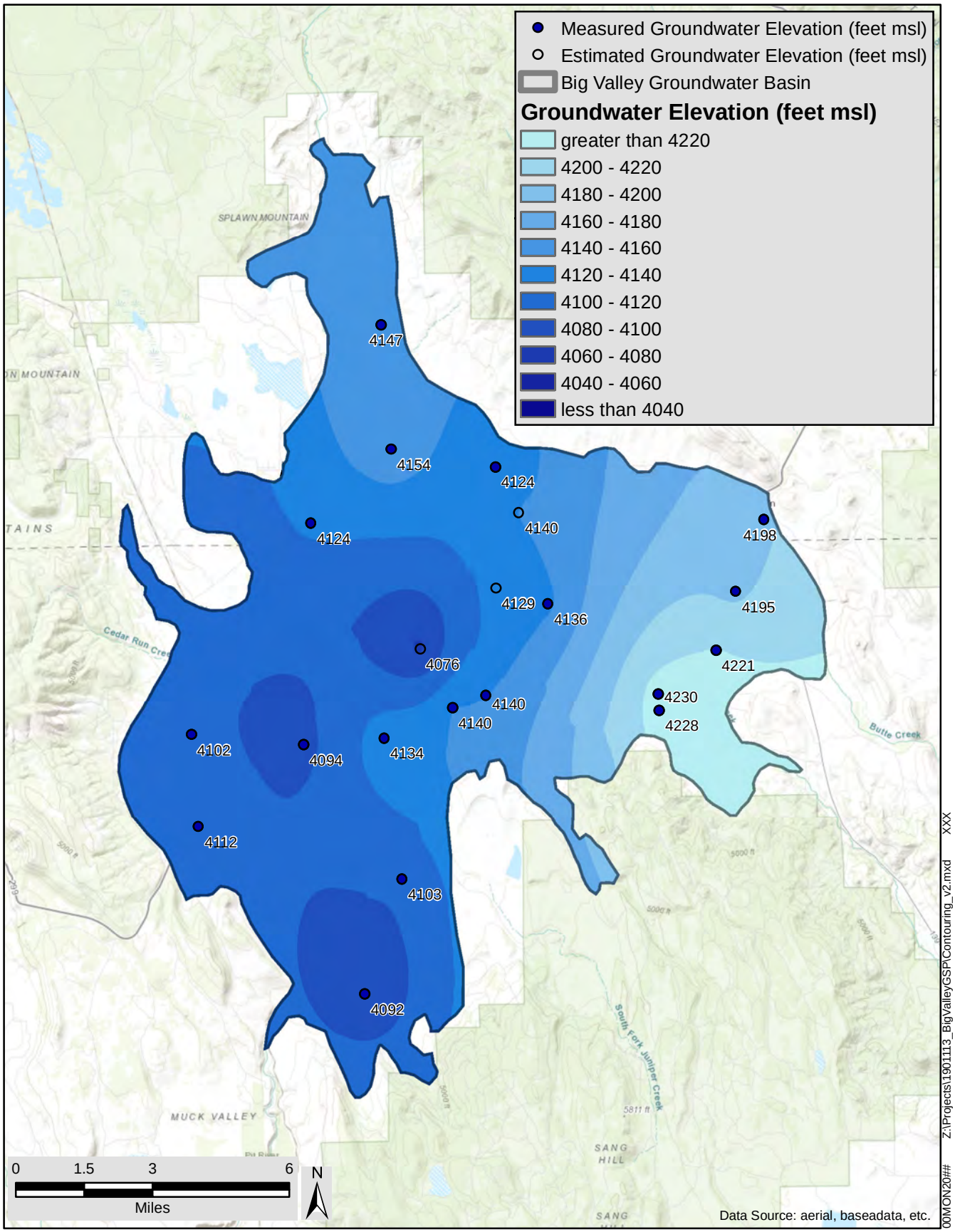
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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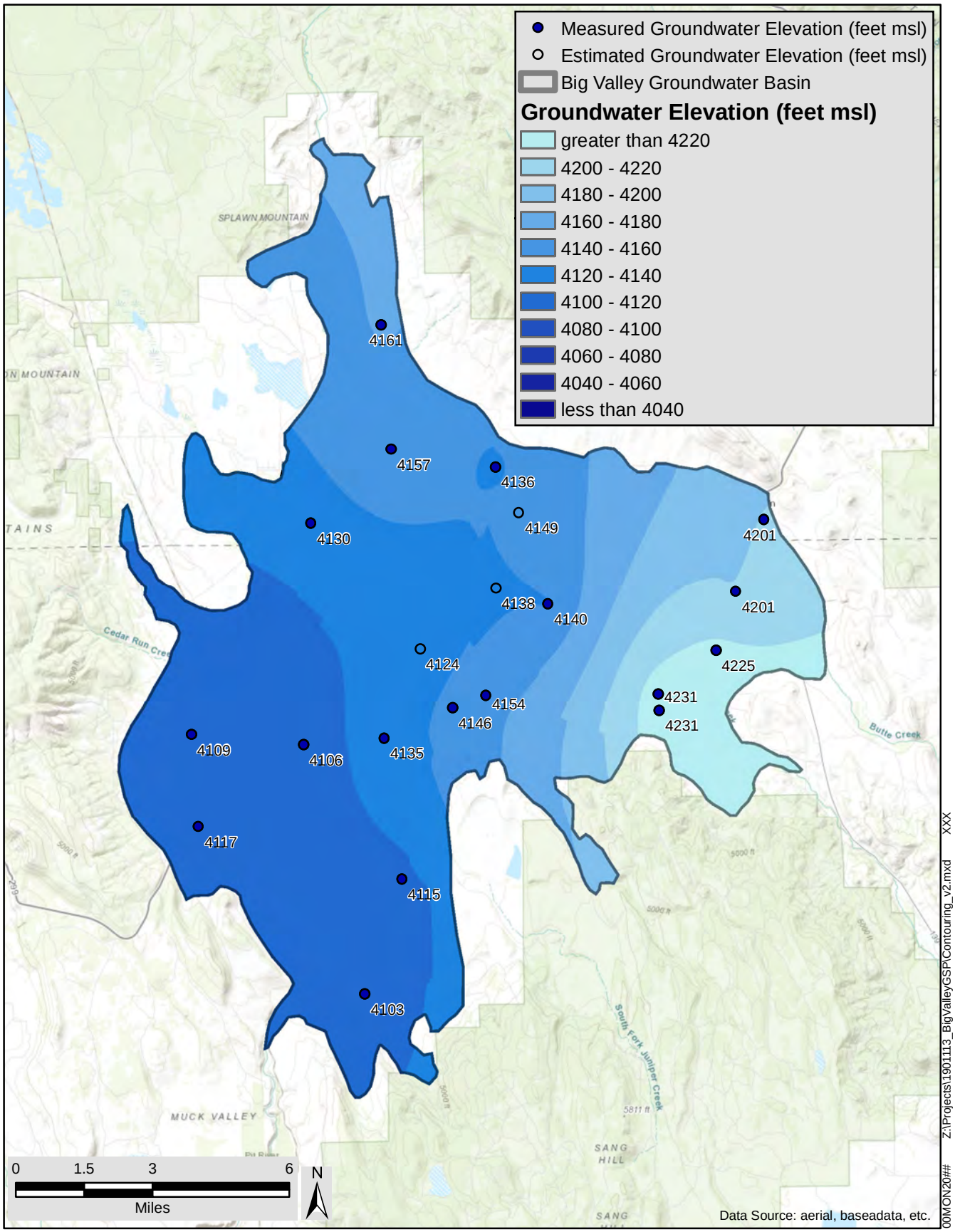
Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Fall 1995	
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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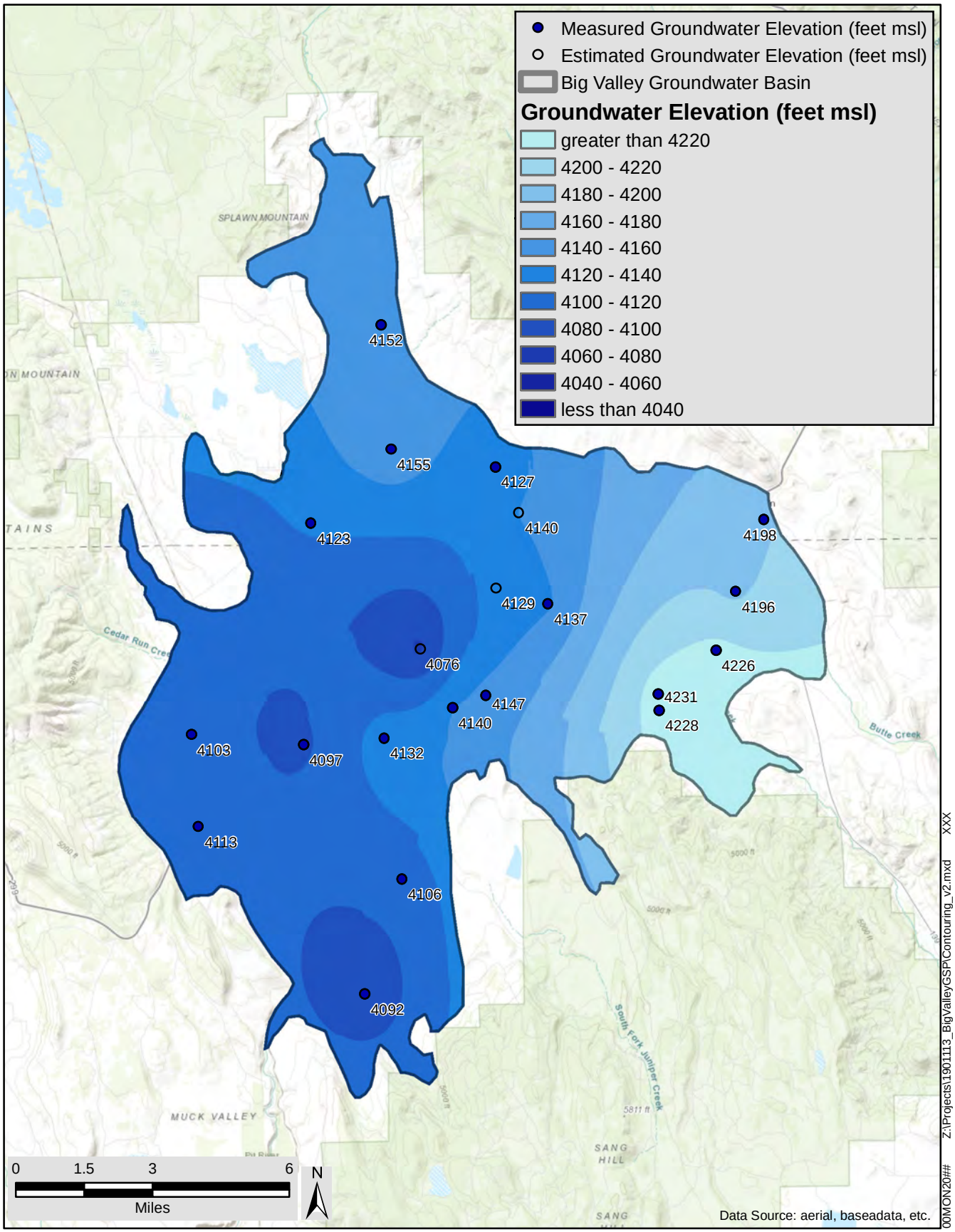
Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Spring 1996	
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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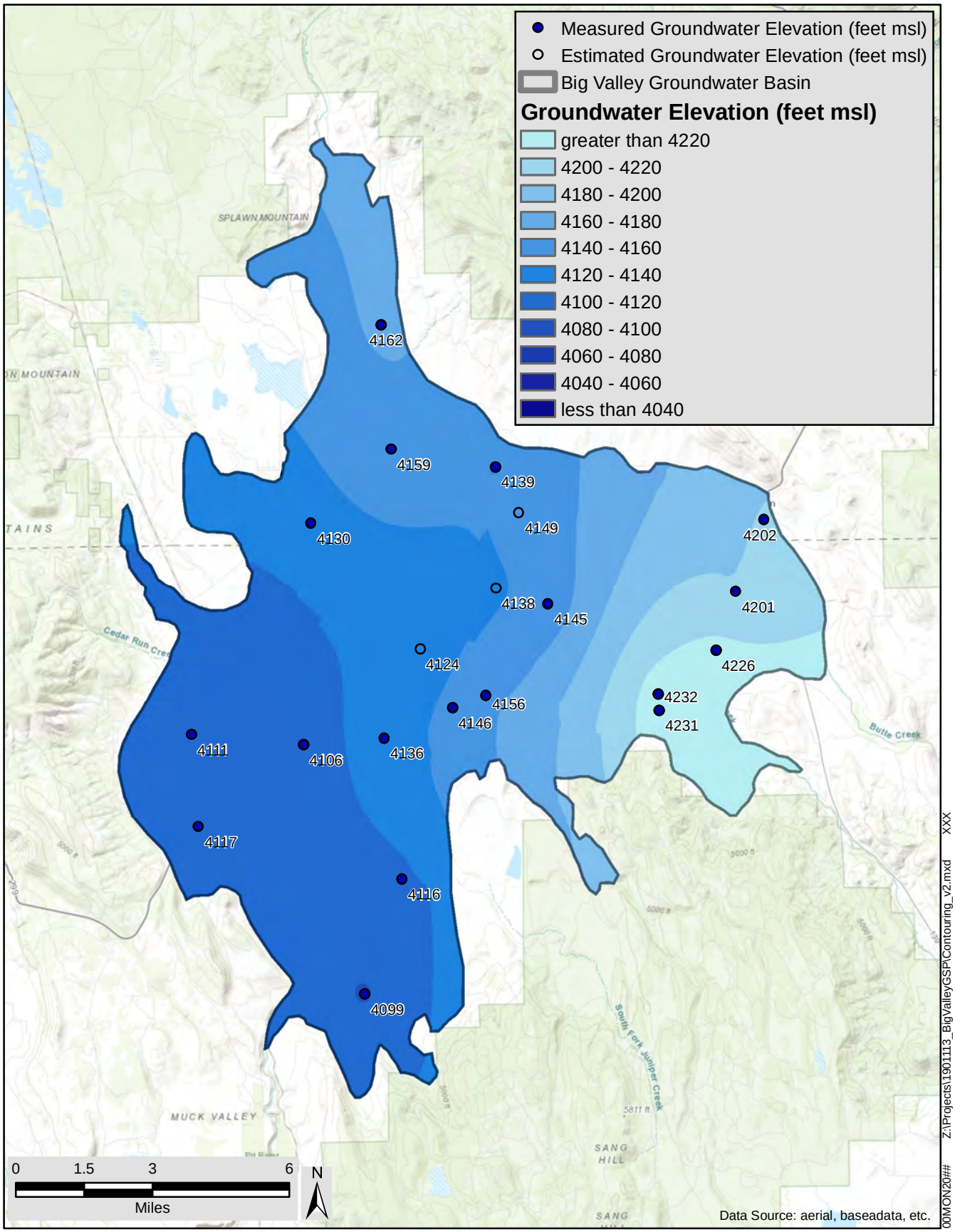
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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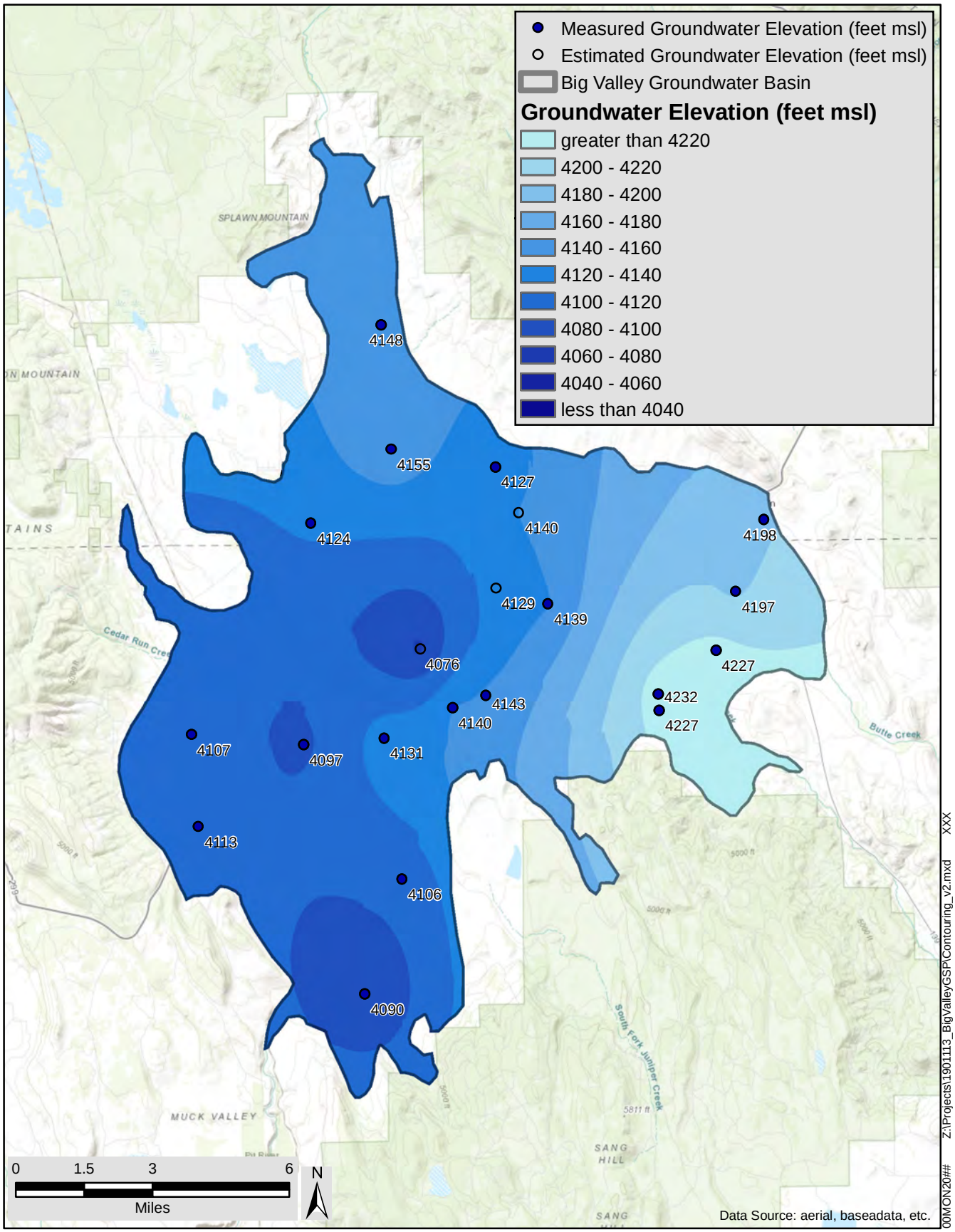
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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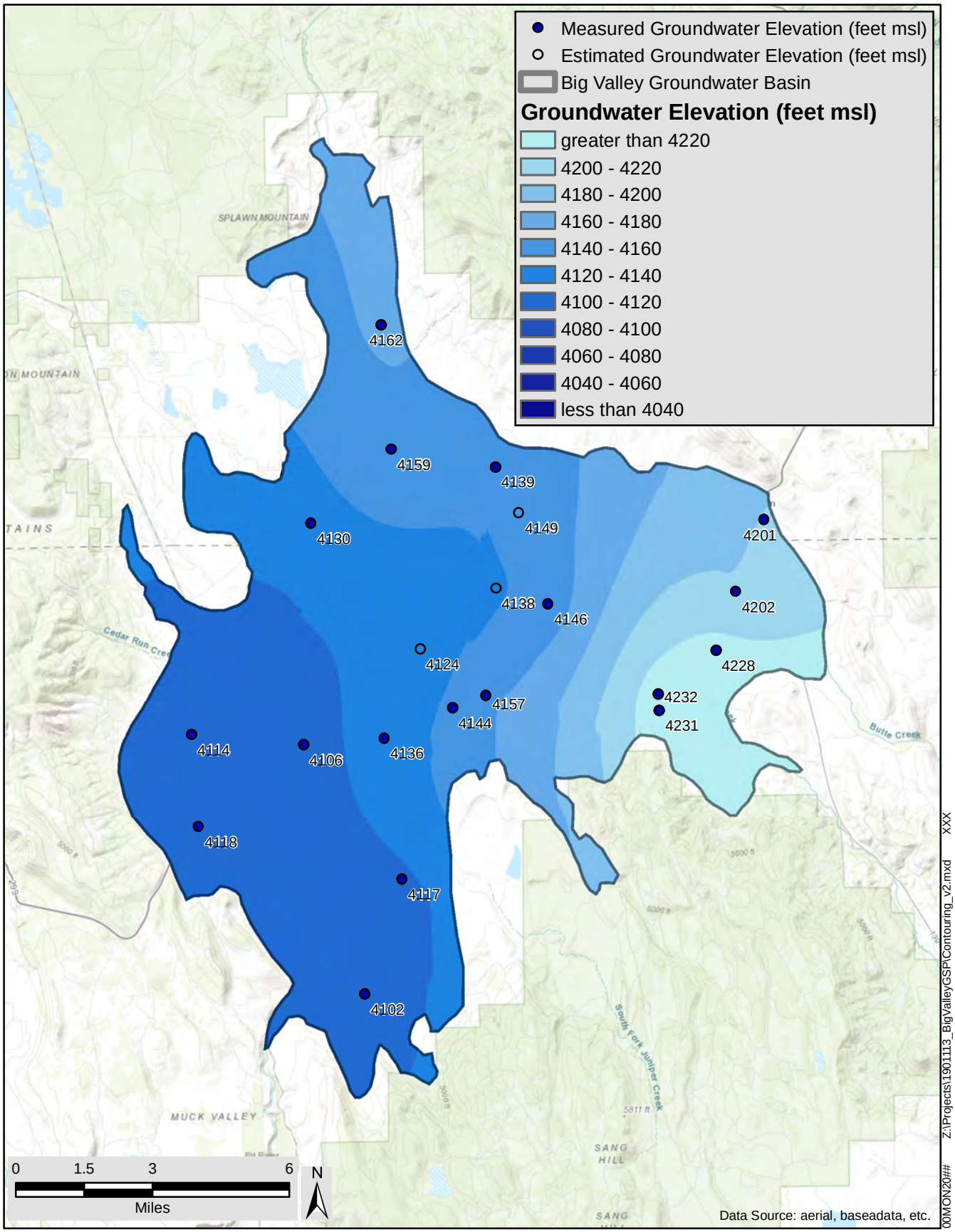
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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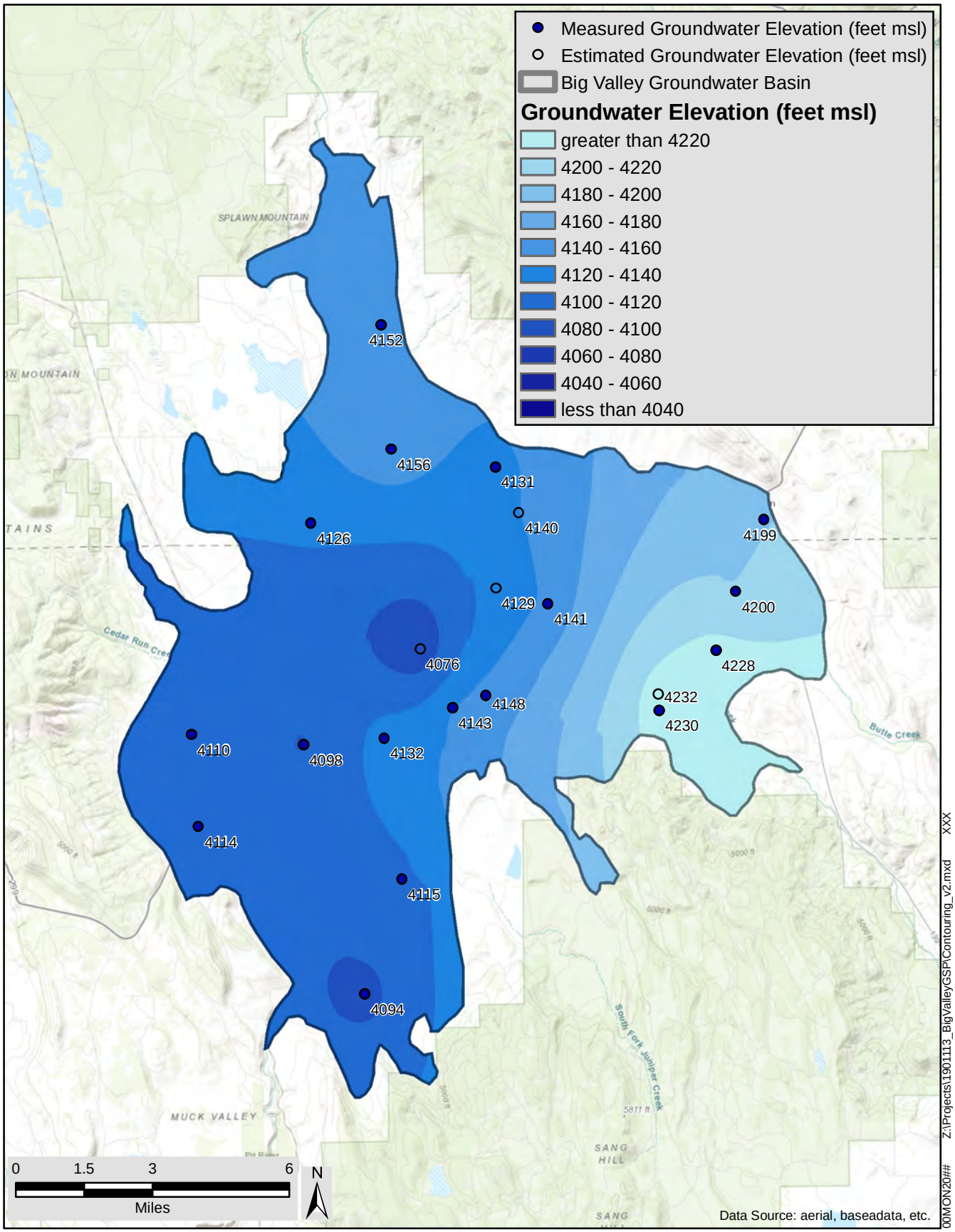
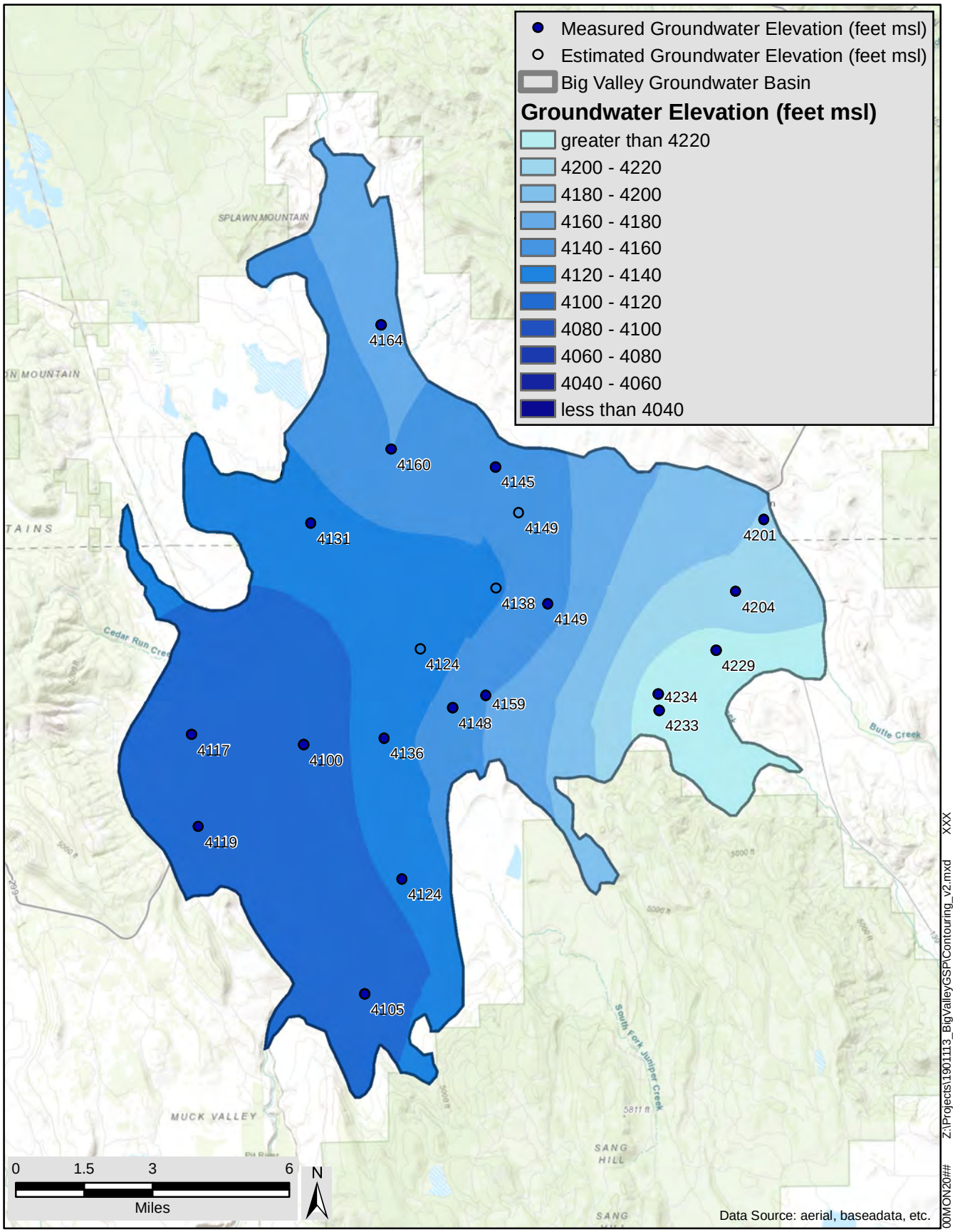
Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Spring 1998	
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Fall 1998	
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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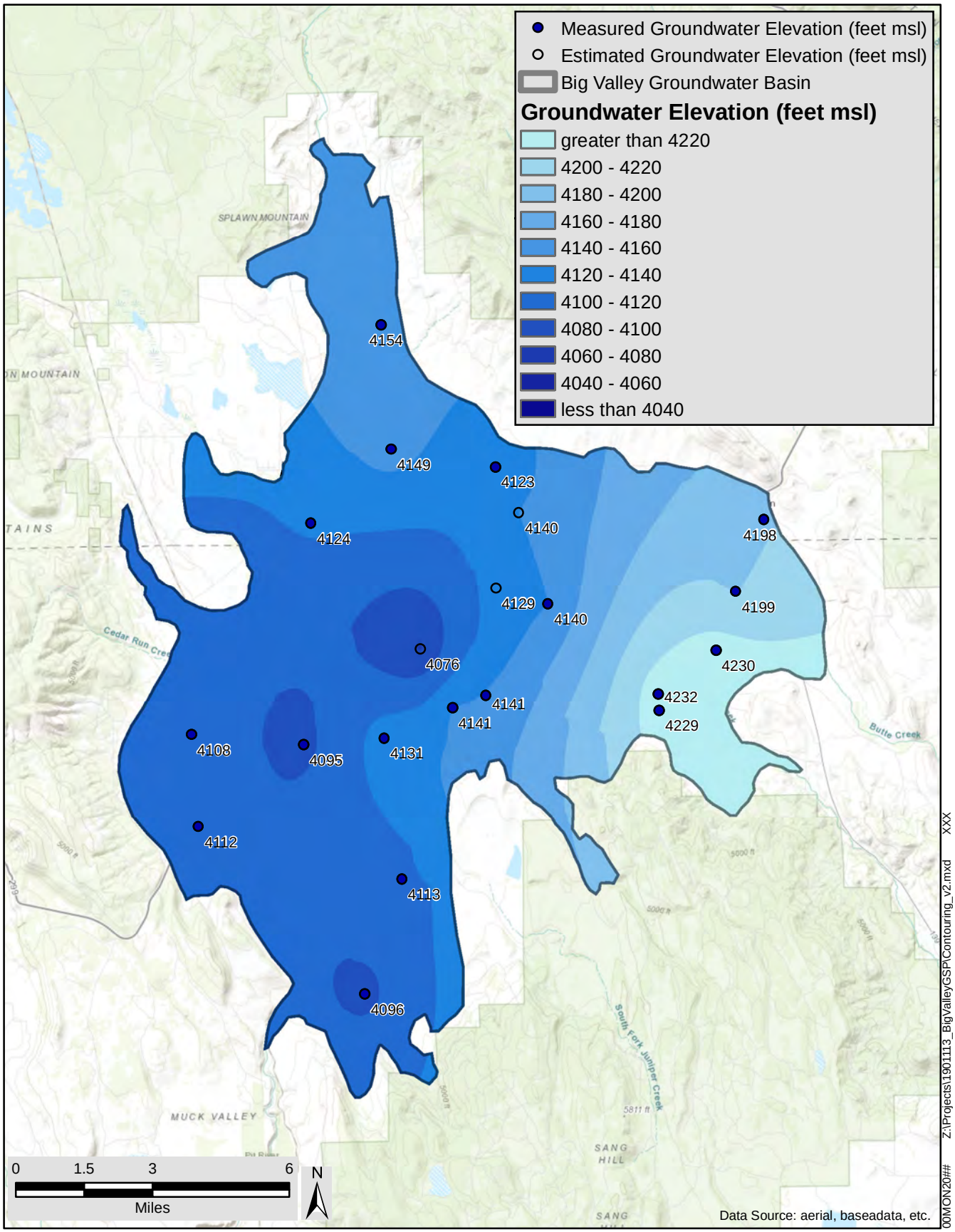
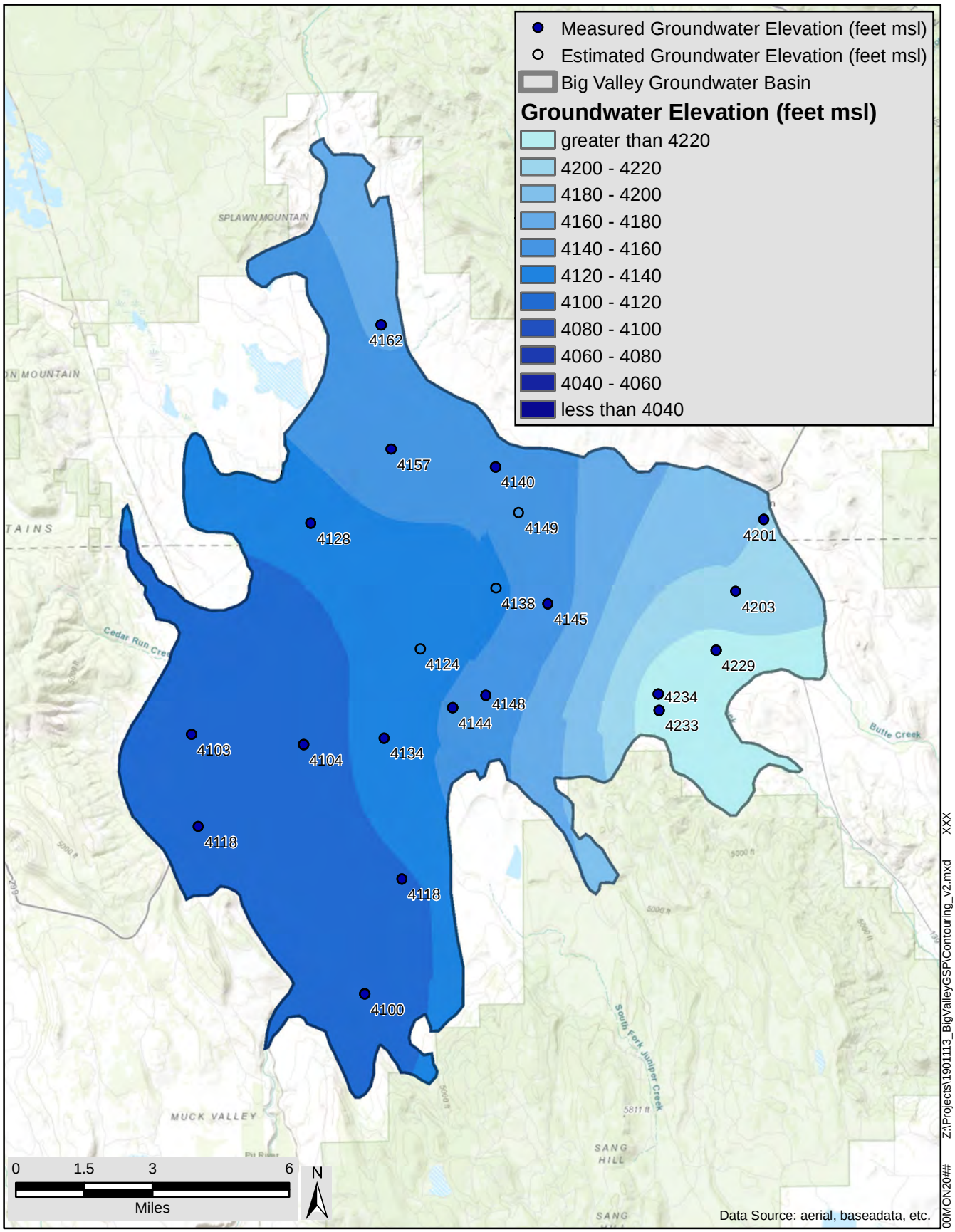
Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Spring 1999	
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Fall 1999	
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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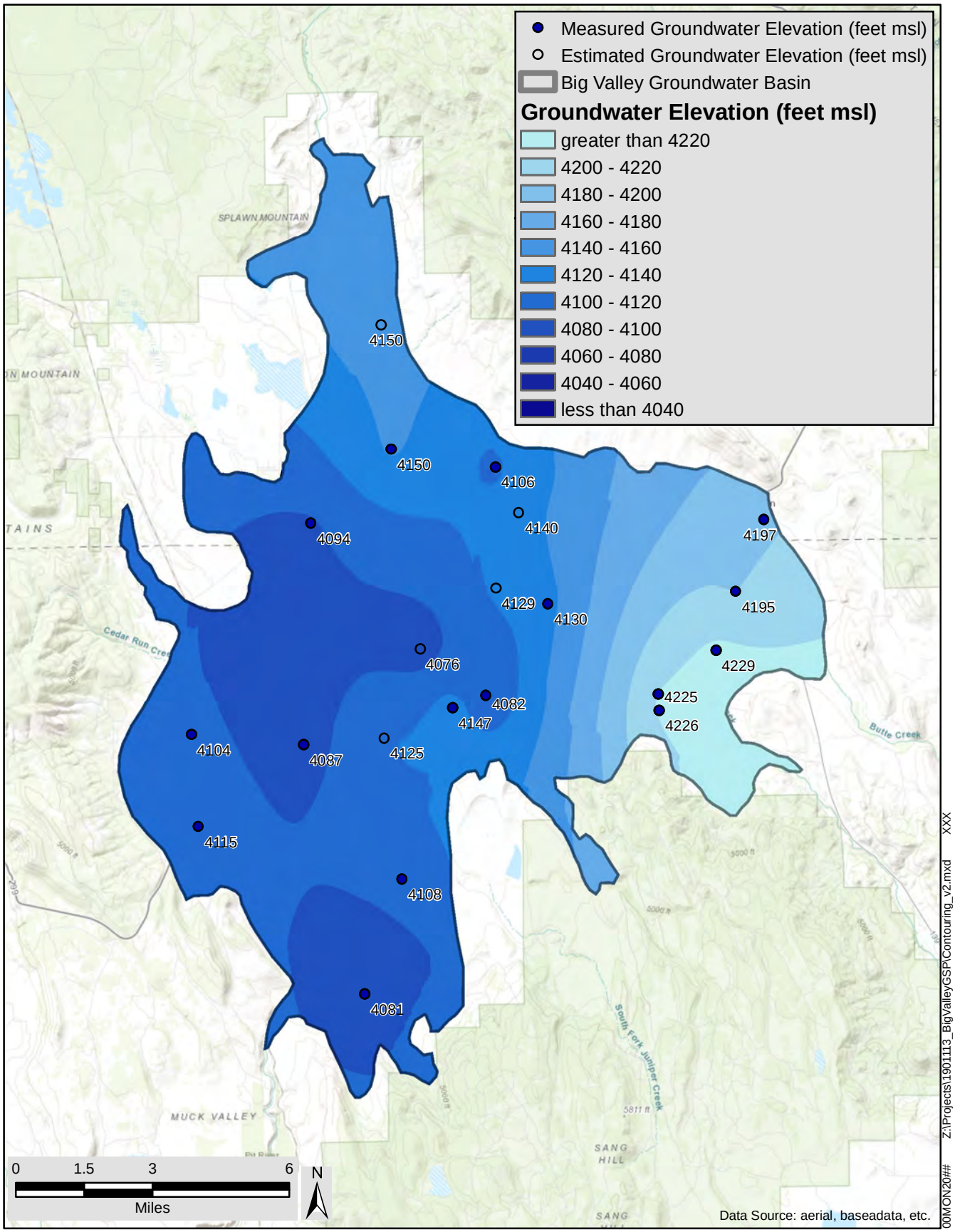
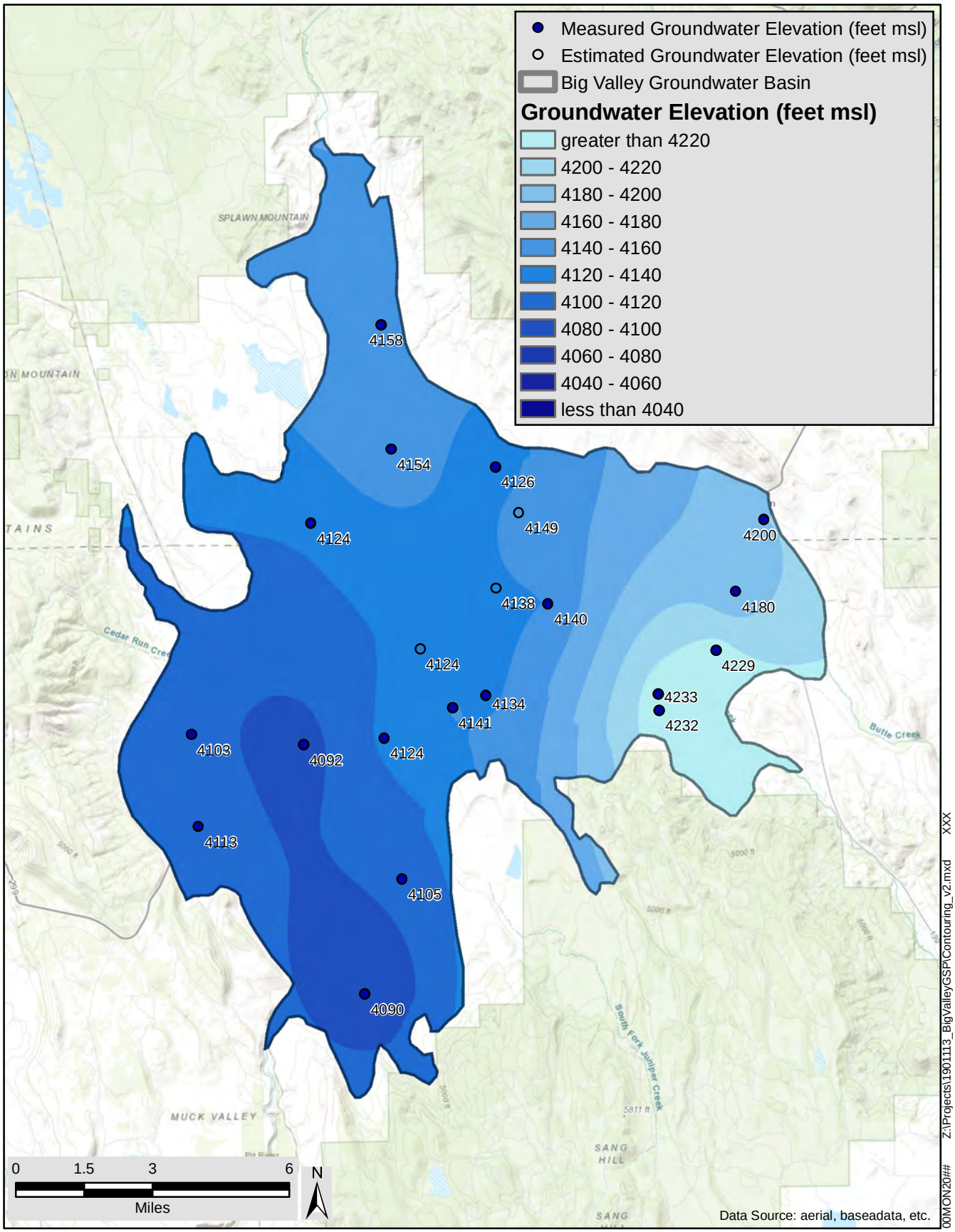
Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Spring 2000	
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Fall 2000	
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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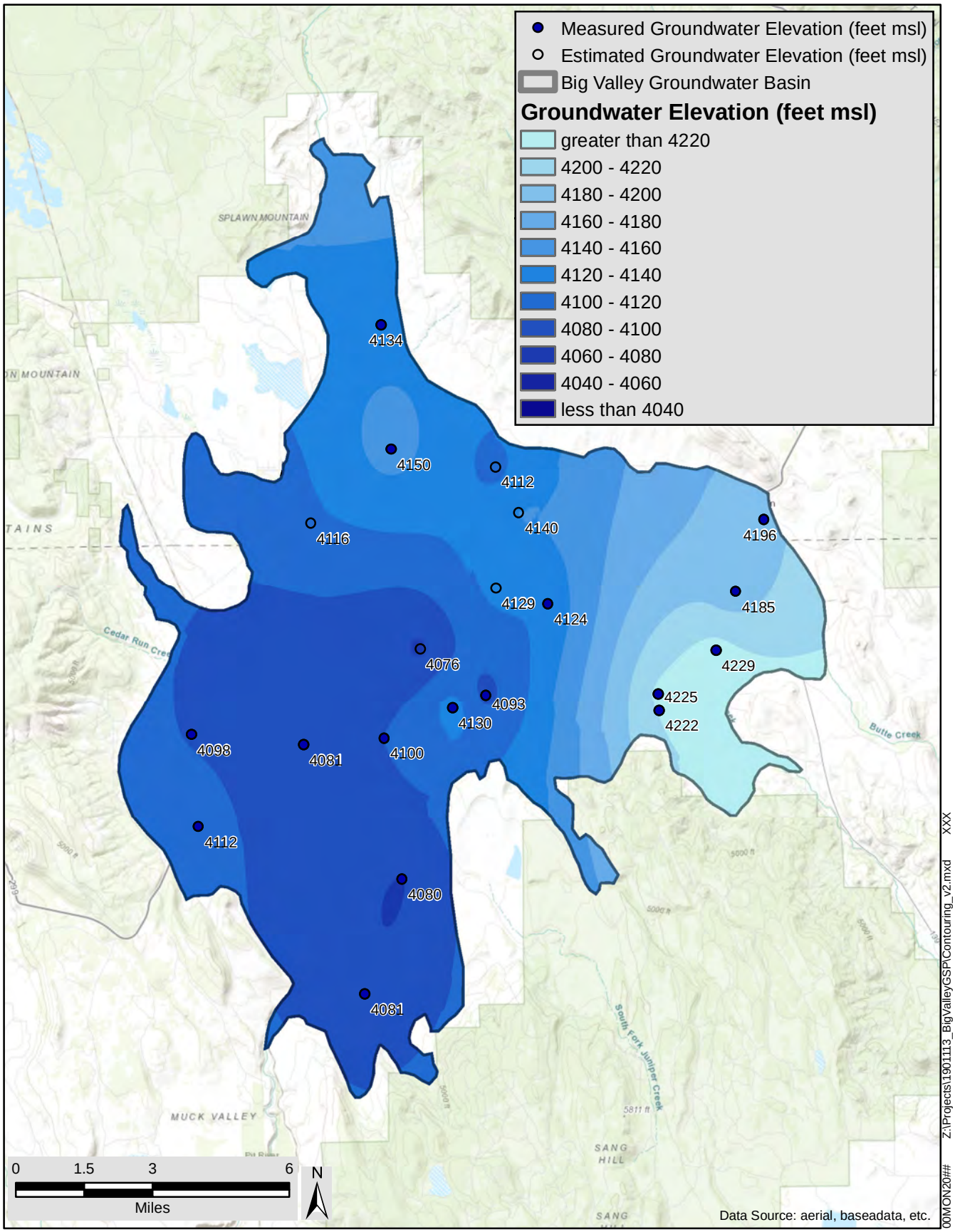
Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Spring 2001	
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Fall 2001	
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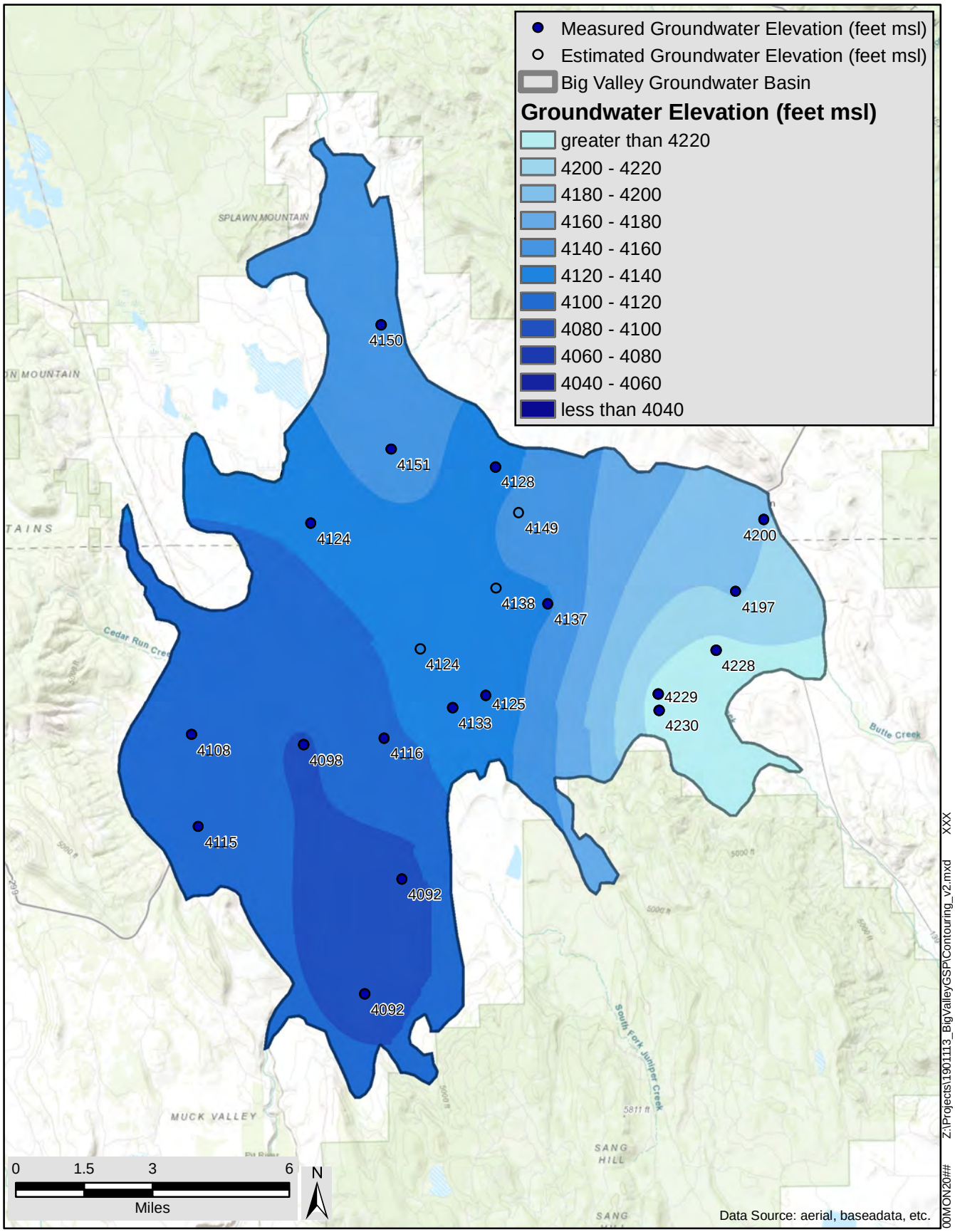

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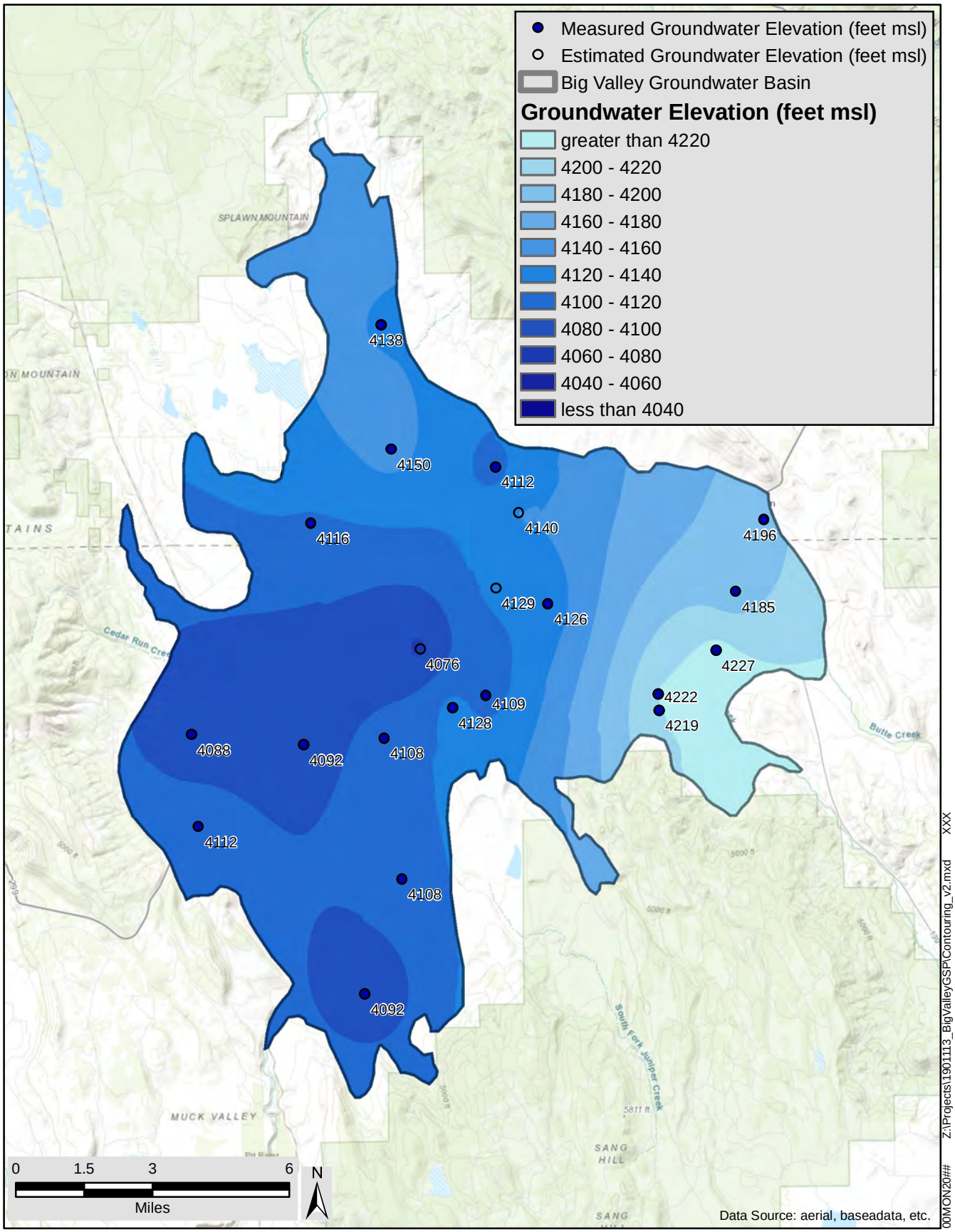
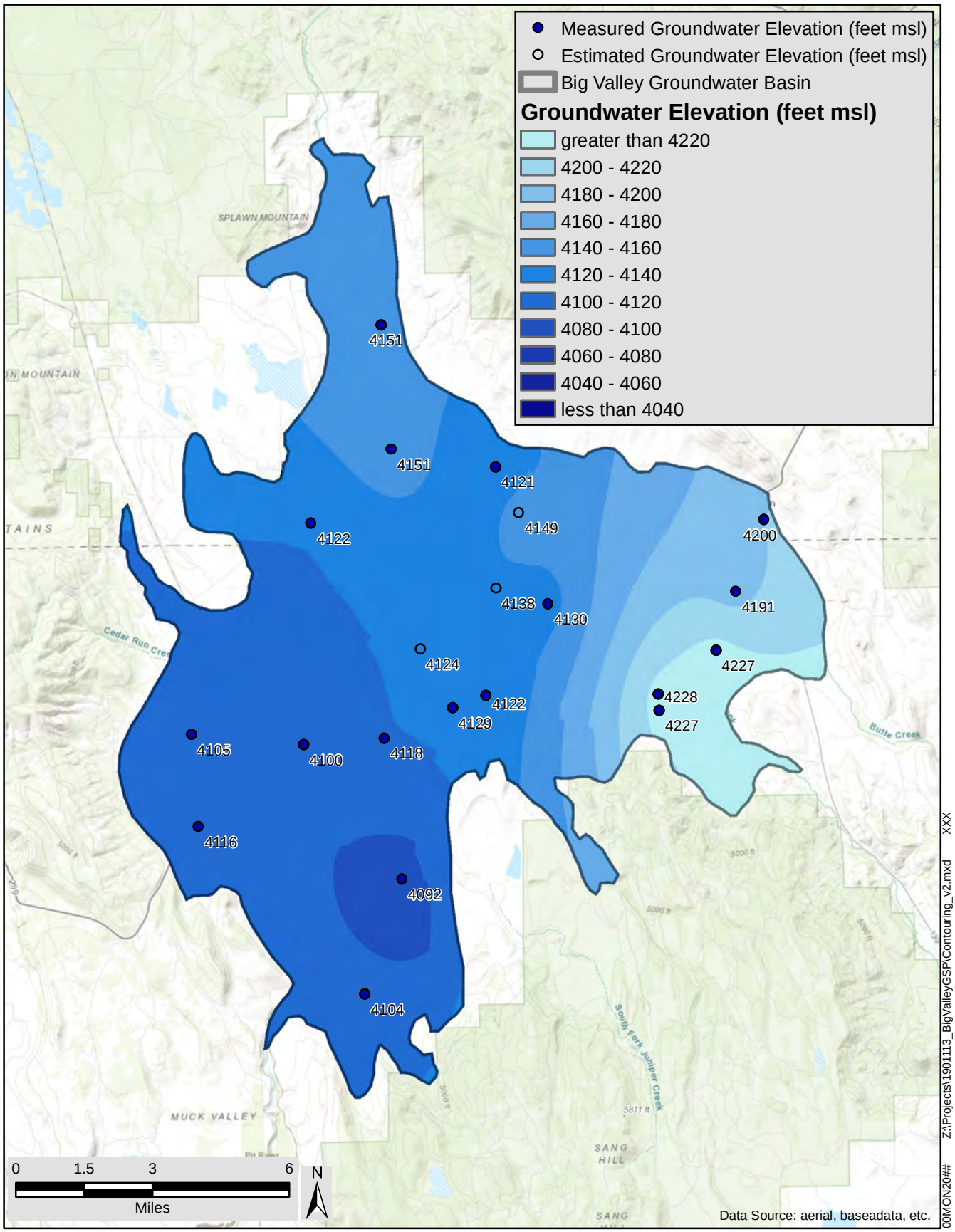


Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Fall 2002	
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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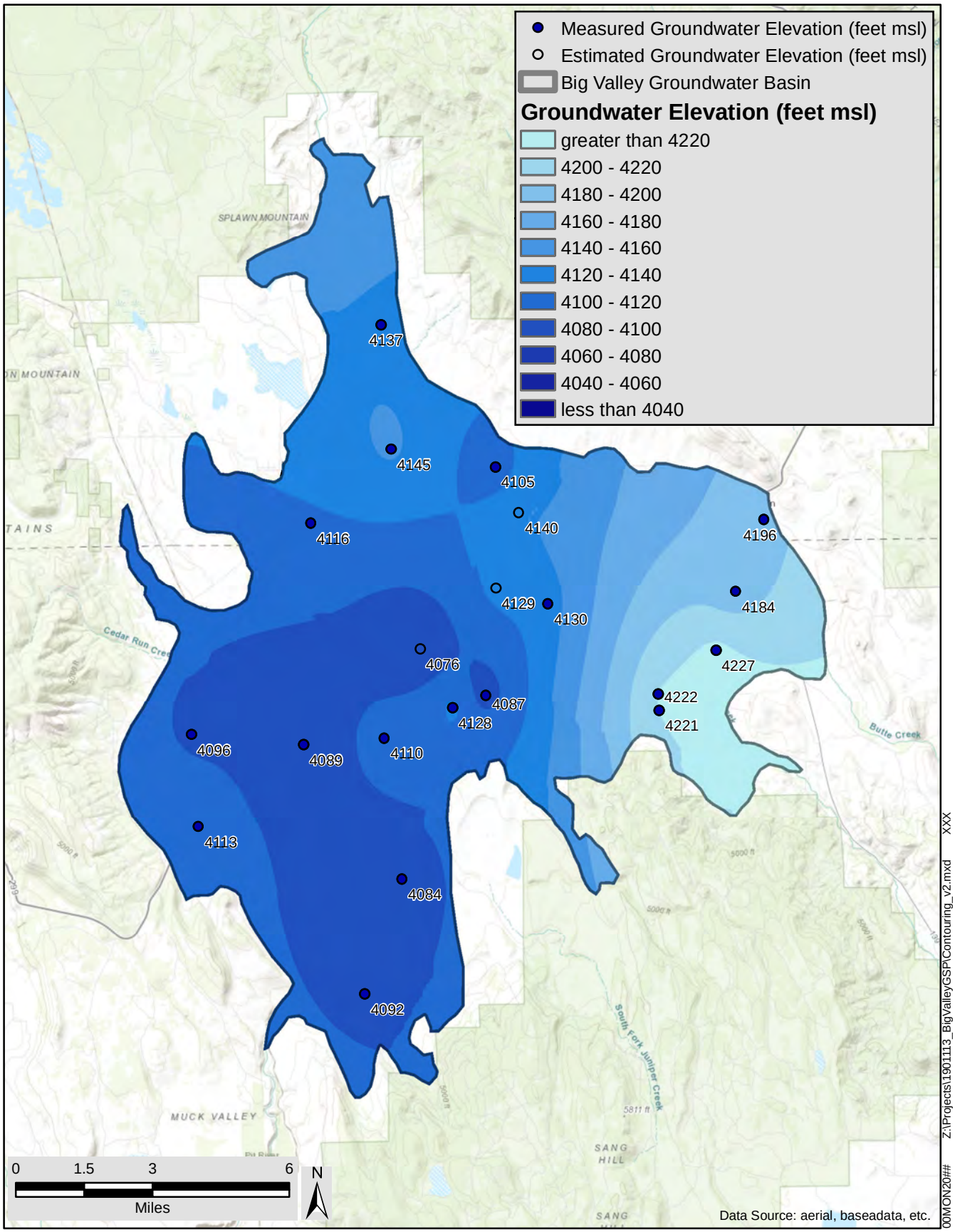

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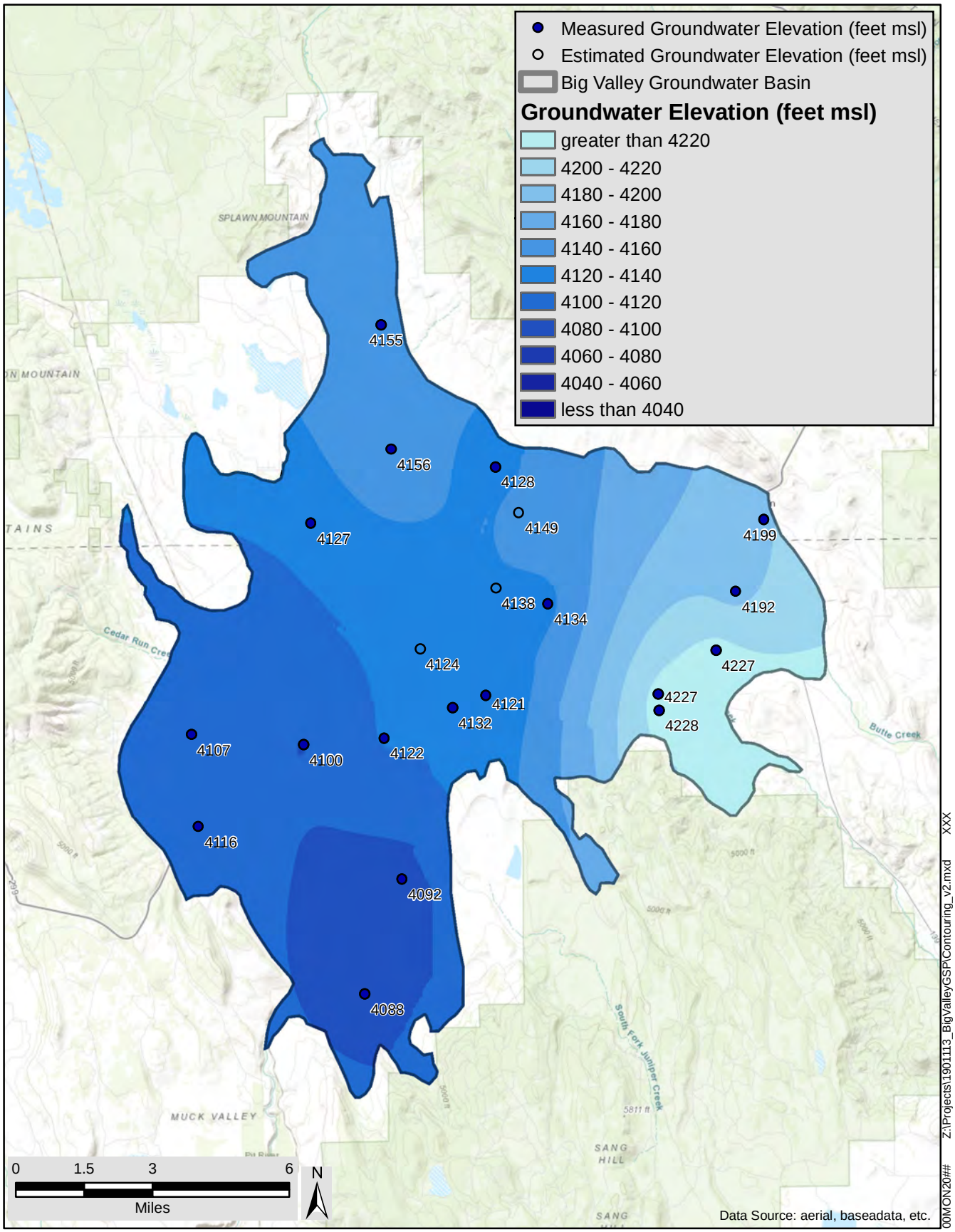
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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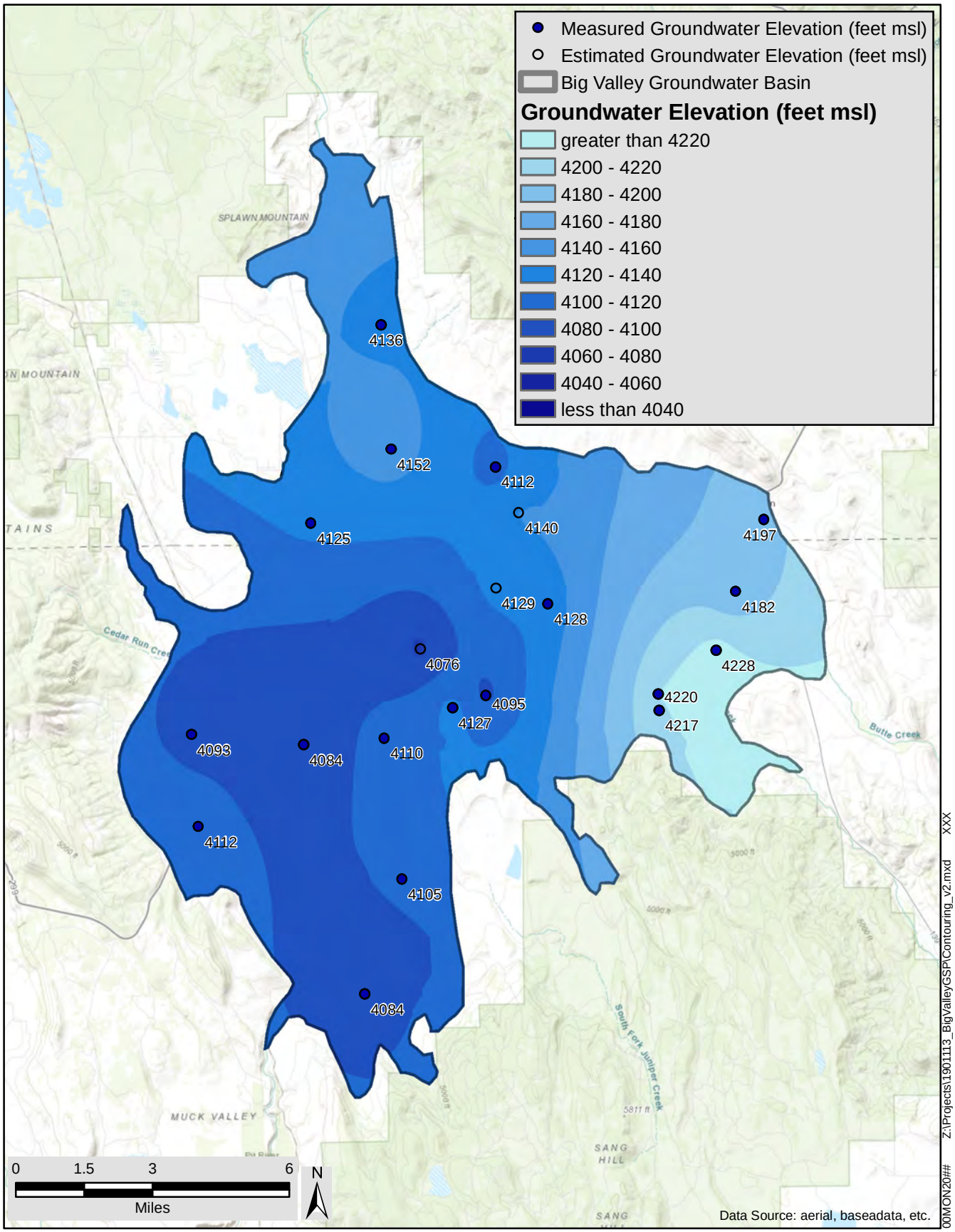
Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Spring 2004	
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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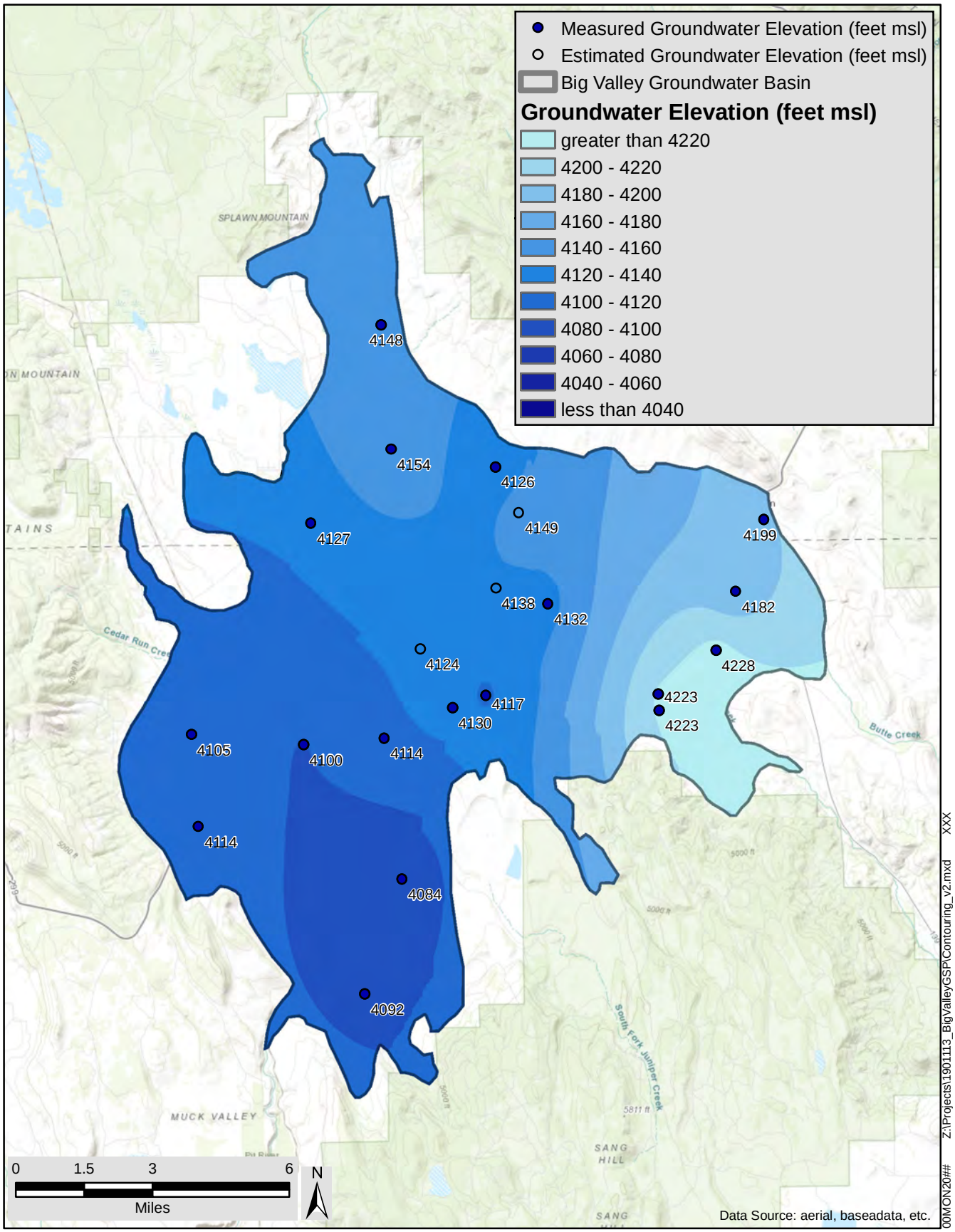
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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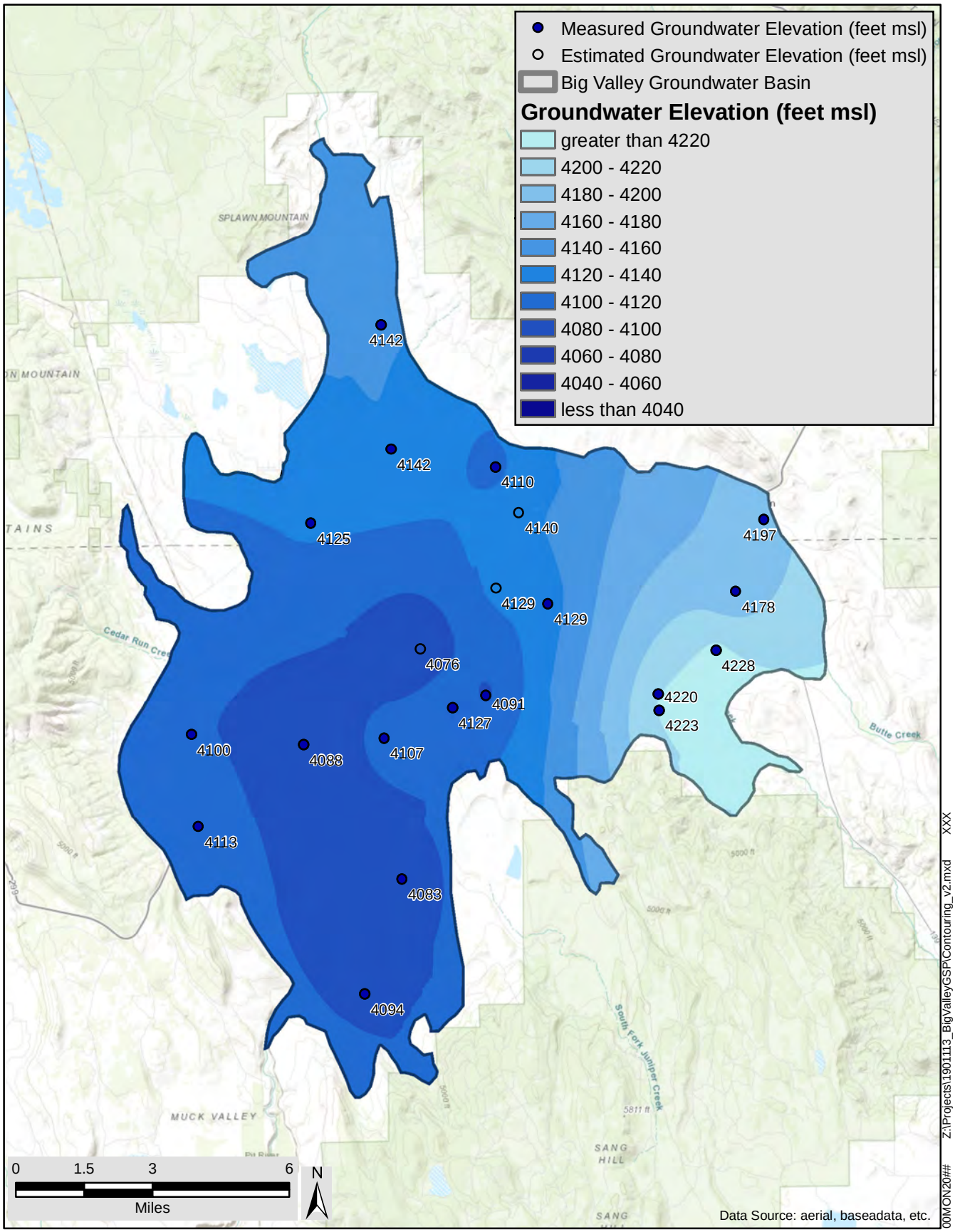
Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Spring 2005	
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Fall 2005	
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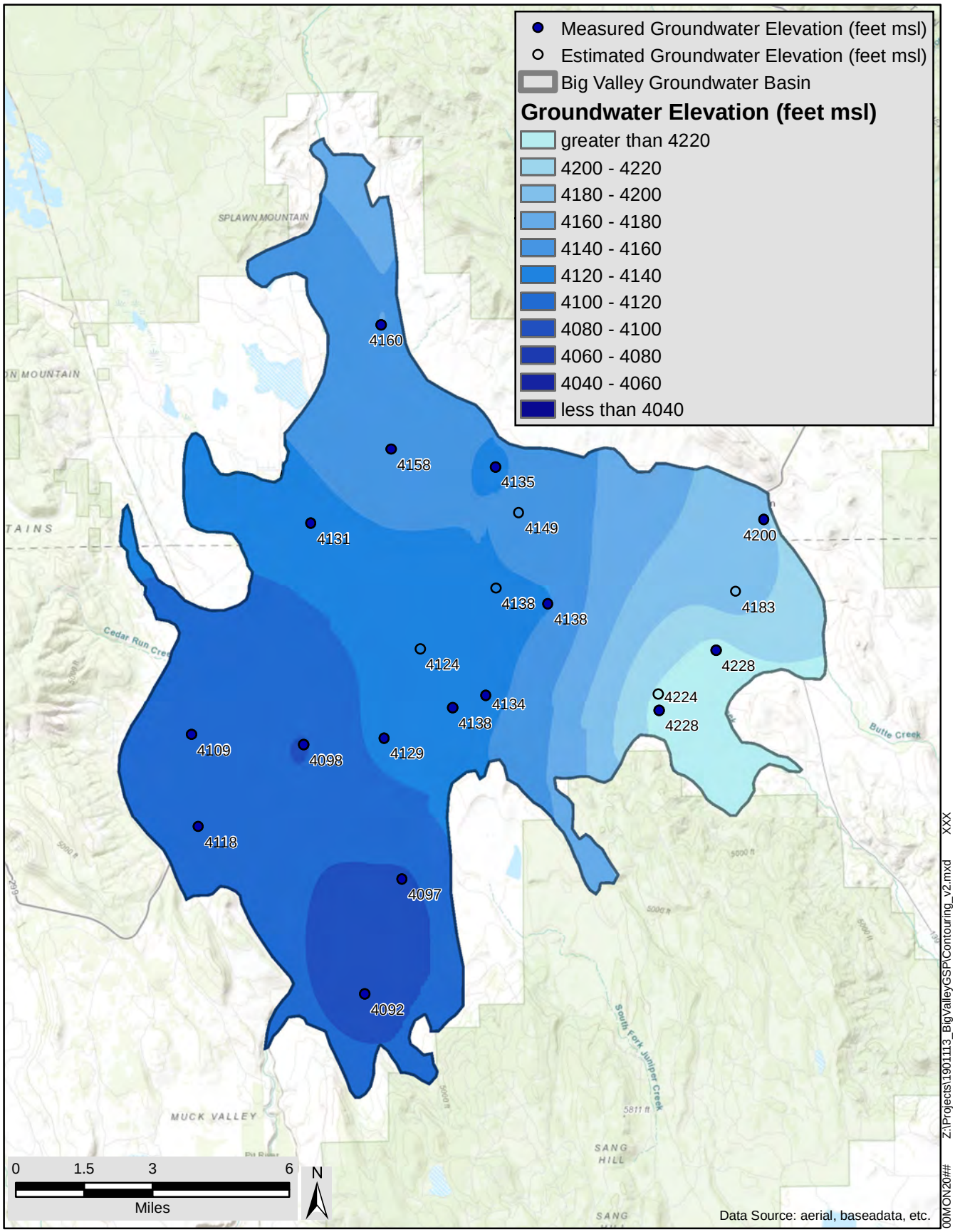

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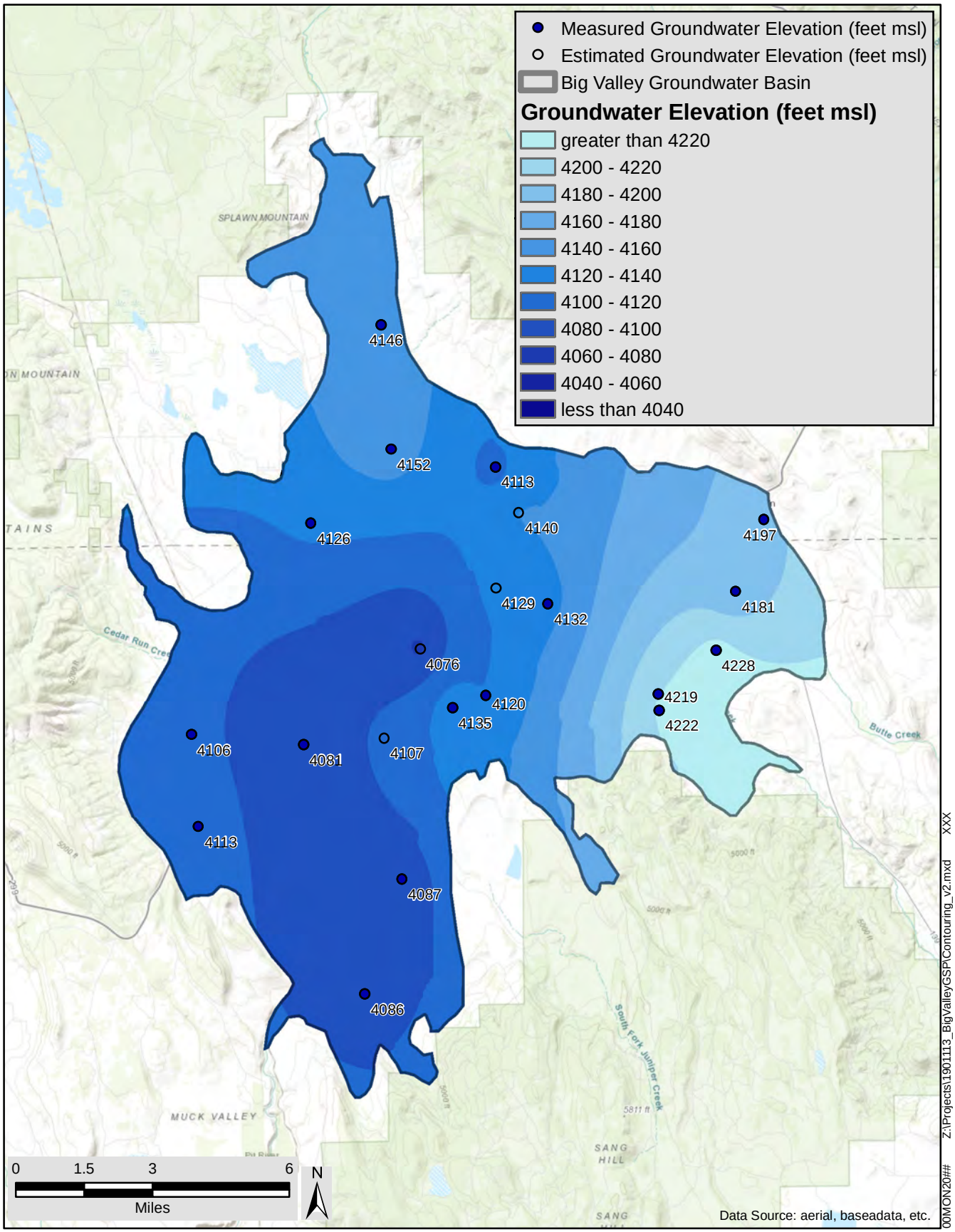
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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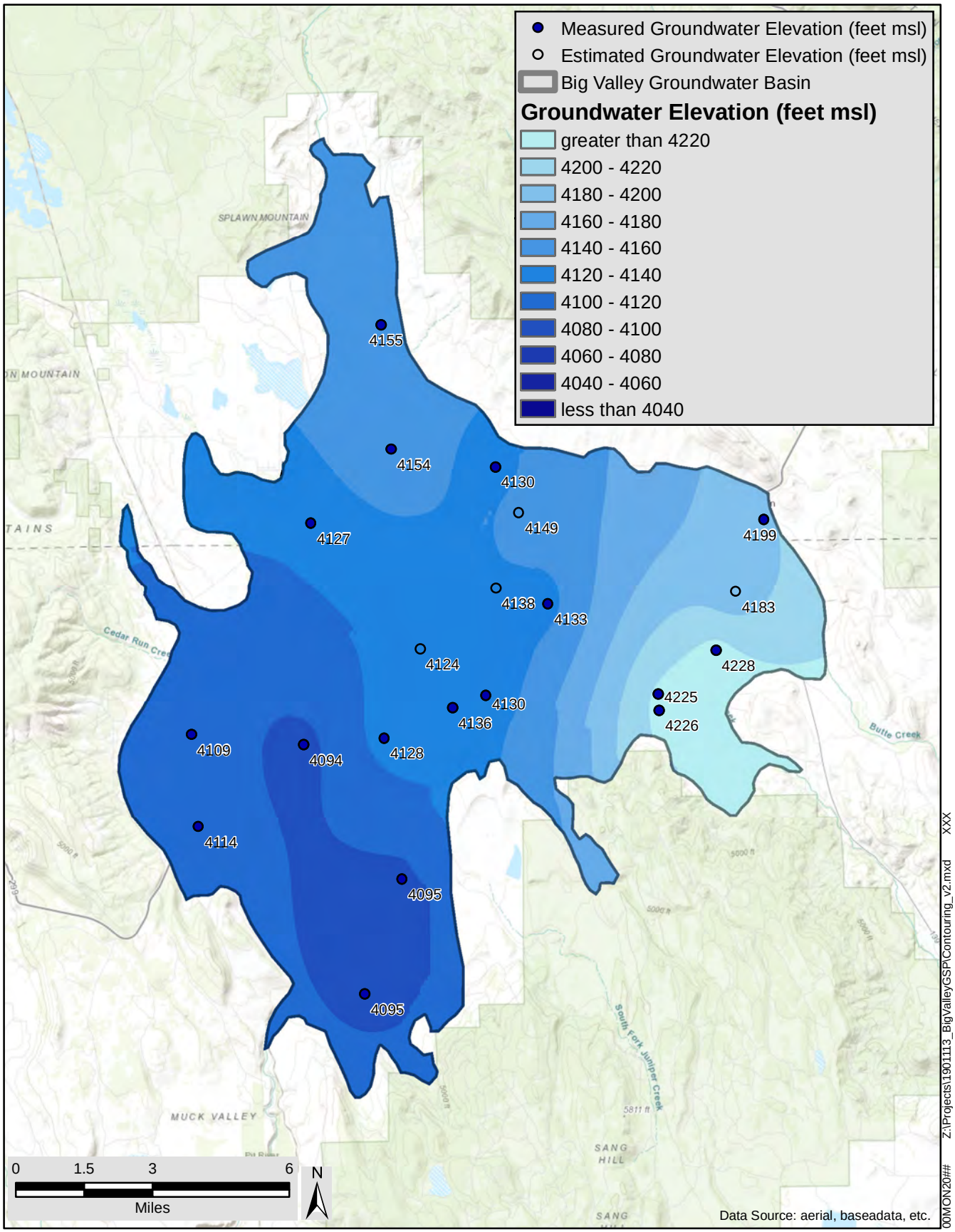

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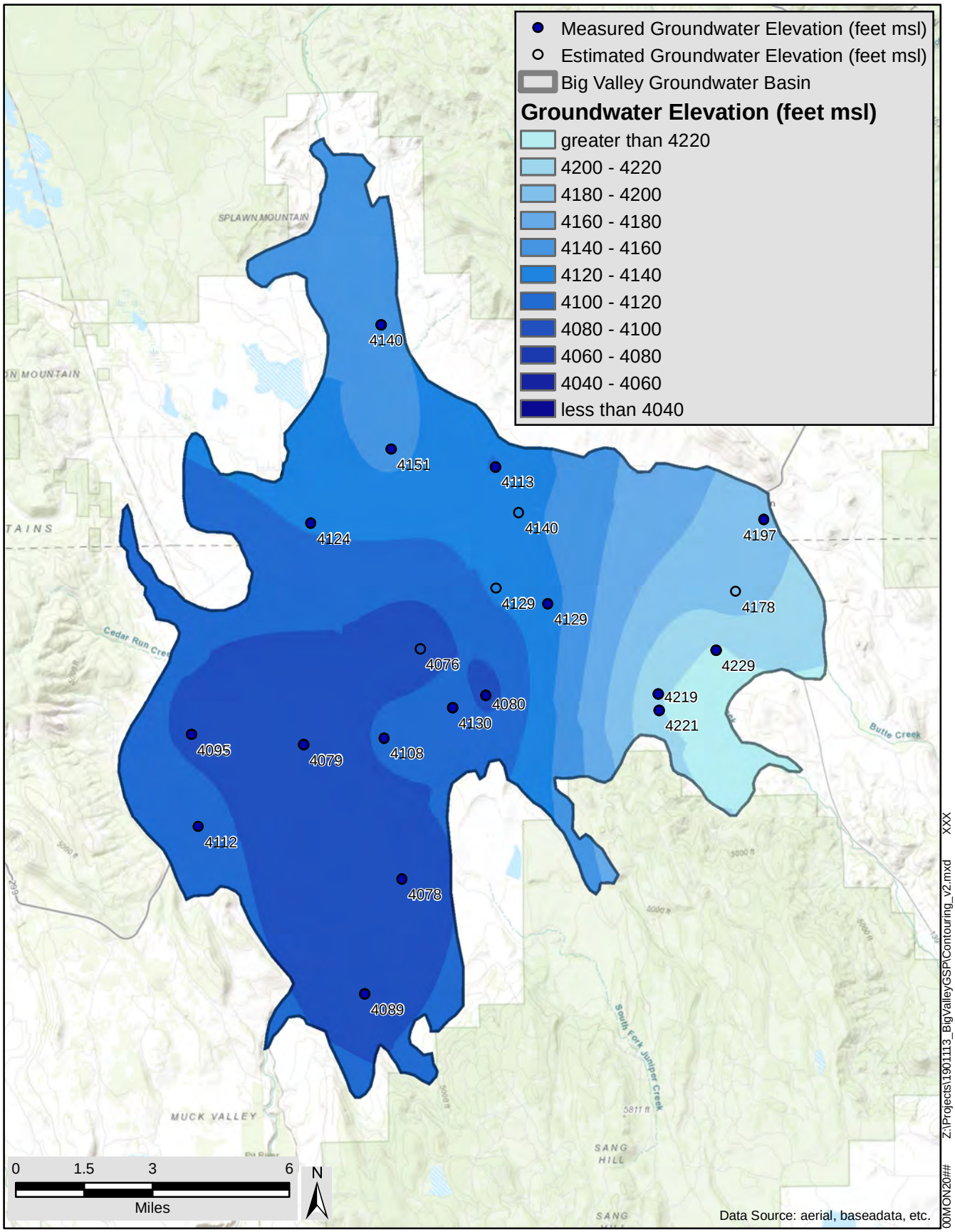

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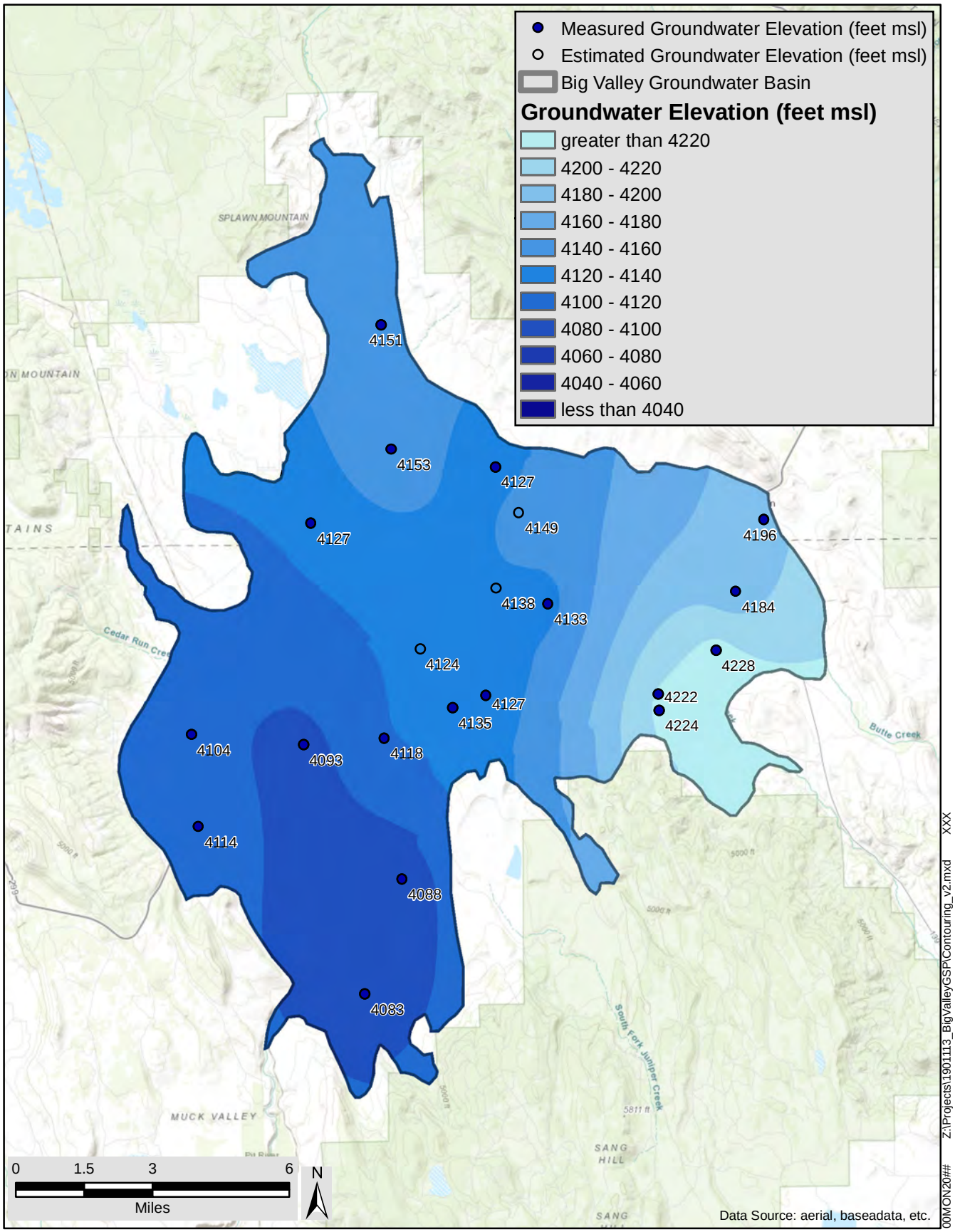

Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Spring 2008	
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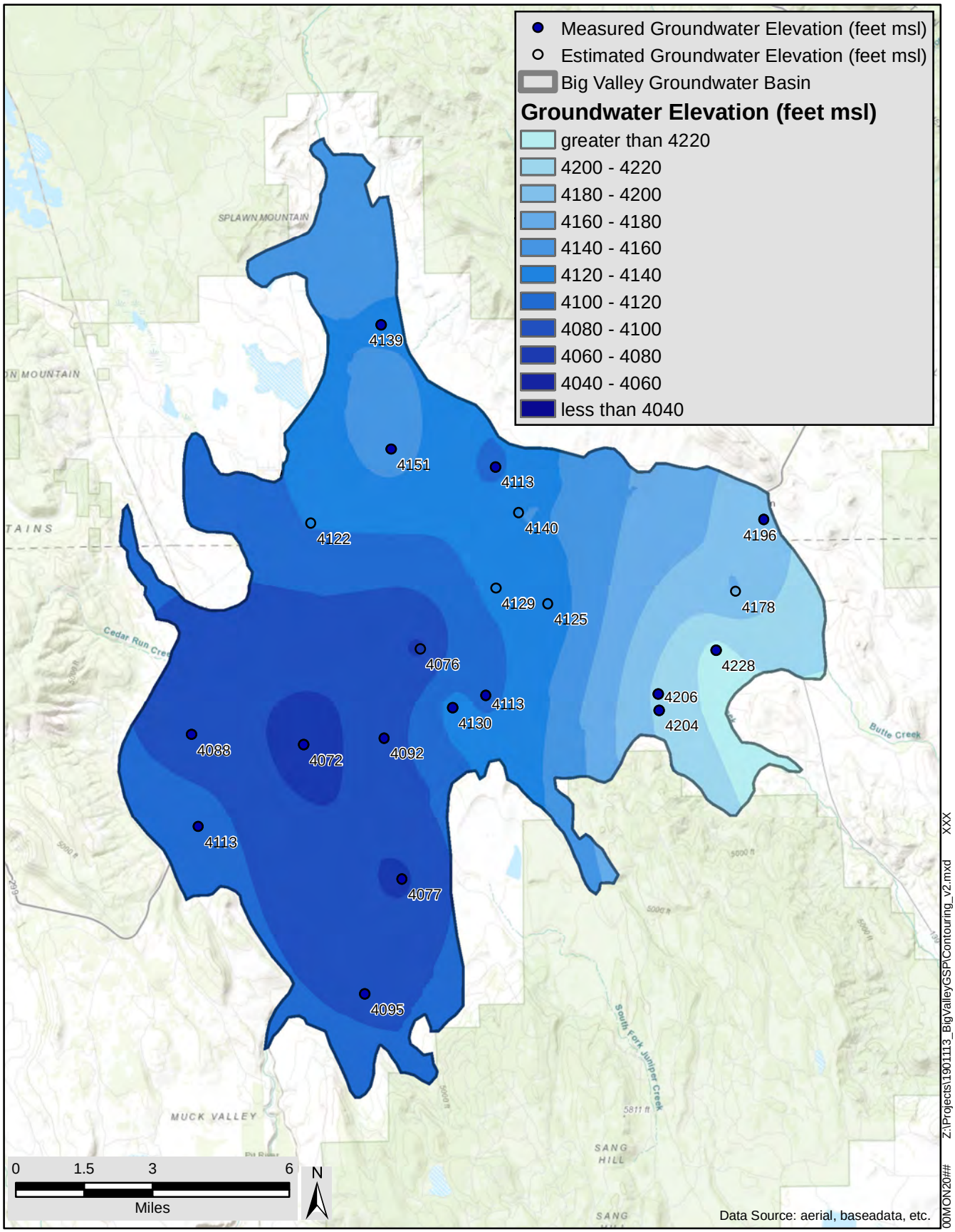

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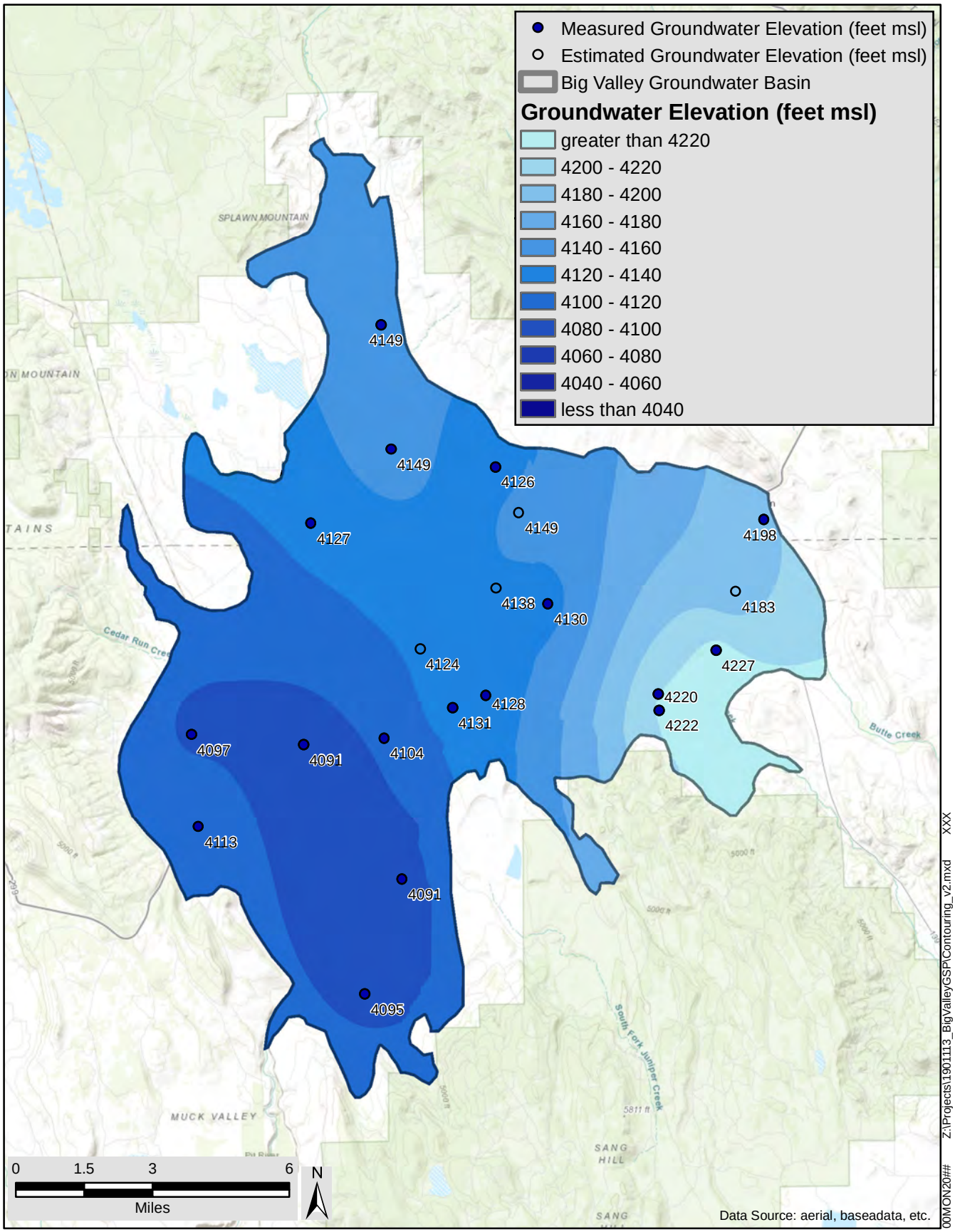

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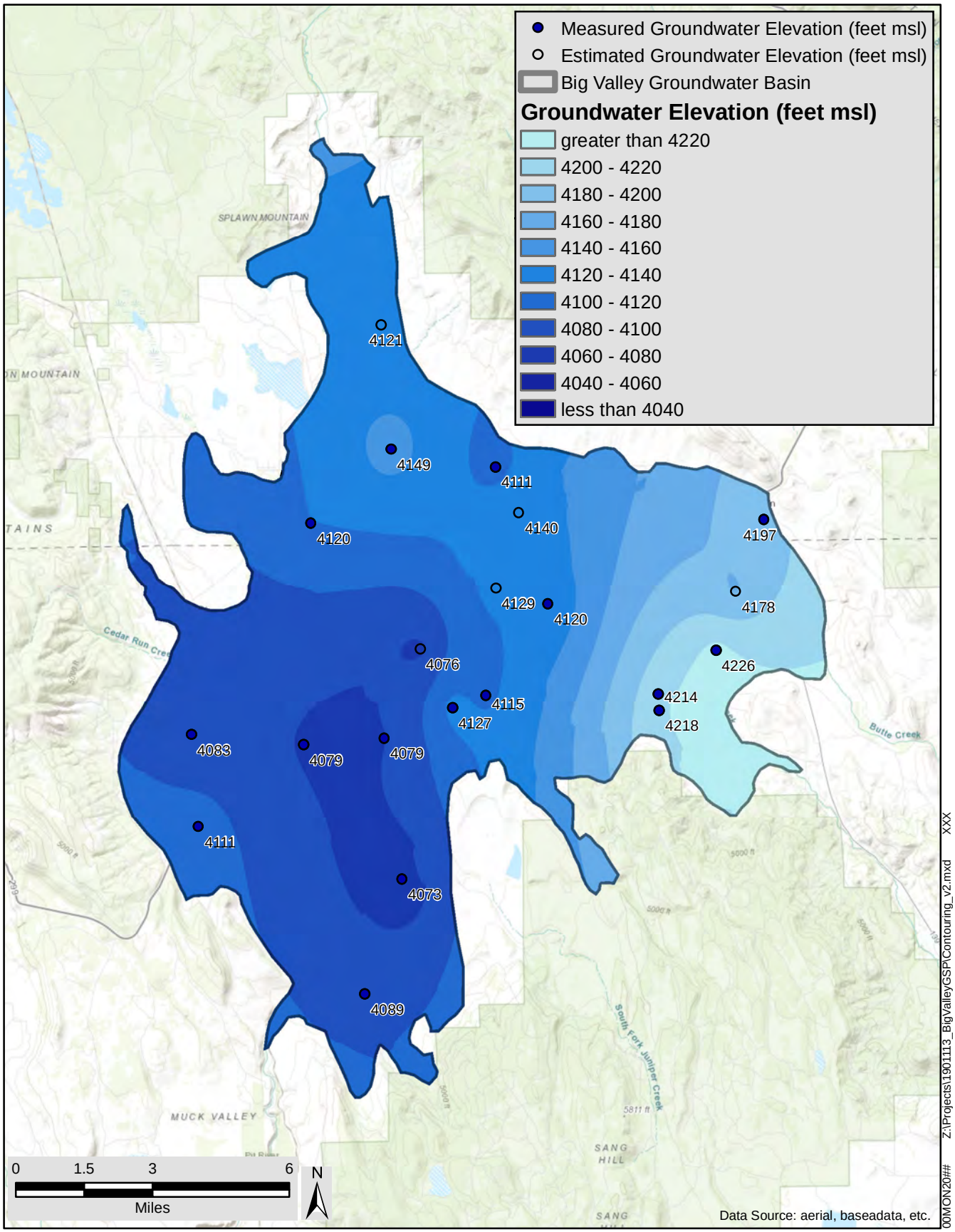

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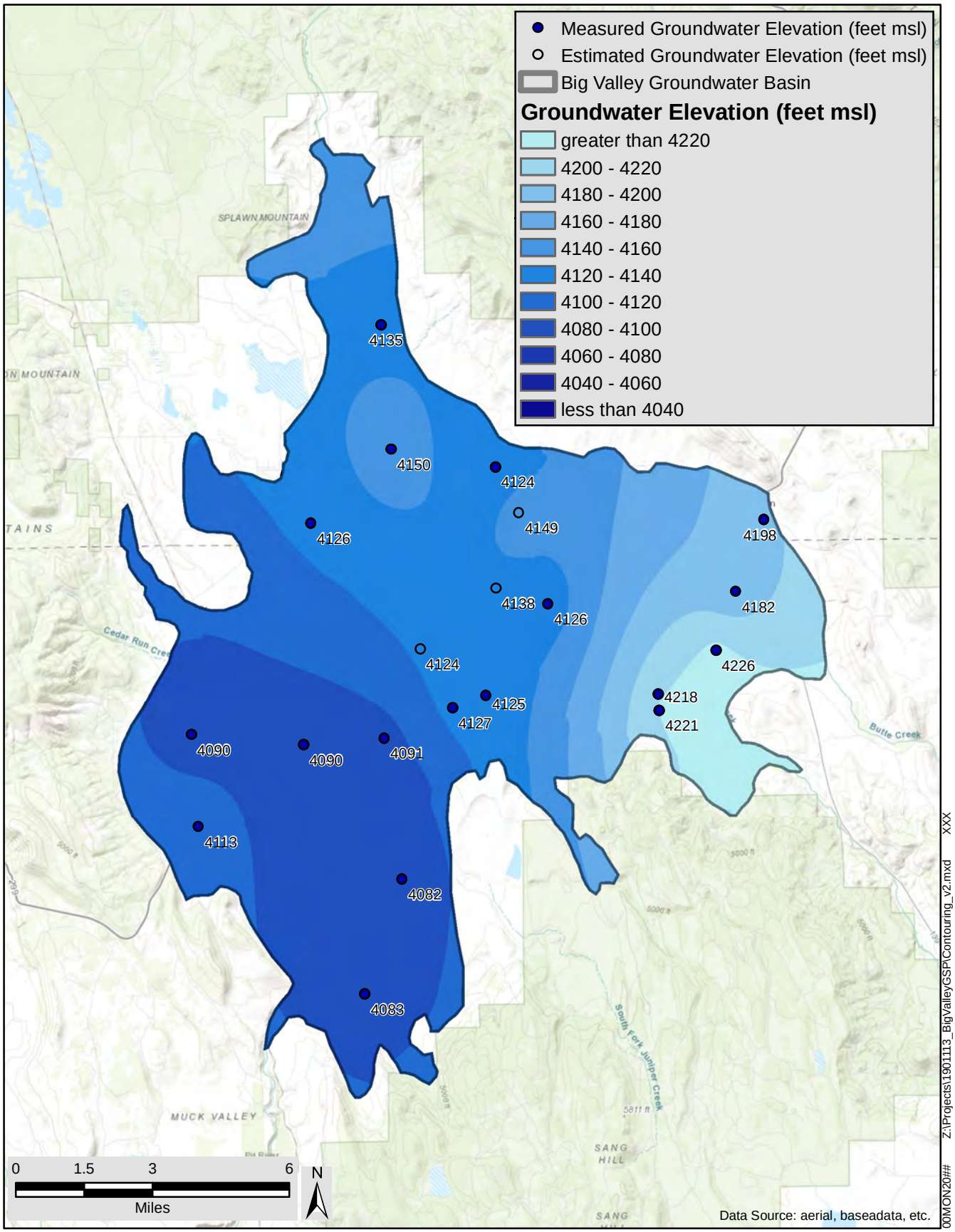

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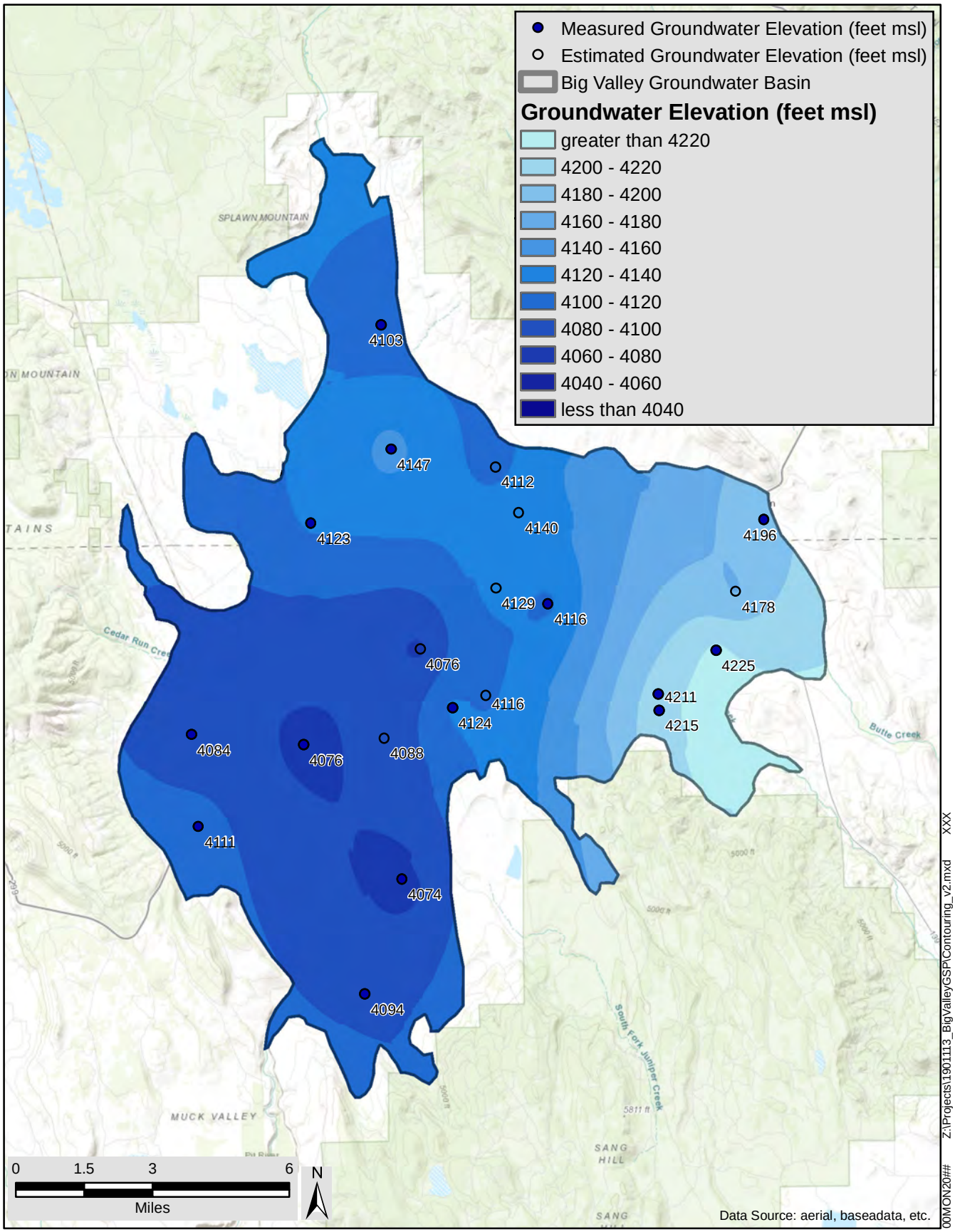
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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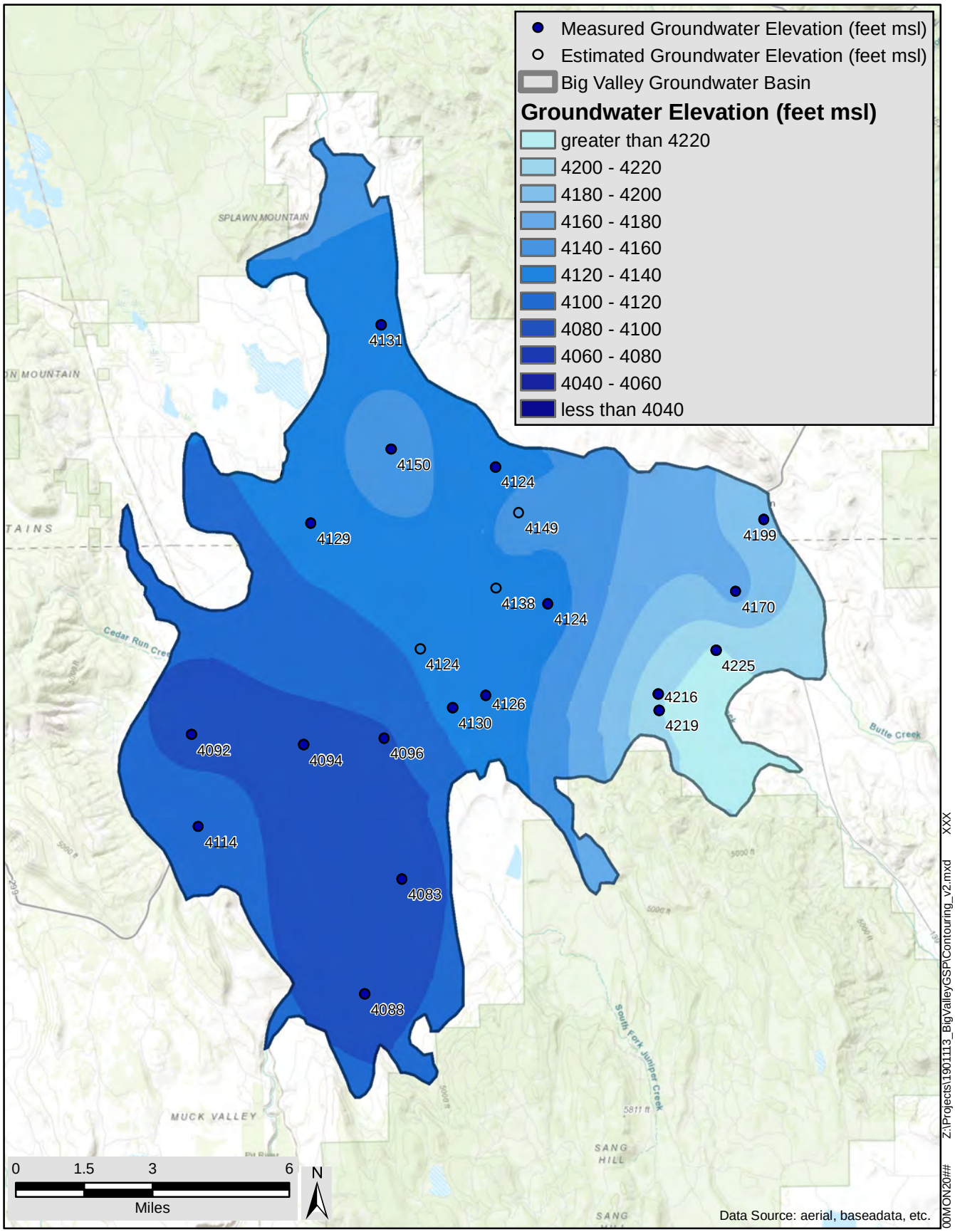
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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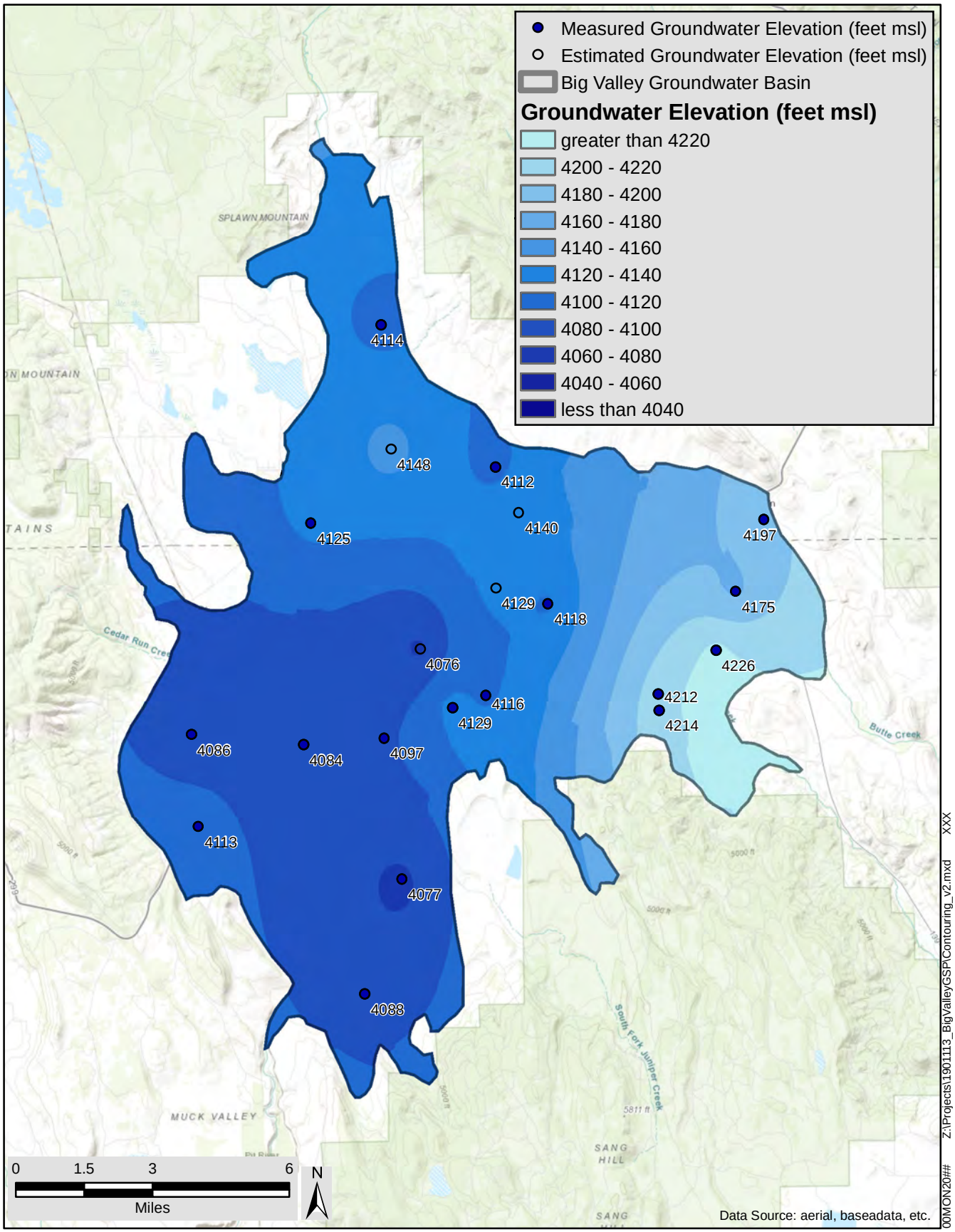
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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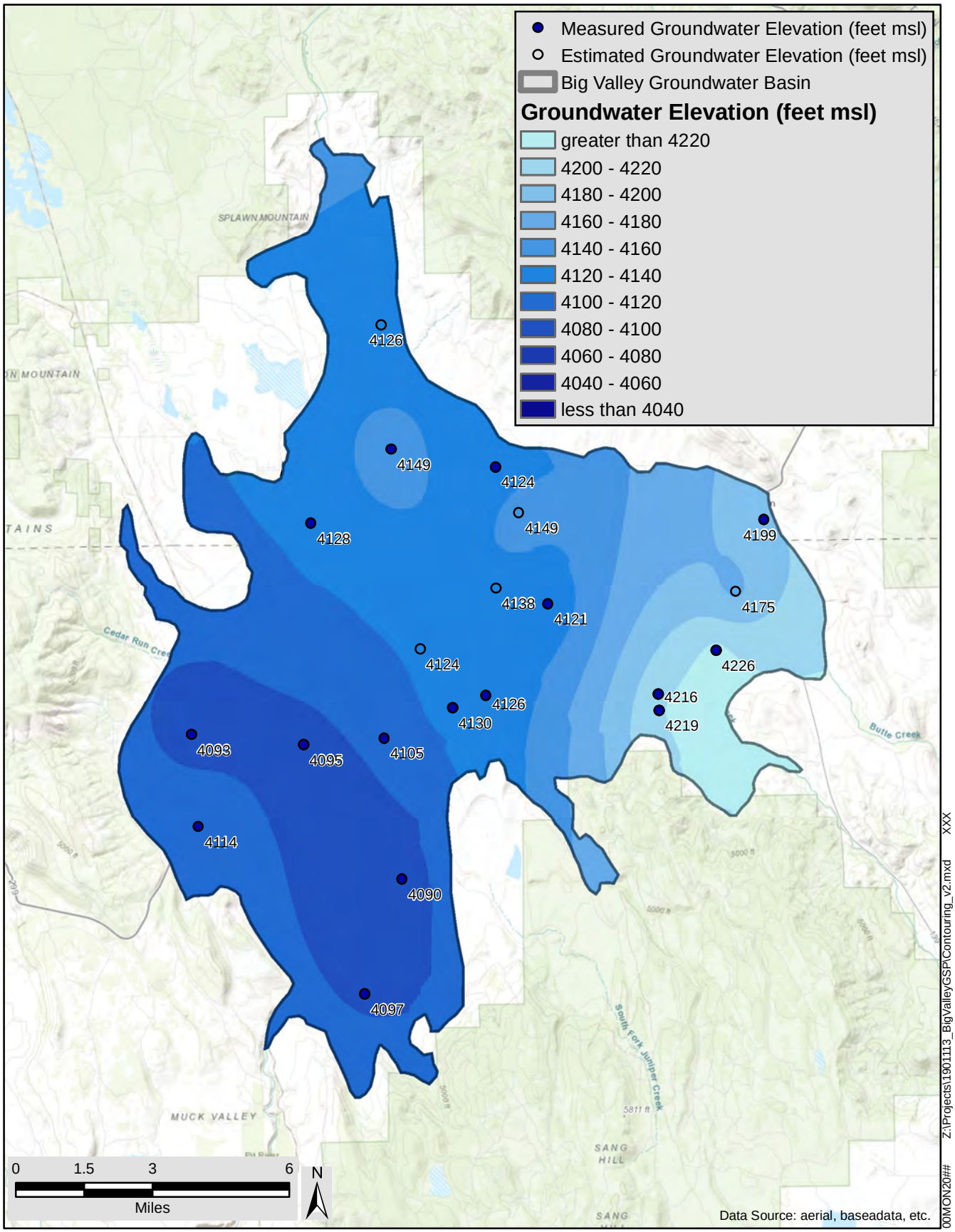
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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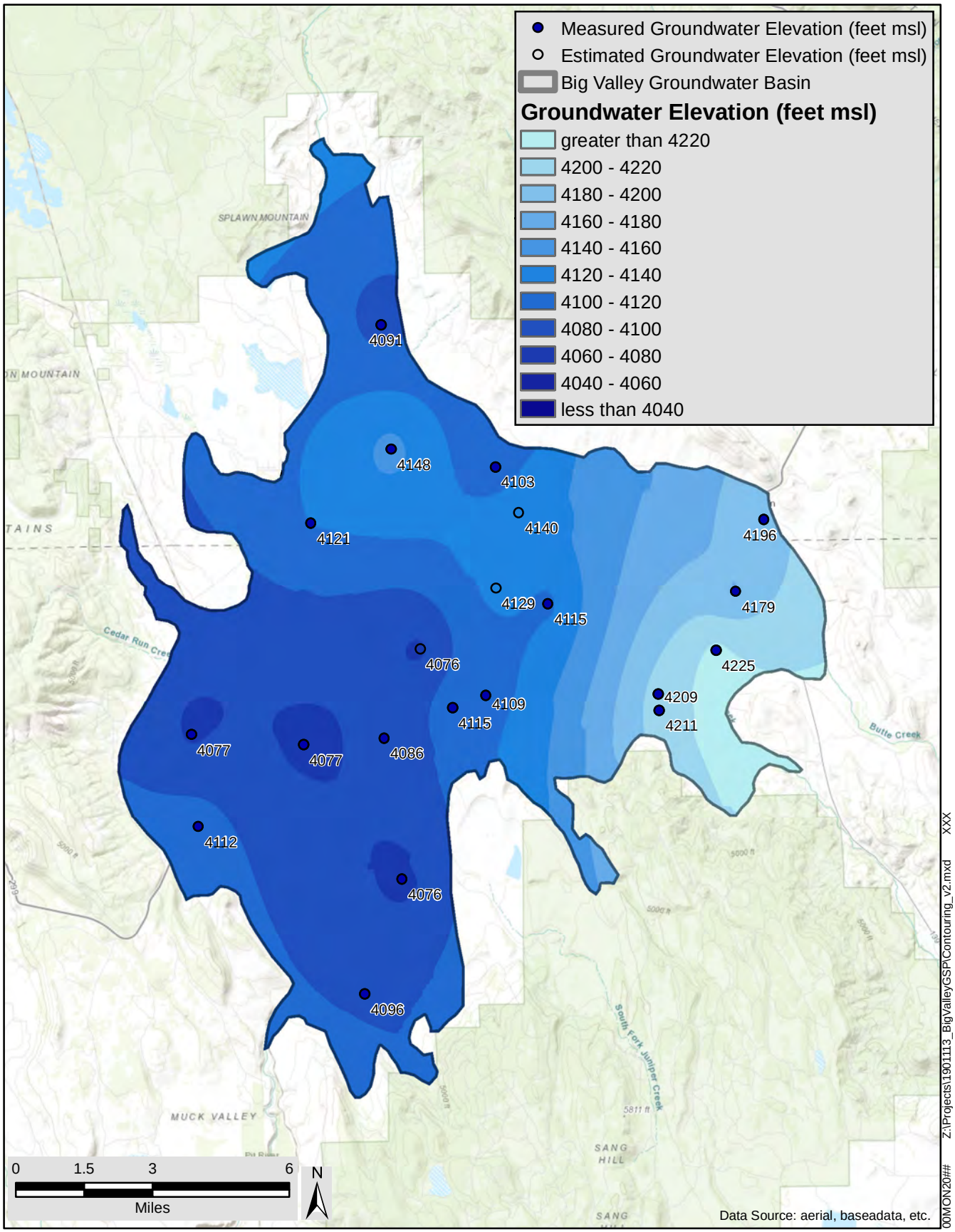
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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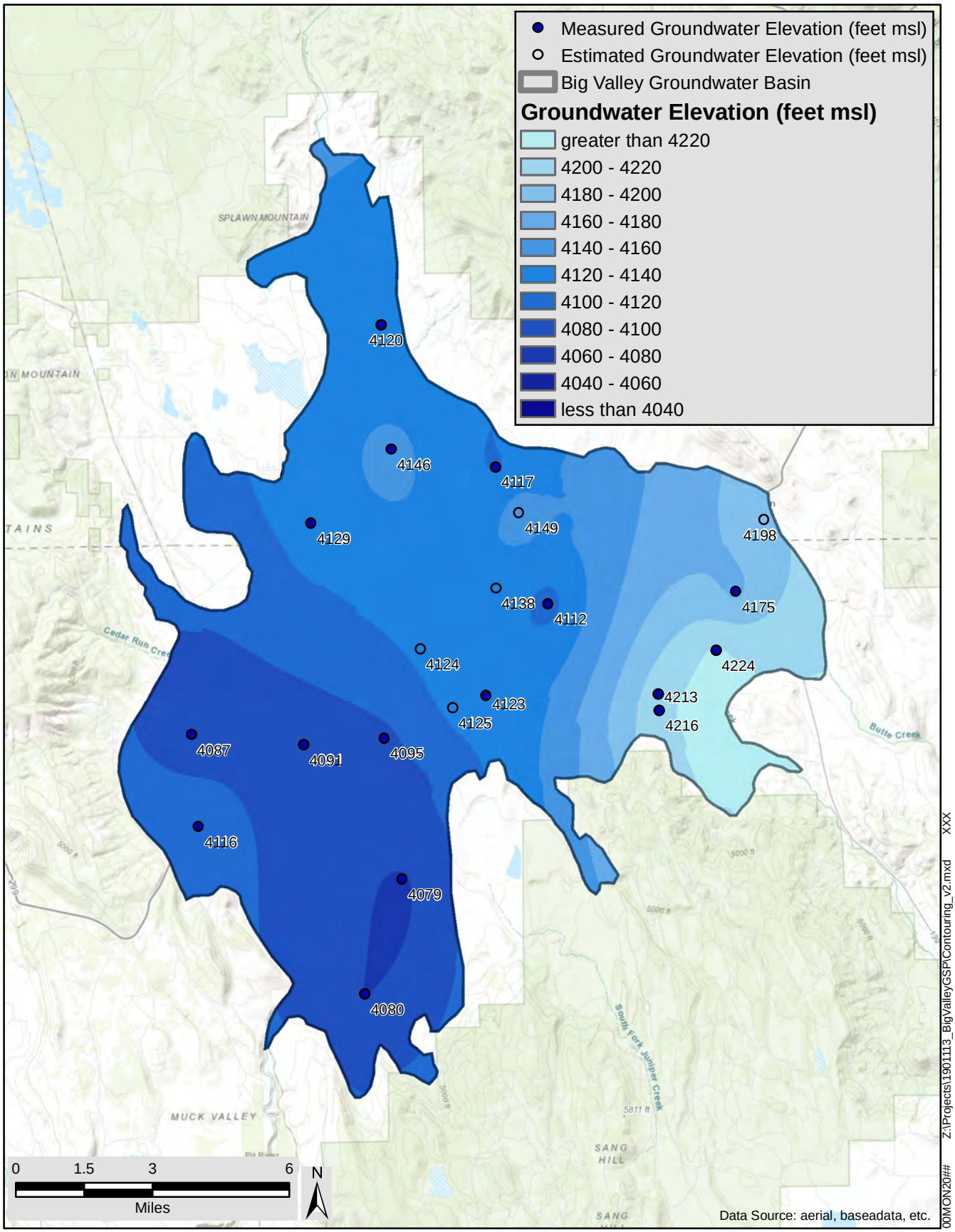
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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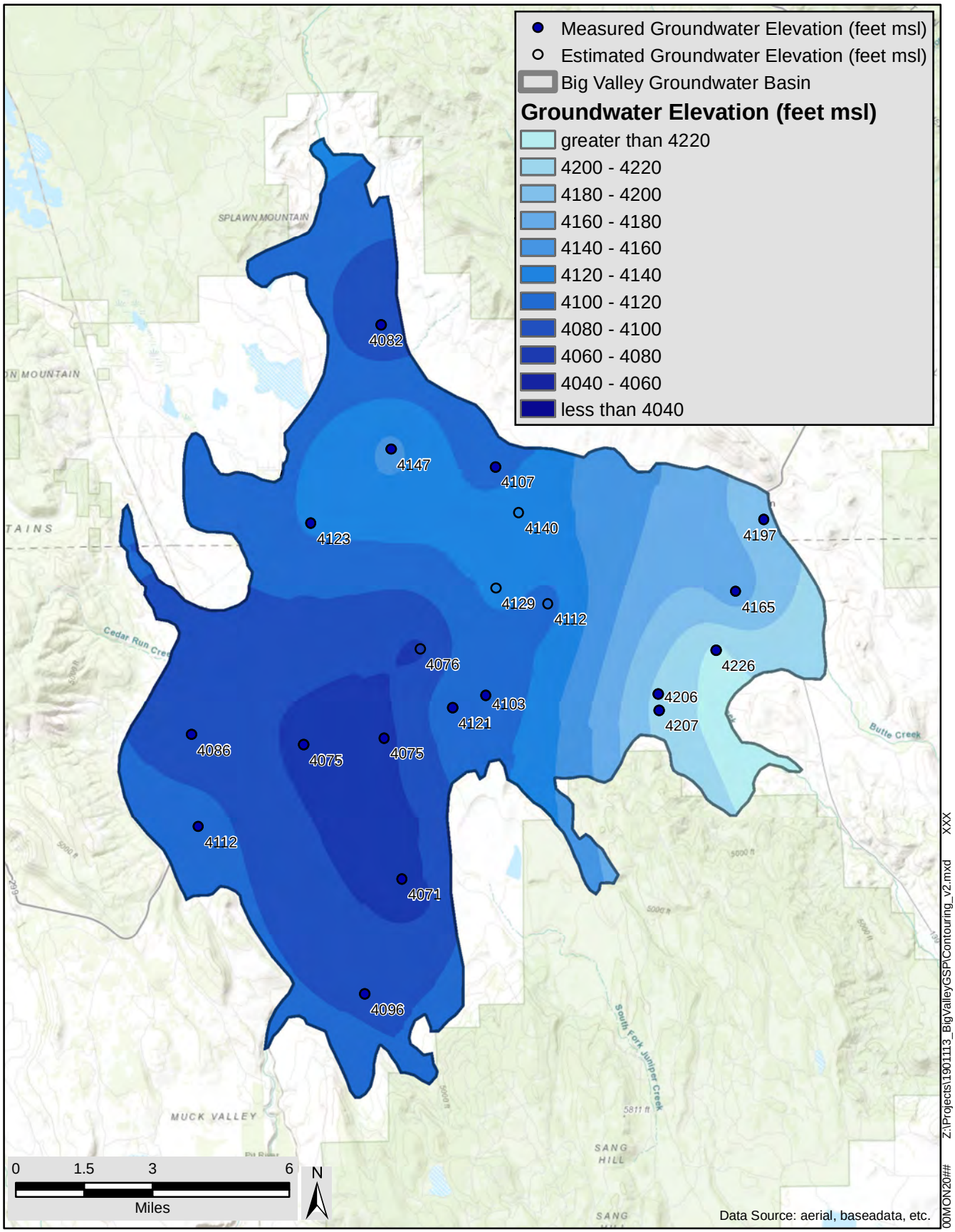

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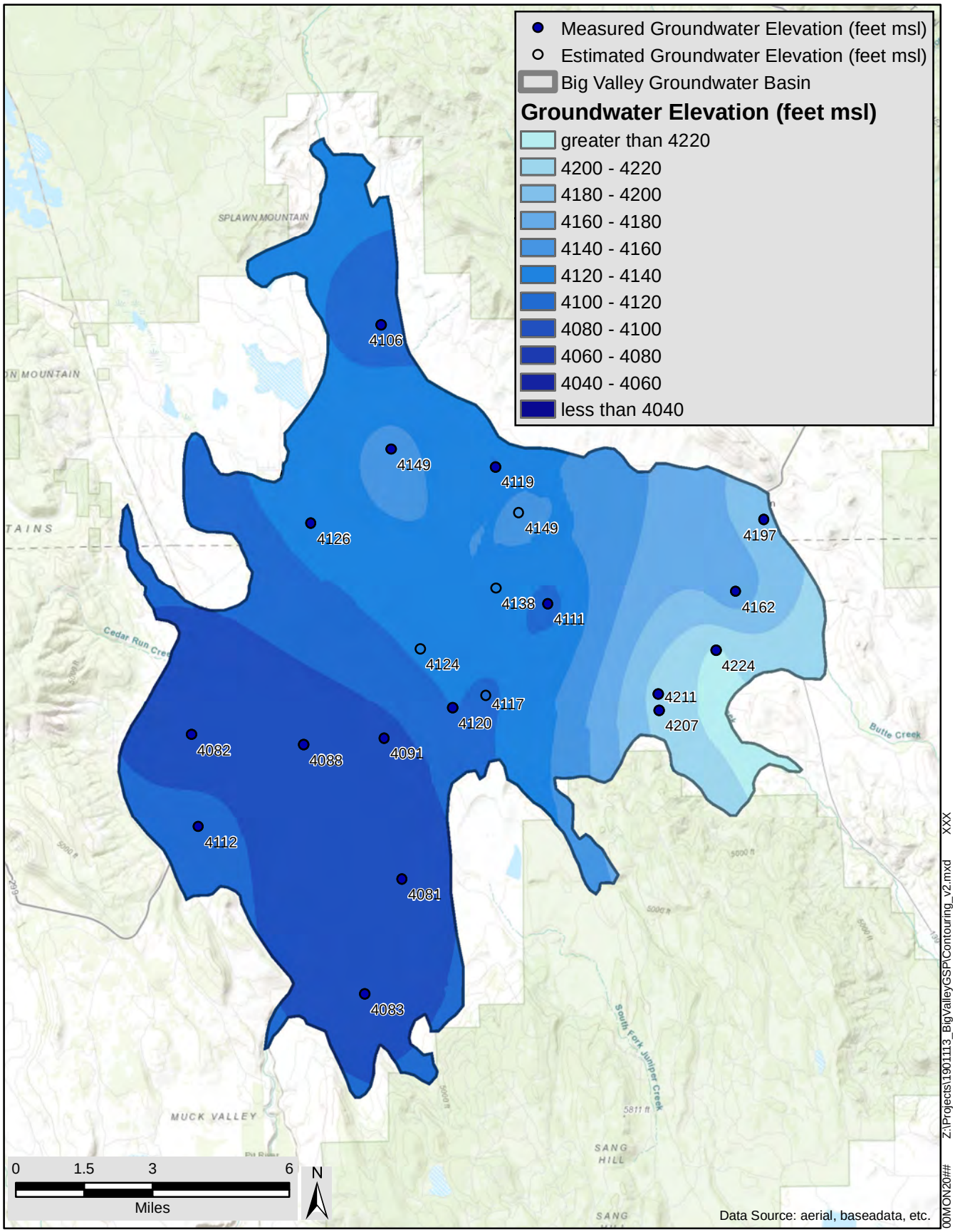
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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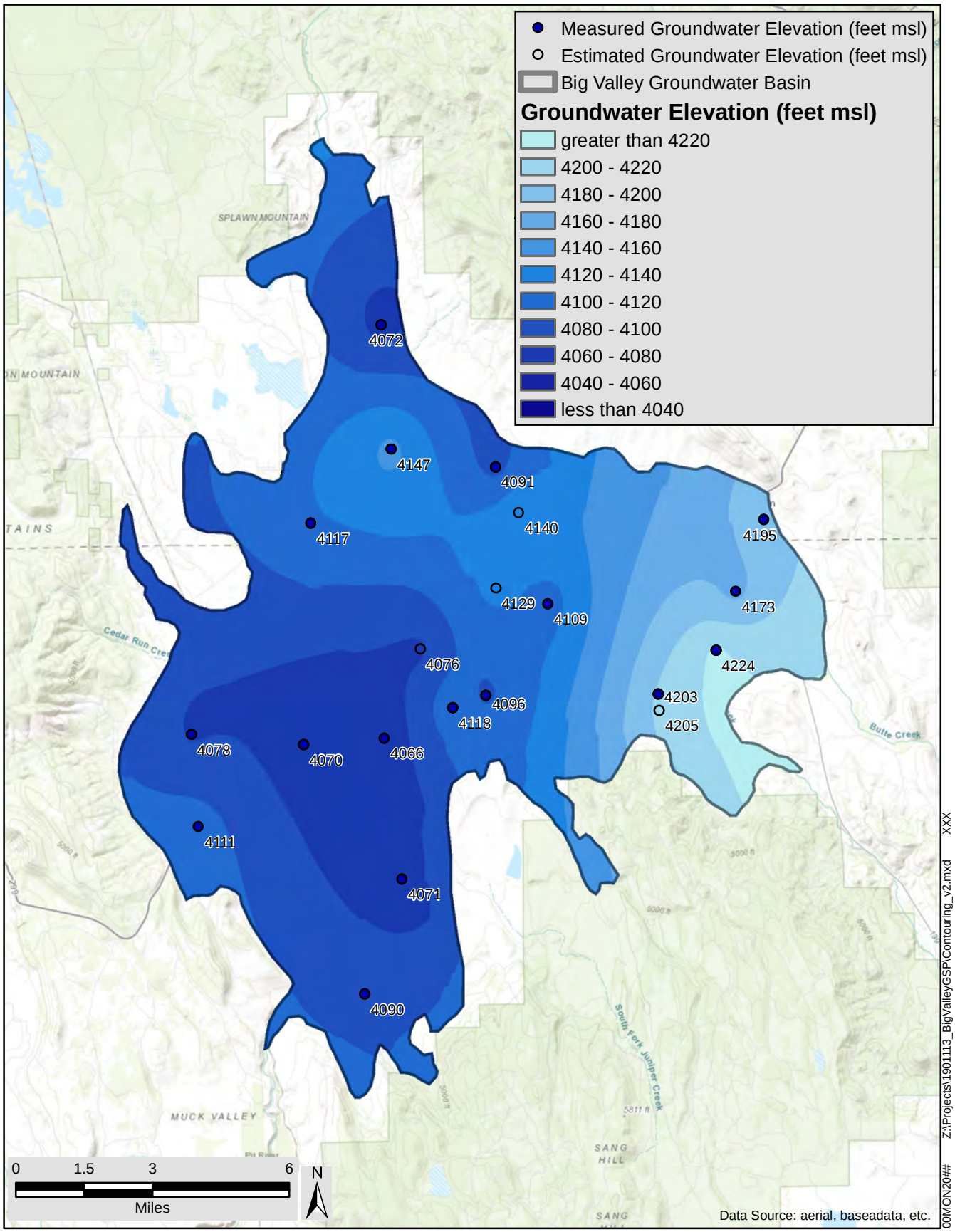
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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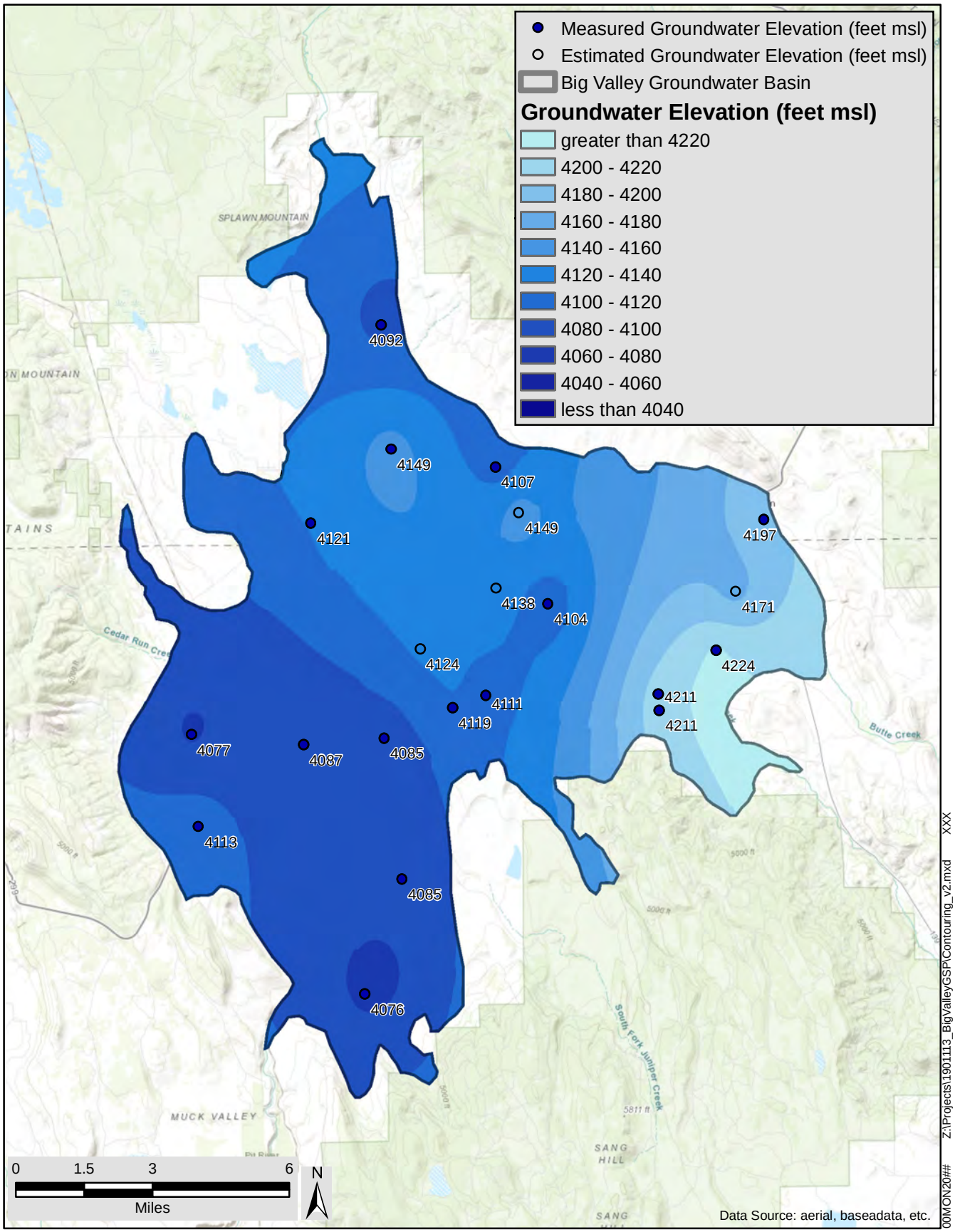
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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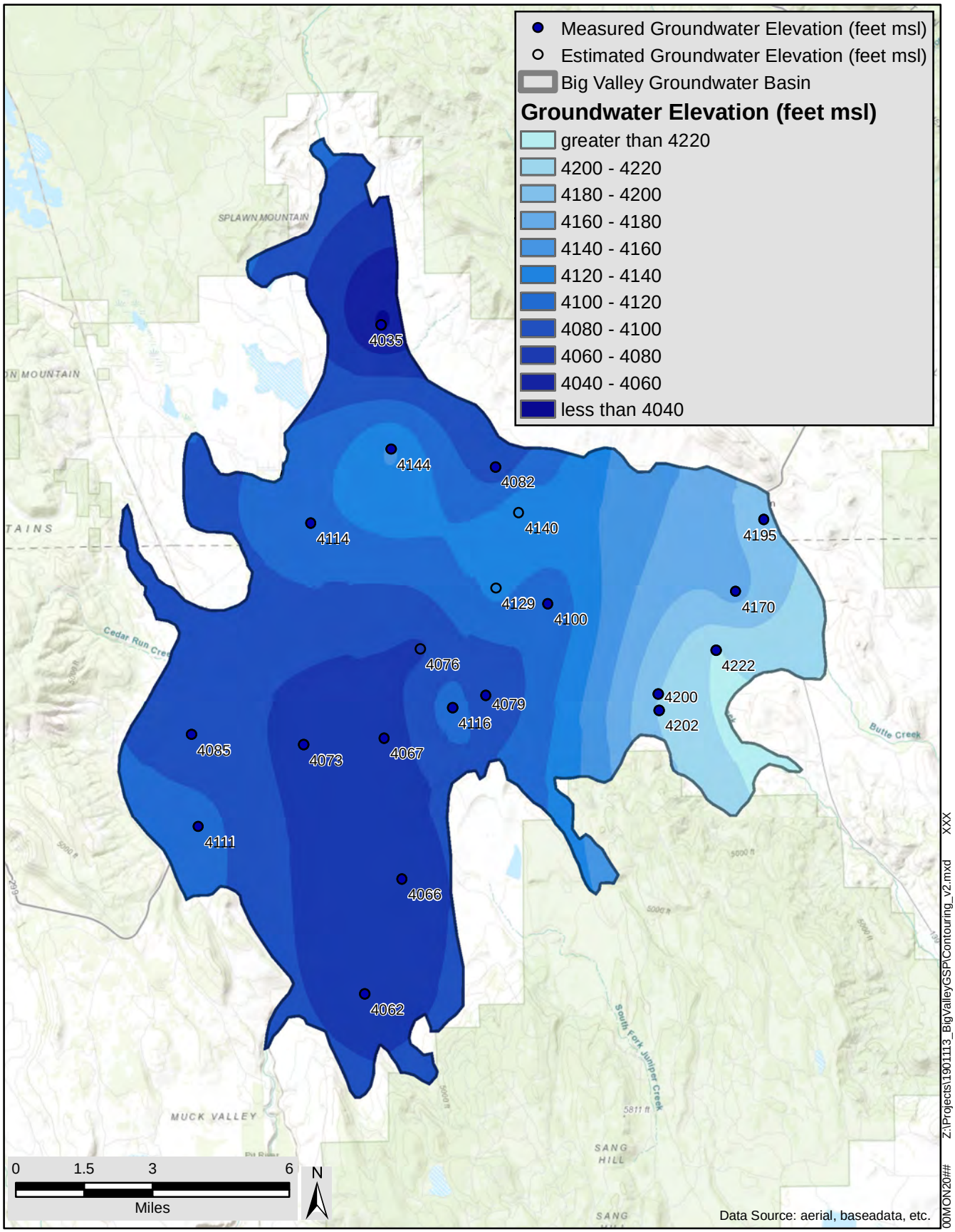
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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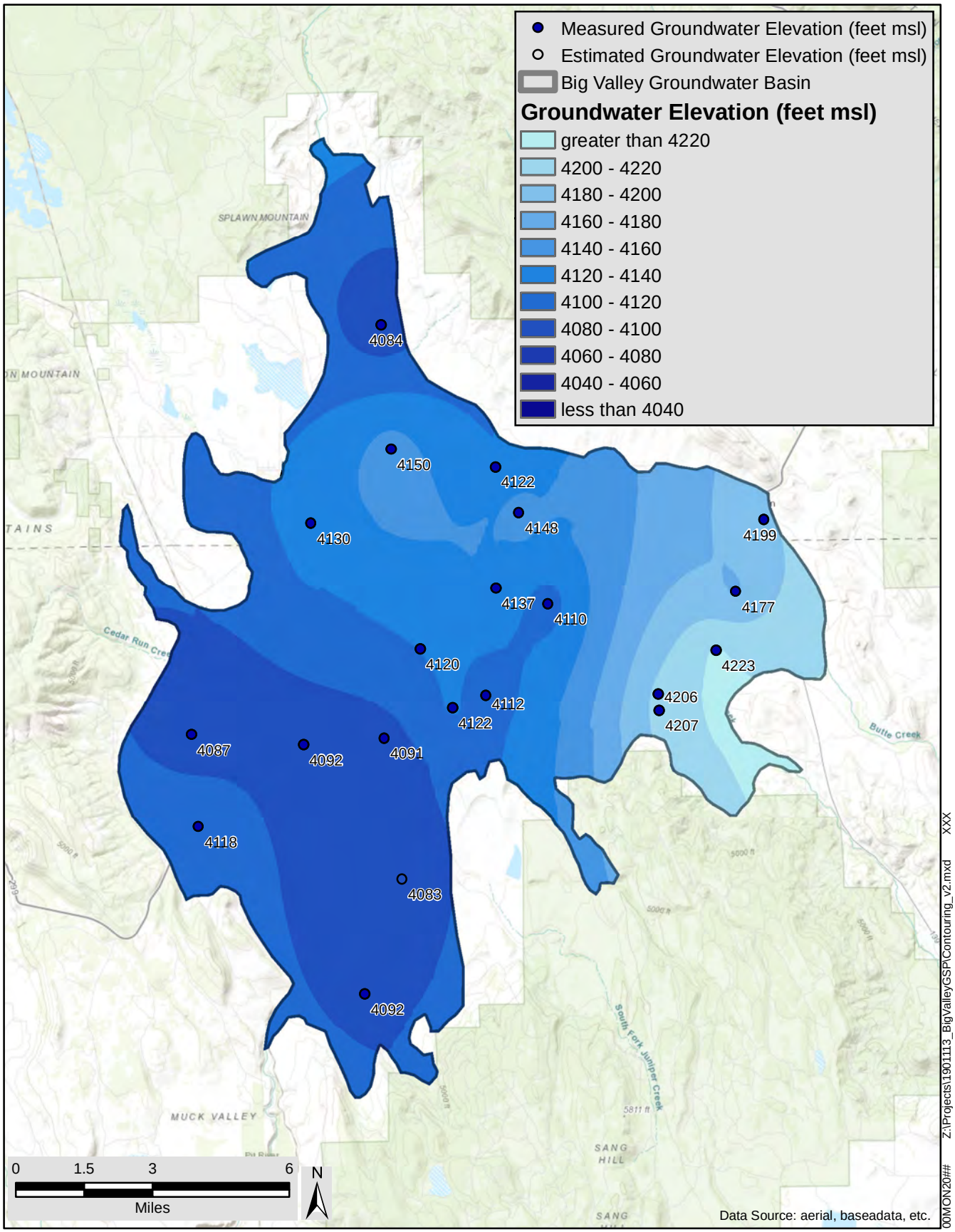
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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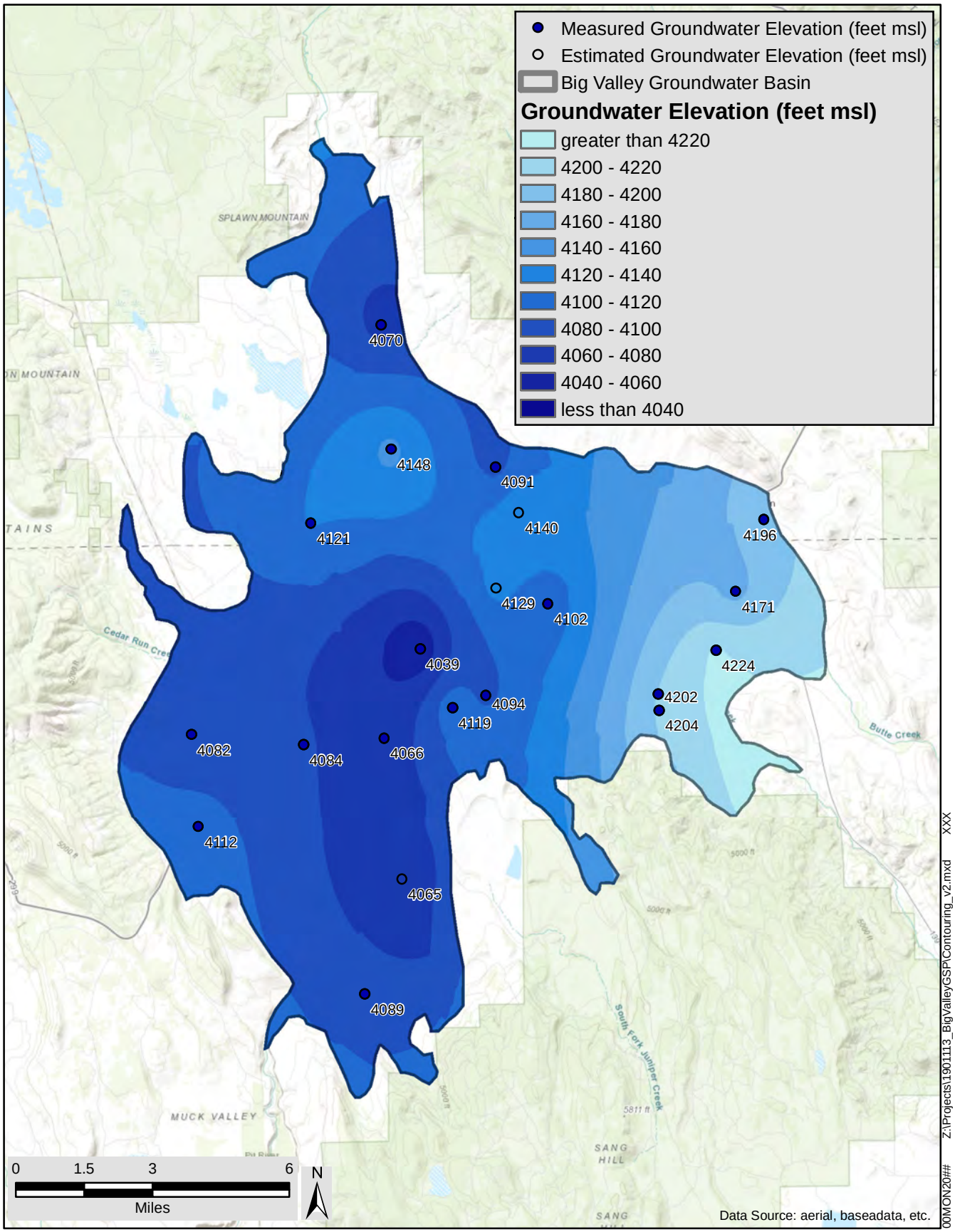
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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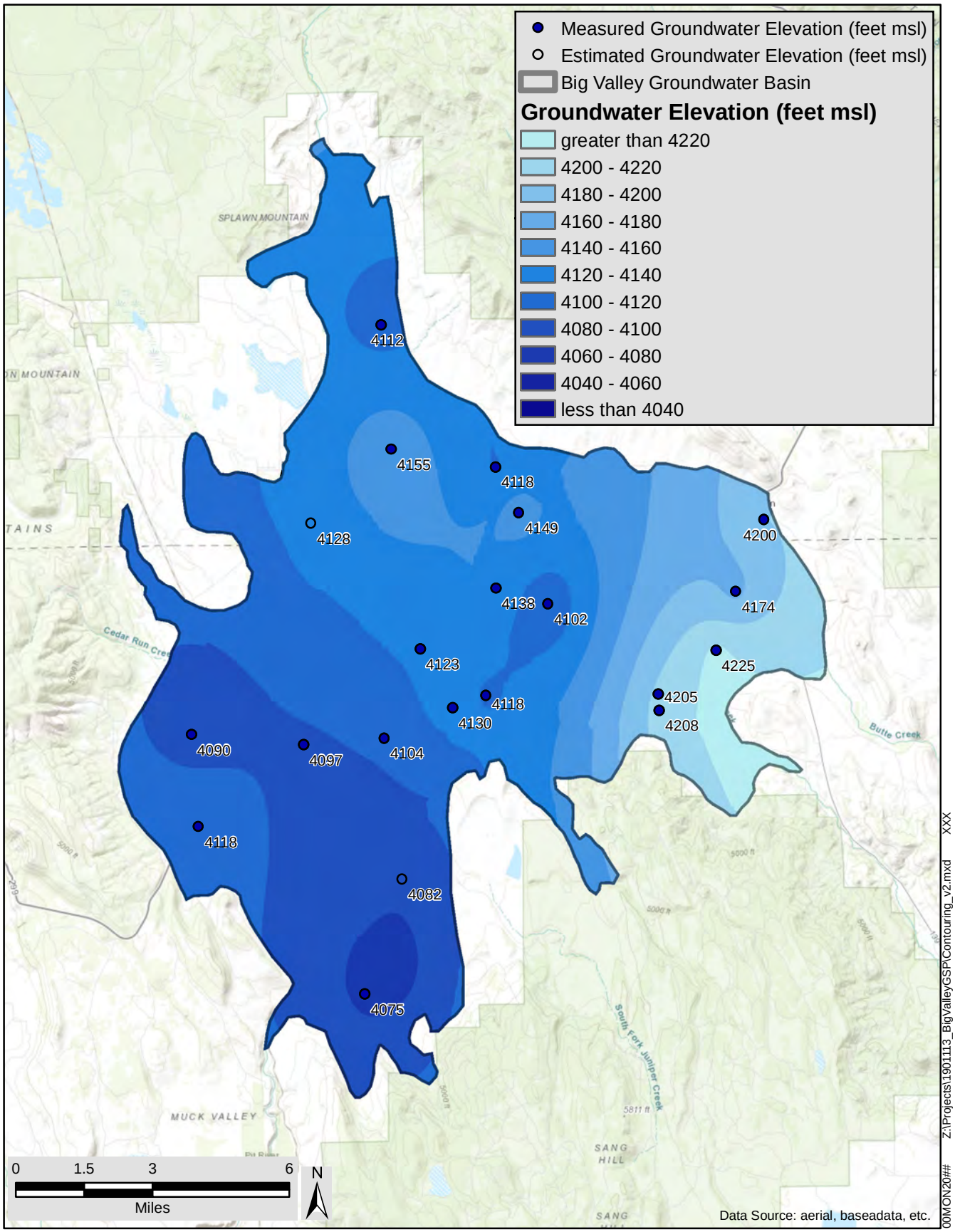
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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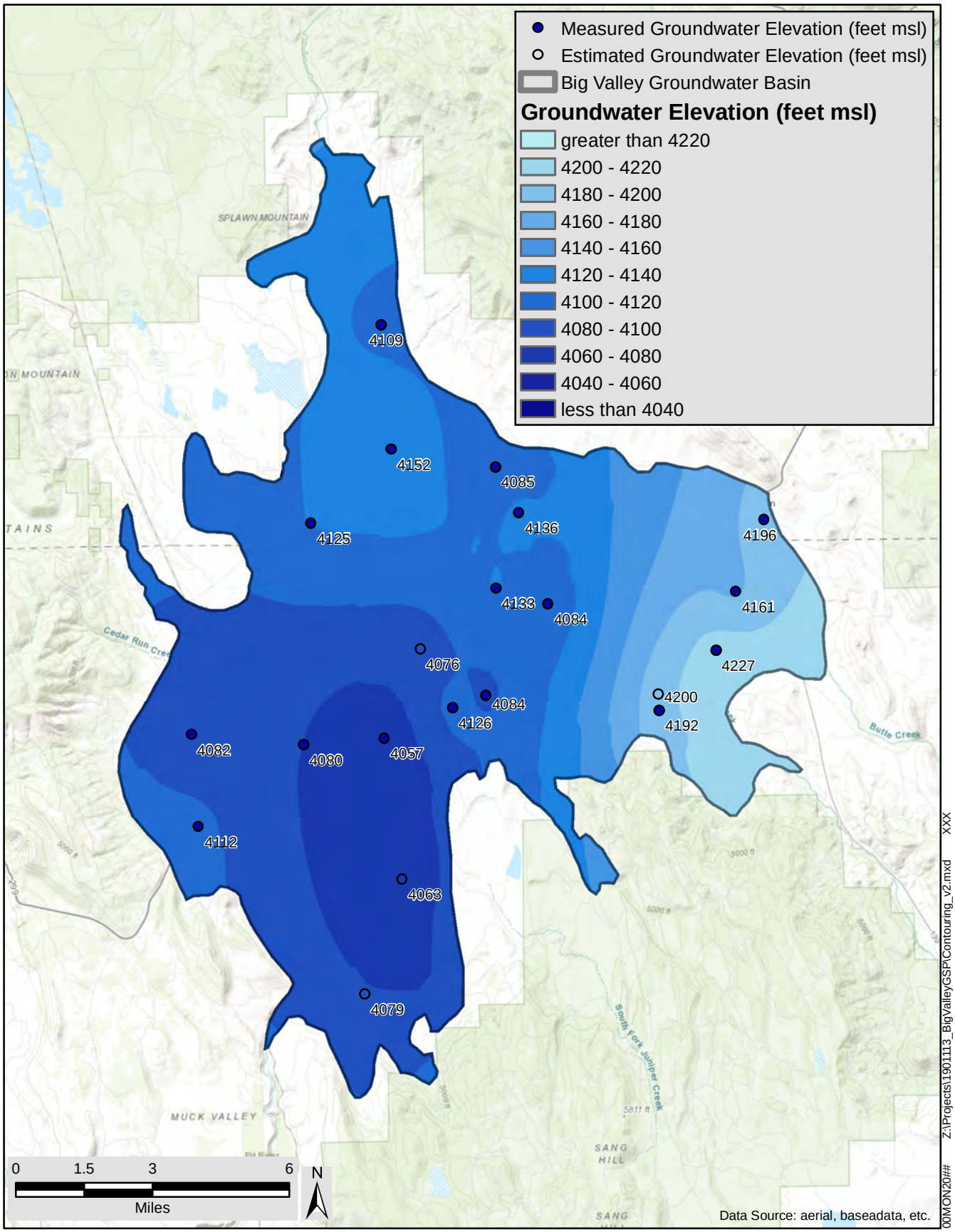

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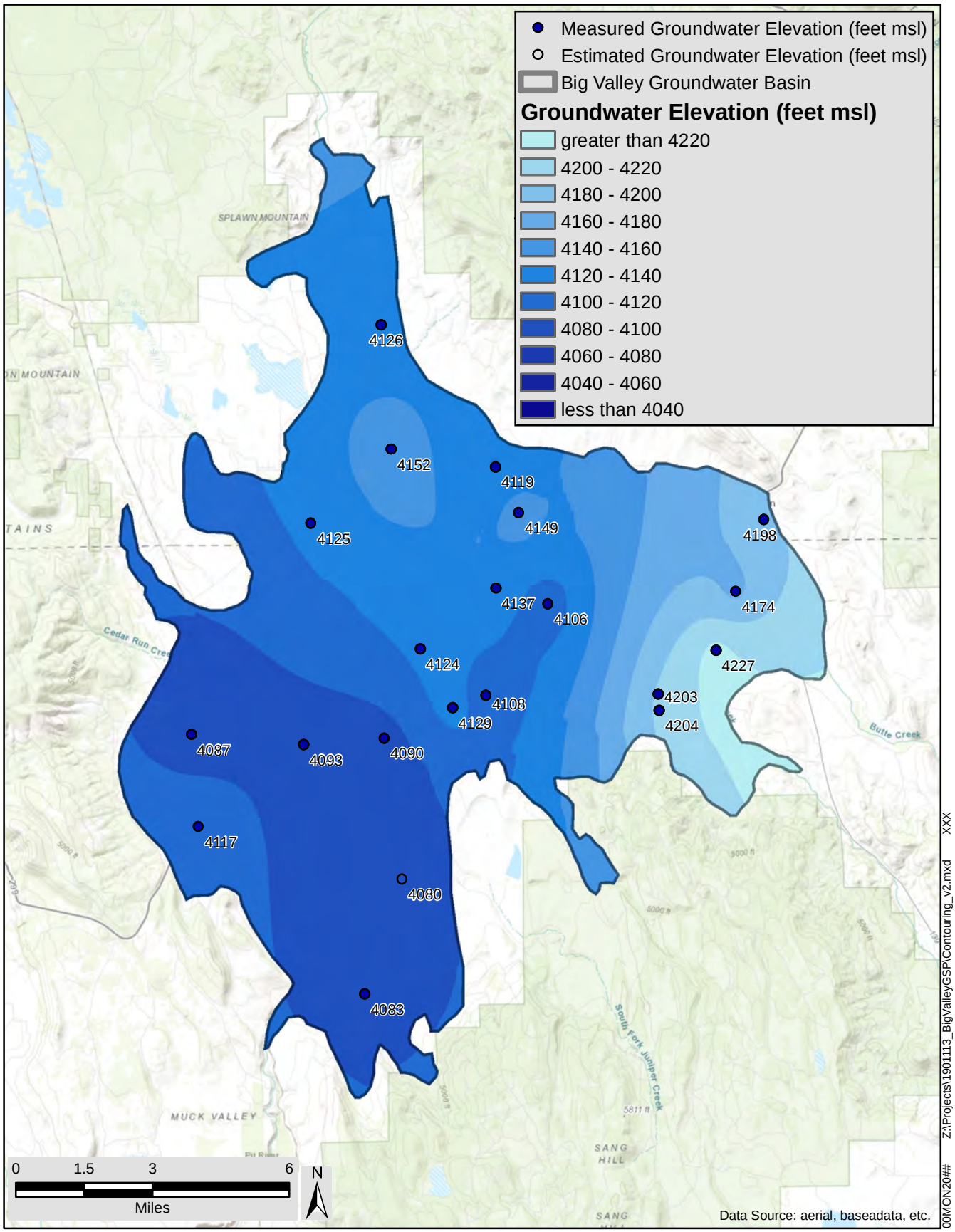

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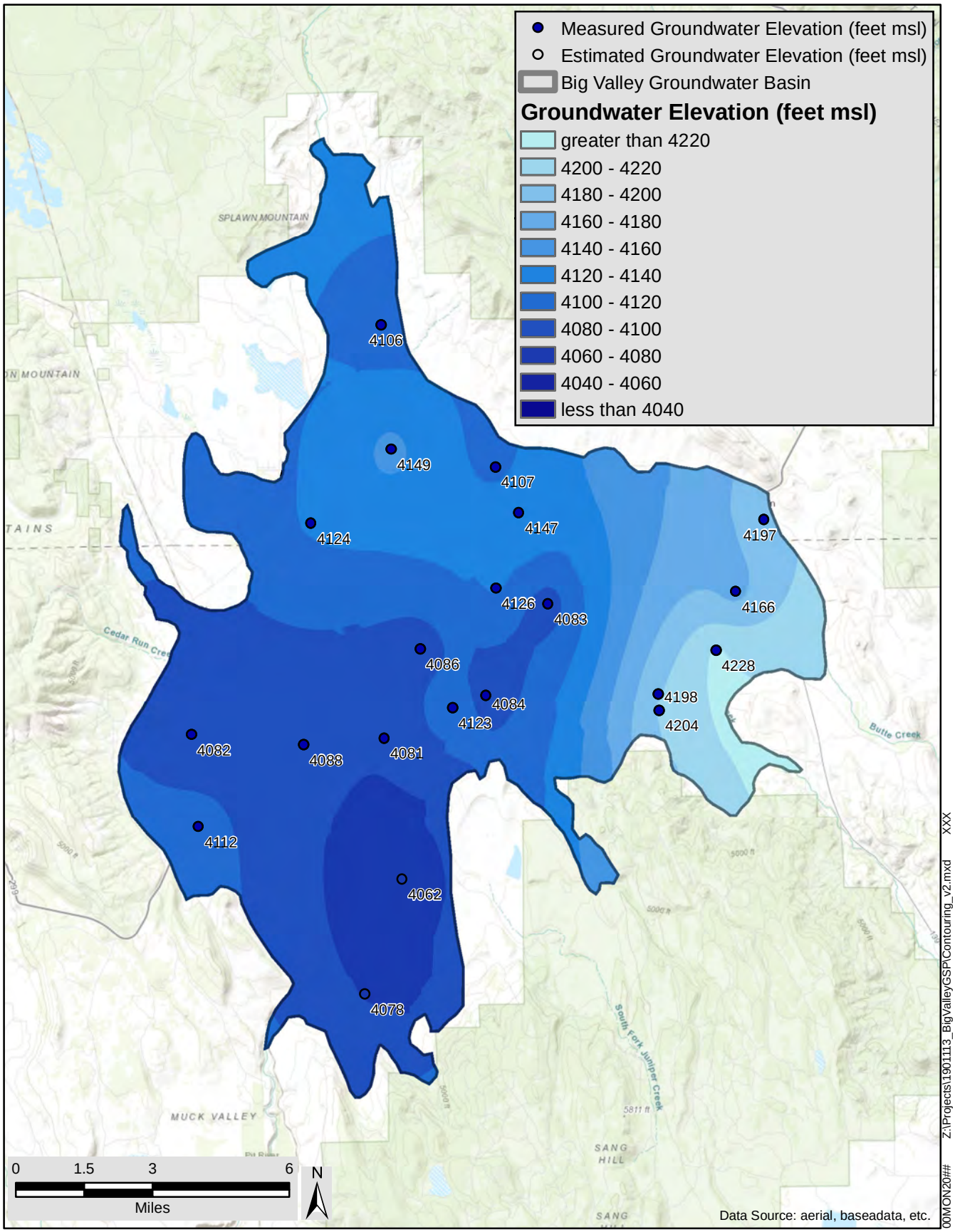
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE



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Big Valley Basin Groundwater Sustainability Plan Modoc and Lassen Counties, California	GEI Consultants	Groundwater Elevations Fall 2018	
Big Valley Groundwater Basin GSAs		JUNE 2020 DRAFT	FIGURE